IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

TERMINOLOGY:

In these pages, the term "Data Terminal Equipment" and its abbreviation "DTE" will mean any business machine which has a telecommunications capability, be it a terminal, a multiplexer or a processor with an integrated communications adapter.

Also, the term "Data Circuit-terminating Equipment" and its abbreviation "DCE" will mean any equipment whose function it is to convert DTE signals into a form suitable for transmission over a communication facility, and to convert signals received from a communications facility into a form suitable for transfer to a DTE. This DCE may be a modem (a MOdulator/DEModulator), a telegraph line adapter or another type of signal conversion equipment.

Finally, the term "Automatic Calling Equipment" and its abbreviation "ACE" will mean that equipment which will accept dial digits from a DTE and present them to the telephone central office for the purpose of effecting a switched network connection.

ORGANIZATION:

These pages are organized into intercommunication charts, which are:

Chart 1 - IBM Start/Stop DTE Intercommunication Capability Table

Chart 2 - IBM Binary Synchronous DTE Intercommunication Capability Table

Chart 3 - IBM Synchronous Data Link Control DTE Intercommunication Capability Table

and communication facility charts, which are:

Chart A - Nonswitched Telegraph Lines

Chart C - The Public Switched Telephone Network

Chart D - Nonswitched Voice Grade Lines

Chart E - Nonswitched Wideband Channels

Chart G - Nonswitched Limited Distance Baseband Channels (including Customer Owned and Maintained, COAM, lines)

Chart L - Public Switched Data Networks Providing an "X" Series Interface

Chart M - Nonswitched Data Networks Providing a "V" Series Interface

Chart N - Nonswitched Data Networks Providing an "X" Series Interface

Chart P - Public Packet Switched Networks Providing a CCITT X.21bis (EIA RS-232-C) Interface

Chart Q - Public Packet Switched Networks Providing a CCITT X.21 Interface

USE:

To use these pages:

Refer to the appropriate intercommunication chart to find the desired DTEs and to determine if they are capable of intercommunication. If they are so capable, read the alphabetic designations for the classes of facility over which they may communicate.

Refer to the charts for the facility classes indicated to find the particular facility and the required feature codes for the DTEs that will allow their intercommunication.

Refer to the individual machine sales pages for the DTEs to determine prerequisites, restrictions, etc.

For example, assume that communication between a 3101 and a 3705-II is desired. Since this would be in start/stop mode, the first reference would be to Chart 1. In Chart 1, the 3101 entry shows that communication between a 3101 and a 3705-II is possible over Facility classes C and D. The 3705-II entry confirms that communication with a 3101 over these facility classes is possible.

Reference to the C and D Facility Charts shows that, since feature codes are entered for both the 3101 and the 3705-II, communication between them is possible over Facilities C1M, C2M, D1M, D2M and D3M.

Further, the C and D Facility Charts show, for both the 3101 and the 3705-II, the feature codes required on each to allow this intercommunication.

Finally, reference should be made to the M3101 and M3705 pages to assure that any restrictions, prerequisites, etc., to the installation of the indicated features are satisfied.

STANDALONE DCEs:

The only standalone DCEs listed in the Facility Charts are:

–the IBM standard product line modems available, and

–those

Common Carrier services in which the use of a

Common Carrier provided modem is mandatory.

Standalone DCEs other than these may be attached to IBM DTEs, but such attachment (other than that of the IBM Special Product Modems) is always under the provisions of the IBM Multiple Supplier Systems Policy (see IBM for information on this Policy).

REFERENCE MATERIAL:

Contact IBM for information on IBM Special Product DCEs and non-IBM DCEs.

CUSTOMER RESPONSIBILITIES:

The customer must be advised in writing that the customer's responsibilities include:

Making arrangements for price quotations, installation and initial and recurring costs of the Common Carrier supplied communication facility/service appropriate to his desired speed of operation.

When operation is planned on the public switched telephone network, obtaining, prior to the processing of the machine orders, assurance from the Common Carrier that facilities of the proper quality to support data transmission will be available between the proposed locations.

Toll charges incurred in the installation and maintenance of the IBM equipment.

Relinquishing the system for service in those cases in which servicing aids and/or available error printouts do not permit localization of the malfunction to the communication facility or terminal location.

The DTE/DCE compatibility and the DTE/ACE compatibility when the DCE and/or ACE is not specifically listed as supported in the Facility Charts.

When using IBM Modems, Line Adapters or Integrated Modems, it is recommended that the customer investigate the economics of providing alternate voice service to facilitate installation and maintenance.

Performing the setup procedures for customer setup products. On these products, the customer is also responsible for following the problem determination procedures and recovery routines furnished by IBM should a problem arise in the setup.

The security of customer data is a customer responsibility. The customer is responsible for the selection, implementation, and adequacy of these products in the protection of his data. For applications in which sensitive data is sent over external communication facilities, the customer may wish to apply cryptography.

Because of the characteristics of the teleprocessing environment, it is possible that in some very unusual circumstances the throughput anticipated on a specific network configuration will not be achieved. The probability is more likely at the higher transmission rates. Actions which the customer may initiate if the anticipated throughput is not achieved are:

Addition of line conditioning by the telecommunications common carrier.

Redialing the connection if operating on the public switched telephone network.

Adjusting, where possible, the block size to optimize throughput, based on the error characteristics of the particular channel.

Requesting the Common Carrier to provide alternate routing or line improvements. This is normally provided at extra cost. The Common Carrier should be contacted for further details.

However, it is possible that, at a particular location, only lower speed speed operation is obtainable.

The customer should be informed that his local IBM representative is available to assist him in analyzing and planning for these alternatives.

Finally, the Marketing Representative must have the customer obtain a firm installation date for the start of transmission service prior to processing the OC card.

MULTIPOINT OPERATION:

Duplex communication facilities are required for multipoint systems in which:

The DCE at the control station is a 1200 bps integrated modem, or

It is desired that a continuous carrier be maintained from the control station to eliminate the control station "Ready For Sending" delays.

The use of duplex facilities and operation in the continuous carrier mode is strongly recommended, since operation in a non-continuous carrier mode (by the control station) will subject the system to inordinate delays, particularly in the polling and addressing sequences.

IBM Line Adapter and Modem Application Guide (cont'd)

IBM DATA TERMINAL AND DATA CIRCUIT-TERMINATING EQUIPMENT:

The following is a list, by machine type number, of the IBM DTEs and DCEs covered in these pages. This list includes, for the DTEs, a reference to the applicable Intercommunication Chart (1, 2 or 3), and, for both the DTEs and DCEs, a reference to the responsible Marketing divisions.

2701 Data Adapter Unit
Charts 1, 2, Mkted by ISG, E/ME/A, A/FE
3101 Display Terminal
Chart 1, Mkted by ISG, E/ME/A, A/FE
3138 Processing Unit (System/370 Model 138)
Charts 1, 2, Mkted by ISG, E/ME/A, A/FE
3232-1 Keyboard Printer Terminal
Chart 3, Mkted by ISG, A/FE (except Japan)
3232-51 Keyboard-Printer Terminal
Chart 1, Mkted by DPMG (Marketing Channels Department)
3274 Control Unit
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
3276 Control Unit Display Station
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
3602 Finance Communication Controller
Chart 3, Mkted by ISG, E/ME/A, A/FE
3603 Terminal Attachment Unit
Chart 3, Mkted by ISG, E/ME/A, A/FE
3624 Consumer Transaction Facility
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
3631 Plant Communication Controller
Chart 3, Mkted by ISG, E/ME/A, A/FE
3632 Plant Communication Controller
Chart 3, Mkted by ISG, E/ME/A, A/FE
3651 Store Controller
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
3659 Remote Communication Unit
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
3669 Store Communication Unit
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
3684 Point Of Sale - Control Unit
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
3689 Store Communications Unit
Charts 2 and 3, Mkted by ISG, A/FE (in Canada only)
3694 Document Processor
Chart 3, Mkted by ISG, A/FE (in Canada and Japan)
3704 Communications Controller
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
3705-II Communications Controller
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
3705-80 Communications Controller
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
3725-1, 2 Communication Controller
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
3726 Communication Controller Expansion
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
3741 Data Station/Programmable Work Station
Chart 2, Mkted by ISG, E/ME/A, A/FE
3747 Data Converter
Chart 2, Mkted by ISG, E/ME/A, A/FE
3767 Communication Terminal
Charts 1, 3 Mkted by ISG, E/ME/A, A/FE
3771 Communication Terminal
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
3774 Communication Terminal
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
3775 Communication Terminal
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
3776 Communication Terminal
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
3777 Communication Terminal
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
3791 Controller (3790 Communication System)
Chart 3, Mkted by ISG, E/ME/A, A/FE
3843 Loop Control Unit
Chart 3, Mkted by ISG, E/ME/A, A/FE
3845 Data Encryption Device
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
3846 Data Encryption Device
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
3863 Modem
Charts C, D, Mkted by ISG, E/ME/A, A/FE
3864 Modem
Charts C, D, Mkted by ISG, E/ME/A, A/FE
3865 Modem
Chart D, Mkted by ISG, E/ME/A, A/FE
3868-1,2 Rack-Mounted Modem
Chart D, Mkted by ISG, E/ME/A, A/FE
3868-3,4 Rack-Mounted Modem
Chart D, Mkted by ISG, E/ME/A, A/FE
3872 Modem
Charts C, D, Mkted by ISG, E/ME/A, A/FE
3874 Modem
Charts C, D, Mkted by ISG, E/ME/A, A/FE
3945 Telegraph Line Termination
Chart A, Mkted by E/ME/A, A/FE
3976 Modem
Charts C, D, Mkted by E/ME/A, A/FE
3977 Modem
Chart D, Mkted by E/ME/A, A/FE
4321 Processor
Charts 1, 2, 3, Mkted by ISG, E/ME/A
4331 Processor
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
4361 Processor
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
4701-1,2 Finance Communication Controller
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
4730 Personal Banking Machine
Chart 3, Mkted by ISG, A/FE (Canada only)
4952 Processor (Series/1)
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
4954 Processor (Series/1)
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
4955 Processor (Series/1)
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
4956 Processor (Series/1)
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
4959 Input/Output Expansion Unit (Series/1)
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
4965 Diskette Drive and I/O Expansion Unit (Series/1)
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
4975-1R, 2R Printer (Series/1)
Charts 1, 2, Mkted by ISG, E/ME/A, A/FE
4987 Programmable Communication Subsystem (Series/1)
Charts 1, 2, Mkted by ISG, E/ME/A, A/FE
5010 Processor Module (System/7)
Charts 1, 2, Mkted by ISG, E/ME/A, A/FE
5110 Computer
Charts 1, 2, Mkted by ISG, E/ME/A, A/FE
5150/5160 IBM Personal Computer
Chart 3, Mkted by ISG, E/ME/A, A/FE (Canada only)
5231 Controller (5230 Data Collection System)
Chart 2, Mkted by ISG, E/ME/A, A/FE
5251 Display Station
Chart 3, Mkted by ISG, E/ME/A, A/FE
5265 Point Of Sale Terminal
Chart 2, Mkted by ISG, E/ME/A, A/FE
5285 Programmable Data Station (5280 Distributed Data System)
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
5288 Programmable Control Unit (5280 Distributed Data System)
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
5294 Remote Control Unit
Chart 3, Mkted by ISG, E/ME/A, A/FE
5340 System Unit (System/34)
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
5360 System Unit (System/36)
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
5381 System Unit (System/38)
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
5525 System Unit (5520 Administrative System)
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
6360 Diskette Unit (Displaywriter)
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
6580 Display Station (Displaywriter)
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
6670 Information Distributor
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
6733 Typewriter Communication Module
Chart 1, Mkted by ISG, A/FE (Canada only)
7426 Terminal Interface Unit
Charts 1, 3, Mkted by ISG, E/ME/A, A/FE
8101 Storage and I/O Unit (8100 Information System)
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
8130 Processor (8100 Information System)
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
8140 Processor (8100 Information System)
Charts 1, 2, 3, Mkted by ISG, E/ME/A, A/FE
8150 Processor (8100 Information System)
Charts 2, 3, Mkted by ISG, E/ME/A, A/FE
8775 Display Terminal
Chart 3, Mkted by ISG, E/ME/A, A/FE
8815 Scanmaster I
Chart 3, Mkted by ISG, E/ME/A, A/FE

CHART 1

START/STOP INTERCOMMUNICATIONS

The	Will Communicate with the	Over Facility Classes
2701	3767, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 6360, 6580	C, D
	5010	C, D, G
	TTY	A
	TWX 33/35	C
3101	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4952, 4954, 4955, 4956, 4959, 4965	C, D
	7426	C, D
	8101, 8130, 8140	D
3138	3232-51, 3767, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5010, 5110 6360, 6580, 6733	C, D
	TWX 33/35	C
3232-51	3138, 3704, 3705-II, 3725-1,2, 3726, 4321, 4331, 4361	C, D
	8101, 8130, 8140	D
3704	3101, 3232-51, 3767, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5110, 6360, 6580	C, D
	5010	C, D, G
	TTY	A
	TWX 33/35/37	C
3705-II	3101 3232-51, 3767, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5110, 6360, 6580, 6733	C, D
	5010	C, D, G
	TTY	A
	TWX 33/35/37	C
3705-80	3101, 3767, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5110, 6360, 6580 , 6733	C, D
	5010	C, D, G
	TWX 33/35/37	C
3725-1, 2, 3726	3101, 3767 3232-51, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5100, 5110, 6360, 6580	C, D
	5010	C, D, G
	TTY	A
	TWX 33/35/37	C
3767	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4331, 4361	C, D
	8101, 8130, 8140	D
3845, 3846	3845, 3846	C, D
4321	3232-51, 3767, 6733 4321, 4331, 4361, 5110, 6360, 6580	C, D
4331, 4361	3232-51 3767, 5110, 6360, 6580, 6733	C, D
4952, 4954, 4955, 4956, 4959, 4965	2701, 3101, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 37266733	C, D
	4975-1R, 2R	D
4975-1R, 2R	4952, 4954, 4955, 4956, 4959, 4965	D
4987	3725-1,2, 3726	C, D
	2701, 3138, 3704, 3705-II, 3705-80,	A, C, D
	6733	C, D
5010	2701, 3704, 3705-II, 3705-80, 3725-1,2, 3726	C, D, G
	3138	C, D
5110	3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	C, D
6360, 6580	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361, 6360, 6580 , 6733	C, D
	TWX 33/35	C
6733	3138, 3705-II, 3705-80, 4321, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4987, 6360, 6580, 6733	C, D
7426	3101	C, D
8101, 8130, 8140	3101, 3232-51, 3767	D
TTY (2)	2701, 3704, 3705-II, 3725-1,2, 3726	A
TWX 33/35	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4361, 6360, 6580	C
TWX 37	3704, 3705-II, 3705-80, 3725-1,2, 3726	C

NOTES FOR CHART 1:

1. The 5110 will communicate in point-to-point mode only.
2. The TTY terminals referred to are Telco 83B2 or 83B3 terminals or Western Union Plan 115 terminals.

CHART 2

BSC INTERCOMMUNICATIONS

The	Will Communicate with the	Over Facility Classes
2701	2701, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4952, 4954, 4955, 4956, 4959, 4965, 5340	C, D, E, G, M
	3138, 3741, 3747, 3771, 3774, 3775, 3776-1,2, 3777-1,2, 4321, 4331, 4361, 4987, 5010, 5231, 5285, 5288, 5360, 5381, 6670	C, D, G, M
	3274-1C,21C,31C,51C, 3276	D, G, M
	6360, 6580	C, D, G
3138	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 3741, 3747, 3771, 3774, 3775, 3776-1,2, 3777-1,2, 4321, 4331, 4361, 4701-1,2, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5010, 5110, 5231, 5265, 5285, 5288, 5340, 5360, 5381, 5525	C, D, G, M
	3274-1C,21C,31C,51C, 3276, 8101, 8130, 8140, 8150	D, G, M
	3689	C
	6360, 6580	C, D, G
3274-1C, 3274-21C, 31C, 51C, 3276-1,4	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	D, G, M
3624	3704, 3705-II, 3705-80, 3725-1,2, 3726	D, G, M
3651-25, 3651-50	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	C, D, G, M
3651-60	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	C
3651-75	3651-75, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	C, D, G, M
3684	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	C, D, G, M
3689	3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	C
3704	2701, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4952, 4954, 4955, 4956, 4959, 4965, 5340	C, D, E, G, M
	3138, 3651-25, 3651-50, 3651-75, 3684, 3741, 3747, 3771, 3774, 3775, 3776-1,2, 3777-1,2, 4321, 4331, 4361, 4701-1,2, 4987, 5010, 5110, 5231, 5265, 5285, 5288, 5360, 5381, 5525, 6670	C, D, G, M
	3274-1C,21C,31C,51C, 3276, 3624, 8101, 8130, 8140, 8150	D, G, M
	3651-60	C
	3689	C
	6360, 6580	C, D, G
3705-II	2701, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4952, 4954, 4955, 4956, 4959, 4965, 5340	C, D, E, G, M
	3138, 3651-25, 3651-50, 3651-75, 3684, 3741, 3747, 3771, 3774, 3775, 3776-1,2, 3777-1,2, 4321, 4331, 4361, 4701-1,2, 4987, 5010, 5110, 5231, 5265, 5285, 5288, 5360, 5381, 5525, 6670	C, D, G, M
	3274-1C,21C,31C,51C, 3276, 3624, 8101, 8130, 8140, 8150	D, G, M
	3651-60, 3689	C
	6360, 6580	C, D, G
3705-80	2701, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4952, 4954, 4955, 4956, 4959, 4965, 5340	C, D, E, G, M
	3138, 3651-25, 3651-50, 3651-75, 3684, 3741, 3747, 3771, 3774, 3775, 3776-1,2, 3777-1, 4321, 4331, 4361, 4701-1,2, 4987, 5010, 5110, 5231, 5265, 5285, 5288, 5360, 5381, 5525, 6670	C, D, G, M
	3274-1C,21C,31C,51C, 3276, 3624, 8101, 8130, 8140, 8150	D, G, M
	3651-60, 3689	C
	6360, 6580	C, D, G
3725-1,2, 3726	2701, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4952, 4954, 4955, 4956, 4959, 4965, 5340	C, D, E, G, M
	3138, 3651-25, 3651-50, 3651-75, 3684, 3741, 3747, 3771, 3774, 3775, 3776-1,2, 3777-1,2, 4321, 4331, 4361, 4701-1,2 4987, 5010, 5110, 5231, 5265, 5285, 5288, 5360, 5381, 5525, 6670	C, D, G, M
	3274-1C,21C,31C,51C, 3276-1,2,3,4, 3624, 8101, 8130, 8140, 8150	D, G, M
	3651-60, 3689	C
	6360, 6580	C, D, G
3741	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 3741, 3747, 4321, 4331, 4361, 5110, 5231, 5265, 5285, 5288, 5340, 5360, 5381	C, D, G, M
3747	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 3741, 3747, 4321, 4331, 4361, 5265, 5285, 5288, 5340, 5360, 5381	C, D, G, M
3771, 3774, 3775, 3777-2	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	C, D, G, M
3776-1,2, 3777-1	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361, 5381	C, D, G, M
3845, 3846	3845, 3846	C, D
4321, 4331, 4361	2701, 3138, 3651-25, 3651-50, 3651-75, 3684, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 3741, 3747, 3771, 3774, 3775, 3776-1,2, 3777-1,2, 4321, 4331, 4361, 4701-1,2, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5010, 5110, 5150, 5160, 5231, 5265, 5285, 5288, 5340, 5360, 5381, 5525, 6670	C, D, G, M
	3274-1C, 21C, 31C, 51C, 3276, 8101, 8130, 8140, 8150	D, G, M
	3651-60, 3689	C
	6360, 6580	C, D, G
4701-1,2	3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	C, D, G, M

Chart 2 - BSC Intercommunications (cont'd)

The	Will Communicate with the	Over Facility Classes
4952, 4954, 4955, 4956, 4959, 4965	2701, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4952, 4954, 4955, 4956, 4959, 4965, 5340	C, D, E, G, M
	3138, 4321, 4331, 4361, 4987, 5265, 5285, 5288, 5360, 5381	C, D, G, M
	4975-1R,2R	D
4975-1R, 2R	4952, 4954, 4955, 4956, 4959, 4965, 4987	D
4987	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5340, 5360	C, D, G, M
5010	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361, 5010, 5340, 5360	C, D, G, M
5110	3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 3741, 4321, 4331, 4361, 5110, 5231, 5265, 5285, 5288, 5340, 5360, 5381	C, D, G, M
5150, 5160	4321, 4331, 4361	C, D, G, M
5231	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 3741, 4321, 4331, 4361, 5110, 5340, 5360, 5381	C, D, G, M
5265	3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 3741, 4321, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288, 5340, 5360, 5381	C, D, G, M
5285, 5288	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 3741, 3747, 4321, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 5110, 5265, 5285, 5288, 5340, 5360, 5381	C, D, G, M
5340	2701, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4952, 4954, 4955, 4956, 4959, 4965, 5340	C, D, E, G, M
	3138, 3741, 3747, 4321, 4331, 4361, 4987, 5010, 5110, 5231, 5265, 5285, 5288, 5360, 5381	C, D, G, M
5360	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726 3741, 3747, 4321, 4321, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5010, 5110, 5231, 5265, 5285, 5288, 5340, 5360, 5381, 5525, 6670	C, D, G, M
	6360, 6580	C, D, G
5381	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 3741, 3747, 3776-1,2, 3777-1, 4321, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 5110, 5231, 5265, 5285, 5288, 5340, 5360, 5381	C, D, G, M
5525	3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361, 5360, 6670	C, D, G, M
	6360, 6580	C, D, G
6360, 6580	2701, 3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361, 5360, 5525, 6360, 6580	C, D, G
6670	2701, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361, 5360, 5525, 6670	C, D, G, M
8101, 8130, 8140, 8150	3138, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	D, G, M

CHART 3

SNA/ SDLC INTERCOMMUNICATIONS

The	Will Communicate with the	Over Facility Classes
3232-1	3704, 3705-II, 3725-1,2, 3726, 4321, 4331, 4361	C, D, G
	8101, 8130, 8140, 8150	D, G
3274-1C	3704	D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	D, G, M, P
3274-21C, 31C	3704	D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	D, G, M, N
3274-51C	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726	C, D, G, L, M, N, P
	4321, 4331, 4361	C, D, G, M, N, P
	8101, 8130, 8140, 8150	D, G, M, N
3276-1,4	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726	C, D, G, M, P
	3791	D, G, M
	4321, 4331, 4361	C, D, G, M, P
	8101, 8130, 8140, 8150	D, G, M,
3276-11, 14	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726	C, D, G, L, M, N, P
	3791	D, G, M
	4321, 4331, 4361	C, D, G, M, N, P
	8101, 8130, 8140, 8150	D, G, M, N
3602	3603*	D, G
	3624*, 8101, 8130, 8140, 8150	D, G, M
	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361, 5360	C, D, G, M, P
	* This communication is not SNA/ SDLC, but via a "B-LOOP"	
3603	3602*, 4701-1,2*	D, G
	* This communication is not SNA/ SDLC, but via a Banking Loop	
3624	3602*, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361, 4701-1,2*	D, G, M
	* This communication is not SNA/ SDLC, but via a Banking Loop	
3631, 3632	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	C, D, G, M
	3843	D,G
	8101, 8130, 8140, 8150	D, G, M
3651-25	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	C, D, G, M, P
	8101, 8130, 8140, 8150	D, G, M
3651-50	3659*	D, G
	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	C, D, G, M, P
	* This communication is not SNA/ SDLC, but via an "S-LOOP"	
3651-60	3669*, 3704	C
	3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	C, P
	* This communication is not SNA/ SDLC, but via an "S-LOOP"	
3651-75	3651-75, 3704	C, D, G, M
	3659*	D, G
	3669*, 3689*	C
	3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	C, D, G, M, P
	8101, 8130, 8140, 8150	D, G, M
	* This communication is not SNA/ SDLC, but via an "S-LOOP"	
3659	3651-50*, 3651-75*	D, G
	* This communication is not SNA/ SDLC, but via an "S-LOOP"	
3669	3651-60*, 3651-75*, 3669*, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	C
	* This communication is not SNA/ SDLC, but via an "S-LOOP"	
3684	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	C, D, G, M, P
	8101, 8130, 8140, 8150	D, G, M
3689	3651-75*, 3689*, 3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	C
	* This communication is not SNA/ SDLC, but via an "R-LOOP"	
3694	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	C, D, G, M
3704	3232-1	C, D, G
	3274-1C,21C,31C, 3624, 4730	D, G, M
	3274-51C, 3276, 3602, 3631, 3632, 3651-25, 3651-50 3651-75, 3684, 3694, 3767, 3771, 3774, 3775, 3776-1,2, 3791, 4321, 4331, 4361, 4701-1,2, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288, 5340, 5360, 5381, 5525, 6360, 6580, 6670, 8130, 8775	C, D, G, M
	3651-60, 3669, 3689	C
	3704, 3705-II, 3705-80, 3725-1,2, 3726, 3776-3,4, 3777-1,3,4, 8101, 8140, 8150	C, D, E, G, M

Chart 3 - SNA/ SDLC Intercommunications (cont'd)

The	Will Communicate with the	Over Facility Classes
3705-II	3232-1	C, D, G
	3274-1C	D, G, M, P
	3274-21C,31C	D, G, M, N
	3274-51C, 3276-11,12,13,14, 8130	C, D, G, L, M, N, P
	3276-1,2,3,4, 3602, 3651-25, 3651-50, 3651-75, 3684, 3771, 3774, 3775, 3776-1,2, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288, 5340, 5381	C, D, G, M, P
	3624, 4730	D, G, M
	3631, 3632, 3694, 3767, 3791, 4701-1,2, 5525, 6360, 6580, 6670	C, D, G, M
	3651-60	C, P
	3669, 3689	C
	3704	C, D, E, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 5360	C, D, E, G, L, M, N, P, Q
	3776-3,4, 3777-1,3,4	C, D, E, G, M, P
	4321, 4331, 4361	C, D, G, M, N, P
	8101, 8140, 8150	C, D, E, G, L, M, N, P
	8775, 8815	C, D, G, M, N
3705-80	3232-1	C, D, G
	3274-1C	D, G, M, P
	3274-21C,31C	D, G, M, N
	3274-51C, 3276-11,12,13,14, 8130	C, D, G, L, M, N, P
	3276-1,2,3,4, 3602, 3651-25, 3651-50, 3651-75, 3684, 3771, 3774, 3775, 3776-1,2, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288, 5340, 5381,	C, D, G, M, P
	3624, 4730	D, G, M
	3631, 3632, 3694, 3767, 3791, 4701-1,2, 5525, 6360, 6580, 6670	C, D, G, M
	3651-60	C, P
	3669, 3689	C
	3704	C, D, E, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 5360	C, D, E, G, L, M, N, P, Q
	3776-3,4, 3777-1,3,4	C, D, E, G, M, P
	4321, 4331, 4361	C, D, G, M, N, P
	8101, 8140, 8150	C, D, E, G, L, M, N, P
	8775, 8815	C, D, G, M, N

The	Will Communicate with the	Over Facility Classes
3725-1,2, 3726	3232-1	C, D, G
	3274-1C	D, G, M, P
	3274-21C,31C	D, G, M, N
	3274-51C, 3276-11,12,13,14, 8130	C, D, G, L, M, N, P
	3276-1,2,3,4, 3602, 3651-25, 3651-50, 3651-75, 3684, 3771, 3774, 3775, 3776-1,2, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288, 5340, 5381, 6360, 6580	C, D, G, M, P
	3624, 4730	D, G, M
	3631, 3632, 3694, 3767, 3791, 4701-1,2, 5525, 6670	C, D, G, M
	3651-60	C, P
	3669, 3689	C
	3704	C, D, E, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 5360	C, D, E, G, L, M, N, P, Q
	3776-3,4, 3777-1,3,4	C, D, E, G, M, P
	4321, 4331, 4361	C, D, G, M, N, P
	8101, 8140, 8150	C, D, E, G, L, M, N, P
	8775	C, D, G, M, N
3767	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	C, D, G, M
	8101, 8130, 8140, 8150	D, G, M
3771, 3774, 3775, 3776-1,2	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	C, D, G, M, P
3776-3,4, 3777-1, 3,4	3704	C, D, E, G, M
	3705-II, 3705-80, 3725-1,2, 3726	C, D, E, G, M, P
	4321, 4331, 4361	C, D, G, M, P
3791	3276	D, G, M
	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	C, D, G, M
3843	3631, 3632, 8101, 8130, 8140, 8150	D, G
3845, 3846	3845, 3846	C, D
4321, 4331, 4361	3232-1	C, D, G
	3274-1C	D, G, M, P
	3274-21C,31C	D, G, M, N
	3274-51C, 3276-11,12,13,14, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361, 8101, 8130, 8140, 8150	C, D, G, M, N, P
	3276-1,2,3,4, 3602, 3651-25, 3651-50, 3651-75, 3684, 3771, 3774, 3775, 3776, 3777, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288, 5340, 5360, 5381	C, D, G, M, P
	3624, 4730	D, G, M
	3631, 3632, 3694, 3704, 3767, 3791, 4701-1,2, 5150, 5160, 5525, 6360, 6580, 6670	C, D, G, M
	3651-60	C, P
	3669, 3689	C
	7426	D, M
	8775, 8815	C, D, G, M, N
4701-1,2	3603*	D, G
	3624*, 4730, 8101, 8130, 8140, 8150	D, G, M
	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361, 5340, 5360	C, D, G, M

* This communication is not SNA/ SDLC, but via a Banking Loop

Chart 3 - SNA/ SDLC Intercommunications (cont'd)

The	Will Communicate with the	Over Facility Classes
4730	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361, 4701	D, G, M
4952, 4954, 4955, 4956, 4959, 4965	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	C, D, G, M, P
	8101, 8130, 8140, 8150	D, G, M, P
5150, 5160	4321, 4331, 4361	C, D, G, M
	8101, 8130, 8140, 8150	D, M
5251-2,12	5340, 5360*, 5381	C, D, G, M, P
	* Supports 5251-12 only	
5285, 5288	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	C, D, G, M, P
	8101, 8130, 8140, 8150	D, G, M
5294	5360	C, D, G, M, P
5340	3704, 4701-1,2	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361, 5251-2,12, 5340, 5360	C, D, G, M, P
5360	3704, 4701-1,2	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 5360	C, D, G, L, M, N, P, Q
	4321, 4331, 4361, 5251-12, 5294, 5340, 5360	C, D, G, M, P
5381	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361, 5251-2,12	C, D, G, M, P
5525	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361, 5525	C, D, G, M
6360, 6580	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361, 6360, 6580	C, D, G, M
	8101, 8130, 8140, 8150	D, G, M
6670	3704, 3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361, 6670	C, D, G, M
	8101, 8130, 8140, 8150	D, G, M
7426-2	4321, 4331, 4361, 8101, 8130, 8140, 8150	D, G, M
8101, 8140, 8150	3232-1, 3843	D, G
	3274-51C, 3276-11,12,13,14, 8775	D, G, M, N
	3276-1,2,3,4, 3602, 3631, 3632, 3651-25,75, 3684, 3767, 4701-1,2, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288, 6360, 6580, 6670, 7426-2	D, G, M
	3704	C, D, E, G, M
	3705-II, 3705-80, 3725-1,2, 3726	C, D, E, G, L, M, N, P
	4321, 4331, 4361	C, D, G, M, N, P
	5150, 5160	D, M
	8101, 8140, 8150	D, E, G, M, N, P
	8130	D, G, M, N, P
8130	3232-1, 3843	D, G
	3274-51C, 3276-11,12,13,14, 8775	D, G, M, N
	3276-1,2,3,4, 3602, 3631, 3632, 3651-25,75, 3684, 3767, 4701-1,2, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288, 6360, 6580, 6670, 7426-2	D, G, M
	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726	C, D, G, L, M, N, P
	4321, 4331, 4361	C, D, G, M, N, P
	5150, 5160	D, M
	8101, 8130, 8140, 8150	D, G, M, N, P
8775	3704	C, D, G, M
	3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361	C, D, G, M, N
	8101, 8130, 8140, 8150	D, G, M, N
8815	3705-II, 3705-80, 3725-1,2, 3726, 4321, 4331, 4361, 8815	C, D, G, M, N

IBM ISG

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

CHART A
NONSWITCHED TELEGRAPH LINES

FACILITY A1

Point-to-point start/stop operation at 45.5, 56.9 or 74.2 bps on a Type 1002 Channel or 75 bps on a Type 1005 Channel via an integrated telegraph line adapter (1, 2)

Machine Types	Special Features Required for Attachment
2701	#7860 (at 45.5 bps), #7861 (at 56.9 bps) or #7862 (at 75 bps)
3704, 3705	#4721 and #9601 (at 45.5 bps), #9602 (at 56.9 bps), #9603 (at 74.2 bps) or #9604 (at 75 bps)

FACILITY A2

Point-to-point start/stop operation at 134.5 bps on a telegraph line via a stand-alone DCE providing an EIA RS-232-C interface (1)

Machine Types	Special Features Required for Attachment
2701	#4640 and #9581
3704, 3705	#9606 and #4711 or #4714
3725-1, 2, 3726	#4911 and #4666 (5)
3845, 3846	(4)

NOTES FOR CHART A:

1. Contact IBM for information on these facilities, including attachable DCEs.

2. Communication over this facility is with a Telco Type 83B2 or 83B3 teleprinter or a Western Union Plan 115 terminal

4. No special feature is required to attach the 3845 or 3846 on this facility. The DCEs must be in compliance with EIA RS-232-C. The 3845 and 3846 will operate with DTEs at speeds of 110 or 134.5 bps.

IBM ISG

IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

CHART C
THE PUBLIC SWITCHED TELEPHONE NETWORK (PSTN)

FACILITY CA1

Start/stop operation at 300 bps on the PSTN via an integrated modem (1, 2)

Machine Types	Special Features Required for Attachment
3704, 3705-II	#4782 and #9612 or, for Interrupt, #4786 and #9612
3767	#5502, #9540 and #7111 or #7113 or, for Interrupt, #5506, #7113 and #9540
4987	#4746 or #4747

FACILITY C1M

Start/stop operation at 134.5 or 300 bps on the PSTN via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (2)

Machine Types	Special Features Required for Attachment
2701	#4640 and #9581 (at 134.5 bps only)
3101	(5)
3138	#4640 and #9721 (3)
3232-51	(at 300 bps only) (5)
3704, 3705-II	#4711 or #4714 and #9606 (at 134.5 bps) or #9612 (at 300 bps)
3705-80	No special feature required at 134.5 bps, #1413 (at 300 bps)
3725-1, 2, 3726	#4911 and #4666 (20)
3767	#3719, #9619, #9540 and #7111 or #7113 (at 300 bps only)
3792	#3701 (at 134.5 bps only)
3845, 3846	(5, 15)
4321	#1601, #3701, #4696 and #968X (4)
4331, 4361	#1601, #3701, #4696 and #968X (4)
4952, 4954, 4955, 4956, 4959, 4965	#1610 or #2092 or #2096
4987	#4730
5010	#1610 and #2154 (at 134.5 bps only)
5110	#1525 (at 134.5 bps only)
6360	#3704 or #3705 or #3707
6580	#3705
6733	at 300 bps only (5)
7426	(5)

FACILITY CA2

Synchronous operation at 600/1200 bps on the PSTN via an integrated modem (1, 2, 8))

Machine Types	Special Features Required for Attachment
2701	#4782 (7)
3274-51C	#6301, #9112 and #5501 or #5502
3276-11, 14	#5501 and #6301
3651-25	#9512
3684	#5530 and #9481
3704, 3705-II	#4782 or, with Interrupt, #4786 (9) and #9607 (at 600 bps) or #9608 (at 1200 bps)
3741	#5501
3767	#5502 or, with Interrupt, #5506 and #9531 (at 600 bps) or #9532 (at 1200 bps)
3771, 3774, 3775	#1482 and #5501 or #5502
3791	#5501 and #6301 (6)
4321	#1601, #4696, #4781 and #967X or #969X (4)
4331, 4361	#1601, #4696, #4781 and #967X or #969X (4)
4987	#4751 or #4752
5010	#5501
5110-1, 2	#5501
5231	#5501
5251-2, 12	#5502
5265	#5501
5285, 5288	#5501
5340	#5501 (10)
5360	#5501
5381	#5501 or #5502
5525	#1750 and #5501 or #1751 and #5503
6670	#5501
8101, 8130 A, 8140 A, B	#5501 and #1601

FACILITY C2M

Start/stop or synchronous operation at 600/1200 bps via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (2, 8)

S/S Machine Types	Special Features Required for Attachment
3101	(5)
3705-II	#4711 or #4714 and #9607 (at 600 bps), #9608 (at 1200 bps or #9615 (at 600/1200 bps)
3725-1, 2, 3726	#4911 and #4666 (11, 19, 20) or #4911 (12, 19)
4952, 4954 4955, 4956, 4959, 4965	#1610 or #2096 or #1310 (1200 bps only)
4987	#4730
6733	(at 1200 bps only--Start/Stop) (5)

Sync Machine Types	Special Features Required for Attachment
2701	#7692 and #7698 (11)
3138	#4640 and #9649 (3, 11) or #4640, #9609 and #9649 (3, 12)
3232-1	(5)
3232-51	(5)
3274-51C	#3701, #6301, and #9112
3276-11, 14	#3701 and #6301 (11) or #3701 and #6302 (12)
3602	#3701 and #4501 or #6301 (11) or #3701 and #4502 or #6302 (12)
3631, 3632	#3701 and #6301 (11) or #3701 and #4502 or #6302 (12)
3651-25	#9150
3651-50	9121 (11)
3651-60	(5, 11)
3651-75	#9121 or #6185 (11)
3684	#3701 and #9695 (11) or #3701 and #9820 (12)
3694	#3701 and #4501 (11) or #3701 and #4502 or (12)
3704, 3705-II	#4711 or #4714 and #9607 (at 600 bps), #9608 (at 1200 bps) or #9615 (at 600/1200 bps) (9, 11) or #4714 (9, 12)

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Chart C - PSTN (cont'd)

3705-80	#1415 (11) or no special feature required (12)
3725-1, 2, 3726	#4911 and #4666 (11, 19, 20) or #4911 (12, 19)
3741	#9123 (11)
3747	#1660 and #9123 (11)
3767	#3719, #9619 and #9532 (11) or #3718, #9619 and #9532 (12)
3771, 3774, 3775	#1482 and #3701 (11) or #1481 and #3701 (12)
3791	#3701 and #6301 (6, 11) or #3701 and #6302 or #6303 (6, 12)
3845, 3846	(5)
4321	#1601, #3701, #4696 and #967X or #969X (4, 11) or #1601, #3701, #4695 and #967X or #969X (4, 12)
4331, 4361	#1601, #3701, #4696 and #967X or #969X (4, 11) or #1601, #3701, #4695 and #967X or #969X (4, 12)
4701-1, 2	(17)
4952, 4954, 4955, 4956, 4959, 4965	#2074 or #2090 or #2094 or #2096 or #1310 (1200 bps only)
4987	#4730
5010	#2074 and #4703 (11) or #2074 (12)
5110	#2074 and #3701
5231	#2074, #4780, #9334, #9483 and #9751 (11) or #2074, #4780, #9483 and #9751 (12)
5251-2, 12	#3701 and #4703 (11) or #3701 (12)
5265	#3701
5285, 5288	#3701
5340	#3701 and #4703 (10, 11) or #3701 (10, 12)
5360	#3701 and #5321 (11) or #3701 (12)
5381	#3701
5525	#1750 and #3701 or #1751 and #3702 (11) or #3701 or #3702 (12)
6360	#3704 or #3705 or #3707 (11)
6580	#3701 (11)
6670	#3701 (11)
7426	(5)
8101, 8130 A	#1601 and #3701 (11) or #1602 and #3701 (12)
8130 B	#1602 and #3701 (12)
8140 A, B	#1601 and #3701 (11) or #1602 and #3701 (12)
8140 C	#1610, #1611, #1620, #1621, #1622 or #1630 (12)
8150	#1732, #1733, #1734, #1735, #1763 or #1764 (12)
8775	#1488, #3701 and #9493 (11) or #3701 and #9493 (12)

FACILITY CA3

Synchronous operation at 2400 bps on the PSTN via an integrated modem (1, 2, 13)

Machine Types	Special Features Required for Attachment
3669	(5, 13)
3704, 3705-II	#4761 (9)
3774, 3775, 3776-1, 2	#5610
5251-2, 12	#5641
5340	#5610 (10)
5381	#5641

FACILITY C3

Synchronous operation at 2400 bps on the PSTN via an IBM 3863 Model 2 Modem or an IBM 3872 Modem (1, 2, 14)

Machine Types	Special Features Required for Attachment
2701	#7698 (7)
3138	#4640, #9609 and #9649 (3
3232-1	(5)
3274-51C	#3701, #9112 and #6302 or #6303
3276-11, 14	#3701, #6302 and #9490
3602	#3701 and #4502 or #6302
3631, 3632	#3701 and #4502 or #6302
3651-25, 50	#9120
3651-75	#9120 and/or #6185
3684	#3701 and #9822
3694	#3701 and #4502
3694	#3701 and #4502
3704, 3705-II	#4714 (9)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (19)
3741	#9121
3747	#1660 and #9121
3767	#3718, #9533, and #9619
3771, 3774 3775	#1481 and #3701
3776-1, 2, 3777-1, 2	#1481 and #3701
3776-3, 4, 3777-3, 4	#3701
3791	#3701 and #6302 or #6303 (6)
3845, 3846	(5, 15)
4321	#1601, #3701, #4695 and #967X or #969X (4)
4331, 4361	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(17)
4952, 4954, 4955, 4956, 4959, 4965	#2074 or #2090 or #2094 or #2096 or #1310
4987	#4730
5010	#4800
5110	#2074 and #3701
5231	#4780, #9483 and #9753
5251-2, 12	#3701
5294	#3701
5265	#3701
5285, 5288	#3701
5340	#3701 (10)
5360	#3701
5381	#3701
5525	#3701 or #3702
6360	#3704 or #3705 or #3707
6580	#3705
6670	#3701
8101, 8130, 8140 A, B	#1602 and #3701
8140 C	#1610, #1611, #1620, #1621, #1622 or #1630
8150	#1732, #1733, #1734, #1735, #1763 or #1764 (12)
8775	#3701 and #9493

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Chart C - PSTN (cont'd)

8815-1	#3701

FACILITY C3M

Synchronous operation at 2400 bps on the PSTN via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (2)

Machine Types	Special Features Required for Attachment
2701	#7698 (7)
3138	#4640, #9609 and #9649 (3
3232-1	(5)
3274-51C	#3701, #9112 and #6302 or #6303
3276-11, 14	#3701, #6302 and #9490
3602	#3701 and #4502 or #6302
3631, 3632	#3701 and #4502 or #6302
3651-25, 50	#9120
3651-75	#9120 and/or #6185
3684	#3701 and #9822
3694	#3701 and #4502
3704, 3705-II	#4714 (9)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (19)
3741	#9121
3747	#1660 and #9121
3767	#3718, #9533 and #9619
3771, 3774, 3775	#1481 and #3701
3776-1, 2, 3777-1, 2	#1481 and #3701
3776-3, 4, 3777-3, 4	#3701
3791	#3701 and #6302 or #6303 (6)
3845, 3846	(5, 15)
4321	#1601, #3701, #4695 and #967X or #969X (4)
4331, 4361	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(17)
4952, 4954, 4955, 4956, 4959, 4965	#2074 or #2090 or #2094 or #2096 or #1310
4987	#4730
5010	#4800
5110	#2074 and #3701
5231	#4780, #9483 and #9753
5251-2, 12	#3701
5294	#3701
5265	#3701
5285, 5288	#3701
5340	#3701 (10)
5360	#3701
5381	#3701
5525	#3701 or #3702
6360	#3704 or #3705 or #3707
6580	#3705
6670	#3701
8101, 8130, 8140 A, B	#1602 and #3701
8140 C	#1610, #1611, #1620, #1621, #1622 or #1630
8150	#1732, #1733, #1734, #1735, #1763 or #1764 (12)
8775	#3701 and #9493
8815-1	#3701 (23)

FACILITY CA4

Synchronous operation at 4800 bps on the PSTN via an integrated modem (1, 2, 16)

Machine Types	Special Features Required for Attachment
3689	(5, 16)
5251-2, 12	#5741
5340	#5361 (10)
5381	#5741
8815-3	(23)

FACILITY C4

Synchronous operation at 4800 bps on the PSTN via an IBM 3864 Model 2 Modem or an IBM 3874 Modem (1, 2)

Machine Types	Special Features Required for Attachment
2701	#7698 (7)
3138	#4640, #9609 and #9649 (3
3232-1	(5)
3274-51C	#3701, #9112 and #6302 or #6303
3276-11, 14	#3701 and #6302
3602	#3701 and #4502 or #6302
3631, 3632	#3701 and #4502 or #6302
3651-50	#9126
3684	#3701 and #9823
3694	#3701 and #4502
3704, 3705-II	#4714 (9)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (19)
3771, 3774, 3775	#1481 and #3701
3776-1, 2, 3777-1, 2	#1481 and #3701
3776-3, 4, 3777-3, 4	#3701
3791	#3701 and #6302 or #6303 (6)
3845, 3846	(5, 15)
4321	#1601, #3701, #4695 and #967X or #969X (4)
4331, 4361	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(17)
4952, 4954, 4955, 4956, 4959, 4965	#2074 or #2090 or #2094 or #2096 or #1310
4987	#4730
5010	#4800
5110	#3701
5231	#4780, #9483 and #9754
5251-2, 12	#3701
5294	#3701
5285, 5288	#3701, #9483 and #9754
5340	#3701 (10)

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Chart C - PSTN (cont'd)

5360	#3701
5381	#3701
5525	#3701 or #3702
8101, 8130, 8140 A, B	#1602 and #3701
8140 C	#1610, #1611, #1620, #1621, #1622 or #1630
8150	#1732, #1733, #1734, #1735, #1763 or #1764 (12)
8775	#3701 and #9493
8815-1	#3701 (18)

FACILITY C4M

Synchronous operation at 4800 bps on the PSTN via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (2)

Machine Types	Special Features Required for Attachment
2701	#7698 (7)
3138	#4640, #9609 and #9649 (3
3232-1	(5)
3274-51C	#3701, #9112 and #6302 or #6303
3276-11, 14	#3701 and #6302
3602	#3701 and #4502 or #6302
3631, 3632	#3701 and #4502 or #6302
3651-25, 50, 75	#9126
3684	#3701 and #9823
3694	#3701 and #4502
3704, 3705-II	#4714 (9)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (19)
3771, 3774, 3775	#1481 and #3701
3776-1, 2, 3777-1, 2	#1481 and #3701
3776-3, 4, 3777-3, 4	#3701
3791	#3701 and #6302 or #6303 (6)
3845, 3846	(5, 15)
4321	#1601, #3701, #4695 and #967X or #969X (4)
4331, 4361	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(17)
4952, 4954, 4955, 4956, 4959, 4965	#2074 or #2090 or #2094 or #2096 or #1310
4987	#4730
5010	#4800
5110	#2074 and #3701
5231	#4780, #9483 and #9754
5251-2, 12	#3701
5294	#3701
5285, 5288	#3701
5340	#3701 (10)
5360	#3701
5381	#3701
5525	#3701 or #3702
8101, 8130, 8140 A, B	#1602 and #3701
8140 C	#1610, #1611, #1620, #1621, #1622 or #1630
8150	#1732, #1733, #1734, #1735, #1763 or #1764 (12)
8775	#3701 and #9493
8815-1	#3701 (18)

AUTOMATIC CALLING ON THE PUBLIC SWITCHED TELEPHONE NETWORK (PSTN)

On FACILITY C1M: via a stand-alone ACE attached under the provisions of the IBM Multiple Supplier Systems Policy (2)

Machine Types	Special Features Required for ACE Attachment
2701	#1302
3138	#1290
3704, 3705-II	#4715
3705-80	#6714
3725-1, 2, 3726	#4911
4321	#1020
4331, 4361	#1020
4987	#4743

On FACILITY CA2: via an integrated automatic call originate feature

Machine Types	Special Features Required for Auto Calling
2701	#4791
3704	#4709
3705-II	#4791

On FACILITY C2M: via a stand-alone ACE attached under the provisions of the IBM Multiple Supplier Systems Policy (2)

Machine Types	Special Features Required for ACE Attachment
2701	#1314
3138	#1290
3704, 3705	#4715
3705-80	#6714
3725-1, 2, 3726	#4911
4321	#1020
4331, 4361	#1020
4987	#4743
5340	#5411 or #5412 or #5413 or #5314
5360	#5411
5381	#5760
5525	#1315 or #1316

On FACILITY C3: via the Automatic Call Originate feature, #1091, of the IBM 3872 Modem

Machine Types	Special Features Required for ACE Attachment
2701	#1314
3138	#1290
3704, 3705-II	#4715
3705-80	#6714

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Chart C - PSTN (cont'd)

3725-1, 2, 3726	#4911
4321, 4331 4361	#1020
4987	#4743
5340	#5411 or #5412 or #5413 or #5414
5360	#5411
5381	#5760
5525	#1315 or #1316

On FACILITY C3M: via a stand-alone ACE attached under the provisions of the IBM Multiple Supplier Systems Policy (2)

Machine Types	Special Features Required for ACE Attachment
2701	#1314
3138	#1290
3704, 3705-II	#4715
3705-80	#6714
3725-1, 2, 3726	#4911
4321	#1020
4331, 4361	#1020
4987	#4743
5340	#5411 or #5412 or #5413 or #5414
5360	#5411
5381	#5760
5525	#1315 or #1316

On FACILITY C4: via the Automatic Call Originate feature, #1091, of the IBM 3874 Modem

Machine Types	Special Features Required for ACE Attachment
2701	#1314
3138	#1290
3704, 3705-II	#4715
3705-80	#6714
3725-1, 2, 3726	#4911
4321, 4331, 4361	#1020
4987	#4743
5340	#5411 or #5412 or #5413 or #5414
5360	#5411
5381	#5760
5525	#1315 or #1316

On FACILITY C4M: via a stand-alone ACE attached under the provisions of the IBM Multiple Supplier Systems Policy (2)

Machine Types	Special Features Required for ACE Attachment
2701	#1314
3138	#1290
3704, 3705-II	#4715
3705-80	#6714
3725-1, 2, 3726	#4911
4321	#1020
4331, 4361	#1020
4987	#4743
5340	#5411 or #5412 or #5413 or #5414
5360	#5411
5381	#5760
5525	#1315 or #1316

NOTES FOR CHART C:

1. Attachment of these modems to the public switched telephone network will be via FCC registered circuitry. The IBM 3863 Model 2 Modem and the IBM 3864 Model 2 Modem provide such circuitry and may be directly connected to the PSTN. The 2400 and 4800 bps integrated modems, #5641 and #5741 only, also provide such circuitry and may also be directly connected to the PSTN. All other modems must be connected to the PSTN via a customer-supplied FCC registered coupler equivalent to either the USOC CBS Data Coupler (for manual or automatic answering), or the USOC CDT Data Access Arrangement (for manual only answering). The customer will be responsible for the installation of the proper type of coupler for the mode of operation he desires. See the "Accessories" section of this Manual or the specific machine pages for information on the IBM Protective Coupler.
2. Contact IBM for more information on attachable DCEs, services, etc.
3. The listed 3138 feature codes are for the attachment of the first communication line. See the M3138 pages for additional line attachment feature codes.
4. Specify codes **#967X**, **#968X** and **#969X** on the 4321, 4331 or 4361 stipulate in which protocol the 4321, 4331 or 4361 is to communicate and to which line position on the 4321, 4331 or 4361 that protocol is to be assigned, with the "X" in each case being the line position. See M4321, 4331 or 4361 pages for details. **Note:** On the 4361, specify codes **#967X** and **#969X** are not required.
5. No special feature is required to attach this DTE to this facility.
6. 3791 switched network operation is supported at the 3704, 3705 or 3725-1, 2, 3726 nonswitched programming. Special procedures are required to establish and disconnect the link. Refer to VTAM and 3790 operation instructions for the appropriate procedures.
7. The 2701 feature code listed is for the attachment of a single synchronous communication line. See the description of the "Dual Communications Interface" feature in the M2701 pages for the conditions under which a second line may be attached.
8. The 3602 will operate on this facility at 1200 bps only. The operational speed of the other DTEs on this facility is determined by:
   - a customer accessible switch on the 2701, 3138, 3274, 3276, 3651, 3684, 3741, 3747, 3767, 3771, 3774, 3775, 4952, 4955, 4959, 4987, 5110, 5251, 5265, and 5340
   - the installation of a CE strap on the 5010
   - the installation of a "Speed specify" on the 3704, 3705, 5381, 8101, 8130 and 8140
   - a customer initiated keyboard request on the 3791, 4321, 4331, 4361 or 5231
   - an Operator Command Language (OCL) instruction on the 6670.
   - the options chosen at the generation of the control program of the 3725-1, 2.
9. A 3705, equipped with the "Remote Program Loader" feature, may serve as a "Remote" and communicate with a"Local" 3704 or 3705. Their primary communication link must be a nonswitched line, and, therefore, communication over this facility between a "Remote"and a "Local" 3704 or 3705 can only be as a secondary, alternate, path to the primary nonswitched communication link.
10. The listed 5340 feature codes are for the attachment of a single communication line. A second line may be attached to a 5340 equipped with #3500. Second, third and fourth lines may be attached to a 5340 equipped with #4500. See the M5340 pages for details.
11. These feature codes are for the attachment of a modem which does *not* provide its own clocking. This class of modem should always be used on international connections.
12. These feature codes are for the attachment of a modem which *does* provide its own clocking. This class of modem may only be used on intranational connections.
13. There are two types of 2400 bps Integrated Modems that are *not* compatible with each other. The first type, #4761 and #5610 are line compatible and suitable for communication with each other and with an IBM 3872 Modem equipped with #7941 or #7942.

Chart C - PSTN (cont'd)

The second type, #5641, is line compatible and suitable for communication with another #5641 or with an IBM 3863 Model 2 Modem.

14. CCITT V.23 modems providing modem clocking and CCITT V.26 modems using Alternative B coding are not truly data transparent, in that the transmission of a long string of zeros can cause the receiving modem to lose synchronization. Therefore, unless the PTT can assure that the modems will not lose synchronization during the transmission of zeros for up to one second, NRZI coding must be used in the SDLC protocol, and transparent mode may *not* be used in the BSC protocol. See Your PTT coordinator for details.
15. The 3845 and 3846 are data encryption/decryption devices inserted between the DTE and the DCE. The DCE must satisfy the requirements of EIA RS-232-C to allow this insertion.
16. The 4800 bps Integrated Modems, #536X and #5741, are line compatible and suitable for communication with each other and with the IBM 3864 Model 2 Modem. The "X" in the #536X feature code is the line position on the 5340 in which this modem will be mounted. See the M5340 pages for details. The 3689 provides a 4800 bps integrated modem as part of the basic machine. This modem is line compatible and suitable for communication with another 3689 or with an IBM 3864 Model 2 Modem.
17. For communication in SNA/SDLC protocol, no special feature is required on the 4701. For communication in BSC protocol, #1422 is required. In either protocol, the 4701 requires that clocking be provided by the attached stand-alone DCE.
18. The 8815 mdl 3 provides a 4800 bps integrated modem as part of the basic machine. This modem is line compatible and suitable for communication with another IBM 8815-3 or IBM 8815-1 equipped with an IBM 3864 mdl 2.
19. A 3725-1, 2 or 3726 may serve as a "Remote" and communicate with a "Local" 3704, 3705, 3725-1, 2, or 3726. Their primary communication link must be a nonswitched line and, therefore, communication over this facility between a "Remote" and a "Local" 3704, 3705 or 3725-1,2, 3726 can only be as a secondary, alternate path to the primary nonswitched communication link.
20. This feature is only required for the 3725-1 and the 3726, not for the 3725-2.

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CHART D
NONSWITCHED VOICE GRADE LINES

FACILITY DA1

Point-to-point or multipoint start/stop operation at 134.5, 200, or 300 bps on a half-duplex Type 3002 Channel (or equivalent) via an integrated modem (1, 2)

Machine Types	Special Features Required for Attachment
3704, 3705-II	#4742 (on 2 wires) or #4743 (on 4 wires) and #9606 (at 134.5 bps only) or #4781 or #4785 and #9612 (at 300 bps only)
3767	#5500 or #5505, #9540 and #7111 or #7113 (at 300 bps only)
3792	#5400 (at 134.5 bps only)
4321	#1601, #2832, #4696 and #968X (4) (at 300 bps only)
5010	#4751 (on 2 wires) or #4752 (on 4 wires) (both at 134.5 bps only)

FACILITY D1M

Point-to-point or multipoint start/stop operation at 134.5 or 300 bps on a nonswitched line via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
2701	#4640 and #9581 (at 134.5 bps only)
3101	(6)
3138	#4640 and #9721 (3)
3232-51	(Point-to-point only) (6)
3704, 3705-II	#4711 or #4714 and #9606 (at 134.5 bps) or #9612 (at 300 bps)
3705-80	No special feature required at 134.5 bps or #1413 (at 300 bps)
3725-1, 2, 3726	#4911 and #4666 (29)
3767	#3719, #9540 and #7111 or #7113 (at 300 bps only)
3792	#3701 (at 134.5 bps only)
3845, 3846	(6, 16)
4321	#1601, #3701, #4696 and #968X (4)
4331, 4361	#1601, #3701, #4696 and #968X (4)
4952, 4954, 4955, 4956, 4959, 4965	#1610 or #2092 or #2096
4987	#4730
5010	#1610 and #2165 (at 134.5 bps only)
5110	#1525 (point-to-point only)
6360	#3704 or #3705 or #3707 (point-to-point only)
6580	#3705 (point-to-point only)
6733	(at 300 bps only) (point-to-point only) (6)
8101, 8130 A, 8140 A, B	#1603 and #3701 (point-to-point only)

FACILITY DA2

Point-to-point or multipoint start/stop operation at 600 bps on a duplex Type 3002 Channel (or equivalent) via an integrated modem (1, 2)

Machine Types	Special Features Required for Attachment
3704, 3705-II	#4742 (on 2 wires) or #4743 (on 4 wires) and #9607
3767	#5500, #7112 and #9541
4321	#1601, #4696, #4832, and #968X (4)
4331	#1601, #4696, #4781 and #968X (4)
4987	#4748
5010	#4751 (on 2 wires) or #4752 (on 4 wires)

FACILITY D2M

Point-to-point or multipoint start/stop operation at 600 bps on a duplex nonswitched line via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
2701	#4640 and #9582 or #4648
3101	(6)
3138	#4640 and #9721 (3)
3232-51	(Point-to-point only) (6)
3704, 3705-II	#4711 or #4714 and #9607
3705-80	#1414
3725-1, 2, 3726	#4911 and #4666 (29)
3767	#3719, #7112 and #9541
3845, 3846	(6, 16)
4321	#1601, #3701, #4696 and #968X (4)
4331, 4361	#1601, #3701, #4696 and #968X (4)
4952, 4954, 4955, 4956, 4959, 4965 4965	#1610 or #2092 or #2096
4987	#4730
5010	#1610 and #2165
8101, 8140 A, B	#1603 and #3701 (point-to-point only) (23)

FACILITY DA3

Point-to-point or multipoint start/stop or synchronous operation at 600/1200 bps on a Type 3002 Channel (or equivalent) via an integrated modem (1, 2, 7)

S/S Machine Types	Special Features Required for Attachment
3704, 3705-II	#4781 and #9607 (at 600 bps), #9608 (at 1200 bps) or #9615 (at 600/1200 bps)
3767	#5500, #7112 and #9541 (at 600 bps) or #9542 (at 1200 bps)
3791	#5500 and #6301 (14) or #3210 and #4781 (9)
4321	#1601, #4696, #4781, and #968X (4)
4331	#1601, #4696, #4781 and #968X (4)

Sync Machine Types	Special Features Required for Attachment
2701	#4781, #7698 and #7692 (at 1200 bps) or #7401 at 600/1200 bps) (8)
3274-51C	#5500 and #6301
3276-1, 4	#5500 and #6301
3276-11, 14	#5500 and #6301 (14)
3602	#5500 and #4501 or #6301 (14) or #8001 (5)
3603-1	(5, 6) 3624#5500 and #1421 or #6301 (7, 14) or #8001 (5, 7)
3684	#5530 and #9482 (14)
3704, 3705-II	#4781 or #4784 and #9607 (at 600 bps), #9608 (at 1200 bps or #9615 (at 600/1200 bps) (14)
3741	#5500
3747	#5500

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Chart D - Nonswitched Voice Grade Lines (cont'd)

3767	#5500 and #9531 (at 600 bps) or #9532 (at 1200 bps) (14)
3771, 3774, 3775	#1482 and #5500 (14)
3791	#5500 and #6301 (14) or #3210 and #4781 (9)
4321	#1601, #4696, #4781, and #967X or #969X (4)
4331	#1601, #4696, #4781 and #967X or #969X (4)
4987	#4748
5010	#4703 and #5500
5110-1, 2	#5500
5231	#5500 and #9334
5251-2, 12	#5500
5285, 5288	#9751 and #9481 or #9482 (14)
5340	#5500 (11, 14)
5360	#5500 (14)
5381	#5500 (14)
5525	#1750 and #5500 or #1751 and #5502
6670	#5510
8101, 8130 A, 8140 A, B	#5500 and #1601 or #1603 (14)
8775	#1488 and #5500

FACILITY DAB3

Point-to-point or multipoint synchronous operation at 600/1200 bps on a Type 3002 Channel (or equivalent) with backup on the public switched telephone network via an integrated modem (1, 2, 7, 21)

Machine Types	Special Features Required for Attachment
3274-51C	#5507 or #5508 and #6301
3276-1, 4	#5507 or #5508
3276-11, 14	#5507 or #5508 (14)
5110-1, 2	#5508
5285, 5288	#5508 (14)
5381	#5508 (14)
6670	#5508

FACILITY D3M

Point-to-point or multipoint start/stop or synchronous operation at 600/1200 bps on a nonswitched line via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1, 7)

S/S Machine Types	Special Features Required for Attachment
3101	(6)
3232-51	(Point-to-point and start/stop only) (6)
3704, 3705-II	#4711 or #4714 and #9607 (at 600 bps), #9608 (at 1200 bps) or #9615 (at 600/1200 bps) (12)
3705-80	#1415 (10) or no special feature required (11)
3725-1, 2, 3726	#4911 and #4666 (12, 29)
3767	#3719, #7112 and #9541 (at 600 bps) or #9542 (at 1200 bps)
3845, 3846	(6, 16)
4321	#1601, #3701, #4696 and #968X (4, 12)
4331, 4361	#1601, #3701, #4696 and #968X (4, 12)
4952, 4954 4955, 4956, 4959, 4965	#1610 or #2092 or #2096 (12) or #1310 (1200 bps only)
4975-1R, 2R	(1200 bps only) (7)
4987	#4730 or #4731 (12)
6733	(at 1200 bps only) (point-to-point only) (6)

Sync Machine Types	Special Features Required for Attachment
2701	#7698 and #7692 (at 1200 bps) or #7401 (at 600/1200 bps) (8, 12)
3138	#4640 and #9649 (3), 12) or #4640, #9609 and #9649 (3), 13)
3232-1	(6)
3274-51C	#3701 and #6301
3276-1, 4	#3701, #6301 and #9491 (12) or #3701, #6302 and #9491 (13)
3276-11, 14	#3701, #6301 and #9491 (12, 14) or #3701, #6302 and #9491 (13, 14)
3602	#3701 and #4501 or #6301 (5, 13, 14) or #3701 and #4502 or #6302 (5, 13, 14)
3603-2	(6, 12) or #6352 (5, 13)
3624	#3701 and #1421 or #6301 (7, 13, 14) or #3701 and #1422 or #6302 (7, 13, 14)
3631, 3632	#3701 and #6301 (12, 14) or #3701 and #4502 or #6302 (13, 14)
3684	#3701 and #9695 (12, 14) or #3701 and #9820 (13, 14)
3694	#3701 and #4501 (12, 14) or #3701 and #4502 (13, 14)
3704, 3705-II	#4711 or #4714 and #9607 (at 600 bps), #9608 (at 1200 bps) or #9615 (at 600/1200 bps) (12, 14) or #4714 (13, 14)
3705-80	#1415 (10) or no special feature required (11)
3725-1, 2, 3726	#4911 and #4666 (12, 14, 29) or #4911 (13, 14)
3741	#7705 and #9122 (12)
3747	#1660, #7705 and #9122 (12)
3767	#3719 and #9531 (at 600 bps) or #9532 (at 1200 bps) (12, 14) or #3718 and #9532 (13, 14)
3771, 3774, 3775	#1482 and #3701 (12, 14) or #1481 and #3701 (13, 15)
3791	#3701 and #6301 (12, 14) or #3701 and #6302 or #6303 (13, 14) or #3703 and #3210 (9, 12) or #3703 and #3211 (9, 13)
3845, 3846	(6, 16)
4321	#1601, #3701, #4696 and #967X or #969X (4, 12) or #1601, #3701, #4695 and #967X or #969X (4, 13)
4331, 4361	#1601, #3701, #4696 and #967X or #969X (4, 12) or #1601, #3701, #4695 and #967X or #969X (4, 13)
4701-1, 2	(14, 25)
4730	(1200 bps only) (6, 13, 14)
4952, 4954, 4955, 4956, 4959, 4965	#2074 or #2090 or #2094 or #2096 (14) or #1310 (1200 bps only)
4975-1R, 2R	(1200 bps only) (7)
4987	#4730 or #4731 (14)
5010	#2074, #4703 and #4800 (12) or #2074 and #4800 (13)
5110	#2074 and #3701
5150	(6, 13)
5231	#2074, #4780, #9334, #9751 and #9481 or #9482 (12) or #2074, #4780, #9751 and #9481 or #9482 (13)
5251-2, 12	#3701 and #4703 (12) or #3701 (13)
5265	#3701

Chart D - Nonswitched Voice Grade Lines (cont'd)

5285, 5288	#3701 (14)
5340	#3701 and #4703 (11, 13, 14) or #3701 (11, 13, 14)
5360	#3701 and #5321 (12, 14) or #3701 (13, 14)
5381	#3701 (14)
5525	#1750 and #3701 or #1751 and #3702 (12) or #3701 or #3702 (13)
6360	#3704 or #3705 or #3707 (12) (point-to-point only)
6580	#3705 (12) (point-to-point only)
6670	#3701 (12, 14)
7426	(6)
8101, 8130 A, 8140 A, B	#3701 and #1601 or #1603 (12, 14) or #3701 and #1602 or #1604 (13, 14) or #3701 and #1605 (12, 13)
8140 C	#1610, #1611, #1620, #1621 or #1630 (13, 14) or #1622 or #1623 (12, 13, 14)
8150	#1732, #1733, #1734, #1735, #1763 or #1764 (13, 14)
8775	#1488, #3701 and #9494 (12) or #3701 and #9494 (13)

FACILITY D4M

Point-to-point or multipoint synchronous operation at 2000 bps on a nonswitched line via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
2701	#7698 (8)
3138	#4640, #9609 and #9649 (3)
3232-1	(6)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (14)
3276-1, 4	#3701, #6302 and #9491
3276-11, 14	#3701, #6302 and #9491 (14)
3602	#3701 and #4502 or #6302 (14)
3624	#3701 and #1422 or #6302 (14)
3631, 3632	#3701 and #4502 or #6302 (14)
3694	#3701 and #4502 (14)
3704, 3705-II	#4714 or #4718 (14, 17)
3705-80	No special feature required
3741	#9120
3747	#1660 and #9120
3771, 3774 3775	#1481 and #3701 (14)
3776-1, 2	#1481 and #3701 (14)
3845, 3846	(6, 16)
3791	#3701 and #6302 or #6303 (14) or #3211 and #3703 (9)
4321	#1601, #3701, #4695 and #967X or #969X (4)
4331, 4361	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(14, 25)
4730	(6, 13, 14)
4952, 4954, 4955, 4956, 4959, 4965	#2074 or #2090 or #2094 or #2096 or #1310
4987	#4730 or #4731
5010	#2074 and #4800
5110	#2074 and #3701
5150	(6, 13)
5231	#2074, #4780 and #9481 or #9482
5251-2, 12	#3701
5265	#3701
5285, 5288	#3701 (14)
5340	#2500 and #3701 (11, 14)
5360	#3701 (14)
5381	#3701 (14)
5525	#3701 or #3702
6360	#3704 or #3705 or #3707 (point-to-point only)
6580	#3705 (point-to-point only)
6670	#3701 (14)
7426	(6)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (14) or #3701 and #1605 (13)
8130 B	#3701 and #1602 (13, 14)
8140 C	#1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623
8150	#1732, #1733, #1734, #1735, #1763 or #1764 (14)
8775	#3701 and #9494
8815-1	#3701 (14)

FACILITY DA5

Point-to-point or multipoint synchronous operation at 2400 bps on a Type 3002 Channel (or equivalent) via an integrated modem (1, 2, 18)

Machine Types	Special Features Required for Attachment
3274-31C	#5640, #9112 and #6302 or #6303
3659	(6)
3669	(6)
3704, 3705-II	#4751 or #4752 or #4754 or #4755 (14, 17)
3774, 3775, 3776-1, 2	#5600 or #5602 (14)
3842	(6, 10)
5251-2, 12	#5640
5340	#5600 or #5601 or #5602 (14)
5381	#5640 (14)

FACILITY DAB5

Point-to-point or multipoint synchronous operation at 2400 bps on a Type 3002 Channel (or equivalent) with backup on the public switched telephone network via an integrated modem (1, 2, 19, 20)

Machine Types	Special Features Required for Attachment
3774, 3775, 3776-1, 2	#7951 and #5600 or #5602 (14)
3842	#7951 (10)
5340	#7951 and #5600 or #5601 or #5602 (11, 14)

FACILITY D5

Point-to-point or multipoint synchronous operation at 2400 bps on a Type 3002 Channel (or equivalent) via an IBM 3863 mdl 1 Modem, an IBM 3868 mdl 1 Rack-Mounted Modem or an IBM 3872 Modem (1, 19, 23)

Machine Types	Special Features Required for Attachment
2701	#7698 (8)
3138	#4640, #9609 and #9649 (3)
3232-1	(6)

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Chart D - Nonswitched Voice Grade Lines (cont'd)

3274-1C, 21C, 31C	#3701 and #6302 or #6303 (14)
3274-51C	#3701 and #6302 or #6303 (14)
3276-1, 4	#3701, #6302 and #9491
3276-11, 14	#3701, #6302 and #9491 (14)
3602	#3701 and #4502 or #6302 (14)
3603-2	#6352
3624	#3701 and #1422 or #6302 (14)
3631, 3632	#3701 and #4502 or #6302 and/or #3211 and #3703 (14)
3651-25, 50	#9121 or #9122 (14, 22)
3651-75	#9121 or #9122 or #6185 (14, 22)
3684	#3701 and #9822 (14)
3704, 3705-II	#4714 or #4718 (14, 16, 17)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (14, 27, 28)
3741	#9121
3747	#1660 and #9121
3767	#3718 and #9533 (14)
3771, 3774, 3775	#1481 and #3701 (14)
3776-1, 2, 3777-1, 2	#1481 and #3701 (14)
3776-3, 4, 3777-3, 4	#3701 (14)
3791	#3701 and #6302 or #6303 (14) or #3211 and #3703 (9)
3843	(6, 10)
3845, 3846	(6, 16)
4321	#1601, #3701, #4695 and #967X or #969X (4)
4331, 4361	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(14, 25)
4730	(6, 14)
4952, 4954, 4955, 4956, 4959, 4965	#2074 or #2090 or #2094 or #2096 (14) or #1310
4975-1R, 2R	(7)
4987	#4730 or #4731 (14)
5010	#2074 and #4800
5110	#2074 and #3701
5150	(6, 13)
5231	#4780, #9753 and #9481 or #9482
5251-2, 12	#3701
5265	#3701
5285, 5288	#3701 (14)
5294	#3701
5340	#2500 and #3701 (11, 14)
5360	#3701 (14)
5381	#3701 (14)
5525	#3701 or #3702
6360	#3704 or #3705 or #3707 (point-to-point only)
6580	#3705 (point-to-point only)
6670	#3701 (14)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (14) or #3701 and #1605 (13)
8130 B	#3701 and #1602 (14)
8140 C	#1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623
8150	#1732, #1733, #1734, #1735, #1763 or #1764 (14)
8775	#3701 and #9494
8815-1	#3701 (14)

FACILITY D5M

Point-to-point or multipoint synchronous operation at 2400 bps on a nonswitched line via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
2701	#7698 (8)
3138	#4640, #9609 and #9649 (3)
3232-1	(6)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (14)
3274-51C	#3701 and #6302 or #6303 (14)
3276-1, 4	#3701, #6302 and #9491
3276-11, 14	#3701, #6302 and #9491 (14)
3602	#3701 and #4502 or #6302 (14)
3603-2	#6352
3624	#3701 and #1422 or #6302 (14)
3631, 3632	#3701 and #4502 or #6302 and/or #3211 and #3703 (14)
3651-25, 50	#9121 or #9122 (14, 22)
3651-75	#9121 or #9122 (14) or #6185 (22)
3684	#3701 and #9822 (14)
3694	#3701 and #4502 (14)
3704, 3705-II	#4714 or #4718 (14, 16, 17)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (14, 27, 28)
3741	#9121
3747	#1660 and #9121
3767	#3718 and #9533
3771, 3774, 3775	#1481 and #3701 (14)
3776-1, 2, 3777-1, 2	#1481 and #3701 (14)
3776-3, 4, 3777-3, 4	#3701 (14, 15)
3791	#3701 and #6302 or #6303 (14) or #3211 and #3703 (9)
3843	(6, 10)
3845, 3846	(6, 16)
4321	#1601, #3701, #4695 and #967X or #969X (4)
4331, 4361	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(14, 25)
4730	(6, 14)
4952, 4954, 4955, 4956, 4959, 4965	#2074 or #2090 or #2094 or #2096 (14) or #1310
4975-1R, 2R	(8)
4987	#4730 or #4731 (14)
5010	#2074 and #4800

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Chart D - Nonswitched Voice Grade Lines (cont'd)

5110	#2074 and #3701
5150	(6, 13)
5231	#4780, #9753 and #9481 or #9482
5251-2, 12	#3701
5265	#3701
5285, 5288	#3701 (14)
5294	#3701
5340	#2500 and #3701 (11, 14)
5360	#3701 (14)
5381	#3701 (14)
5525	#3701 or #3702
6360	#3704 or #3705 or #3707 (point-to-point only)
6580	#3705 (point-to-point only)
6670	#3701 (14)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (14) or #3701 and #1605 (13)
8130 B	#3701 and #1602 (14)
8140 C	#1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623
8150	#1732, #1733, #1734, #1735, #1763 or #1764 (14)
8775	#3701 and #9494
8815-1	#3701 (14)

FACILITY D5SB

Point-to-point or multipoint synchronous operation at 2400 bps on a Type 3002 Channel (or equivalent) via an IBM 3863 Model 1 Modem equipped with #7953 or an IBM 3872 Modem equipped with #7951 or #7952 (1, 20, 23)

Machine Types	Special Features Required for Attachment
2701	#7698 (8)
3138	#4640, #9609 and #9649 (3)
3232-1	(6)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (14)
3274-51C	#3701 and #6302 or #6303 (14)
3276-1, 4	#3701, #6302 and #9491
3276-11, 14	#3701, #6302 and #9491 (14)
3602	#3701 and #4502 or #6302 (14)
3631, 3632	#3701 and #4502 or #6302 (14)
3651-25, 50	#9121 or #9122 (14)
3651-75	#9121 or #9122 (14)
3684	#3701 (14)
3694	#3701 and #4502 (14)
3704, 3705-II	#4714 (14, 16, 17)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (14, 27, 28)
3771, 3774, 3775	#1481 and #3701 (14)
3776-1, 2, 3777-1, 2	#1481 and #3701 (14)
3776-3, 4, 3777-3, 4	#3701 (14, 15)
3791	#3701 and #6302 or #6303 and/or #3211 and #3703 (9)
3843	(6, 10)
3845, 3846	(6, 16)
4321	#1601, #3701, #4695 and #967X or #969X (4)
4331, 4361	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(14, 25)
4952, 4954, 4955, 4956, 4959, 4965	#2074 or #2090 or #2094 or #2096 (14) or #1310
4987	#4730 or #4731 (14)
5110	#2074 and #3701
5150	(6, 13)
5251-2, 12	#3701 and #9492
5285, 5288	#3701, #9753 and #9481 or #9482 (14)
5294	#3701 (30)
5340	#2500 and #3701 (11, 14)
5360	#3701 (14)
5381	#3701 (14)
5525	#3701 or #3702
6360	#3704 or #3705 or #3707 (point-to-point only)
6580	#3705 (point-to-point only)
6670	#3701 (14)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (14) or #3701 and #1605 (13)
8130 B	#3701 and #1602 (14)
8140 C	#1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623
8150	#1732, #1733, #1734, #1735, #1763 or #1764 (14)
8775	#3701 and #9494
8815-1	#3701 (14)

FACILITY DA6

Point-to-point or multipoint synchronous operation at 4800 bps on a duplex Type 3002 Channel (or equivalent) via an integrated modem (1, 2, 21)

Machine Types	Special Features Required for Attachment
3274-31C	#5740 or #9112 and #6302 or #6303 (14)
3776-1, 2	#5700 or #5702 (14)
5251-2, 12	#5740
5340	#5351 (11, 14)
5381	#5740 (14)
8815-4	(14, 26)

FACILITY DAB6

Point-to-point or multipoint synchronous operation at 4800 bps on a duplex Type 3002 Channel with C1 Conditioning (or equivalent) with backup on the public switched telephone network via an integrated modem (1, 2, 20, 21)

Machine Types	Special Features Required for Attachment
3776-1, 2	#9752 and #5700 or #5702 (14)

FACILITY D6

Point-to-point or multipoint synchronous operation at 4800 bps on a duplex Type 3002 Channel (or equivalent) via an IBM 3864 mdl 1 Modem or an IBM 3868 mdl 2 Rack-Mounted Modem or, on a Type 3002 Channel with CI Conditioning (or equivalent), via an IBM 3874 Modem (1, 23)

Machine Types	Special Features Required for Attachment
2701	#7698 (8)

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Chart D - Nonswitched Voice Grade Lines (cont'd)

3138	#4640, #9609 and #9649 (3)
3232-1	(6)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (14)
3274-51C,	#3701 and #6302 or #6303 (14)
3276-1, 4	#3701, #6302 and #9491
3276-11, 14	#3701, #6302 and #9491 (14)
3602	#3701 and #4502 or #6302 (14)
3624	#3701 and #1422 or #6302 (14)
3631, 3632	#3701 and #4502 or #6302 (14)
3651-25, 50	#9124 or #9125 (14)
3651-75	#9124 or #9125 (14)
3684	#3701 and #9823
3694	#3701 and #4502 (14)
3704, 3705-II	#4714 or #4718 (14, 16, 17)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (14, 27, 28)
3771, 3774, 3775	#1481 and #3701 (14)
3776-1, 2 3777-1, 2	#1481 and #3701 (14)
3776-3, 4, 3777-3, 4	#3701 (14, 15)
3791	#3701 and #6302 or #6303 (14) or #3211 and #3703 (9)
3843	(6, 10)
3845, 3846	(6, 16)
4321	#1601, #3701, #4695 and #967X or #969X (4)
4331, 4361	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(14, 25)
4730	(6, 14)
4952, 4954, 4955, 4956, 4959, 4965	#2074 or #2090 or #2094 or #2096 (14) or #1310
4975-2R (7)	
4987	#4730 or #4731 (14)
5010	#2074 and #4800
5110	#2074 and #3701
5150	(6, 13)
5231	#4780, #9754 and #9481 or #9482
5251-2, 12	#3701
5265	#3701
5285, 5288	#3701 (14)
5294	#3701
5340	#2500 and #3701 (11, 14)
5360	#3701 (14)
5381	#3701 (14)
5525	#3701 or #3702
6360, 6580	#3705 (point-to-point only), #3707 (point-to-point only)
7426	(6)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (14) or #3701 and #1605 (13)
8130 B	#3701 and #1602 (14)
8140 C	#1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623
8150	#1732, #1733, #1734, #1735, #1763 or #1764 (14)
8775	#3701 and #9494
8815-1	#3701 (14, 26)

FACILITY D6M

Point-to-point or multipoint synchronous operation at 4800 bps on a nonswitched line via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
2701	#7698 (8)
3138	#4640, #9609 and #9649 (3)
3232-1	(6)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (14)
3274-51C	#3701 and #6302 or #6303 (14)
3276-1, 4	#3701, #6302 and #9491
3276-11, 14	#3701, #6302 and #9491 (14)
3602	#3701 and #4502 or #6302 (14)
3624	#3701 and #1422 or #6302 (14)
3631, 3632	#3701 and #4502 or #6302 (14)
3651-25, 50	#9124 or #9125 (14)
3651-75	#9124 or #9125 (14)
3684	#3701 and #9823
3694	#3701 and #4502 (14)
3704, 3705-II	#4714 or #4718 (14, 16, 17)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (14, 27, 28)
3771, 3774, 3775	#1481 and #3701 (14)
3776-1, 2, 3777-1, 2	#1481 and #3701 (14)
3776-3, 4, 3777-3, 4	#3701 (14, 15)
3791	#3701 and #6302 or #6303 (14) or #3211 and #3703 (9)
3843	(6, 10)
3845, 3846	(6, 16)
4321	#1601, #3701, #4695 and #967X or #969X (4)
4331, 4361	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(14, 25)
4730	(6, 14)
4952, 4954, 4955, 4956, 4959, 4965	#2074 or #2090 or #2094 or #2096 (14) or #1310
4975-2R	(7)
4987	#4730 or #4731 (14)
5010	#2074 and #4800
5110	#2074 and #3701
5150	(6, 13)
5231	#4780, #9754 and #9481 or #9482
5251-2, 12	#3701
5265	#3701
5285, 5288	#3701 (14)
5294	#3701
5340	#2500 and #3701 (11, 14)

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Chart D - Nonswitched Voice Grade Lines (cont'd)

5360	#3701 (14)
5381	#3701 (14)
5525	#3701 or #3702
6360, 6580	#3705 (point-to-point only), #3707 (point-to-point only)
7426	(6)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (14) or #3701 and #1605 (13)
8130 B	#3701 and #1602 (14)
8140 C	#1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623
8150	#1732, #1733, #1734, #1735, #1763 or #1764 (14)
8775	#3701 and #9494
8815-1	#3701 (14, 26)

FACILITY D6SB

Point-to-point or multipoint synchronous operation at 4800 bps on a duplex Type 3002 Channel (or equivalent) with backup on the public switched telephone network via an IBM 3864 Model 1 Modem equipped with #7953 or, on a duplex Type 3002 Channel with CI Conditioning, via an IBM 3874 Modem equipped with #7951 or #7952 (1, 20, 23)

Machine Types	Special Features Required for Attachment
2701	#7698 (8)
3138	#4640, #9609 and #9649 (3)
3232-1	(6)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (14)
3274-51C	#3701 and #6302 or #6303 (14)
3276-1, 4	#3701, #6302 and #9491
3276-11, 14	#3701, #6302 and #9491 (14)
3602	#3701 and #4502 or #6302 (14)
3631, 3632	#3701 and #4502 or #6302 (14)
3651-25, 50	#9124 or #9125 (14)
3651-75	#9124 or #9125 (14)
3684	#3701 and #9823 (14)
3694	#3701 and #4502 (14)
3704, 3705-II	#4714 (14, 16, 17)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (14, 27, 28)
3771, 3774, 3775	#1481 and #3701 (14)
3776-1, 2 3777-1, 2,	#1481 and #3701 (14)
3776-3, 4, 3777-3, 4	#3701 (14)
3791	#3701 and #6302 or #6303 and/or #3211 and #3703 (14)
3843	(6, 10)
3845, 3846	(6, 16)
4321	#1601, #3701, #4695 and #967X or #969X (4)
4331, 4361	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(14, 25)
4952, 4954, 4955, 4956, 4959, 4965	#2074 or #2090 or #2094 or #2096 (14) or #1310
4987	#4730 or #4731 (14)
5110	#2074 and #3701
5150	(6, 13)
5251-2, 12	#3701 and #9492
5265	#3701
5285, 5288	#3701 (14)
5294	#3701 (30)
5340	#2500 and #3701 (11, 14)
5360	#3701 (14)
5381	#3701 (14)
5525	#3701 or #3702
6360, 6580	#3705 (point-to-point only), #3707 (point-to-point only)
7426	(6)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (14) or #3701 and #1605 (13)
8130 B	#3701 and #1602 (14)
8140 C	#1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623
8150	#1732, #1733, #1734, #1735, #1763 or #1764 (14)
8775	#3701 and #9494
8815-1	#3701 (14, 26)

FACILITY D7M

Point-to-point or multipoint synchronous operation at 7200 bps on a nonswitched line via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
2701	#7698 (8)
3138	#4640, #9609 and #9649 (3)
3232-1	(6)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (14)
3276-1, 4	#3701, #6302 and #9491
3276-11, 14	#3701, #6302 and #9491 (14)
3602	#3701 and #4502 (14)
3631, 3632	#3701 and #4502 (14)
3694	#3701 and #4502 (14)
3704, 3705-II	#4714 or #4718 (14, 16, 17)
3705-80	No special feature required
3776-3, 4, 3777-3, 4	#3701 (14, 17)
3777-1, 2	#1481 and #3701 (14)
3791	#3701 and #6303 (14) or #3211 and #3703 (9)
3845, 3846	(6, 16)
4321	#1601, #3701, #4695 and #967X or #969X (4)
4331, 4361	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(14, 25)
4730	(6, 14)
4952, 4954, 4955, 4956, 4959, 4965	#2074 or #2090 or #2094 or #2096 (14) or #1310
4987	#4730 or #4731 (14)
5010	#4800
5150	(6, 13)
5251-2, 12	#3701
5294	#3701
5340	#3701 (11, 14)

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Chart D - Nonswitched Voice Grade Lines (cont'd)

5360	#3701 (14)
5381	#3701 (14)
5525	#3701 or #3702
6360, 6580	#3705 (point-to-point only), #3707 (point-to-point only)
7426	(6)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (14) or #3701 and #1605 (13)
8130 B	#3701 and #1602 (14)
8140 C	#1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623
8150	#1732, #1733, #1734, #1735, #1763 or #1764 (14)
8775	#3701 and #9494
8815-1	#3701 (14, 26)

FACILITY DA8

Point-to-point or multipoint synchronous operation at 9600 bps on a duplex Type 3002 Channel (or equivalent) via an integrated modem (1)

Machine Types	Special Features Required for Attachment
3274-31C	#5840 or #5842, #9112 and #6302 or #6303 (14)

FACILITY D8

Point-to-point or multipoint synchronous operation at 9600 bps on a duplex Type 3002 Channel (or equivalent) via an IBM 3865 Modem or an IBM 3868 mdl 3 or 4 Rack-Mounted Modem

Machine Types	Special Features Required for Attachment
3232-1	(6)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (14)
3274-51C	#3701 and #6302 or #6303 (14)
3276-1, 4	#3701, #6302, #6315 and #9491
3276-11, 14	#3701, #6302 and #9491 (14)
3602	#3701 and #4502 (14)
3631, 3632	#3701 and #4502 (14)
3694	#3701 and #4502 or #6302 (14)
3704, 3705-II	#4714 or #4718 (14, 16, 17)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (14, 27, 28)
3776-3, 4, 3777-3, 4	#3701 (14, 15)
3777-1, 2	#1481 and #3701 (14)
3791	#3701 and #6303 (14) or #3211 and #3703 (9)
3843	(6, 10)
3845, 3846	(6, 16)
4321	#1601, #3701, #4695 and #967X or #969X (4)
4331, 4361	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(14, 25)
4730	(6, 14)
4952, 4955, 4955, 4959, 4965	#2074 or #2090 or #2094 or #2096 (14) or #1310
4987	#4730 or #4731 (14)
5150	(6, 13)
5251-2, 12	#3701
5294	#3701
5340	#2500 and #3701 (11, 14)
5360	#3701 (14)
5381	#3701 (14)
5525	#3701 or #3702
6360, 6580	#3705 (point-to-point only), #3707 (point-to-point only)
7426	(6)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (14) or #3701 and #1605 (13)
8130 B	#3701 and #1602 (14)
8140 C	#1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623
8150	#1732, #1733, #1734, #1735, #1763 or #1764 (14)
8775	#3701 and #9494
8815-1	#3701 (14)

FACILITY D8M

Point-to-point or multipoint synchronous operation at 9600 bps on a nonswitched line via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
3232-1	(6)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (14)
3274-51C	#3701 and #6302 or #6303 (14)
3276-1, 4	#3701, #6302, #6315 and #9491
3276-11, 14	#3701, #6302 and #9491 (14)
3602	#3701 and #4502 (14)
3631, 3632	#3701 and #4502 (14)
3694	#3701 and #4502 (14)
3704, 3705-II	#4714 or #4718 (14, 16, 17)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (14, 27, 28)
3776-3, 4, 3777-3, 4	#3701 (14, 15)
3777-1, 2	#1481 and #3701 (14)
3791	#3701 and #6303 (14) or #3211 and #3703 (9)
3843	(6, 10)
3845, 3846	(6, 16)
4321	#1601, #3701, #4695 and #967X or #969X (4)
4331, 4361	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(14, 25)
4730	(6, 14)
4952, 4954, 4955, 4956, 4959, 4965	#2074 or #2090 or #2094 or #2096 (14) or #1310
4987	#4730 or #4731 (14)
5150	(6, 13)
5251-2, 12	#3701
5294	#3701
5340	#2500 and #3701 (11, 14)
5360	#3701 (14)
5381	#3701 (14)
5525	#3701 or #3702

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Chart D - Nonswitched Voice Grade Lines (cont'd)

6360, 6580	#3705 (point-to-point only), #3707 (point-to-point only)
7426	(6)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (14) or #3701 and #1605 (13)
8130 B	#3701 and #1602 (14)
8140 C	#1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623
8150	#1732, #1733, #1734, #1735, #1763 or #1764 (14)
8775	#3701 and #9494
8815-1	#3701 (14)

FACILITY D8SB

Point-to-point or multipoint synchronous operation at 9600 bps on a duplex Type 3002 Channel (or equivalent) with backup on the public switched telephone network via an IBM 3865 Modem equipped with #7953 (1)

Machine Types	Special Features Required for Attachment
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (14)
3274-51C	#3701 and #6302 or #6303 (14)
3276-1, 4	#3701, #6302, #6315 and #9491
3276-11, 14	#3701, #6302 and #9491 (14)
3602	#3701 and #4502 (14)
3631, 3632	#3701 and #4502 (14)
3694	#3701 and #4502 (14)
3704, 3705-II	#4714 or #4718 (14, 16, 17)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (14, 27, 28)
3776-3, 4, 3777-3, 4	#3701 (14, 15)
3777-1, 2	#1481 and #3701 (14)
3791	#3701 and #6303 (14) or #3211 and #3703 (9)
3843	(6, 10)
3845, 3846	(6, 16)
4321	#1601, #3701, #4695 and #967X or #969X (4)
4331, 4361	#1601, #3701, #4695 and #967X or #969X (4)
4701-1, 2	(14, 25)
4952, 4954, 4955, 4956, 4959, 4965	#2074 or #2090 or #2094 or #2096 (14) or #1310
4987	#4730 or #4731 (14)
5150	(6, 13)
5251-2, 12	#3701 and #9492
5294	#3701 (30)
5340	#2500 and #3701 (11, 14)
5360	#3701 (14)
5381	#3701 (14)
5525	#3701 or #3702
6360, 6580	#3705 (point-to-point only), #3705 (point-to-point only)
7426	(6)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (14) or #3701 and #1605 (13)
8130 B	#3701 and #1602 (14)
8140 C	#1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623
8150	#1732, #1733, #1734, #1735, #1763 or #1764 (14)
8775	#3701 and #9494
8815-1	#3701 (14)

NOTES FOR CHART D:

1. Contact IBM for more information on attachable DCEs, services, etc.
2. Integrated modems perform the modulation/demodulation function on a communication facility at speeds up to 4800 bps. When they are used, stand-alone DCEs are not required. GA24-3435 provides descriptions of these modems and definitions of the communication facilities on which they may be used.
3. The listed 3138 feature codes are for the attachment of the first communication line. See the M3138 pages for additional line attachment feature codes.
4. Specify codes **#967X**, **#968X** and **#969X** stipulate in which protocol the 4321, 4331 or 4361 is to communicate, and to which line position this protocol will be assigned, with the "X" in each case denoting the line position. See M4321, 4331 or 4361 pages for details. **Note:** On the 4361, specify codes **#967X** and **#969X** are not required.
5. The 3603 Model 1 and the 3624, when equipped with #8001, will communicate with a 3602 over a normal "3600 System Loop". When more than one 3603 and/or 3624 are on the loop, point-to-point, half-duplex, 2-wire terminated links are required from the 3602 to the first station on the loop, between successive stations on the loop, and from the last station on the loop back to the 3602. When there is only one 3603 or 3624 on the loop, a point-to-point, duplex, 4-wire terminated link is required between that station and the 3602.

   The 3602 and 3624, when equipped with either #3701 or #5500, will communicate over a nonswitched voice grade line with a 3704, 3705, 3725-1, 2, or 3726 in either point-to-point or multipoint mode.
6. No special feature is required to attach this DTE to to this facility.
7. The 3602 and 3624 will operate on this facility at 1200 bps only. The operational speed of the other DTEs on the facility is determined by:
   - a customer-accessible switch on the 2701, 3138, 3274, 3276, 3624, 3631, 3632, 3651, 3741, 3747, 3771, 3774, 3775, 5110, 5251, 5265, 5340, and 5381
   - the installation of a speed specify on the 3704, 3705, 5010, 8101, 8130, 8140 and 8775. (Please note that, in Emulation mode, the reassignment of a line on the 3704 or 3705 to a different speed will require the re-IPL of the 3704/3705. In NCP mode, this reassignment can be accomplished through a customer-initiated message to the access method.)
   - a customer-accessible switch on the 3767 when #2834 is installed, otherwise, through the installation of a speed specify
   - a customer-initiated keyboard request on the 3791, 4321, 4331 or 4361
   - a customer initiated console request on the 4952, 4955, 4959, 4987 and 5231
   - an Operator Control Language (OCL) instruction on the 6670.
   - the options chosen at the generation of the control program of the 3725-1, 2. (Please note that in Emulation mode, the reassignment of a line on the 3725-1, 2, 3726 to a different speed will require the re-IPL of the 3725-1, 2. In NCP mode, this reassignment can be accomplished through a customer-initiated message to the access method.
8. The listed feature code is for the attachment of a single synchronous communication line to the 2701. See the description of the "Dual Communications Interface" feature in the M2701 pages for the conditions under which a second synchronous line may be attached.
9. The 3276 may be attached as a tributary station on a multipoint nonswitched line where the control station is a 3791 equipped with the Data Link Adapter #3210 or #3211. All stations on such a link must operate at the same line speed and use the same clocking source, i.e., either DTE clock or modem clock, but not a mixture of these two.
10. The 3631, 3632, 8101, 8130 and 8140 support communication with down line 3843 Loop Control Units. The 3843 provides an EIA/CCITT interface to a stand-alone DCE and can be utilized with any synchronous modem at a speed of 2400, 4800 or 9600 bps.

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Chart D - Nonswitched Voice Grade Lines (cont'd)

11. The listed feature codes are for the attachment of a single communication line to the 5340. A second line may be attached to a 5340 equipped with #3500. Second, third and fourth lines may be attached to a 5340 equipped with #4500. See the M5340 pages for details.

12. These feature codes are for the attachment of a modem which does *not* provide its own clocking. This class of modem should always be used where the network is international.

13. These feature codes are for the attachment of a modem which *does* provide its own clocking. This class of modem should only be used on an intranational network.

14. The 3274 Models 1C and 51C, 3276 Models 11 thru 14, 3602, 3624, 3631, 3632, 3651, 3684, 3694, 3767, 3771, 3774, 3775, 3776, 3777, 3791, 4701, 4730 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5285, 5288, 5340, 5360, 5381, 6670, 8101, 8130, 8140, 8150 and 8815 may communicate as tributary stations on a multipoint network with a control station 3704 or 3705 using Synchronous Data Link Control (SDLC). In a multipoint network, SDLC allows the control station to receive from one tributary station while it is transmitting to another tributary station. Operation in this mode requires duplex communication facilities and a 3704, 3705, 3725-1, 2, or 3726 equipped with:
    - #4784 for communication with tributary stations with 1200 bps integrated modems
    - #4755 for communication with tributary stations with 2400 bps integrated modems (#5602) or attaching IBM 3872 Modems
    - #4718 for communication with tributary stations via stand-alone DCEs.

    or a 3725-1, 2, 3726 equipped with:
    - #4911 for communication with tributary stations via stand-alone DCEs.

15. When equipped with #4718, the 3704 or 3705 can communicate in data-full-duplex mode (i.e., simultaneous data transmission in both directions) with a 3776 Model 3, 3776 Model 4 or 3777 Model 3. This type communication requires full-duplex communication facilities.

16. The 3845 and 3846 are data encryption/decryption devices, installed between the DTE and the DCE. They will operate at speeds of up to 1200 bps with start/stop DTEs, and at speeds of up to 19.2K bps with synchronous DTEs. The DCEs involved must meet the requirements of EIA RS-232-C

17. 3704/3705 "Remotes" may communicate with 3704/3705 "Locals" over this facility as their primary communication link. #4714, #4751 and #4781 will support the normal data-half-duplex mode of operation on half-duplex or duplex communication facilities. #4718, #4754 and #4784 will support a data-full-duplex operation (i.e., simultaneous data transmission in both directions) on duplex communication facilities.

18. There are two types of 2400 bps integrated modems that are *not* compatible with each other. The first type, #4751, #4752, #4754, #4755, #5600 and #5602 are line compatible and suitable for communication with each other and with a properly equipped IBM 3872 Modem. The second type, #5640, is line compatible and suitable for communication with another #5640 or with an IBM 3863 mdlel 1 Modem or with an IBM 3868 mdl 1 Rack- Mounted Modem.

19. CCITT V.23 modems that provide modem clocking and CCITT V.26 modems that use Alternative B coding are not truly data transparent, in that transmission of a long string of zeros can cause the receiving modem to lose synchronization. Therefore, unless the PTT can assure that the modems will not lose synchronization during the transmission of zeros for up to one second, NRZI encoding should be used in SDLC (when the 3845 or 3846 are *not* to be installed), and transparent mode should *not* be used in BSC. See your PTT coordinator for details.

20. On switched network backup facilities, the IBM stand-alone or integrated modem must be equipped as shown for operation on the backup link. However, a control station may elect to operate on this type service via two separate ports, one of which is dedicated to the primary nonswitched link, and the other of which is dedicated to the backup switched link. Each of these ports must be equipped with a modem compatible with the stand-alone or integrated modem with which it is to communicate.

21. There are two types of 4800 bps integrated modems that are *not* compatible with each other. The first type, #5700 and #5702, is line compatible and suitable for communication with each other and with a properly equipped IBM 3874 Modem. The second type, #5740, is line compatible and suitable for communication with another #5740 and with an IBM 3864 Model 1 Modem or IBM 3868 Model 2 Rack-Mounted Modem.

22. The 3651 will communicate over this facility with a 3704, 3705, 3725-1, 2 or 3726 at the host system, or with a 3659 at a remote store site. See the M3651 pages for the appropriate feature codes for both type communications. See the M3659 pages for the requirements on that unit for the remote store communications.

23. Refer to the M3863, 3864 and 3865 pages for the DTE attachment codes required for each attaching DTE.

23. The 8101 can only be attached to an 8140.

25. For communication in the SNA/SDLC protocol, no special feature is required on the 4701. For communication in the BSC protocol, *which is limited to a speed of no greater than 4800 bps,* #1422 is required. Communication in either protocol requires that clocking be provided by the attached DCE.

26. The IBM 8815 mdl 4 provides a 4800-bps integrated modem as part of the basic machine. This modem is line compatible and suitable for communication with another IBM 8815-4 or with an IBM 8815-1 equipped with an IBM 3864 mdl 1.

27. 3725-1, 2, 3726 "Remotes" may communicate over this facility with 3704, 3705 or 3725-1, 2, 3726 "Locals" as their primary communication link. #4911 will support the normal data half-duplex operational mode on half-duplex or duplex communication facilities or a data full-duplex (i.e., simultaneous data transmission in both directions) operational mode on duplex communication facilities.

28. The 3725-1, 2, 3726 equipped with #4911 can communicate in a data full-duplex mode (i.e., data transmission in both directions simultaneously) with a 3776 mdl 3 or 4, or a 3777 mdl 3. This type of communication requires full-duplex communication facilities.

29. This feature is only required for the 3725-1 and the 3726, not for the 3725-2.

30. The 5294 supports operation on this facility only when the attached modem is not dependent on use of a signal. Use Select-Standby for selection of switched network backup mode; that is, SNBU must be selectable by a modem operator switch.

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IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

CHART E
NONSWITCHED WIDEBAND CHANNELS

FACILITY E1

Point-to-point synchronous operation at 19.2K bps on a Type 8803 Service (1)

Machine Types	Special Features Required for Attachment
2701	#7697 (4)
3704	#4717
3705-II	#4717 or #4725 (2, 3)
3705-80	#6713
3725-1, 2, 3726	#4921 or #4931 (8, 9)
3776-3, 4, 3777-3, 4	#4501 (3)
3777-1, 2	#1481 and #4501
4952, 4954, 4955, 4956, 4959, 4965	#2075
5340	#5401 or #5402 or #5403 or #5404

FACILITY E2

Point-to-point synchronous operation at 40.8K bps on a Type 8801 Service (1)

Machine Types	Special Features Required for Attachment
2701	#7697 (4)
3704	#4717(2)
3705-II	#4717 or #4725 (2)
3705-80 3726	#6713
4321	#1601, #4695, #4720 and #967X or #969X (4)
4952, 4954, 4955, 4956, 4959, 4965	#2075
5010	#2074 and #4805
5340	#5401 or #5402 or #5403 or #5404

FACILITY E3

Point-to-point synchronous operation at 50K bps on a Type 8801 Service (1)

Machine Types	Special Features Required for Attachment
2701	#7697 (4)
3704	#4717 (2)
3705-II	#4717 or #4725 (2)
3705-80	#6713
3725-1, 2, 3726	#4921 or #4931 (8)
4952, 4954, 4955, 4956, 4959, 4965	#2075
5340	#5401 or #5402 or #5403 or #5404

FACILITY E4

Point-to-point synchronous operation at 230.4K bps on a Type 8751 Service (1)

Machine Types	Special Features Required for Attachment
2701	#7697 (4)
3705-II	#4722 or #4723 (2)
3725-1, 2, 3726	#4921 (8)

NOTES FOR CHART E:

1. Contact IBM for more information on attachable DCEs, services, etc.
2. 3704/3705 "Remotes" may communicate over this facility with 3704/3705 "Locals" as their primary communication link. #4717 and #4722 will support the normal data-half-duplex operational mode, while #4725 will support a data-full-duplex (i.e., simultaneous data transmission in both directions) operational mode.
3. The 3705, using #4725 can communicate in a data-full-duplex mode (i.e., data transmission in both directions simultaneously) with a 3776 Model 3, 3776 Model 4 or a 3777 Model 3.
4. This feature code is for the attachment of a single communication line. See the description of the "Dual Communications Interface" feature in the M2701 pages for the conditions under which a second line may be attached.
5. A communication line attached to the ICA via this feature presents a 100% load factor to the ICA, and must not be operated simultaneously with any other line on the ICA.
6. The 8101 will operate at this speed only when it is installed in conjunction with an 8140 A or B or with an 8140 C without #1610-#1614 or with an 8150 without ports 1-4 and 9-12.
7. IBM DTEs normally provide cables terminating with #16 pins. In those countries where #20 pins are required, an adapter cable is available. This is supplied as Cable Group #1393 on the 3704 and 3705, and as specify **#2723** on the 4952, 4955, 4959, 4987, 8101 and 8140.
8. 3725-1, 2, 3726 "Remotes" may communicate over this facility with 3704, 3705 or 3725-1, 2, 3726 "Locals" as their primary communication link. #4921 will support the normal data half-duplex operational mode and a data full-duplex (i.e., simultaneous data transmission in both directions) operational mode.
9. The 3725-1, 2, 3726 using #4921 can communicate in a data full-duplex mode (i.e., data transmission in both directions simultaneously) with a 3776 mdl 3 or 4, or a 3777 mdl 3.

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IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

CHART G
NONSWITCHED BASEBAND LINES

FACILITY G1

Point-to-point or multipoint start/stop operation at 134.5 bps via an integrated Type 1A (half-duplex) or Type 1B (duplex) limited distance line adapter (1)

Machine Types	Special Features Required for Attachment
3704, 3705-II	#9606 and #4731 (Ty 1A) or #4732 (Ty 1B)

FACILITY G2

Point-to-point or multipoint start/stop operation at 134.5 or 600 bps via an integrated Type 2A (half-duplex) or Type 2B (duplex) limited distance line adapter (1)

Machine Types	Special Features Required for Attachment
2701	#4636 (Ty 2A) or #4637 (Ty 2B)
3704, 3705-II	#4741 and #9606 (at 134.5 bps) or #9607 (at 600 bps)
5010	#4750

FACILITY G3M

Point-to-point or multipoint synchronous operation at 2400, 4800 or 9600 bps via a stand-alone baseband modem attached under the provisions of the IBM Multiple Supplier Systems Policy (2)

Machine Types	Special Features Required for Attachment
2701	#7698 (3)
3138	#4640, #9609 and #9649 (3, 4)
3232-1	(5)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (6)
3274-51C	#3701 and #6302 or #6303 (6)
3276-1,4	#3701, #6302 and #9491 (3)
3276-11,14	#3701, #6302 and #9491 (6)
3602	#3701 and #4502 or #6302
3603-2	2400 bps, point-to-point only (5)
3624	#3701 and #1422 or #6302 (3, 6)
3631, 3632	#3701 and #4502 or #6302
3651-25, 50	#9121 or #9122 (6, 7) or #9124 or #9125 (6, 8)
3651-75	#9121 or #9122 (6, 7) or #9124 or #9125 (6, 8) or #6185 (7)
3684	#3701 and #9822 (6, 7) or #3701 and #9823 (6, 8)
3694	#3701 or #3701 and #4502 (6)
3704, 3705-II	#4714 or #4718 (6, 9, 10)
3705-80	No special feature required
3705-80	No special feature required
3725-1, 2, 3726	#4911 (6, 16, 17)
3741	#9121 (7)
3747	#1660 and #9121 (7)
3767	#3718 and #9533 (6, 7)
3771, 3774, 3775	#1481 and #3701 (3, 6)
3776-1,2	#1481 and #3701 (3, 6)
3776-3,4, 3777-3,4	#3701 (6)
3777-1,2	#1481 and #3701 (6)
3791	#3701 and #6302 or #6303 (6) or #3211 and #3703 (11)
4321	#1601, #3701, #4695 and #967X or #969X (12)
4331, 4361	#1601, #3701, #4695 and #967X or #969X (12)
4701-1,2	(6, 15)
4730	(5, 6)
4952, 4954, 4955, 4956, 4959, 4965	#2074 or #2090 or #2094 or #2096 (6) or #1310
4987	#4731 or #4731 (6)
5010	#2074 and #4800 (3)
5110	#2074 and #3701 (3)
5150	(5)
5231	#4780, #9753 or #9754 and #9481 or #9482 (3)
5251-2,12	#3701
5265	#3701 (7)
5285, 5288	#3701 (3, 6)
5294	#3701
5340	#2500 and #3701 (6, 13)
5360	#3701 (6)
5381	#3701 (6)
5525	#3701 or #3702
6360	#3704 or #3705 or #3707 (point-to-point only)
6580	#3705 (point-to-point only)
6670	#3701 (6, 7)
7426	(5)
8101, 8130 A	#3701 and #1602 or #1604 (6) or #3701 and #1605
8130 B	#3701 and #1602 (6)
8140 A, B	#3701 and #1602 or #1604 (6) or #3701 and #1605
8140 C	#1610, #1611, #1620, #1621, #1622, #1623, or #1630 (6)
8150	#1732, #1733, #1734, #1735, #1763, or #1764 (6)
8775	#3701 and #9494
8815-1	#3701 (6)

NOTES FOR CHART G:

1. The Limited Distance Line Adapters, Types 1A and 1B, are limited to a link of no more than 7.65km (4.75 miles). The Limited Distance Line Adapters, Types 2A and 2B, are limited to a link of no more than 13.25km (8 miles). See GA24-3435 for detailed descriptions of these adapters and the communication links over which they may operate.
2. Contact IBM for more information on attachable DCEs, services, etc.
3. These feature codes will support communication on this facility at 2400 or 4800 bps only.
4. The listed 3138 feature codes are for the attachment of the first communication line. See the M3138 pages for additional line attachment feature codes.
5. No special feature is required to attach this DTE to this facility.
6. The 3274 Models 1C and 51C, 3276 Models 11 thru 14, 3602, 3624, 3631, 3632, 3651, 3684, 3767, 3771, 3774, 3775, 3776, 3777, 3791, 4701, 4730, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5285, 5288, 5340, 5360, 5381, 6670, 8101, 8130, 8140, 8150 and 8815 may communicate as tributary stations on a multipoint network with a control station 3704, 3705, 3725-1, 2 or 3726 using Synchronous Data Link Control (SDLC). In a multipoint network, SDLC allows the control station to receive from one tributary station while it is transmitting to another tributary station. Operation in this mode requires duplex communication facilities and a 3704/3705 equipped with #4718 or a 3725-1, 2, 3726 equipped with #4911. SDLC also supports the normal data-half-duplex mode of operation over half-duplex or duplex facilities.
7. These feature codes will support communication on this facility at 2400 bps only.

Chart G - Nonswitched Baseband Lines (cont'd)

8. These feature codes will support communication on this facility at 4800 bps only.
9. 3704/3705 "Remotes" may communicate with 3704/3705 "Locals" over this facility as their primary communication link. #4714 will support the normal data-half-duplex mode of operation on half-duplex or duplex facilities. #4718 will support a data-full-duplex (i.e., simultaneous data transmission in both directions) on duplex communication lines.
10. When equipped with #4718, the 3704 or 3705 can communicate in data-full-duplex (i.e., simultaneous data transmission in both directions) mode with a 3776 Model 3, 3776 Model 4 or 3777 Model 3. This mode of operation requires duplex communication facilities.
11. The 3276 may be attached as a tributary station on a multipoint line where the control station is a 3791 equipped with the Data Link Adapter, #3211.
12. Specify codes **#967X** and **#969X** on the 4331 stipulate in which protocol the 4331 is to communicate, and to which line position on the 4331 that protocol is to be assigned, with the "X" in each case denoting the line position. See the M4331 pages for details.
13. The listed feature codes are for the attachment of a single communication line to the 5340. A second line may be attached to a 5340 equipped with #3500. Second, third and fourth lines may be attached to a 5340 equipped with #4500. See the M5340 pages for details.
14. The 8101 will operate at this speed only when it is installed in conjunction with an 8140 A or B or 8140 C without #1610-#1614 or an 8150 without ports 1-4 and 9-12.
15. Communication in the SNA/SDLC protocol requires no special feature on the 4701. Communication in the BSC protocol, *which is limited to a speed no greater than 4800 bps,* requires #1422.
16. 3725-1, 2, 3726 "Remotes" may communicate over this facility with 3704, 3705 or 3725-1, 2, 3726 "Locals" as their primary communication link. #4911 will support the normal data half-duplex operational mode on half-duplex or duplex facilities or a data full-duplex (i.e., simultaneous data transmission in both directions) operational mode on duplex communication lines.
17. The 3725-1, 2, 3726, equipped with #4911 can communicate in data full-duplex mode (i.e., simultaneous data transmission in both directions) with a 3776 mdl 3 or 4, or a 3777 mdl 3. This type of communication requires full-duplex communication facilities.

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CHART L

CIRCUIT SWITCHED PUBLIC DATA NETWORKS PROVIDING A CCITT "X" SERIES INTERFACE

FACILITY L3

Synchronous operation at 2400 bps on a public switched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in IBM GA27-3287 (1)

Machine Types	Special Features Required for Attachment
3274-51C	#5656, #6303 and #9112 (2, 5)
3276-11, 14	#1068, #5656 and #6302 (2, 5)
3705-II	#5656 and #9840 (2, 3)
3705-81, 3705-82	#5657 and #9775 (2, 3)
3725-1, 2, 3726	#4941 (2)
5360	#5655 (2)
8101 A2X, 8130, 8140 B	#1602 and #5656 (2)
8140 C	#1612 (2)
8150	#1752 or #1755 (2)

FACILITY L4

Synchronous operation at 4800 bps on a public switched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in IBM GA27-3287 (1)

Machine Types	Special Features Required for Attachment
3274-51C	#5656, #6303 and #9112 (2, 5)
3276-11, 14	#1068, #5656 and #6302 (2, 5)
3705-II	#5656 and #9840 (2, 3)
3705-81, 3705-82	#5657 and #9775 (2, 3)
3725-1, 2, 3726	#4941 (2)
5360	#5655 (2)
8101 A2X, 8130, 8140 B	#1602 and #5656 (2)
8140 C	#1612 (2)
8150	#1752 or #1755 (2)

FACILITY L5

Synchronous operation at 9600 bps on a public switched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in IBM GA27-3287 (1)

Machine Types	Special Features Required for Attachment
3274-51C	#5656, #6303 and #9112 (2, 5)
3276-11, 14	#1068, #5656 and #6302 (2, 5)
3705-II	#5656 and #9840 (2, 3)
3705-81, 3705-82	#5657 and #9775 (2, 3)
3725-1, 2, 3726	#4941 (2)
5360	#5655 (2)
8101 A2X, 8130, 8140 B	#1602 and #5656 (2)
8140 C	#1612 (2)
8150	#1752 or #1755 (2)

FACILITY L6

Synchronous operation at 48K bps on a public switched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in IBM GA27-3287

Machine Types	Special Features Required for Attachment
3274-51C	#5656, #6303 and #9112
3705-II	#5656 and #9841 (3)
3705-81, 3705-82	#5658 and #9776 (3)
3725-1, 2, 3726	#4942
5360	#5655 (2)
8101 A2X, 8130 B, 8140 B	#1602 and #5656 (2, 4)
8140 C	#1612 (2)
8150	#1752 or #1755 (2)

NOTES FOR CHART L:

1. Contact IBM for more information on attachable DCEs, services, etc.
2. When attached to a Network via the CCITT X.21 interface feature (as noted), these DTEs may communicate with other DTEs attached to this network via a CCITT X.21bis interface.
3. 3705-II X.21 switched operation requires the use of a Type 2 Communication Scanner. Switched X.21 operation on the 3705-II and the 3705-80 is supported by ACF/NCP/VS Release 3, ACF/VTAM Release 3 and ACF/TCAM Version 2 Release 3. User Facilities as defined in CCITT Recommendation X.2 are supported as follows:
   - Automatic Answering.
   - Address Calling and Abbreviated Address Calling Only address blocks, consisting of a single address signal are supported, and abbreviated address calling is supported on a per-call basis only.
   - Direct Call is supported on a contractual or a per-call basis.
   - Closed User Groups are supported on a contractual basis only, with both Preferred and Nonpreferred Groups included. The Facility Request Block used to select the Closed User Group (CUG) may only consist of a single Facility Request Signal, to be followed by an Address Block as described under Address Calling above. Please note that the Facility Request Codes for a CUG may vary from country to country. Your local teleprocessing coordinator should be contacted for details.
   - Call Progress Signalling is reported via an operator message containing the Call Progress Signal (CPS) code and a brief message of its significance. Those CPSs defined in Annex 6 of Recommendation X.21 are recognized, with the exception of CPSs 82 and 83, which are related to a currently unsupported user facility. Any unrecognized CPS that is received is reported via an operator message that states that this is an "Unrecognized CPS."
4. The 8101 A2X cannot attach to an 8130 or 8140 C containing #1610-#1614 or to an 8150 without ports 1-4 and 9-12.
5. The 3274 and 3276 X.21 switched interface features will support the following network facilities as defined in CCITT Recommendation X.2:
   - Abbreviated address call
   - Direct call
   - Call progress signalling
   - Closed user groups

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IBM LINE ADAPTER AND MODEM APPLICATION GUIDE

CHART M

NONSWITCHED PUBLIC DATA NETWORKS PROVIDING AN EIA RS-232-C OR CCITT V.35 INTERFACE

FACILITY M1M

Point-to point or multipoint start/stop operation at 134.5 or 300 bps on a nonswitched public data network via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
3101	(4)
3138	#4640 and #9721 (2)
3704, 3705-II	#4711 or #4714 and #9606 (at 134.5 bps) or #9612 (at 300 bps)
3705-80	No special feature required at 134.5 bps or #1413 at (300 bps)
3725-1, 2, 3726	#4911 and #4666 (17)
3767	#3719, #9540 and #7111 or #7113 (at 300 bps only)
3792	#3701 (at 134.5 bps only)
3845, 3846	(4, 10)
4321	#1601, #3701, #4696 and #968X (3)
4331, 4361	#1601, #3701, #4696 and #968X (3)
4952, 4954, 4955, 4956, 4959, 4965	#1610 or #2092 or #2096
4987	#4730 or #4731
5110	#1525 (point-to-point only)
8101, 8130 A, 8140 A, B	#1603 and #3701 (point-to-point only)

FACILITY M2M

Point-to-point or multipoint start/stop operation at 600 or 1200 bps on a nonswitched public data network via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
3101	(4)
3138	#4640 and #9721 (2)
3704, 3705-II	#4711 or #4714 and #9607 (at 600 bps) or #9608 (at 1200 bps)
3705-80	#1415
3725-1, 2, 3726	#4911 and #4666 (17)
3767	#3719, #7112 and #9541 (at 600 bps only)
3845, 3846	(4, 10)
4321	#1601, #3701, #4696 and #968X (3)
4331, 4361	#1601, #3701, #4696 and #968X (3)
4387	#4730 or #4731
8101, 8140 A, B	#1603 and #3701 (point-to-point only)

FACILITY MA3

Point-to-point or multipoint synchronous operation at 2400 bps on the Dataphone* Digital Service via an integrated DCE (1)

* Registered trademark of AT&T

Machine Types	Special Features Required for Attachment
3274-1C, 21C, 31C	#5650 or #5651, #6302 and #9822 (8)
3274-51C	#5650 or #5651, #6302 and #9822 (8)
3276-1, 4	#5650 or #5651, #6302 and #9822
3276-11, 14	#5650 or #5651, #6302 and #9822 (8)
3776-3, 4, 3777-3, 4	#5650 or #5651 and #9822 (8)
4321, 4331, 4361	#1601, #4695, #5650 and #967X or #969X (3)
5110-1, 2	#5650 or #5651
5251-2, 12	#5650 or #5651
5294	#5650 or #5651
5340	#5650 or #5651 (7, 8)
5360	#5650 (8)
8101, 8130 A, 8140 A, B	#5660 and #1602 or #1604 (8)
8775	#5650 or #5651 and #9822
8815-1	#5650 and #9822 (8)

FACILITY M3M

Point-to-point or multipoint synchronous operation at 2400 bps on a nonswitched public data network via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
2701	#7698 (5)
3138	#4640, #9609 and #9649 (2)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (8)
3274-51C	#3701 and #6302 or #6303 (8)
3276-1, 4	#3701, #6302 and #9491
3276-11, 14	#3701, #6302 and #9491 (8)
3602	#3701 and #4502 or #6302 (8)
3624	#3701 and #1422 or #6302 (8)
3631, 3632	#3701 and #4502 or #6302 (8)
3651-25, 50	#9121 or #9122 (8, 12)
3651-75	#9121 or #9122 (8) or #6185 (12)
3684	#3701 and #9822 (8)
3694	#3701 and #4502 (8)
3704, 3705-II	#4714 or #4718 (8, 9, 11)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (8, 14)
3741	#9121
3747	#1660 and #9121
3767	#3718, 9404 and #9533
3771, 3774, 3775	#1481 and #3701 (8)
3776-1, 2, 3777-1, 2	#1481 and #3701 (8)
3776-3, 4, 3777-3, 4	#3701 (8, 9)
3791	#3701 and #6302 or #6303 (8) or #3211 and #3703 (6)
3845, 3846	(4, 10)
4321	#1601, #3701, #4695 and #967X or #969X (3)
4331, 4361	#1601, #3701, #4695 and #967X or #969X (3)
4701-1, 2	(8, 14)
4730	(4, 8)

Chart M - Nonswitched Public Data Networks (cont'd)

4952, 4954, 4955, 4956, 4959, 4965	#2074 or #2090 or #2094 or #2096 (8) or #1310
4987	#4730 or #4731 (8)
5010	#2074
5110	#2074 and #3701
5150	(4)
5231	#2074, #4780, #9753 and #9481 or #9482
5251-2, 12	#3701
5265	#3701
5285, 5288	#3701, #9753 and #9481 or #9482
5294	#3701
5340	#2500 and #3701 (7, 8)
5360	#3701 (8)
5381	#3701 (8)
5525	#3701 or #3702
6360, 6580	#3705 (point-to-point only), #3707 (point-to-point only)
6670	#3701 (8)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (8) or #3701 and #1605
8130 B	#3701 and #1602 (8)
8140 C	#1610, #1611, #1620, #1621 or #1630 (8) or #1622 (8) or #1623
8150	#1732, #1733, #1734, #1735, #1763 or #1764 (8)
8775	#3701 and #9494
8815-1	#3701 (8)

FACILITY MA4

Point-to-point or multipoint synchronous operation at 4800 bps on the Dataphone* Digital Service via an integrated DCE (1)

* Registered trademark of AT&T

Machine Types	Special Features Required for Attachment
3274-1C, 21C, 31C	#5650 or #5651, #6302 and #9823 (8)
3274-51C	#5650 or #5651, #6302 and #9823 (8)
3276-1, 4	#5650 or #5651, #6302 and #9823
3276-11, 14	#5650 or #5651, #6302 and #9823 (8)
3776-3, 4, 3777-3, 4	#5650 or #5651 and #9823 (8)
4321, 4331 4361	#1601, #4695, #5650 and #967X or #969X (3)
5110-1, 2	#5650 or #5651
5251-2, 12	#5650 or #5651
5294	#5650 or #5651
5340	#5650 or #5651 (7, 8)
5360	#5650 (8)
5381	#5650 or #5651 (8)
8101, 8130 A, 8140 A, B	#5660 and #1602 or #1604 (8)
8130 B	#3701 and #1602 (8)
8775	#5650 or #5651 and #9823
8815-1	#5650 and #9823 (8)

FACILITY M4M

Point-to-point or multipoint synchronous operation at 4800 bps on a nonswitched public data network via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
2701	#7698 (5)
3138	#4640, #9609 and #9649 (2)
3274-1C, 21C, 31C	#3701 and #6302 or #6303 (8)
3274-51C	#3701 and #6302 or #6303 (8)
3276-1, 4	#3701, #6302 and #9491
3276-11, 14	#3701, #6302 and #9491 (8)
3602	#3701 and #4502 or #6302 (8)
3624	#3701 and #1422 or #6302 (8)
3631, 3632	#3701 and #4502 or #6302 (8)
3651-25, 50	#9124 or #9125 (8)
3651-75	#9124 or #9125 (8)
3684	#3701 and #9823
3694	#3701 and #4502 (8)
3704, 3705-II	#4714 or #4718 (8, 9, 11)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (8, 14)
3771, 3774, 3775	#1481 and #3701 (8)
3776-1, 2, 3777-1, 2	#1481 and #3701 (8)
3776-3, 4, 3777-3, 4	#3701 (8, 9)
3791	#3701 and #6302 or #6303 (8) or #3211 and #3703 (6)
3845, 3846	(4, 10)
4321	#1601, #3701, #4695 and #967X or #969X (3)
4331, 4361	#1601, #3701, #4695 and #967X or #969X (3)
4701-1, 2	(8, 14)
4730	(4, 8)
4952, 4954, 4955, 4956, 4959, 4965	#2074 or #2090 or #2094 or #2096 (8) or #1310
4987	#4730 or #4731 (8)
5010	#2074 and #4800
5110	#2074 and #3701
5150	(4)
5231	#2074, #4780, #9754 and #9481 or #9482
5251-2, 12	#3701
5285, 5288	#3701, #9754 and #9481 or #9482 (8)
5294	#3701
5340	#2500 and #3701 (7, 8)
5360	#3701 (8)
5381	#3701 (8)
5525	#3701 or #3702
6360, 6580	#3705 (point-to-point only), #3707 (point-to-point only)
7426	(4)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (8) or #3701 and #1605
8130 B	#3701 and #1602 (8)

Chart M - Nonswitched Public Data Networks (cont'd)

8140 C	#1610, #1611, #1620, #1621 or #1630 (8) or #1622 (8) or #1623
8150	#1732, #1733, #1734, #1735, #1763 or #1764 (8)
8775	#3701 and #9494
8815-1	#3701 (8)

FACILITY MA5

Point-to-point or multipoint synchronous operation at 9600 bps on the Dataphone* Digital Service via an integrated DCE (1)

* Registered trademark of AT&T

Machine Types	Special Features Required for Attachment
3274-1C, 21C, 31C	#5650 or #5651, #6302 and #9825 (8)
3274-51C	#5650 or #5651, #6302 and #9825 (8)
3276-11, 14	#5650 or #5651, #6302 and #9825 (8)
3776-3, 4, 3777-3, 4	#5650 or #5651 and #9825 (8)
4321, 4331, 4361	#1601, #4695, #5650 and #967X or #969X (3)
5251-2, 12	#5650 or #5651
5294	#5650 or #5651
5340	#5650 or #5651 (7, 8)
5360	#5650 (8)
5381	#5650 or #5651 (8)
8101, 8130 A, 8140 A, B	#5660 and #1602 or #1604 (8)
8130 B	#3701 and #1602 (8)
8775	#5650 or #5651, #9494 and #9825
8815-1	#5650 and #9825 (8)

FACILITY M5M

Point-to-point or multipoint synchronous operation at 9600 bps on a nonswitched public data network via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
3274-1C, 21C, 31C	#370l and #6302 or #6303 (8)
3274-51C	#3701 and #6302 or #6303 (8)
3276-1, 4	#3701, #6302, #6315 and #9491
3276-11, 14	#3701, #6302 and #9491 (8)
3602	#3701 and #4502 (8)
3631, 3632	#3701 and #4502 (8)
3694	#3701 and #4502 (8)
3704, 3705-II	#4714 or #4718 (8, 9, 11)
3705-80	No special feature required
3725-1, 2, 3726	#4911 (8, 14)
3776-3, 4, 3777-3, 4	#3701 (8, 9)
3777-1, 2	#1481 and #3701 (8)
3791	#3701 and #6302 or #6303 (8) or #3211 and #3703 (6)
3845, 3846	(4, 10)
4321	#1601, #3701, #4695 and #967X or #969X (3)
4331, 4361	#1601, #3701, #4695 and #967X or #969X (3)
4701-1, 2	(8, 14)
4730	(4, 8)
4952, 4954, 4955, 4956, 4959, 4965	#2074 or #2090 or #2094 or #2096 (8) or #1310
4987	#4730 or #4731 (8)
5150	(4)
5251-2, 12	#3701
5294	#3701
5340	#2500 and #3701 (7, 8)
5360	#3701 (8)
5381	#3701 (8)
5525	#3701 or #3702
6360, 6580	#3705 (point-to-point only), #3707 (point-to-point only)
7426	(4)
8101, 8130 A, 8140 A, B	#3701 and #1602 or #1604 (8) or #3701 and #1605
8130 B	#3701 and #1602 (8)
8140 C	#1610, #1611, #1620, #1621 or #1630 (8) or #1622 (8) or #1623
8150	#1732, #1733, #1734, #1735, #1763 or #1764 (8)
8775	#3701 and #9494
8815-1	#3701 (8)

FACILITY MA6

Point-to-point or multipoint synchronous operation at 56K bps on the Dataphone* Digital Service via an integrated DCE (1)

* Registered trademark of AT&T

Machine Types	Special Features Required for Attachment
3274-1C, 21C, 31C	#6302, #9833 and #5650 or #5651
4321, 4331, 4361	#1601, #4695, #5650 and #967X or #969X (3)
5294	#5650 or #5651
5340	#5391 (7)
5360	#5650 (8)
8101, 8140, A, B	#5660 and #1602 (13)

FACILITY M6M

Point-to-point or multipoint synchronous operation at 56K bps on a nonswitched public data network via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

Machine Types	Special Features Required for Attachment
3274-1C, 21C, 31C	#1550 and #6303 (point-to-point only)
3705-II	#4720 or #4726
3705-80	#6712
3725-1, 2, 3726	#4931
4321, 4331, 4361	#1601, #4695, #4720 and #967X or #969X (3)
4952, 4954, 4955, 4956, 4959, 4965	#2075, #2780
8101, 8140 A, B	#1550 and #1602 (13)
8140 C	#1614
8150	#1742 or #1745

Chart M - Nonswitched Public Data Networks (cont'd)

NOTES FOR CHART M:

1. Contact IBM for more information on these facilities, including attachable DCEs, required options, etc.
2. The listed 3138 feature codes are for the attachment of the first communication line. See the M3138 pages for additional line attachment feature codes.
3. Specify codes **#967X**, **#968X** and **#969X** stipulate in which protocol the 4321, 4331 or 4361 is to communicate, and to which line position this protocol will be assigned, with the "X" in each case denoting the line position. See the M4321, 4331 or 4361 pages for details. **Note:** On the 4361, specify codes **#967X** and **#969X** are not required.
4. No special feature is required to attach this DTE to this facility.
5. The listed feature code is for the attachment of a single synchronous communication line to the 2701. See the description of the "Dual Communications Interface" feature in the M2701 pages for the conditions under which a second synchronous line may be attached.
6. The 3276 may be attached as a tributary station on a multipoint nonswitched line where the control station is a 3791 equipped with the Data Link Adapter, #3210 or #3211. All stations on such a line must operate at the same line speed and use the same type clocking source, i.e., either DTE clock or modem clock, but not a mixture of these two.
7. The listed feature codes are for the attachment of a single communication line to the 5340. A second line may be attached to a 5340 and equipped with #3500. Second, third and fourth lines may be attached to a 5340 equipped with #4500. See the M5340 pages for details.
8. The 3274 Models 1C and 51C, 3276 Models 11 thru 14, 3602, 3624, 3631, 3632, 3651, 3684, 3694, 3767, 3771, 3774, 3775, 3776, 3777, 3791, 4701, 4730, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5285, 5288, 5340, 5360, 5381, 6670, 8101, 8130, 8140, 8150 and 8815 may communicate as tributary stations on a multipoint network with a control station 3704, 3705, 3725-1, 2, or 3726 using Synchronous Data Link Control (SDLC). In a multipoint network, SDLC allows the control station to receive from one tributary station while it is transmitting to another tributary station. Operation in this mode requires duplex communication facilities, and a 3704/3705 equipped with #4718 or a 3725-1, 2, 3726 equipped with #4911.
9. When equipped with #4718, the 3704 or 3705 can communicate in data-full-duplex mode (i.e., simultaneous data transmission in both directions) with a 3776 Model 3, 3776 Model 4 or 3777 Model 3. This type communication requires duplex communication facilities.
10. The 3845 and 3846 are data encryption/decryption devices, installed between the DTE and the DCE. They will operate at speeds of up to 1200 bps with start/stop DTEs and at speeds of up to 19.2K bps with synchronous DTEs. The DCEs involved must meet the requirements of EIA RS-232-C.
11. 3704/3705 "Remotes" may communicate with 3704/3705 "Locals" over this facility as their primary communication link. #4714 will support the normal data-half-duplex mode of operation on half-duplex or duplex communication facilities. #4718 will support a data-full-duplex operation (i.e., simultaneous data transmission in both directions) on duplex communication facilities.
12. The 3651 will communicate over this facility with a 3704, 3705, 3725-1, 2, or 3726 at the host system, or with a 3659 at a remote store site. See the M3651 pages for the appropriate feature codes for both communications types. See the M3659 pages for the requirements on that unit for the remote store communications.
13. The 8101 will operate at this speed only when it is installed in conjunction with an 8140 A or B or 8140 C without #1610-#1614 or with an 8150 without ports 1-4 and 9-12.
14. Communication in the SNA/SDLC protocol requires no special feature on the 4701. Communication in the BSC protocol, *which is limited to a speed no greater than 4800 bps,* requires #1422.
15. 3525-1, 2, 3726 "Remotes" may communicate over this facility with 3704, 3705 or 3725-1, 2, 3726 "Locals" as their primary communication link. #4911 will support the normal data half-duplex operational mode on half-duplex or duplex communication facilities and a data full-duplex (i.e., simultaneous data transmission in both directions) operational mode on duplex communication facilities.
16. The 3525-1, 2, 3726 equipped with #4911 can communicate in data full-duplex mode (i.e., simultaneous data transmission in both directions) with a 3776 mdl 3 or 4, or a 3777 mdl 3. This type of communication requires full-duplex communication facilities.
17. This feature is only required for the 3725-1 and the 3726, not for the 3725-2.

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CHART N

NONSWITCHED PUBLIC DATA NETWORKS PROVIDING A CCITT "X" SERIES INTERFACE

FACILITY N3

Point-to-point or multipoint synchronous operation at 2400 bps on a public nonswitched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in GA27-3287 . (1)

Machine Types	Special Features Required for Attachment
3274-21C, 31C, 51C	#5655 and #6302 (2)
3276-11, 14	#5655 and #6302 (2)
3705-II	#5655 and #9842 (2)
3705-81, 3705-82	#5657 and #9777 (2)
3725-1, 2, 3726	#4941 (2)
4321	#1601, #4695, #5655 and #969X (2, 3)
4331, 4361	#1601, #4695, #5655 and #969X (2, 3)
4701-1, 2	#5655 (2)
4952, 4954, 4955, 4956, 4959, 4965	#2080
5294	#5655
5360	#5655
8101, 8130, 8140 A, B	#1602 and #5655 (2)
8140 C	#1613 (2)
8150	#1752 or #1755 (2)
8775	#5655 and #9822 (2)
8815	#5655 (2)

FACILITY N4

Point-to-point or multipoint synchronous operation at 4800 bps on a public nonswitched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in GA27-3287 . (1)

Machine Types	Special Features Required for Attachment
3274-21C, 31C, 51C	#5655 and #6302 (2)
3276-11, 14	#5655 and #6302 (2)
3705-II	#5655 and #9842 (2)
3705-81, 3705-82	#5657 and #9777 (2)
3725-1, 2, 3726	#4941 (2)
4321	#1601, #4695, #5655 and #969X (2, 3)
4331, 4361	#1601, #4695, #5655 and #969X (2, 3)
4701-1, 2	#5655 (2)
4952, 4954, 4955, 4956, 4959, 4965	#2080
5294	#5655
5360	#5655
8101, 8130, 8140 A, B	#1602 and #5655 (2)
8140 C	#1613 (2)
8150	#1752 or #1755 (2)
8775	#5655 and #9823 (2)
8815	#5655 (2)

FACILITY N5

Point-to-point or multipoint synchronous operation at 9600 bps on a public nonswitched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in GA27-3287 . (1)

Machine Types	Special Features Required for Attachment
3274-21C, 31C, 51C	#5655 and #6302 (2)
3276-11, 14	#5655 and #6302 (2)
3705-II	#5655 and #9842 (2)
3705-81, 3705-82	#5657 and #9777 (2)
3725-1, 2, 3726	#4941 (2)
4321	#1601, #4695, #5655 and #969X (2, 3)
4331, 4361	#1601, #4695, #5655 and #969X (2, 3)
4701-1, 2	#5655 (2)
4952, 4954, 4955, 4956, 4959, 4965	#2080
5294	#5655
5360	#5655
8101, 8130, 8140 A, B	#1602 and #5655 (2)
8140 C	#1613 (2)
8150	#1752 or #1755 (2)
8775	#5655 and #9825 (2)
8815	#5655 (2)

FACILITY N6

Point-to-point or multipoint synchronous operation at 48K bps on a public nonswitched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in GA27-3287 . (1)

Machine Types	Special Features Required for Attachment
3274-21C, 31C, 51C	#5655 and #6303
3705-II	#5655 and #9843
3705-81, 3705-82	#5658 and #9778
3725-1, 2, 3726	#4942
4321	#1601, #4695, #5655 and #969X (3)
4331, 4361	#1601, #4695, #5655 and #969X (3)
4952, 4954, 4955, 4956, 4959, 4965	#2080
5294	#5655
5360	#5655
8101, 8130 B 8140 A, B	#1602 and #5655 (4)
8140 C	#1613
8150	#1752 or #1755

NOTES FOR CHART N:

1. Contact IBM for more information on attachable DCEs, services, etc.

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Chart N - Nonswitched Public Data Networks Providing a CCITT "X" Series Interface (cont'd)

2. The 3274, 3276, 8101, 8130, 8140, 8150, 8775 and 8815 will communicate as tributary stations with a control station 3705-II or 3725-1, 2, 3726, or 4331 using Synchronous Data Link Control (SDLC). In a multipoint network, SDLC allows the control station to receive from one tributary station while it is transmitting to another tributary station. Operation in this mode requires a control station equipped for "data-full-duplex" operation. SDLC also supports the normal "data-half-duplex" mode of operation.

   The 8101, 8130 or 8140 will communicate as a control station to 3274-51C, 3276, and 8775 tributary stations in "data-half-duplex" mode.

   Finally, these SDLC DTEs, when attached to a network via the CCITT X.21 interface (as noted), will communicate with other SDLC DTEs attached to the same network via a CCITT X.21bis (EIA RS-232-C) interface feature. See facilities M3, M4 and M5 in Chart M for information on DTEs attachable via a CCITT X.21bis interface feature.

3. The "X" in the **#969X** specify code denotes the line position on the 4321, 4331 or 4361 to which the SDLC protocol will be assigned. See the M4321, 4331 or 4361 pages for details. **Note:** On the 4361, specify codes **#967X** and **#969X** are not required.

4. The 8101 will operate at this speed only when it is installed in conjunction with an 8140 A or B or when the 8140 C does not contain #1610-#1614 or with an 8150 without ports 1-4 and 9-12.

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CHART P

PUBLIC PACKET SWITCHED NETWORKS PROVIDING A CCITT X.21bis (EIA RS-232-C OR CCITT V.35) INTERFACE

FACILITY P3

Synchronous operation at 2400 bps on a public packet switched network via a CCITT X.21bis stand-alone DCE complying with CCITT Recommendation X.25 as it is delineated in IBM GA27-3345 (1)

Machine Types	Special Features Required for Attachment
3274-1C, 21C, 31C, 41C, 51C, 61C	#3701 and #6302 or #6303 (2)
3274-1C, 31C, 41C, 51C, 61C	#3701 and #6303 (7)
3276-1, 4	#3701, #6302 and #6315 (2)
3276-11, 14	#3701, #6302 and #9491 or #9490 (2)
3602	#3701 and #4502 or #6302 (2)
3651-25, 50, 75	#9121 or #9122 (2)
3651-60	No special feature required (2)
3684	#3701 and #9822 (2)
3705-II	#4714 (3)
3705-80	No special feature required (3)
3725-1, 2, 3726	#4911 (3)
3771, 3774 3775	#1481 and #3701 (2)
3776-1, 2, 3777-1, 2	#1481 and #3701 (2)
3776-3, 4, 3777-3, 4	#3701 (2)
4321	#1601, #3701, #4695 and #969X (2, 4)
4331, 4361	#1601, #3701, #4695 and #969X (2, 4)
4952, 4954, 4955, 4956, 4959, 4965	#2074 or #2090 or #2094 or #2096 (2) or #1310
5251-2, 12	#3701 (2)
5285, 5288	#3701, #9753 and #9482 (2)
5294	#5680 and #3701
5340	#2500 and #3701 (2, 5)
5360	#3701, #4500, #4501, #5301, #5680, and #9212 or #9214 (8)
5381	#3701 and #922X (2, 6)
8101, 8130, 8140	#3701 and #1602 (2)

FACILITY P4

Synchronous operation at 4800 bps on a public packet switched network via a CCITT X.21bis stand-alone DCE complying with CCITT Recommendation X.25 as it is delineated in IBM GA27-3345 (1)

Machine Types	Special Features Required for Attachment
3274-1C, 21C, 31C, 41C, 51C, 61C	#3701 and #6302 or #6303 (2)
3274-1C, 31C, 41C, 51C, 61C	#3701 and #6303 (7)
3276-1, 4	#3701, #6302 and #6315 (2)
3276-11, 14	#3701, #6302 and #9491 or #9490 (2)
3602	#3701 and #4502 or #6302 (2)
3651-25, 50, 75	#9124 or #9125 (2)
3651-60	No special feature required (2)
3684	#3701 and #9823 (2)
3705-II	#4714 (3)
3705-80	No special feature required (3)
3725-1, 2, 3726	#4911 (3)
3771, 3774 3775	#1481 and #3701 (2)
3776-1, 2, 3777-1, 2	#1481 and #3701 (2)
3776-3, 4, 3777-3, 4	#3701 (2)
4321	#1601, #3701, #4695 and #969X (2, 4)
4331, 4361	#1601, #3701, #4695 and #969X (2, 4)
4952, 4954, 4955, 4956, 4959, 4965	#2074 or #2090 or #2094 or #2096 (2) or #1310
5251-2, 12	#3701 (2)
5285, 5288	#3701, #9754, and #9482 (2)
5294	#5680 and #3701
5340	#2500 and #3701 (2, 5)
5360	#3701, #4500, #4501, #5301, #5680, and #9222 or #9224 (8)
5381	#3701 and #923X (2, 6)
8101, 8130, 8140	#3701 and #1602 (2)

FACILITY P5

Synchronous operation at 9600 bps on a public packet switched network via a CCITT X.21bis stand-alone DCE complying with CCITT Recommendation X.25 as it is delineated in IBM GA27-3345 (1)

Machine Types	Special Features Required for Attachment
3274-1C, 21C, 31C, 41C, 51C, 61C	#3701 and #6302 or #6303 (2)
3274-1C, 31C, 41C, 51C, 61C	#3701 and #6303 (7)
3276-1, 4	#3701, #6302 and #6315 (2)
3276-11, 14	#3701, #6302 and #9491 or #9490 (2)
3602	#3701 and #4502 (2)
3705-II	#4714 (3)
3705-80	No special feature required (3)
3725-1, 2, 3726	#4911 (3)
3776-1, 2, 3777-1, 2	#1481 and #3701 (2)
3776-3, 4, 3777-3, 4	#3701 (2)
4331	#1601, #3701, #4695 and #969X (2, 4)
4952, 4954, 4955, 4956, 4959, 4965	#2074 or #2090 or #2094 or #2096 (2) or #1310
5251-2, 12	#3701 (2)
5294	#5680 and #3701
5340	#2500 and #3701 (2, 5)

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Chart P - Public Packet Switched Networks Providing a CCITT X.21bis(an EIA RS-232-C or CCITT V.35) Interface (cont'd)

5360	#3701, #4500, #4501, #5301, #5680, and #9232 or #9234 (8)
5381	#3701 and #925X (2, 6)
8101, 8130, 8140	#3701 and #1602 (2)

FACILITY P6

Synchronous operation at speeds up to 56K bps on a public packet switched network via a CCITT X.21bis stand-alone DCE complying with CCITT Recommendation X.25 as it is delineated in IBM GA27-3345 (1)

Machine Types	Special Features Required for Attachment
3705-II	#4726 (3)
3705-80	#6712 and #9713 (3)
3725-1, 2, 3726	#4931 (3)

NOTES FOR CHART P:

1. Contact IBM for more information on these facilities, including attachable DCEs, required options, etc.
2. Attachment of these DTEs to this facility is via a 5973 L02 Network Interface Adapter. For more information on this adapter, see RPQ Y96635.
3. The 3705-II, the 3705-80, and the 3725-1,2, 3726 require either the Program Product 5668-981 or the 5973-L02 Network Interface Adapter for operation on this facility.
4. The "X" in the specify code **#969X** specifies in which line position on the 4321 or 4331 this protocol is to be installed. See the M4321 or 4331 pages for details.
5. The listed feature codes are for the attachment of a single communication line to the 5340. A second line may be attached to a 5340 equipped with #3500. See the M5340 pages for details.
6. The "X" in the 5381 specify code denotes the line position to which this speed will be assigned. See the M5381 pages for details.
7. The 3274 models 1C, 31C, 41C, 51C and 61C require either Configuration Support P or Configuration Support D, Release level 62, for operation on this facility.
8. The **#92XX** specify code designates the second line used for X.25 (see M5360 pages for details).

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CHARTQ

PUBLIC PACKET SWITCHED NETWORKS PROVIDING A CCITT X.21 INTERFACE

FACILITY Q3

Synchronous operation at 2400 bps on a public packet switched network via a CCITT X.21 stand-alone DCE complying with CCITT Recommendation X.25 as it is delineated in IBM GA27-3345 (1)

Machine Types	Special Features Required for Attachment
3705-II	#5655 and #9842 (2)
3705-81, 3705-82	#5657 and #9777 (2)
3725-1, 2, 3726	#4941 (2)
5294	#5655, #5680
5360	#4500, #4501, #5301, #5680, #5655 and #9212 or #9214 (4)

FACILITY Q4

Synchronous operation at 4800 bps on a public packet switched network via a CCITT X.21 stand-alone DCE complying with CCITT Recommendation X.25 as it is delineated in IBM GA27-3345 (1)

Machine Types	Special Features Required for Attachment
3705-II	#5655 and #9842 (2)
3705-81, 3705-82	#5657 and #9777 (2)
3725-1, 2, 3726	#4941 (2)
5294	#5655, #5680
5360	#4500, #4501, #5301, #5680, #5655 and #9222 or #9214 (4)

FACILITY Q5

Synchronous operation at 9600 bps on a public packet switched network via a CCITT X.21 stand-alone DCE complying with CCITT Recommendation X.25 as it is delineated in IBM GA27-3345 (1)

Machine Types	Special Features Required for Attachment
3705-II	#5655 and #9842 (2)
3705-81, 3705-82	#5657 and #9777 (2)
3725-1, 2, 3726	#4941 (2)
5294	#5655, #5680
5360	#4500, #4501, #5301, #5680, #5655 and #9232 or #9214 (4)

NOTES FOR CHART Q:

1. Contact IBM for more information on attachable DCEs, services, etc.
2. The 3705 and the 3725-1, 2, 3726 require Program Product 5668-981 for operation on this facility. A 3705 or a 3725-1, 2, 3726 attached to a network via a CCITT X.21 interface (as noted) may communicate with other DTEs attached to the same network via a CCITT X.21bis interface. See facilities P3, P4, P5 and P6 in Chart P for information on the attachment of DTEs to a network via the CCITT X.21bis interface.
3. No special feature is required. Specify **#9777** for nonswitched operation at 2400 bps, 4800 bps or 9600 bps. Specify **#9778** for nonswitched operation at 48K bps.
4. The **#92XX** specify code designates the line on which X.25 is installed (see M5360 pages for details).

2821 CONTROL UNIT

PURPOSE

Control and buffer storage unit for a card read punch and/or one or more printers in a S/360 mdl 22 through 85 and 195, or any S/370 or 4300 processor.

MODELS

Model 1	001	Controls a 2540 Card Read Punch and one printer.
Model 2	002	Controls one printer.
Model 3	003	Controls two printers ... with Third Printer Control (#7945) controls three printers.
Model 4	004	[NO LONGER AVAILABLE] Controls a 2540 Card Read Punch and one 1404 Printer.
Model 5	005	Controls a 2540 Card Read Punch and two printers ... with Third Printer Control (#7945) controls three printers.
Model 6	006	Controls a 2540 Card Read Punch.

Limitations: 1403s -- for mdls available for each S/360, S/370 mdl or any 4300 processor, see "Models" under 1403 ... 1404s -- cannot be attached to a S/360 mdl 22, 44, 65, 67, 75, 85, 195, or any S/370 or 4300 processor.

Prerequisites: A control unit position on a system channel.

S/360 mdl 25: Special feature on 2025: Multiplexer channel, or selector channels.

S/360 mdl 22, 30, 40, 50: Multiplexer channel (standard), selector channels (special features, except on 2022 one selector channel is standard).

S/360 mdl 44: Special features on 2044: Multiplexer channel, high speed multiplexer channels, add'l high speed multiplexer subchannels.

S/360 mdl 65, 75: Selector channel of 2860, basic multiplexer channel of 2870, selector subchannels (special features) on 2870 ... see M2860, 2870 pages.

S/360 mdl 67: Basic multiplexer channel of 2870 ... see M2870 pages.

S/360 mdl 85, 195: Selector channel of 2860, basic multiplexer channel of 2870, selector subchannels (special features) on 2870, shared or unshared subchannels of 2880 (non-shared is recommended) ... see M2860, 2870, 2880 pages.

S/370 mdl 115, 125: Multiplexer channel (special feature) ... see M3115, 3125 pages.

S/370 mdl 135: Multiplexer channel (standard), selector channel block multiplexer channel ... see M3135 pages.

S/370 mdl 135-3: Byte multiplexer channel (standard), block multiplexer channels (special features) ... see M3135-3 pages.

S/370 mdl 138: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3138 pages.

S/370 mdl 145: Multiplexer channel (standard), selector channels ... see M3145 pages.

S/370 mdl 145-3: Byte multiplexer channel (standard), block multiplexer channels ... see M3145-3 pages.

S/370 mdl 148: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3138 pages.

S/370 mdl 155, 158: Multiplexer channel (standard), 2nd byte multiplexer channel (special feature), block multiplexer channels (first two are standard) ... see M3155, 3158 and 3158-3 pages.

S/370 mdl 165, 168, 195: Selector channel of 2860, basic multiplexer channel of 2870, selector subchannels (special features) of 2870, shared or unshared subchannels of 2880 (non-shared are recommended) ... see M2860, 2870, 2880 pages.

3031, 3032 Processor: Byte multiplexer channel (one is standard), block multiplexer channels (five are standard) ... see M3031, 3032 pages.

3033 Processor: Byte multiplexer channels (two are standard), block multiplexer channels (ten are standard) ... see M3033 pages.

3081, 3083, 3084 Processor: Byte multiplexer channels, block multiplexer channels ... see M3081, M3083, 3084 pages.

4300 Processor: Byte multiplexer channel, block multiplexer channel.

HIGHLIGHTS

Mdls 1 and 2: The printer may be a 1403 mdl 2, 3, 7 or N1 ... for attachment for a 1403 mdl 2 or 7, see "Specify" ... for attachment of a 1403 mdl 3 or N1, see 1100 lpm Printer Adapter (#3615) under "Special Features".

Mdls 3 and 5: Two printers, or with Third Printer Control (#7945), three printers can be attached. They may be in any combination of 1403 mdls 2, 3, 7 and N1 ... for attachment of 1403 mdls 2s and 7s, see "Specify" ... for attachment of 1403 mdls 3s or N1s, see 1100 lpm Printer Adapter (#3615) under "Special Features". Program priority for multiple printers on these mdls is:

1st Priority	Printer Control No. 1
2nd Priority	Printer Control No. 2
3rd Priority	Printer Control No. 3

Bibliography: S/360 -- GC20-0360, S/370 -- GC20-0001.

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- 1403 Mdl 2 Attachment -- for each 1403 mdl 2 to be attached to a 2821 mdl 1, 2, 3 or 5, specify one of the following: **#9241** -- to attach a 1403 mdl 2 to a 2821 mdl 1 or 2, or to Printer Control No. 1 on a 2821 mdl 3 or 5 ... **#9242** -- to attach a 1403 mdl 2 to Printer Control No. 2 on a 2821 mdl 3 or 5 ... **#9243** -- to attach a 1403 mdl 2 to Printer Control No. 3 on a 2821 mdl 3 or 5. Third Printer Control (#7945) also required ... see "Special Features".
- 1403 Mdl 7 Attachment -- for each 1403 mdl 7 to be attached to a 2821 mdl 1, 2, 3 or 5, specify one of the following: **#9246** -- to attach a 1403 mdl 7 to a 2821 mdl 1 or 2, or to attach Printer Control No. 1 on a 2821 mdl 3 or 5 ... **#9247** -- to attach a 1403 mdl 7 to Printer Control No. 2 on a 2821 mdl 3 or 4 ... **#9248** -- to attach a 1403 mdl 7 to Printer Control No. 3 on a 2821 mdl 3 or 5. Third Printer Control (#7945) also required ... see "Special Features".
- 1403 Mdl 3 or N1 Attachment: Each 1403 mdl 3 or N1 requires the appropriate 1100 lpm Printer Adapter (#3615) ... see "Special Features".
- Compatibility Attachment: If the 2540 is to be used with 1401/1403 Attachment (#4463) with 1401/1440/1460 Basic Compatibility (#4456) or 1620 Compatibility (#7190) on a 2030, or with 1401/1460 Compatibility (#4457) on a 2040, then 2540 Compatibility Attachment (#8065) is required ... see "Special Features".
- Compatibility Attachment: If the 2540 is to be used with 1401/1440/1460 Compatibility (#4457) on a 3115, 3125, 3135, 3135-3, 3138, 3145, 3145-3 or 3148, or with 1401/1440/1460, 1410/7010 Compatibility (#4458) on a 3145, 3145-3 or 3148, or 1401/1440/1460, 1410/7010 Compatibility (#3950) on a 3155, 3158 or 3158-3, then 2540 Compatibility Attachment (#8065) is required ... see "Special Features".
- Compatibility Attachment: If the 2540 is to be used with 1401/1440/1460 Compatibility (#3950) on a 4331 Processor, then 2540 Compatibility Attachment (#8065) is required ... see "Special Features".
- Isolation Feature: May be required on units shipped prior to December 29, 1967 ... see "Special Features".

SPECIAL FEATURES

Column Binary (#1990): [Mdls 1, 5, 6] Cards with multiple significant digit punching in a single card column can be processed by the 2540 ... the Extended BCD Interchange Code used by S/360 assemblers and compilers does not required this feature on the 2821. Prerequisites: Column Binary (#1990) on the 2030 Processing Unit if column binary cards are to be processed on the 2540 when the S/360 mdl 30 is operating in 1401/1440/1460 compatibility mode.

1100 lpm Printer Adapter (#3615): [Mdls 1, 2, 3, 5] To attach a 1403 Printer mdl 3 or N1. One #3615 is required for each 1100 lpm printer attached. **Specify:** With each #3615, one of the following, depending upon the control position to which the printer is to be attached: **#9262** -- to a 2821 mdl 1 or 2, or to Printer Control No. 1 on a 2821 mdl 3 or 5 ... **#9263** -- to Printer Control No. 2 on a 2821 mdl 3 or 5 ... **#9264** -- to Printer Control No. 3 on a 2821 mdl 3 or 5. Third Printer Control (#7945) is also required.

Isolation, Control Unit (#4701-#4705): [for field installation on units shipped prior to December 29, 1967 ... standard on units shipped after that] To turn power on or off the 2821 without generating spurious signals. Thus, a processor program, if it can be logically disconnected from the system before power is turned off, can continue operating.

#4702: For a 2821 mdl 1, 2, 3 or 5 with neither Two-Channel Switch (#8100) nor Universal Character Set Adapter (#8637, #8638, #8639).

2821 Control Unit (cont'd)

#4703: For a 2821 mdl 1, 2, 3 or 5 with #8637, #8638 or #8639 but not #8100.
#4704: For a 2821 mdl 1, 2, 3 or 5 with #8100 but not with #8637, #8638 or #8639.
#4705: For a 2821 mdl 1, 2, 3 or 5 with both #8100 and #8637, #8638 or #8639.

Prerequisites: Since in all cases there are compatible EC level requirements, the concurrence of IBM is required for any orders for these features ... #4703 requires #8637, #8638 or #8639 ... #4704 requires #8100 ... #4705 requires both #8100 and #8637, #8638 or #8639.

Punch Feed Read Control (#5895): [Mdls 1, 5, 6] Required for Punch Feed Read (#5890) on a 2540.

Remote Switch Attachment (#6148): [Mdls 1, 2, 3, 5] To attach the Two-Channel Switch (#8100) to a 2167 Configuration Unit in a S/360 mdl 67-2, to a S/360 mdl 65MP which has the Configuration Control Panel (#1505) installed, or to a S/370 mdl 158MP or 168MP.

Selective Tape Listing Control (#6412): Required for Selective Tape Listing (#6410, #6411) on a 1403 mdl 2, 3 or N1. One #6412 is required for each printer equipped with #6410 or #6411. **Specify:** With each #6412, one of the following, depending upon the control position to which the printer with #6410 or #6411 is to be attached:

#9761: To a 2821 mdl 1 or 2, or to Printer Control No. 1 on a 2821 mdl 3 or 5.
#9762: To Printer Control No. 2 on a 2821 mdl 3 or 5.
#9763: To Printer No. 3 on a 2821 mdl 3 or 5 ... **#9745** is also required.

Note: Orders for this feature for a 1403 mdl N1 equipped with Selective Tape Listing (#6410) are no longer accepted ... for 1403 mdl N1s equipped with the new Selective Tape Listing (#6420), see #6425 below.

Selective Tape Listing Control (#6425): [Mdls 1, 2, 3, 5] [for use in S/360 mdls 22, 25, 30, 40, 50 only] Required for the Selective Tape Listing (#6420) on a 1403 mdl N1. One #6425 is required for each printer equipped with #6420. **Specify:** With each #6425, one of the following, depending upon the control position to which the printer with #6420 is to be attached:

#9765: To a 2821 mdl 1 or 2, or to Printer Control No. 1 on a 2821 mdl 3 or 5.
#9766: To Printer Control No. 2 on a 2821 mdl 3 or 5.
#9767: To Printer Control No. 3 on a 2821 mdl 3 or 5 ... #7945 is also required.

Third Printer Control (#7945): [Mdls 3, 5] To attach a third printer, any combination of three 1403s, mdls 2, 3, 7, N1 can be used. An 1100 lpm Printer Adapter (#3615) is required for each 1403 mdl 3 or N1 attached. **Field Installation:** No.

2540 Compatibility Attachment (#8065): [Mdls 1, 5, 6] Required if the 1402/1403 Attachment (#4463) with 1401/1440/1460 Basic Compatibility (#4456) or 1620 Compatibility (#7190) is used on a 2030 Processing Unit, or 1401/1460 Compatibility (#4457) is used on a 2040 Processing Unit ... not required for normal S/360 operation of the 2540. Required if 1401/1440/1460 Compatibility (#4457) is used on a 3115. 3125, 3135, 3135-3, 3145, 3145-3 or 3148 Processing Unit, or if 1401/1440/1460, 1410/7010 Compatibility (#4458) is used on a 3145, 3145-3 or 3148 Processing Unit, or if 1401/1440/1460, 1410/7010 Compatibility (#3950) is used on a 3155, 3158 or 3158-3 Processing Unit ... not required for normal S/370 operation of the 2540. Required if 1401/1440/1460 Compatibility (#3950) is used on a 4331 ... not required for normal 4300 processor operation of the 2540.

Two-Channel Switch (#8100): [Mdls 1, 2, 3, 5] To attach the 2821 to a second channel. Switching is under program control. Includes partitioning. For use in a S/360 mdl 67, a multiprocessor S/360 mdl 65, or a S/370 mdl 158MP or 168MP only. **Field Installation:** No. **Prerequisites:** If the Two-Channel Switch is routed through the Configuration Control Panel (#1505) of a multiprocessing S/360 mdl 65, Remote Control Switch Attachment (#6148) is required. #6148 is also required in a S/360 mdl 67-2, or a S/370 mdl 158MP or 168MP. See above. For a 2821 mdl 1 or 5, a Two-Channel Switch Adapter (#8102) is required on the attached 2540.

Universal Character Set Adapter (#8637-#8639): [Mdls 1, 2, 3, 5] Required for Universal Character Set (#8641 on 1403 mdl 2, #8640 on 1403 mdl 3 or N1) ... one adapter is required for each printer so equipped. Note: A 1403 previously equipped with a Multiple Character Set (#5110 on 1403 mdl 2, #5111 on N1) can be attached to the 2821. The MCS feature provides the same function as the UCS feature on the printer.

#8637: To attach such a printer to a 2821 mdl 1 or 2, or to Printer Control No. 1 on a 2821 mdl 3 or 5.
#8638: To attach such a printer to Printer Control No. 2 on a 2821 mdl 3 or 5.
#8639: To attach such a printer to Printer Control No. 3 on a 2821 mdl 3 or 5 ... #7945 is also required.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

2860 SELECTOR CHANNEL

[NO LONGER AVAILABLE]

(New RPQs will not be accepted.)

PURPOSE

Selector channel(s) for attachment and control of a wide variety of I/O control units for a S/360 mdl 65 through 195, or a S/370 mdl 165, 168, 168-3, 195.

MODELS

Model 1	001	Has one selector channel
Model 2	002	Has two selector channels
Model 3	003	Has three selector channels

Maximum

S/360 mdl 65, 67-1 (2067 mdl 1), 75 -- up to two 2860s in any combination of mdls can be attached. Up to two 2870 Multiplexer Channels can also be attached. Total channels (both 2860 and 2870) cannot exceed seven per CPU.

Limitations: On either a 65MP system with eight 2365 mdl 13 frames, or on a system with four 2361 mdl 2s, only three channel frames or seven logical channels, whichever occurs first, can be attached. The 2860 may only use channel addresses 1 through 6. If no 2870s are attached, only up to six logical channels can be attached per CPU.

S/360 mdl 67-2 (one or two 2067 mdl 2s) -- up to two 2860s in any combination of mdls can be attached to each 2846 Channel Controller. A 2870 Multiplexer Channel can also be attached to each 2846.

S/360 mdl 85, 195, or S/370 mdl 165, 168, 168-3, 195 -- up to two 2860s in any combination of mdls can be attached. 2870 Multiplexer Channels and 2880 Block Multiplexer Channels can also be attached. For combinations possible, see M3165, 3168, 3168-3 or 3195 pages. For 2085, consult IBM.

Prerequisites:

With 2065 or 2067 mdl 1 -- Channel Attachment (**#9065**) is required to attach channels addressed 3 and 4. Channel Attachment (**#9066**) is required in addition to **#9065** to attach channels addressed 5 and 6. See "Specify" in M2065 and 2067 pages.

With 2067 mdl 2 -- a 2846 Channel Controller is required.

With 2075 -- a 2075 Attachment (**#9820**) is required on each 2860 ... see "Specify".

With 2085 -- a 2085 Attachment (**#9821**) is required on each 2860 ... see "Specify". On the 2085, Channel Attachment (**#9065**) is required to attach channels addressed 3 and 4. Channel Attachment (**#9066**) is required in addition to **#9065** to attach channels addressed 5 and 6. Consult IBM.

With 3195 -- a 3195 Attachment (**#9828**) is required on each 2860 ... see "Specify".

With 3165, 3168, 3168-3 -- a 3165/3168/3168-3 Attachment (**#9830**) is required on each 2860 ... see "Specify". When attaching this channel to a S/370 mdl 165, the 3165 must have sufficient addressing capability ... see "Channel Attachment" under "Specify" for the 3165. For S/370 mdl 165 systems, the power distribution unit must be equipped for at least the number of frames actually attached ... see "Channel Frames" under "Specify" for the 3067 mdl 1. Channel Indirect Data Addressing feature is required for a system operating in EC mode ... see "Special Features".

Isolation: Appropriate features are required on any 2860 shipped prior to September 7, 1967 ... see "Special Features".

HIGHLIGHTS

Channels permit data rates up to 1.3 million bytes/second. A full set of channel control and buffer registers permit each channel to operate with minimal interference. Up to eight I/O control units can be attached to each channel, permitting a wide variety of attached devices. I/O operations are overlapped with processing and, depending upon the data rate, all channels can operate simultaneously.

Bibliography: S/360 -- GC20-0360 S/370 -- GC20-0001.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Method of Installation: **#9400**, if 2860 will **not** be installed on a raised floor.
- 2075 Attachment: **#9820** required for attachment to a 2075.
- 2085 Attachment: **#9821** required for attachment to a 2085.
- 3195 Attachment: **#9828** required for attachment to a 3195.
- 3165/3168/3168-3 Attachment: **#9830** required for attachment to a 3165, 3168 or 3168-3.
- Unit Position: Required on 2860s when more than one unit, either 2860 or 2870, is attached to a 2065, 2067 mdl 1, 2075, 2085, 2846, or 3165. Specify **#9501** on each 2860 that is not attached last on the channel bus. If the 2860 is to be last (only when there is no 2870) no code is required. When field installing an additional 2860 which will be last on the bus, order **#9501** for the installed 2860 that is currently last on the bus. All MES orders for **#9501** must give the model, serial number and special features on the installed 2860. On the 3168, 3168-3 or 3195, the bus is two cable strings to which the channels are attached. Therefore, for each string, specify **#9501** for each 2860 that is not attached last on that string. If the 2860 is last on either string, no code is required. When field installing an additional 2860 which is to be last on the string, order **#9501** by MES for the installed 2860 that is currently last on the string.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Two-processor System: A 2860 that is to be used in a S/360 mdl 67-2 with two 2067 mdl 2s requires Address Prefixing (#1095) ... see "Special Features".
- 2301 Drum Storage: In a S/360 mdl 67-2 or 85, or a S/370 mdl 165, High Speed Direct Access Storage Priority (#4597) is required on the selector channel to which the 2820 Storage Control for the 2301 is to be attached ... see "Special Features".
- Isolation Features: Appropriate features must be ordered for field installation on units shipped prior to September 7, 1967 ... see "Special Features".

SPECIAL FEATURES

Address Prefixing (#1095): [S/360 mdl 67-2] One is required on each selector channel in a two-processor system ... provides prefixing to identify the processing unit that has initiated an I/O operation. **Specify:** **#9026** for first channel of 2860 ... **#9047** for second ... **#9048** for third. **Maximum:** One per 2860 mdl 1, two per 2860 mdl 2, three per 2860 mdl 3.

Channel-To-Channel Adapter (#1850): To interconnect two system channels ... only one of the two connected channels requires this feature. The feature uses one control unit position on each of the channels. The plant must know on which of the three possible 2860 channel gates the adapter is to be installed. **Specify:** **#9095** for installation on first gate ... **#9096** for second gate ... **#9097** for third gate. **Maximum:** One per gate.

Channel Indirect Data Addressing (#1861-#1863): [For use on a S/370 mdl 165II or 168 ... 3165/3168/3168-3 Attachment (**#9830**) is required on channel] One is required on each selector channel to provide indirect address for data transfer. Required for a system operating in EC mode. #1861 -- for 2860 mdl 1 ... #1862 for 2860 mdl 2 ... #1863 for 2860 mdl 3. **Maximum:** One per 2860.

High Speed Direct Access Storage Priority (#4597): [S/360 mdl 67-2 or 85, or S/370 mdl 165] Gives storage priority to a 2301 Drum over all other devices in the system. Required on a 2860 channel to which a 2301 is attached in the above systems. **Specify:** **#9171** for installation on first channel ... **#9172** on second channel. **Maximum:** In a S/360 mdl 67-2, only one #4597 may be attached to a 2860, regardless of mdl. Although two 2860s may be attached to a 2846, only one may have this feature. In a S/360 mdl 85 or S/370 mdl 165, up to two features may be used, but they must be located on the first 2860 in the system. **Prerequisite:** #7516 on the 2820 associated with the 2301.

3803 Mdl 2 Attachment (#7850): One is required for each 2860 channel to which 3803 mdl 2s are attached. **Specify:** #9181 for first channel of a 2860 ... #9182 for second channel ... #9183 for third channel. **Maximum:** One for 2860 mdl 1 ... two for 2860 mdl 2 ... three for 2860 mdl 3.

Isolation Features

The following features, as appropriate, must be ordered for field installation on each 2860 installed or shipped prior to September 7, 1967.

Isolation, 2860 Channel (#4611-#4613): Permits power to be turned off or on the 2860 without introducing transient noise signals on the I/O interface bus during the powering operation. #4611 -- for 2860 mdl 1 ... #4612 -- for 2860 mdl 2 ... #4613 -- for 2860 mdl 3. **Maximum:** One per 2860.

Isolation, On Channel-To-Channel Adapter (#4621-#4623): Permits power to be turned on or off the 2860 without introducing transient noise signals on units attached via Channel-to-channel Adapter(s) (#1850) during the powering operation. #4621 -- if there is only one #1850 on the 2860 frame ... #4622 -- if there are two #1850s ... #4623 -- if there are three #1850s. **Maximum:** One #4621, #4622 or #4623. **Prerequisites:** For #4621, one #1850 ... for #4622, two #1850s ... for #4623, three #1850s.

2860 Selector Channel (cont'd)

MODEL CHANGES

Available at time of manufacture only.

2870 MULTIPLEXER CHANNEL

[NO LONGER AVAILABLE]

(New RPQS will not be accepted.)

PURPOSE

For attachment of a wide variety of low to medium speed I/O control units and devices to a S/360 mdl 65, 67, 75, 85, 195, or S/370 mdl 165, 168, 168-3, 195.

MODELS

Model 1 001

Maximum

S/360 mdl 65, 67-1 (2067 mdl 1), 75 -- two 2870s can be attached ... up to two 2860 Selector Channels in any combination of mdls can also be attached. The total number of channels (both 2870s and 2860s) cannot exceed seven per CPU. **Limitations:** On either a 65MP system with eight 2365 mdl 13 frames or on a system with four 2361 mdl 2s, only three channel frames or seven logical channels, whichever occurs first, can be attached. If no 2870s are attached, only up to six logical channels can be attached per CPU. The first 2870 address must be zero and the second is assigned an available address from 1 to 6.

S/360 mdl 67-2 (one or two 2067 mdl 2s) -- one 2870 can be attached to each 2846 Channel Controller ... up to two 2860 Selector Channels in any combination of mdls can also be attached to each 2846.

S/360 mdl 85, 195 and S/370 mdl 165, 168, 168-3, 195 -- two 2870s can be attached. 2860 Selector Channels and 2880 Block Multiplexer Channels can also be attached. For combinations possible, see M3165, 3168, 3168-3 or 3195 pages. For 2085, consult IBM.

> **Note:** The 2870 may be connected to another system channel for channel-to-channel interconnection of two system channels. However, the Channel-to-channel Adapter required for this interconnection must be installed on the other channel, not the 2870 ... unbuffered devices precede buffered devices. A 2821 Control Unit should normally be last in priority because of the high instantaneous data rates.

Prerequisites

With 2065 or 2067 mdl 1 -- Channel Attachment (**#9065**) is required to attach channels addressed 3 and 4. Channel Attachment (**#9066**) is required for channels addressed 5 and 6. See "Specify" in M2065 or 2067 pages.

With 2067 mdl 2 -- a 2846 Channel Controller is required.

With 2075 -- a 2075 Attachment (**#9820**) is required on each 2870 ... see "Specify".

With 2085 -- a 2085 Attachment (**#9821**) is required on each 2870 ... see "Specify". On the 2085, Channel Attachment (**#9065**) is required to attach channels addressed 3 and 4. Channel Attachment (**#9066**) is required for channels addressed 5 and 6. Consult IBM.

With 3195 -- a 3195 Attachment (**#9828**) is required on each 2870 ... see "Specify".

With 3165, 3168, 3168-3 -- a 3165/3168/3168-3 Attachment (**#9830**) is required on each 2870 ... see "Specify". When attaching this channel to a S/370 mdl 165, the 3165 must have sufficient channel addressing capability ... see "Channel Attactment" under "Specify" for the 3165. For S/370 mdl 165 systems, the power distribution unit must be equipped for at least the number of frames actually attached ... see "Channel Frames" under "Specify" for the 3067 mdl 1. Channel Indirect Data Addressing (#1861) is required for a system operating in EC mode ... see "Special Features".

Isolation Feature: An appropriate Isolation Feature is required on any 2870 shipped prior to December 29, 1967 ... see "Special Features".

HIGHLIGHTS

Provides up to 196 subchannels ... including four selector subchannels. See "Special Features". Aggregate data rates range from 110KB to 670KB, depending upon the features installed.

The basic channel can attach up to eight I/O control units and can address up to 192 I/O devices. Up to four selector subchannels can be added, each of which can operate one device simultaneously with the basic channel. Up to eight I/O control units can be attached to each selector subchannel. If one 2841 is attached, no other control unit can be attached to that selector subchannel. A maximum of sixteen devices can be attached to each selector subchannel. The first 2870 attached to a system must be assigned address zero. The second 2870 may be assigned any address 1 through 6, depending upon the total number of channels installed and the priority desired ... see Functional Characteristics SRL for the using system.

Maximum aggregate data rates are shown in the following table. These are machine rates for the 2870 ... for S/360 mdl 65, 67-1, 75 and 85, or S/370 mdl 165, 168, 168-3 or 195, information on system data rates may be found in the appropriate Functional Characteristics SRL.

SELECTOR SUBCHANNELS

Basic Channel	1st #6990	2nd #6991	3rd #6992	4th #6993
110KB	*	*	*	*
88KB	180KB	*	*	*
66KB	180KB	180KB	*	*
44KB	180KB	180KB	180KB	*
30KB	180KB	180KB	180KB	100KB

* Not installed

Bibliography: S/360 -- GC20-0360 S/370 -- GC20-0001.

SPECIFY

- Voltage (AC, 3-phase, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Method of Installation: **#9400**, if 2870 will **not** be installed on a raised floor.
- 2075 Attachment: **#9820** required for attachment to a 2075.
- 2085 Attachment: **#9821** required for attachment to a 2085.
- 3195 Attachment: **#9828** required for attachment to a 3195. **Note:** 2870s serial numbers 70000 to 79999 must be used with a 3195.
- 3165/3168/3168-3 Attachment: **#9830** required for attachment to a 3165, 3168 or 3168-3. **Note:** 2870s serial numbers 70000 to 79999 must be used with a 3165, 3168 or 3168-3.
- Unit Position: The 2870 is normally last on the channel bus of a 2065, 2067 mdl 1, 2075, 2085, 2846 or 3165. If two 2870s are installed, one should be last and the other next to last on the channel bus. **#9501** must be specified for the 2870 which is next to last. The 2870 which is last does not require a code. All MES orders to add **#9501** to an installed 2870 must specify the serial number and special features on the installed unit. On the 3168, 3168-3 or 3195, the bus is two cable strings to which the channels are attached. Therefore, when one or two 2870s are installed, they should be last on separate strings. If on the same string, one should be last and the other next to last. **#9501** must be specified for the 2870 which is next to last on the string. The 2870 which is last on either string does not require a code. **Note:** 2870s with serial numbers 60002 through 69999 must be installed as the first 2870 with channel address of zero on all systems except the S/360 mdl 195 or S/370 mdl 165.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Two-processor System: A 2870 which is to be used in a S/360 mdl 67-2 with two 2067 mdl 2s requires Address Prefixing (#1095) ... see "Special Features".
- Isolation Feature: The appropriate Isolation Feature must be ordered for field installation on units shipped prior to December 29, 1967 ... see "Special Features".

SPECIAL FEATURES

Address Prefixing (#1095): [S/360 mdl 67-2] One required on each 2870 in a two-processor system ... provides prefixing to identify the processing unit that has initiated an I/O operation. **Maximum:** One per 2870.

Channel Indirect Data Addressing (#1861): [For use on a S/370 mdl 165II or 168 ... 3165/3168/3168-3 Attachment (**#9830**) is required on channel] Provides indirect address for data transfer. Required for a system operating in EC mode.

Selector Subchannel (#6990-#6993): Each selector subchannel permits attachment of up to eight I/O control units for devices with a data rate not exceeding 180KB ... see aggregate data rates possible under "Highlights". Each selector subchannel operates simultaneously with devices on the basic 2870 channel. **Limitation:** Regardless of the number of control units attached, a maximum of sixteen I/O devices can be attached to a selector subchannel. #6990 -- for first selector subchannel ... #6991 -- for second ... #6992 -- for third ... #6993 -- for fourth. **Maximum:** Four on the first or only 2870 (channel address 0) ... two (#6990 and #6991) on the second 2870 (channel address 1 through 6, depending on the number of 2860 and 2880 logical channels also attached). On a 65MP, the maximums are: Four on the first 2870 ... none on the second. **Prerequisites:** #6991 requires #6990 ... #6992 requires #6991 ... #6993 requires #6992.

Isolation Features

One of the following features, as appropriate, must be ordered for field installation on each 2870 shipped prior to December 29, 1967 ... see DP Letter 267-41 for ordering.

Isolation, Channel-Control Unit (#4600, #4601): To turn power on or off the 2870 without introducing noise signals on the I/O interface bus. #4600 -- for a 2870 with no selector subchannels ... #4601 -- for a 2870 with one or more selector subchannels (#6990, 6993). **Maximum:** One per 2870. **Prerequisite:** #4601 requires at least #6990.

MODEL CONVERSIONS: None

2880 BLOCK MULTIPLEXER CHANNEL

[NO LONGER AVAILABLE]

(New RPQs will not be accepted.)

PURPOSE

Block multiplexer channel(s) for attachment and control of a wide variety of I/O control units in a S/360 mdl 85, 195, or S/370 mdl 165, 168, 168-3, 195.

MODELS

Model 1 001 Has one block multiplexer channel

Model 2 002 Has two block multiplexer channels

Maximum:

Up to three 2880s (six channels), in any combination of mdls can be attached. With Extended Channels (#3850 on the 2085, #3851 on the 3195, #3850 on the 3165, or #3855 on the 3168 or 3168-3) up to six 2880s (twelve channels) may be attached to a 2085, up to seven 2880s (thirteen channels) may be attached to a 3195, or up to six 2880s (eleven channels) may be attached to a 3165, 3168 or 3168-3. See M3195, 3165, 3168 or 3168-3 pages for allowable channel combinations. For 2085, consult IBM.

Limitations: A 2820 Storage Control equipped with Storage Priority (#7516) cannot be attached to a 2880.

Prerequisites:

With 2085 -- 2085 Attachment (**#9821**) is required on each 2880 ... see "Specify". On the 2085, an appropriate Channel Attachment (**#9065-#9069**) may be required. Consult IBM.

With 3195 -- 3195 Attachment (**#9828**) is required on each 2880 ... see "Specify".

With 3165, 3168, 3168-3 -- a 3165/3168/3168-3 Attachment (**#9830**) is required on each 2880 ... see "Specify". When attaching the channel to a S/370 mdl 165, the 3165 must have sufficient channel addressing capability ... see "Channel Attachment" under "Specify" for the 3165. For S/370 mdl 165 systems, the power distribution unit must be equipped for at least the number of frames actually attached ... see "Channel Frames" under "Specify" for the 3067 mdl 1. Channel Indirect Data Addressing feature is required for a system operating in EC mode ... see "Special Features".

HIGHLIGHTS

Channels permit data rates up to 1.5 million bytes/second. With Two Byte Interface (#7850, #7851), data rates up to 3.0 million bytes/second are possible ... see "Special Features".

Provides up to 56 non-shared (block multiplex mode operation) subchannels per block multiplexer channel, allowing up to 56 block multiplex devices to operate concurrently in a burst interleaved mode on the single data path of the channel. Thus, although only one device may actually be transmitting data at any given instant, multiple channel programs may be concurrently active for up to 56 block multiplex devices at one time. Up to eight control units, of which seven may be block multiplexed, can be attached to each channel, permitting a wide variety of attached devices. There will always be one shared (non-block multiplex mode operation) subchannel having all addresses not assigned to non-shared subchannels. Subsequently, the shared channel will always have at least 200 unit addresses and may have up to 256 unit addresses, depending on the number of non-shared subchannels plugged during installation. With the Extended UCW feature installed, the capability of the channel to operate non-shared subchannels is extended from 56 to 256.

All block multiplex devices must be assigned to a non-shared subchannel. All non-block multiplex devices must be assigned to the shared subchannel. (Exception: The 2821 and 3811 control units may be attached to either type of subchannel, but non-shared subchannel attachment is recommended.)

Can be connected to a S/360 or S/370 selector channel via a Channel-to-Channel Adapter (#1850) on the selector channel. Can be connected to a 4381 or 4341 Processor block multiplexer channel via a Channel-to-Channel Adapter (#1850) of the block multiplexer channel of the 4381 or 4341 Processor.

I/O operations are overlapped with processing and, depending upon system considerations and upon data rate, all channels can operate simultaneously.

Bibliography: S/360 -- GC20-0360 S/370 -- GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Method of Installation: **#9400**, if 2880 will **not** be installed on a raised floor.
- 2085 Attachment: **#9821** required for attachment to a 2085.
- 3195 Attachment: **#9828** required for attachment to a 3195.
- 3165/3168/3168-3 Attachment: **#9830** required for attachment to a 3165, 3168 or 3168-3.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Unit Position: **#9505**. For the mdl 165, **#9505** must be specified on the 2880 which is last on the channel bus. For a mdl 168, 168-3 or 195, where there are two cable strings, each 2880 which is last on a string must have **#9505** specified. All MES orders to add **#9505** to an installed 2880 must specify the serial number and special features on the installed unit.

SPECIAL FEATURES

Channel Indirect Data Addressing (#1861, #1862): [For use on a S/370 mdl 165II or 168 ... 3165/3168/3168-3 Attachment (**#9830**) is required on channel] One is required on each channel to provide indirect address for data transfer. Required for a system operating in EC mode. #1861 -- for 2880 mdl 1 ... #1862 -- for 2880 mdl 2. **Maximum:** One per 2880.

Extended Unit Control Words (#3851, #3852): Extends channel storage to 256 unit control words. May be installed on either or both channels of a 2880 mdl 2. #3851 -- for mdl 1 or first channel of a mdl 2 ... #3852 -- for second channel of a mdl 2. **Limitations:** Cannot be installed on the same channel with #7850 or #7851, RPQ WE4259 channel-to-channel adapter and specify feature 2085 Attachment (**#9821**). **Field Installation:** Yes.

Two Byte Interface (#7850, #7851): One is required on each channel attaching a 2835 Storage Control mdl 1 for 2305 Fixed Head Storage(s). #7850 -- for a 2880 mdl 1 or the first channel of a 2880 mdl 2 ... #7851 -- for the second channel of a 2880 mdl 2. **Limitations:** Cannot be installed on the same channel with #3851 or #3852. **Field Installation:** Yes.

MODEL CONVERSIONS

Not recommended for field installation .

3081 PROCESSOR UNIT

PURPOSE

Provides arithmetic, logic and control function through two integrated central processors and houses shared central storage and channels for a 3081 Processor Complex.

MODELS

Models			Bytes of Central Storage
D16	K16	G16	16,777,216
D24	K24	G24	25,165,824
D32	K32	G32	33,554,432
	K48	G48	50,331,648

Note: At initial microcode load time, a minimum of 327,680 bytes of central storage is assigned for system usage and is unavailable for programs. Depending upon channel attachment needs for configurations requiring greater than 512 UCWs, additional system area assignments are required. Expansion of the system area occurs automatically in 32KB increments (up to 589,824 bytes) as determined by the size of the I/O configuration. A maximum of 4080 devices is possible.

Limitations: In 370 mode, address translation is limited to 64K byte segments and 4K byte page size (except mdl D16, which translate 2K or 4K byte page size.) In 370 mode, mdl D16 uses 2K storage protect keys, while all other models use 4K storage protect keys.

Prerequisites: Each 3081 Processor Unit requires:

1. One 3082 Processor Controller,
2. One 3087 Coolant Distribution Unit,
3. One 3278-2A Display Console as the system console, and
4. One 3089 Power Unit or other appropriate 400 Hz power source.

Note: Depending upon the 3081 mdl, **#9491**, **#9492**, or **#9493** must be specified on the 3082 Processor Controller. See "Specify" under 3082.

Those customers using the 3087 mdl 1 CDU to cool their systems, must supply chilled water. See *IBM System/370 Installation Manual - Physical Planning,* GC22-7004. In addition, the System Control Program will require an appropriate operator console in addition to the system console. Access to a 3274 mdl X1B or X1D, or availability of an operator console is required to satisfy the minimum service configuration.

HIGHLIGHTS

Depending upon the mdl, contains up to 50,331,648 bytes of monolithic central storage ... 312 nanosecond storage access cycle ... two integrated central processors having a cycle time of 26 nanoseconds ... eight byte data flow between each processor and storage ... each processor has its own high speed buffer having a cycle time of 26 nanoseconds ... buffer storage is transparent to a program and significantly reduces the effective access time of storage ... integrated byte and block multiplexer channels ... extensive use of LSI logic circuitry ... has the ability to operate in S/370 mode or 370-XA mode ... 370 XA mode extends addressing to 2 GB and for hardware controlled channel pathing to an I/O device ... distributed microcode logic and control stores ... microcode assists for both MVS and VM ... extensive data checking.

Standard Features: S/370 mode ... 370-XA mode ... Universal Instruction Set ... S/370 Extended Facility ... 3033 Extension Feature ... extended addressing ... extended control mode ... PSW key handling ... conditional swapping ... set prefix ... store prefix ... signal processor ... store CPU address ... extended precision floating point ... processor checkpoint retry ... time-of-day clock ... clock comparator ... CPU timer ... interval timer ... byte oriented operand feature ... key controlled storage page protection ... tracing protection ... storage error checking and correction ... configuration control ... dynamic address translation ... program event recording ... store status ... program reset ... set system-mask suppression ... integrated channels ... channel set switching ... data streaming ... start I/O fast release ... clear I/O ... Virtual Machine Assist ... Preferred Machine Assist.

Channels: The External Data Controller (EXDC) is an integrated I/O processor containing 16 channels organized in two groups of eight. An additional group of eight channels is available as an optional feature. Channels are configurable as either byte or block multiplexer channels. A maximum of four byte multiplexer channels are permitted and are assignable only within the first two physical channel groups. Byte multiplexer channels can operate only with unshared devices. Where byte multiplexer channels are not needed, block multiplexer channels may be substituted. All block multiplexer channels are capable of data streaming and are capable of operating at data rates up to three million bytes/second across a 1-byte interface. Each channel can address up to 256 I/O devices and may physically attach up to eight control units.

In S/370 mode, channels may be grouped into two logical channel sets, with up to 16 channels to a set, one set assignable to each central processor. Channel set switching is standard. In S/370 mode, physical channels may be given any valid logical designation.

In 370-XA mode, either central processor may initiate an operation with any I/O device and process any I/O interruption, using any of the 24 channel paths to which the device is attached.

Bibliography: GC20-0001.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, or **#9915** for 240V.
- Color: The standard color for this unit is pearl white. Those wishing colored accents should specify **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown or **#9065** for pebble gray.
- Power: When 400 Hz power source is other than the 3089 Power Unit, specify **#9491**.
- Shipping Instructions: (Use of this specify option will increase installation time. Use only where required.) The standard external dimensions of Frame S are 945mm wide by 1,778mm long by 1,875mm high (37.2" x 70" x 73.8"). Should these dimensions need reduction, the side covers may be removed, reducing external dimension to 858mm wide by 1,778mm long (33.8" x 70"). This reduction may be obtained by specifying **#9571**. Further reduction may be achieved by splitting Frame S into two subframes, the largest of which has external dimensions of 778mm by 1,778mm long (30.6" x 70"). This reduction may be obtained by specifying **#9572**. Specify either **#9571** or **#9572** as required. For additional information, see *IBM System/370 Installation Manual - Physical Planning,* GC22-7004, and/or your Installation Planning Representative.
- Weight Considerations: (Use of this specify option will increase installation time. Use only where required.) Some older elevators may have weight limitations of 1,136kg/2500 lbs and may require partial depopulation of 3081 frames to satisfy this limitation. Specify **#9581** to reduce frame weights to less than 1,136kg/2,500 lbs.
- RETAIN: The capability of using the RETAIN remote service/logout analysis is standard and provided by the 3082 Processor Controller.

SPECIAL FEATURES

Channel Group Add'l (#1550): Provides an add'l group of eight block multiplexer channels. **Prerequisites:** Every #1550 requires support from a 3082 Processor Controller mdl 24. **Limitations:** #1550 may be configured only as block multiplexer channels. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS

Model upgrades from model Ds and Gs to model Ks or model upgrades increasing storage capacity are field installable and the parts removed or replaced become the property of IBM and must be returned. Model downgrade from model Ks to model Ds are not available. Model downgrade from a 3081 model G or K to a 3083 is not recommended.

Note: Any 3081-K upgrades to a 3084-Q requires installation of feature #1550 (Channel Group Add'l) on the 3081-K as a prerequisite to upgrading.

Model upgrades combining performance and storage increases should be ordered as a single MES where possible. Feature additions should be ordered separately from any model upgrade MES.

See M3084 pages for 3081-K to 3084-Q upgrade.

ACCESSORIES

The following is available on a purchase-only basis for shipment with the 3081 Processor Complex.

Console Table, 308X Processor Complex (#1560): Provides an operator workstation with a durable melamine working surface for up to two operators and their display consoles. The table has a color-accented front modesty panel, internal cable channels for routing phone lines and display cables and is designed for a raised floor environment. A raised accessory panel designed to accommodate wall mountable equipment such as tackboards, telephones or intercoms is attached to either one end or the other of the console table. The table measures 1,780mm x 815mm and the end accessory panel is 265mm higher than the 720mm table height. Specify end attachment of accessory panel and color of modesty panel.

Right end attachment	**#9441**	Sunrise Yellow	**#9163**
Left end attachment	**#9442**	Classic Blue	**#9164**
		Charcoal Brown	**#9165**
Willow Green	**#9161**	Pebble Gray	**#9166**
Garnet Rose	**#9162**	Pearl White	**#9167**

SUPPLIES (None)

3082 PROCESSOR CONTROLLER

PURPOSE

Provides the controlling mechanism for monitoring and supervising either the 3081, 3083, or 3084 Processor Complex and houses the interface adapter elements for each channel. It also contains the adapters for attaching the 3278-2A Display Console, an optional 3287 Printer and an optional 3268-2, a 3230-2 or a 3278-2 Display Station (programming support console). **Note:** The 3082 Model Q48 is not orderable from the plant and can only be achieved by upgrading a 3082 Model 24.

MODELS

Model 8	008	Supports 3083 Processor Units with 8 channels.
Model 16	016	Supports 3081 or 3083 Processor Units with 16 channels.
Model 24	024	Supports 3081 or 3083 Processor Units with 24 channels.
Model Q48	Q48	Supports a 3084 having 24 channels per side.

HIGHLIGHTS

The 3082 provides the machine to human interface for either the 3081, 3083, or 3084 Processor Complex and performs the following: Provides the control unit function for the system console ... provides the control unit function for an integrated service support console ... provides the control unit function for an optional printer and a programming support console ... houses the interface logic and control for each channel ... houses basic switches, lights and indicators ... houses the remote service facility modem used in remote servicing ... contains a diskette drive for maintenance data interchange ... contains fixed media direct access storage for processor data ... monitors power levels and coolant flow ... controls usage configurations and effects reconfiguration ... at initial microcode load, controls microcode loading of distributed control stores ... assist the Processor Unit in error recovery ... provides access to RETAIN for a 3278 Model 2 Display Station with or without Switch Control Unit feature (#1720) ... performs basic diagnostic and failure isolation on a time sharing basis with the above functions and operates concurrently to the processor unit to which it attaches.

One 3082 is required for each 3081, 3083, or 3084 Processor Unit. Each side of a 3082 Model Q48 has the functional attributes of model 24 plus the ability to function in a multiprocessor configuration.

3084 Operation: A 3082-Q48 is required to support any 3084 Processor Complex and contains two Monitoring and System Support Facilities (MSSF). Like the 3084 with which it functions, the 3082-Q48 duplicates most hardware, including two MSSFs. In a single image configuration, one MSSF supervises the 3084 Processor Complex. The second MSSF is capable of automatically assuming supervision of a 3084 Processor Complex for most failures of the primary MSSF.

At the failure of any critical hardware element, the MSSF performs its normal identification of failing componentry but also continues to supervise non-failing elements. This permits the operator to vary-off failing elements and to establish a maintenance configuration so that the failing hardware may be repaired. Using the intercommunication capability between the MSSF and the control program, pages are relocated where necessary and fencing is established between the maintenance configuration and the continuing customer's configuration. Upon verification of repair, the maintenance configuration is eliminated, the operator may vary-on the now repaired hardware and return it to continuing configuration.

When the 3084 if partitioned into two configurations, each side of the processor complex functions independently under the supervision of a dedicated MSSF.

Limitations: Natively attached programming support consoles (3278-2) must have installed a 75-key EBCDIC typewriter keyboard **#4621**.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, or **#9915** for 240V.
- Processor Unit Attachment:

3081	3083
any Model D = **#9491**	any Model E = **#9497**
any Model K = **#9492**	any Model B = **#9498**
any Model G = **#9493**	any Model J = **#9499**

- Color: The standard color for this unit is pearl white. Those wishing colored accents should specify: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown or **#9065** for pebble gray.
- Shipping Instructions: (Use of this specify option will increase installation time. Use only where required.) The standard external dimensions of Frame E and L are 945mm wide by 1778mm long by 1790mm high (37.2" x 70" x 70.5"). Should shipping dimensions need reduction, the side covers may be removed, reducing external dimensions to 858mm wide by 1778mm long (33.8" x 70"). This reduction may be obtained by specifying **#9571**. Further reduction may be achieved by additionally removing a frame extension which reduces external dimensions to 858mm x 1550mm (33.8" x 61") and is obtainable by specifying **#9573**. Specify **#9571** and **#9573** as required. For additional information, see *IBM System/370 Installation Manual Physical Planning,* GC22-7004, and/or your Installation Planning Representative.
- Remote Servicing: A customer supplied data communication line with an exclusion key telephoneof the WE503 or 2503 type (or equivalent) and a manual answer Data Protective Coupler (CDT type or equivalent)is necessary in order that higher level support may be received from the Field Support Center. These same facilities may also be used with RETAIN. The capability of using the RETAIN remote service/logout analysis is standard.

  An integrated remote service facility modem is standard on 3082 Connection of the IBM provided telephone interface cable to the telephone network must be arranged for by the customer. Each side of the 3082-Q48 has a remote service facility modem.
- Remote 3278-2A Display Console: The standard cable for interconnecting the 3082 and the 3728-2A (system console) is a fixed length, 15 meter (49 feet) cable. Cables greater than 15 meters (49 feet), up to the maximum length of 1,500 meters (4,921 feet), may be obtained by RPQ.

SPECIAL FEATURES

Channel To Channel Adapter (#1850 For First, #1851 For Second): Provides the controlling element to interconnect two processors via their channels (either S/360 or S/370 or 4300). Only one of the interconnected processors needs this feature. Uses one control unit position on each of the connected channels. On Model Q48, the feature is located on the A-side. **Maximum:** Two, one #1850 and one #1851. **Field Installation:** Yes. **Prerequisites:** #1851 requires #1850.

B-side CTC Adapter (#1852 for third, #1853 for fourth): (Mdl Q48 only.) Provides the controlling element to interconnect two processors via their channels (either S/360, S/370 or 4300). Only one of the interconnected processors needs this feature. Uses one control unit position on each of the connected channels. Feature is located on the B-side of the 3082. **Limitations:** Mdl Q48 only. **Maximum:** Two, one #1852 and one #1853. **Field Installation:** Yes. **Prerequisites:** #1853 requires #1852.

I/O Power Sequence Control (#4650): The 3082 has a standard capability of associating up to 32 control units to a 3081, 3083, or the A-side of a 3084 Processor Complex for power-on/power-off control purposes. When requirements exceed these 32 power control relays, #4650 provides for power-on/power/off control for the 33rd through 64th control unit. **Maximum:** One. **Field Installation:** Yes.

B-side I/O Power Sequence Control (#4651): (Mdl Q48 only.) The B-side of 3082-Q48 has a standard capability of associating up to 32 control units to the B-side of the 3084 for power sequence purposes. When requirements exceed these 32 power-control relays, #4651 provides for power-on/power-off control for the 33rd through 64th control unit attached to the B-side. **Limitations:** Available only on mdl Q48. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS

Model upgrades are field installable. Upgrade to a Model Q48 may only take place from a Model 24. Model downgrade from a Model Q48 to any other model is not recommended.

ACCESSORIES (None)

SUPPLIES (None)

3083 PROCESSOR UNIT

PURPOSE

Provides arithmetic, logic and control function through a single centrai processor and houses shared central storage and channels for a 3083 Processor Complex.

MODELS

Models			Bytes of Central Storage
E8	B8	J8	8,388,608
E16	B16	J16	16,777,216
E24	B24	J24	25,165,824
E32	B32	J32	33,554,432

Note: At initial microcode load time, a minimum of 327,680 bytes of central storage is assigned for system usage and is unavailable for programs. Depending upon channel attachment needs for configurations requiring greater than 512 UCWs, additional system area assignments are required. Expansion of the system area occurs automatically in 32KB increments (up to 589,824 bytes) as determined by the size of the I/O configuration. If required, an additional 512K bytes system area is available.

Model Differences: The various models of 3083 are identical in function but vary in instruction execution rate (ranging from the slowest Model E to the fastest Model J).

Prerequisites: Each 3083 Processor Unit requires:

1. One 3082 Processor Controller,
2. One 3087 Coolant Distribution Unit,
3. One 3278-2A Display Console as the system console, and
4. One 3089 Power Unit or other appropriate 400Hz power source.

Note: See "Specify" under the 3082 for appropriate Processor Unit Attachment Code.

Those customers using the 3087-1 CDU to cool their system must supply chilled water. See *S/370 Installation Manual - Physical Planning,* GC22-7004. In addition, the System Control Program will require an appropriate operator console in addition to the system console. Access to a 3274 mdl X1B or X1D, or availability of an operator console is required to satisfy the minimum service configuration.

HIGHLIGHTS

Depending upon the model, contains up to 33,554,432 bytes of monolithic central storage ... 312 nanosecond storage access cycle ... 26 nanosecond central processor cycle ... eight byte data flow between the central processor and storage ... a high speed buffer in the central processor ... buffer storage is transparent to a program and significantly reduces the effective access time of storage ... integrated byte and block multiplexer channels ... extensive use of LSI logic circuitry ... has the ability to operate in S/370 mode or 370-XA mode ... 370 XA mode extends addressing to 2 GB and provides for hardware controlled channel pathing to an I/O device ... distributed microcode logic and control stores ... microcode assists for both MVS and VM ... extensive data checking.

Standard Features: S/370 mode ... 370-XA mode ... Universal Instruction Set ... S/370 Extended Facility ... 3033 Extension Feature ... extended addressing ... extended control mode ... PSW key handling ... conditional swapping ... set prefix ... store prefix ... signal processor ... store CPU address ... extended precision floating point ... processor checkpoint retry ... time-of-day clock ... clock comparator ... CPU timer ... interval timer ... byte oriented operand feature ... key controlled storage page protection ... tracing protection ... storage error checking and correction ... storage configuration and control ... dynamic address translation ... program event recording ... store status ... program reset ... set system-mask suppression ... integrated channels ... channel set switching ... data streaming ... start I/O fast release ... clear I/O ... Virtual Machine Assist ... Preferred Machine Assist.

Channels: The External Data Controller (EXDC) is an integrated I/O processor containing eight channels as basic. One optional channel group is available on mdl E, two optional channel groups are available on mdls B and J. Channels are configurable as either byte or block multiplexer channels. A maximum of four byte multiplexer channels are permitted, and are assignable only within the first two physical channel groups. Byte multiplexer channels can operate only with unshared devices. Where byte multiplexer channels are not needed, block multiplexer channels may be substituted. All block multiplexer channels are capable of data streaming and are capable of operating at data rates up to three million bytes/second across a 1-byte interface. Each channel can address up to 256 I/O devices and may physically attach up to eight control units.

In S/370 mode, physical channels may be given any valid logical designation. In 370-XA mode, the central processor may initiate an operation with any I/O device and process any I/O interruption, using any of the channel paths to which the device is attached.

Limitations: In S/370 mode, address translation of page sizes is limited to 4K bytes and segment sizes to 64K bytes. Only 4K storage protect keys are used.

Bibliography: GC20-0001.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, or **#9915** for 240V.
- Color: The standard color for this unit is pearl white. Those wishing colored accents should specify **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown or **#9065** for pebble gray.
- Power: When 400 Hz power source is other than the 3089 Power Unit, specify **#9491**.
- Shipping Instructions: (Use of this specify option will increase installation time. Use only where required.) The standard extenal dimensions of Frame S are 945mm wide by 1,778mm long by 1,875mm high (37.2" x 70" x 73.8"). Should these dimensions need reduction, the side covers may be removed, reducing external dimension to 858mm wide by 1,778mm long (33.8" x 70"). This reduction may be obtained by specifying **#9571**. Further reduction may be achieved by splitting Frame S into two subframes, the largest of which has external dimensions of 778mm by 1,778mm long (30.6" x 70"). This reduction may be obtained by specifying **#9572**. Specify either **#9571** or **#9572** as required. For additional information, see *IBM System/370 Installation Manual - Physical Planning,* GC22-7004, and/or your Installation Planning Representative.
- Weight Considerations: (Use of this specify option will increase installation time. Use only where required.) Some older elevators have weight limitations of 1,136kg/2,500 lb and may require partial depopulation of 3083 frames to satisfy this limitation. Specify **#9581** to reduce frame weights to less than 1,136kg/2,500 lb.
- RETAIN: The capability of using the RETAIN remote service/logout analysis is standard and provided by the 3082 Processor Controller.

SPECIAL FEATURES

Channel Group, First Add'l (#1545): Provides the first add'l group of eight channels for any 3083. **Maximum:** One. **Field Installable:** Yes. **Prerequisites:** Every #1545 requires support from the appropriate mdl of a 3082 Processor Controller.

Channel Group, Second Add'l (#1550): Provides the second add'l group of eight channels for any mdl B or J. **Prerequisites:** Every #1550 also requires a #1545. Every #1550 requires support from a 3082 Processor Controller mdl 24. **Limitations:** Not available on mdl E. **Maximum:** One. **Field Installable:** Yes.

MODEL CONVERSIONS

Model upgrade from one 3083 to another is field installable. Parts removed or replaced become the property of IBM and must be returned. Model downgrade from model J to B, or from a model B to E, or from a 3081-K to a 3083-J, or from a 3081-G to a 3083-B, is not recommended.

Model upgrade from a 3083-J to a 3081-K, or from a 3083-B to a 3081-G, is field installable. Parts removed or replaced become the property of IBM and must be returned. Any 3083-J upgrading to a 3081-K, or any 3083-B upgrading to a 3081-G, requires installation of feature #1545 (Channel Group First Add'l) on the 3083 as a prerequisite action.

Model upgrades combining performance and storage increases should be ordered as a single MES where possible. Feature additions should be ordered separately from any model upgrade MES.

ACCESSORIES

The following is available on a purchase only basis for shipment with the 3083 Processor Complex.

Console Table, 308X Processor Complex (#1560): Provides an operator workstation with a durable melamine working surface for up to two operators and their display consoles. The table has a color-accented front modesty panel, internal cable channels for routing phone lines and display cables and is designed for a raised floor environment. A raised accessory panel designed to accommodate wall mountable equipment such as tackboards, telephones or intercoms is attached to either one end or the other of the console table. The table measures 1,780mm x 815mm and the end accessory panel is 265mm higher than the 720mm table height. Specify end attachment of accessory panel and color of modesty panel.

Right end attachment	**#9441**	Sunrise Yellow	**#9163**
Left end attachment	**#9442**	Classic Blue	**#9164**
		Charcoal Brown	**#9165**
Willow Green	**#9161**	Pebble Gray	**#9166**
Garnet Rose	**#9162**	Pearl White	**#9167**

SUPPLIES (None)

3084 PROCESSOR UNIT

PURPOSE

Provides arithmetic, logic and control function through four integrated central processors and houses shared central storage and channels for a 3084 Processor Complex. The processor unit may be partitioned and run as two independent dyadic configurations. The 3084 Processor is not orderable from the plant and can only be achieved by upgrading a 3081-K Processor.

MODELS

Models	Bytes of Central Storage
Q32	33,554,432
Q48	50,331,648
Q64	67,108,864
Q96	100,663,296

Note: At initial microcode load time, a minimum of 327,680 bytes of central storage is assigned for system usage and is unavailable for programs. Depending upon channel attachment needs for configurations requiring greater than 512 UCWs, additional system area assignments are required. Expansion of the system area occurs automatically in 32KB or 64KB increments (up to 589,824 bytes) as determined by the size of the I/O configuration. If required, an additional 512K byte system area is available. A maximum of 4,080 devices is possible.

Limitations: In 370 mode, address translation is limited to 64K byte segments and 4K byte page sizes. Only 4K storage protect keys are used.

Prerequisites: Each 3084 Processor Unit requires:

1. One 3082 mdl Q Processor Controller,
2. Two 3087 mdl 1s or mdl 2s Coolant Distribution Unit,
3. Two 3278 mdl 2A Display Console as the system console, and
4. Two 3089 Power Unit or other appropriate 400 Hz power source.

Those customers using the 3087 mdl 1 CDU to cool their systems must supply chilled water. See *IBM System/370 Installation Manual - Physical Planning,* GC22-7004. In addition, the System Control Program will require an appropriate operator console in addition to the system console. Access to a 3274 mdl X1B or X1D, or availability of an operator console is required to satisfy the minimum service configuration.

See *IBM System/370 Installation Manual - Physical Planning,* GC22-7004 for model upgrade requirements.

HIGHLIGHTS

Depending upon the mdl, contains up to 100,663,296 bytes of monolithic central storage ... 312 nanosecond storage access cycle ... four integrated central processors having a cycle time of 26 nanoseconds ... 8-byte data flow between each processor and storage ... each processor has its own high-speed buffer having a cycle time of 26 nanoseconds ... buffer storage is transparent to a program and significantly reduces the effective access time of storage ... concurrent repair of hardware is the normal maintenance procedure ... may operate as a single multiprocessor or partitioned into two dyadic configurations of an A-side and a B-side ... complete duplication of all critical functional elements ... integrated byte and block multiplexer channels ... extensive use of LSI logic circuitry ... has the ability to operate in S/370 mode or 370-XA mode ... 370 XA mode extends addressing to 2 GB and for hardware controlled channel pathing to an I/O device ... distributed microcode logic and control stores ... microcode assists for both MVS and VM ... extensive data checking.

Standard Features: S/370 mode ... 370-XA mode ... Universal Instruction Set ... S/370 Extended Facility ... 3033 Extension Feature ... extended addressing ... extended control mode ... PSW key handling ... conditional swapping ... set prefix ... store prefix ... signal processor ... store CPU address ... extended precision floating point ... processor checkpoint retry ... time-of-day clock ... clock comparator ... CPU timer ... interval timer ... byte oriented operand feature ... key controlled storage page protection ... tracing protection ... storage error checking and correction ... configuration control ... dynamic address translation ... program event recording ... store status ... program reset ... set system-mask suppression ... integrated channels ... channel set switching ... data streaming ... start I/O fast release ... clear I/O ... Virtual Machine Assist ... Preferred Machine Assist.

Channels: The External Data Controller (EXDC) is an integrated I/O processor containing 24 channels organized in three groups of eight. Two EXDC are integral to each 3084, one per side. Channels are configurable as either byte or block multiplexer channels. A maximum of four byte multiplexer channels are permitted and are assignable only within the first two physical channel groups. Byte multiplexer channels can operate only with unshared devices. Where byte multiplexer channels are not needed, block multiplexer channels may be substituted. All block multiplexer channels are capable of data streaming and are capable of operating at data rates up to three million bytes/second across a 1-byte interface. Each channel can address up to 256 I/O devices and may physically attach up to eight control units.

In S/370 mode, channels may be grouped into two logical channel sets, with up to 16 channels to a set, one set assignable to each central processor. Channel set switching is standard. In S/370 mode, physical channels may be given any valid logical designation.

In 370-XA mode, any central processor may initiate an operation with any I/O device and process any I/O interruption, using any of the 48 channel paths to which the device is attached.

3084 Tightly Coupled Multiprocessing: The 3084 duplicates all critical function elements (4 Central Processors, 2 External Data Controllers, 2 System Controllers) and is supported by two of each type of support unit. Its normal method of operation is in 370-XA mode under the control of a single control program through a single operational interface and provides the greatest computational capability of any 308X Processor Complex. Concurrent repair is the normal mode of maintenance.

The operator has the ability to reconfigure processor elements from the functioning configuration, create a maintenance subsystem, effect concurrent repair and return the repaired subsystem to the continuing configuration without requirement for IPL or IML. The continuing subsystem may consist of either half of the 3084. This provides very high availability of the surviving portion of the processor complex. When run as a 4-way tightly coupled multiprocessor, 3084 may operate only in 370-XA mode.

The 3084 may also be partitioned into two independent dyadic processors. The resultant dyadic configurations may be operated independently of each other in either 370-XA or S/370 mode.

Bibliography: GC20-0001.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, or **#9915** for 240V.
- Color: The standard color for this unit is pearl white. Those wishing colored accents should specify **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown or **#9065** for pebble gray.
- Power: When 400 Hz power source is other than the 3089 Power Unit, specify **#9491** for the A-side capability (on 3081) and **#9591** for the B-side capability (on MES).
- Shipping Instructions: (Use of this specify option will increase installation time. Use only where required.) The standard external dimensions of Frame S and Frame T are 945mm wide by 1,778mm long by 1,875mm high (37.2" x 70" x 73.8"). Should these dimensions need reduction, the side covers may be removed, reducing external dimension to 858mm wide by 1,778mm long (33.8" x 70"). This reduction may be obtained by specifying **#9571.** Further reduction may be achieved by splitting Frame S and Frame T into two subframes, the largest of which has external dimensions of 778mm by 1,778mm long (30.6" x 70"). This reduction may be obtained by specifying **#9572.** Specify either **#9571** or **#9572** as required. For additional information, see *IBM System/370 Installation Manual - Physical Planning,* GC22-7004, and/or your Installation Planning Representative.
- Weight Considerations: (Use of this specify option will increase installation time. Use only where required.) Some older elevators may have weight limitations of 1,136kg/2,500 lbs and may require partial depopulation of 3084 frames to satisfy this limitation. Specify **#9581** to reduce frame weights to less than 1,136kg/2,500 lbs.
- RETAIN: The capability of using the RETAIN remote service/logout analysis is standard and provided by the 3082 Processor Controller.

SPECIAL FEATURES (None)

MODEL CONVERSIONS

Model upgrades from 3081-K to a 3084-Q and storage upgrades within 3084-Q are field installable. Parts removed or replaced become the property of IBM and must be returned.

Upgrade Prerequisites: Prior to model upgrading any 3081-K to a 3084-Q, the 3081-K must have installed feature **#1550** and one-half of the storage capacity of 3084-Q. Only symmetrical upgrades are allowed.

Model downgrade from 3084-Q to a 3081-K is not recommended.

ACCESSORIES

The following is available on a purchase-only basis for shipment with the 3084 Processor Complex.

Console Table, 308X Processor Complex (#1560): Provides an operator workstation with a durable melamine working surface for up to two operators and their display consoles. The table has a color-accented front modesty panel, internal cable channels for routing phone

3084 Processor Unit (cont'd)

lines and display cables and is designed for a raised floor environment. A raised accessory panel designed to accommodate wall mountable equipment such as tackboards, telephones or intercoms is attached to either one end or the other of the console table. The table measures 1,780mm x 815mm and the end accessory panel is 265mm higher than the 720mm table height. Specify end attachment of accessory panel and color of modesty panel.

Right end attachment	**#9441**	Sunrise Yellow	**#9163**
Left end attachment	**#9442**	Classic Blue	**#9164**
		Charcoal Brown	**#9165**
Willow Green	**#9161**	Pebble Gray	**#9166**
Garnet Rose	**#9162**	Pearl White	**#9167**

SUPPLIES (None)

3085 POWER DISTRIBUTION UNIT

[NO LONGER AVAILABLE]

PURPOSE

Provides power control and distribution for a S/360 model 195 or S/370 model 195.

MODELS

Model 1 001 S/360 model 195 or S/370 model 195

HIGHLIGHTS

One unit is used with each 3195 Processing Unit.

Publications: S/360 -- GC20-0360, S/370 -- GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES: (None)

SUPPLIES: (None)

3086 COOLANT DISTRIBUTION UNIT

[NO LONGER AVAILABLE]

PURPOSE

Provides distribution control for coolant required by the S/360 model 195 or S/370 model 195.

MODELS

Model 1 001 S/360 model 195 or S/370 model 195

Prerequisites: Customer-supplied chilled water is required for cooling the system. See *S/360 Installation Manual - Physical Planning,* GC22-6820.

Publications: S/360 -- GC20-0360, S/370 -- GC20-0001

HIGHLIGHTS

One unit is used with each 3195 Processing Unit.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES: (None)

SUPPLIES: (None)

3087 COOLANT DISTRIBUTION UNIT

PURPOSE

Provides the coolant distribution required by a 3081, 3083, or 3084 Processor Unit.

MODELS

Model 1 001
Model 2 002

HIGHLIGHTS

Contains the heat exchanger, pumps and controls necessary to cool the liquid cooled portion of the 3081, 3083 or 3084 Processor Unit. The 3087-1 uses the efficiency of water cooling and evacuates its heat to chilled water, while the 3087-2 evacuates its heat to the air of the computer room.

The 3087 supports a 3081, 3083 or 3084 Processor Unit. Two 3087 mdl 1s or two 3087 mdl 2s are required to support a 3084 Processor Unit. They cannot be intermixed.

Note: If mdls are switched in the field, a new M01 diskette is required for the 3081, 3083, or 3084 Processor Unit.

Bibliography: GC20-0001.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9915** for 240V.
- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray, or **#9066** for pearl white.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3262 Line Printer Mdls 1, 2, 3, 11, 12, 13 (cont'd)

Notes:

1. Order via MSORDER (Category = Bulk Cable) on AAS. Specify Part Number, Assembly Number, or Bulk Number as appropriate. Allow a lead time of 6 weeks.
2. Coax wire and one connector kit (includes two connectors #1836446) required for each indoor cable assembly.
3. Coax wire and one connector kit (includes two connectors #1836447) required for each outdoor cable assembly.
4. Customers replacing 2260 display stations may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
5. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
6. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
7. Replacement station protector elements.
8. Use to join two #2577672 or two #1833108 cable assemblies together.

Print Band, Add'l: Permits the customer to obtain more than one character set print band for various applications. When ordering, use one feature number for character set size and one feature number for character height. Installation and replacement of these bands are the customer's responsibility. If customer desires to have IBM Field Engineering replace or install the print band, the CE time will be billed to the customer.

Character Set Size	Feature
48-character EBCDIC	#5940
48 OCR-AON (numeric and specials)*	#5974
48 OCR-BON (numeric and specials)*	#5975
63-character EBCDIC (optimized)	#5946
64-character EBCDIC	#5944
96-character EBCDIC*	#5948
128-character Text* (mdl 3, 13 only)	#5961
North American 128 distributed office (Models 2 and 12 only)	#5962

Character Set Height	Feature
2.0mm (0.079")**	#5951
2.4mm (0.095")	#5950

* Available only with 2.4mm (0.095") character height (#9950).
** Recommended for 8 lpi operation.
Note: ASCII bands available by RPQ.

SUPPLIES

Ribbons: A black ribbon, P/N 7819690, or equivalent, is required. An OCR ribbon P/N 7032877 or equivalent is required with OCR feature #5450.

3262 LINE PRINTER MDLS B1, C1

PURPOSE

The 3262 mdl B1 is the printed output unit for System/34 and System/38. The 3262 mdl C1 is the printed output unit for System/36.

MODELS

Model B1 B01 650 lpm Stand-alone
Model C1 C01 650 lpm CSU Stand-alone

The above nominal rated speed is based on a standard 48-character set.

Limitations:

1. Only pinfed, continuous forms can be used.
2. Both edges of the forms must be fastened in the forms tractors.
3. No staples are permitted in the areas exposed to the interchangeable print band.
4. Printer operation and print quality vary with paper and number of copies. Forms sets of more than four parts should be tested in operating conditions to verify that results are satisfactory.
5. Due to the complexity of certain characters on the multinational print bands, multiple part forms should be tested in operating conditions to ensure that results are satisfactory.
6. Multiple-part forms are not recommended for OCR printing. The print quality of the top sheet is affected by the underlying sheets. Under no circumstances should the copy sheets be used for optical scanning. For best results use 20-24 lb (75-90g/sg. m.) OCR bond in single-part forms. OCR forms utilizing other papers should be tested for satisfactory results with the user requirements. When reading 3262 documents on the 3886, Re-read on Reject capability and 3211/5211 compatibility **(#9701)** should be used on the 3886. OCR printing is limited to controlled DP room environment. Refer to system planning guides. The OCR feature is a prerequisite for OCR applications.

Maximum: Two 3262 Printers can attach to System/38, one 3262 Printer can attach to System/36, one 3262 Printer can attach to System/34.

Prerequisites: A 3262 Attachment on the 5381 System Unit. Specify #1100 or #1110 on 5381. See 5381 Special Features.

A 3262 attachment on the 5360 System Unit. A 3262 printer attachment feature (#5830) is required on the 5360 System Unit. See 5360 special features. 5360-AXX mdls additionally require processor unit expansion A (#5732).
Note: If an installed 3262 mdl B1 is to be attached to a 5360 system unit, see specify **#9876** in the 5360 pages. See 5360 special features.
Note: An installed 3262 mdl B1 can attach to the 5360 System via specify code **#9030** which is a no-charge MES on the printer. No new orders will be accepted in AAS for a 3262 mdl B1 printer for attachment to the 5360 System.

A 3262 Printer Attachment Feature (#5815) and a 5211/3262 Base Printer Attachment (#1110) are required on the 5340 System Unit. See 5340 Special Features.

For 3262 mdl	Attached to System	Specify System Prereq.	Printer Specify Features	System Sales Pages
B1	5381	#1100 or #1110	#9020	5381
B1	5340	#5815 & #1110	#9010	5340
B1	5360	#9876	#9030	5360
C1	5360-AXX	#5830 & #5732	N/A	5360
C1	5360-BXX	#5830	N/A	5360

Customer Setup (CSU): Yes, mdl C1 only.

HIGHLIGHTS

A universal character set buffer of 288 positions in the 3262 Attachment allows use of graphic sets of up to 288 characters. A general purpose optimized print band of 64-characters is available. (See 3262 in Type Catalog section.) The 64-character optimized print band can provide speeds up to a maximum of 625 lpm. Should specific application data have unique characteristics and not conform to the 64 character set optimized print band, the normal print bands will provide the following nominal rated speeds:

	Nominal Rated Speeds(lpm)
48-character set	650
64-character set	467
96-character set	364

132 print positions are standard. Horizontal spacing is 10 characters per inch. Vertical spacing is six or eight lines per inch under system control for System/38 and operator control for System/34 and System/36. Forms skipping and spacing are program controlled. The carriage is a single speed unit allowing skipping up to 20 inches per second. Continuous forms are fed by a forms tractor. See *Forms Design Reference Guide for Printers,* GA24-3488, for forms design considerations.

OCR capability is provided as a feature (#5460). See special features. The 48 character bands containing numeric A or B font (10 numbers and 3 special characters) are available only as part of the feature. The new OCR feature is supported by the System/38 hardware and software beginning with Release 3.0. The OCR feature is also supported by the System/34 and System/36.

Customer Setup (CSU): The 3262 mdl C1 is designated as a customer setup device. The Marketing Representative must advise the customers of their responsibilities before receipt of the device.

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Power cord and plug: (120 V AC 1-phase, 3 wire, 60 Hz) The standard power cord is 4.3m (14 ft) long with locking plug; specify **#9081.** For Chicago the cord is 1.8m (6 ft) long with a locking plug, specify both **#9986** and **#9081.** For a watertight power cord (System/38 only), specify **#9080.**
- Color: Background color is pearl white. A color accent must be specified. **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray or **#9066** for pearl white.
- Interchangeable Print Band: [Plant only] See "Type Catalog" for print band arrays. When ordering, indicate one specify code for character set and one specify code for character height. When printing 8 lpi, 2.0mm (0.079") character height is recommended.

  Two print bands (same specify code) will be shipped with the printer. The second band will be a spare for use by the customer as a back up. When the customer installs this backup band, a replacement should be ordered via MES and the platen rotated as described in the instructions provided with the printer (exception is when OCR feature is installed). In this case the platen is single surface and cannot be rotated. The customer will be billed at the current accessory band price. Replacement and installation of the print band is the customer's responsibility. If the customer desires to have Field Engineering replace or install the print band, the CE time will be billed to the customer.

Specify	Character Set Size
#9520	48-Character
#9565	48-Character FORTRAN ***
#9521	60-Character S/38 Special **
#9522	64-Character EBCDIC
#9523	64-Character EBCDIC (Optimized)
#9524	64-Character ASCII
#9525	64-Character ASCII (Optimized)
#9564	64-Multinational *
#9526	96-Character EBCDIC *
#9528	96-Character ASCII *
#9563	96-Multinational *
#9562	188-Multinational *

* Available only with 2.4mm (0.095") character height **(#9950).**

** This specially designed band for the System/38 only will enable the user to print the System/38 Control Language characters.

*** Available on System/34 and System/36.

Specify	Character Height
#9951*	2.0mm (0.079")
#9950	2.4mm (0.095")

* Recommended for printing 8 lpi (25.4mm).

If Spanish N (with Tilde) printing capability is desired on the print bands provided with the 3262, order **#2961** plus two additional Specify Codes selected from the following offerings of character set size and character height:

Specify	Character Set Size
#9520	48-Character
#9522	64-Character
#9523	64-Character (Optimized)
#9526*	96-Character

* Available only with 2.4mm (0.095") character height **(#9950).**

3262 Line Printer Models B1, C1 (cont'd)

Specify	Character Height
#9951*	2.0mm (0.079")
#9950	2.4mm (0.095")

* Recommended for printing 8 lpi (25.4mm).

- System Attachment: For attachment to System/34, specify **#9010**. For attachment to System/38 specify **#9020**. When changing from System/34 to System/38, **#9010** must be removed and **#9020** must be added. When changing from System/34 to System/36, **#9030** must be added.

SPECIAL FEATURES

OCR Print Feature (#5460): Provides for manual operator selection of print hammer controls for OCR applications. One of the following OCR print bands must be specified:

Specify	Band Description
#9666	48-Character OCR-AON (1)
#9667	48-Character OCR-BON (1)

Notes:
(1) Non-OCR characters are 2.4mm (0.095") in height.

Two OCR print bands (OCR numerics and 3 specials) will be shipped with #5460 in addition to the two standard bands shipped with the basic printer. The second band will be a spare for use by the customer for backup. When the customer installs the backup band, a replacement should be ordered via an MES. Billing, warranty and ordering additional bands (see Accessories section) is the same as for standard bands shipped with the printer. **Field Installation:** CSU.

MODEL CONVERSIONS (None)

ACCESSORIES

Prints Bands: Two print bands are included with the initial shipment. Additional print bands permit the customer to print more than one character set for various applications and can be interchangeably used with the band provided with the machine. OCR print bands are for use only with OCR Feature #5460. See "Type Catalog" for print band arrays. When ordering, indicate one feature code for character set size and one feature code for character height. Interchangeable Print Bands: See "Specify".

Print Band, Add'l: Permits the customer to obtain more than one character set print band for various applications. When ordering, use one feature number for character set size and one feature number for character height. Installation and replacement of these bands are the customer's responsibility. If customer desires to have IBM Field Engineering replace or install the print band, the CE time will be billed to the customer.

Character Set Size	Feature
48-character EBCDIC	**#5940**
48 OCR-AON (numeric and specials)*	**#5974**
48 OCR-BON (numeric and specials)*	**#5975**
64-character EBCDIC (optimized)	**#5946**
64-character EBCDIC	**#5944**
96-character EBCDIC*	**#5948**
128-character Text* (mdl 3, 13 only)	**#5961**

Character Set Height	Feature
2.0mm (0.079")**	**#5951**
2.4mm (0.095")	**#5950**

* Available only with 2.4mm (0.095") character height (**#9950**).
** Recommended for 8 lpi operation.
Note: ASCII bands available by RPQ.

SUPPLIES

Ribbons: A black ribbon, P/N **7819690**, or equivalent, is required. An OCR ribbon P/N **032877** or equivalent is required with OCR feature #5460.

3262 LINE PRINTER MDL 5

PURPOSE

Printer output for attachment to a processor channel.

MODELS

Model 5	005	Printer output unit for 4300 Processors, all Virtual Storage S/370 (except 15511 or 16511), 3031, 3032, 3033, 3081, 3083 or 3084 Processors.

Limitations:

1. Only pinfed, continuous forms can be used.
2. Both edges of the forms must be engaged by the forms tractor pin feed.
3. No staples are permitted in the areas exposed to the interchangeable print band.
4. Printer operation and print quality vary with paper and number of copies. Form sets of more than four parts (and one part with 128 character text print bands) should be tested under operating conditions to verify that results are satisfactory. Maximum forms thickness is 0.51mm (0.020 inch).
5. Multiple-part forms are not recommended for OCR printing. The print quality of the top sheet is affected by the underlying sheets. Under no circumstances should the copy sheets be used for optical scanning. For best results, use 20-24 lb OCR bond in single-part forms for OCR printing. OCR forms utilizing other papers should be tested for satisfactory results with user requirements. When reading 3262 documents on the 3886, reread on reject capability and 3211/5211 Compatibility (**#9701**) should be used on the 3886. OCR printing is limited to controlled DP room environment. The OCR feature #5450 is a prerequisite for OCR Applications.

Maximum: The number of 3262 mdl 5s that can be attached is limited only by the number of control unit positions available on the system channel. Channel loading and system configuration may affect printer performance.

Prerequisites: An available control unit position on a system channel.

HIGHLIGHTS

132 print positions are standard. Horizontal spacing is 10 characters per 25.4mm. A fine horizontal vernier adjustment is provided on the mdl 5 to allow the operator to horizontally position printed characters in predetermined print positions. The maximum amount of movement is the width of one and one half print positions 3.8mm (.150 inch) at 10 characters per 25.4mm (1 inch). Vertical spacing is 6 or 8 lines per 25.4mm (1 inch) under system control. Forms skipping and spacing are program controlled. The forms carriage is a single speed unit allowing skipping up to 508mm (20 inches) per second. Continuous forms are fed by a forms tractor, which accepts forms of up to a maximum of 406.4mm (16 inches) wide. See *Forms Design Reference Guide for Printers,* GA24-3488, for forms design considerations.

Performance Considerations: Actual printer throughput is dependent upon operational and programming characteristics. The following factors must be considered in determining actual throughput:

- System Configuration
- Application Processing
  - Data organization
  - Output format:
    skipping ... spacing ... print line length
    Character set size of print
    band application program.

Programming Support: For 3262 mdl 5 printers that are shipped prior to the General Availability dates of MVS/SP Version 1 support of the 3262-5, a no charge RPQ S00538 must be ordered via MES and installed to operate on a MVS/SP Version 1 system. RPQ S00538 activates the mode selector switch so that in addition to system generating the 3262 mdl 5 printer as a 3262 mdl 001 and 011 for DOS/VSE, VM/SP and OS/VS1, it can be system-generated as a 4248 printer for MVS/SP Version 1. 3262 mdl 5 printers that are shipped after the MVS/SP Version 1 General Availability dates will operate in either mode and will not require an RPQ.

Print Bands: Operator interchangeable print bands are available which offer the following character sets and nominal speeds:

	Nominal Speed (lpm)
48-character set	650
64-character set	466
96-character set	363
128-character set	252

A general purpose optimized 63-character set print band is available which can provide speeds of up to 625 lpm. The expected performance of the 63-character optimized band is not determinable unless sample data streams are printed. It is possible that the performance could be less than the 64-character band if the low frequency occurring characters on the 63-character band are used at a higher rate.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of problem determination and recovery routines and procedures that are easily understood and used by the operator. See "Customer Responsibilities" below.

Customer Responsibilities: The customer is responsible for:

- Receipt at the customer's receiving dock, unpacking and placement of the 3262.
- Notify IBM of intent to relocate and follow IBM instructions for relocation.
- Use and follow the problem determination procedures and fill out Trouble Report Form prior to calling IBM for service.
- Packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
- Replacing a worn print band with the spare provided and ordering another spare band.
- Rotating the platen per the instructions provided with the printer, The special platen for OCR cannot be rotated when the OCR feature #5450 is installed.

Bibliography: GC20-0001

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- The basic machine is shipped with 120V, AC, 1-phase, 3-wire, 60 Hz, watertight power plug (Russell and Stoll). Power cord length is 4.3m (14 foot). If a 1.8m (6 foot) power cord is desired, specify **#9986**.
- Color: Will be pearl white and accent covers will be pebble gray.
- Print Band Character Set: Specify one number from Group A (character set size) and one number from Group B (character set height). When printing 8 lpi, 2.0mm (0.079") character height is recommended. Two print bands (same specify code) will be shipped with the printer. The second band will be a spare for use by the customer as a backup. When the customer installs this backup band, a replacement should be ordered via an MES. The customer will be billed at the current accessory band price. If the customer desires to have Field Engineering replace or install the print band, or rotate the platen, the CE time involved will be billed to the customer. Available at time of manufacture only. See "Print Band, Add'l" in Accessories section if more than one band style is required.

Group A

Specify Number	Character Set Size
#9520	48-character set EBCDIC
#9530	48-character set International
#9522	64-character set EBCDIC
#9523	63-character EBCDIC (optimized)
#9526*	96-character set EBCDIC
#9536*	96-character set International
#9527*	128-text character set EBCDIC

* Available only with 2.4mm (0.095") character height (**#9950**).

Group B

Specify Number	Character Set Height
#9950	2.4mm (0.095")
#9951*	2.0mm (0.079")

* Recommended for printing 8 lines per 25.4mm (inch)

Character sets may be requested by RPQ.

If Spanish N (with Tilde) printing capability is desired on the print band provided with the 3262, order **#2961** and one number from Group A (character set size) and one number from Group B (character set height).

Group A

Specify	Character Set Size
#9520	48-Character Set
#9522	64-Character Set
#9526*	96-Character Set

* Available only with 2.4mm (0.095") character height (**#9950**).

3262 Line Printer Mdl 5 (cont'd)

Group B

Specify	Character Set Height
#9950	2.4mm (0.095")
#9951*	2.0mm (0.079")

*Recommended for printing 8 lines per 25.4mm (inch)

SPECIAL FEATURES

Audible Alarm Feature (#1090): Audibly notifies the operator that manual intervention or problem determination is required. The alarm is under printer control and is activated only when the "Check Indicator" is turned on. A switch on the operator's panel can disable the alarm. **Maximum:** One. **Field Installation:** Yes.

OCR Print Feature (#5450): Provides a manual selection for OCR print applications.

One of the following OCR bands (numerics only) must also be specified.

#9666 OCR-AON 48-Character Set (1)
#9667 OCR-BON 48-Character Set (1)

Notes:
(1) Non-OCR characters are 2.4mm (0.095") in height

Two OCR print bands (OCR numerics and specials only) will be shipped with #5450, in addition to the bands shipped with the basic printer. The second OCR band will be a spare for use by the customer for backup. When the customer installs the backup band, a replacement should be ordered via an MES. Billing, warranty and ordering additional bands are the same as for non-OCR bands shipped with the printer. **Field Installation:** Yes.

MODEL CONVERSIONS

The model 5 cannot be changed to any other model of the 3262 Printer.

ACCESSORIES

The following items are available on a purchase-only basis. Order the feature number indicated below at the price listed in the Price List section. Order by MES. Only one print band per MES.

Print Band, Add'l: Permits the customer to obtain more than one character set. Installation and replacement of these print bands is the customer's responsibility. If the customer desires to have Field Engineering replace or install the print band, the CE time will be billed to the customer. **Maximum:** One per machine order. Order by MES only.

When ordering, indicate one feature code for character set size and one feature code for character set height.

Feature Number	Description
#5940	48-character EBCDIC
#5944	64-character EBCDIC
#5946	63-character EBCDIC Optimized
#5948*	96-character EBCDIC
#5961*	128-character text

* Available only with 2.4mm (0.095") character height (**#5950**)

Specify	Character Set Height
#5950	2.4mm (0.095")
#5951*	2.0mm (0.079")

* Recommended for printing 8 lines per 25.4mm (inch)

SUPPLIES

Ribbons: A black ribbon, P/N **7819690** or equivalent, is required. An OCR ribbon, P/N **7032877** or equivalent, is required with OCR feature #5450.

3268 PRINTER MDL 1

PURPOSE

Provides hard copy output for the 8100 Information System via Loop attachment, printing at a maximum speed of 340 cps.

MODELS

Model 1 001

Prerequisites: For direct attached loop operation: **#4830** or **#4835** on the 8101, 8130, or 8140. For data link attached loop operation: 3842 or 3843 Loop Control Unit.

Customer Setup (CSU): The 3268 is designated as Customer Setup thereby offering the customer early availability and relocation flexibility. For additional information on CSU, refer to the GI section.

HIGHLIGHTS

The 3268 mdl 1 consists of control functions, printer and indicator lights in one integrally designed pedestal unit. 132 printer positions are standard. Horizontal spacing is 10 characters per 25.4 mm (inch) and 16.7 characters per 25.4mm (inch). Selection of horizontal spacing is via a manual switch on the operator panel or via data stream control. Vertical spacing is 3, 4, 6 or 8 lines per 25.4mm (inch). The printer operates in SCS (SNA LU1) mode, which provides for customer program definable horizontal and vertical formatting. APL/TEXT, Dual Case Operation, Audible Alarm and Cancel Print are provided as standard functions.

Continuous forms are fed by a forms tractor which accepts forms up to 406.4mm (16 inches) wide. Up to 6-part forms may be used. 5- and 6-part forms should be tested on an individual basis for acceptable feeding, registration and print quality.

See *Forms Design Reference Guide for Printers,* GA24-3488, for forms design considerations.

Problem Determination Procedure: Significant function has been designed into this unit to provide greater availability to the customer. This has been done by the use of problem determination and recovery routines and procedures that can be understood and used by the operator. See "Customer Responsibilities", below.

Performance Considerations: Actual printer throughput is dependent upon operational and system characteristics. Factors such as controller configuration, line transmission speed, loop speed, output format, and program application processing must all be considered in determining actual throughput. Refer to *IBM 3268 Printer Component Description,* GA27-3267, for more detail.

Customer Responsibilities: The Customer is responsible for:

- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement of the 3268.
- Physical setup, connection of cables, switch settings and checkout.
- Notifying IBM of intent to relocate and follow IBM instructions for relocation.
- Using and following the problem determination procedures and filling out the trouble report prior to calling for IBM Service.
- Disconnecting, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
- Ordering and replacing a worn printhead and insuring that a functional printhead is available for use by a service personnel. The customer must be advised that on his request, FE can provide on-site installation of the customer-supplied printhead (P/N 7033524) on a per call billable basis.
- Procurement, installation, and maintenance of the loop network.

Communication Cable: A communication cable (Loop Station Connector (LSC) cable) is provided as standard for attachment to a direct attached or data link attached loop. Standard cable is 4.3 meters (14 feet) in length.

Bibliography: See *KWIC Index,* GA20-1621, or specific system bibliography.

SPECIFY

- The basic machine is shipped with the following: Voltage 120V, AC, 1-phase, 3-wire, 60 Hz; power plug non-locking; power cord lengths of 2.8 meters (9 feet).

  The following options may be specified: **#9890** for locking plug; **#9511** for 1.6 meters (5 foot) power cord.

- **Language:** National Use Character Sets are selected via the operator panel. APL/TEXT may be selected via the SCS data stream.

  Character Sets which may be selected include:

- Machine Nomenclature: Available at time of manufacture only.

  Nomenclature default is as follows:
  All other countries default to English. Alternate nomenclature may be chosen by specifying one of the following:

SPECIAL FEATURES (None)

MODEL CONVERSIONS

Not recommended for field installation.

ACCESSORIES

Forms Stand (#4450): Available on a purchase-only basis. For shipment with machine, order **#4450**. Provides for stacking forms after printing. For forms stacking, use of the Forms Stand is recommended. This accessory is a one-shelf forms stand. See *Forms Design Reference Guide for Printers,* GA24-3488, for forms design and stacking considerations.

For field installation:

Forms Stand P/N 8678375 or Feature **#4450**

SUPPLIES

Ribbon (P/N 7032821): A Black Ribbon Cartridge, P/N 7032821 or equivalent, is required. The ribbon cartridge has a print life* of five million characters. Replacement printheads and ribbon cartridges are available for purchase from SSD ... see SSD sales manual.

* Ribbon print life is derived from IBM - conducted tests. Ribbon life experienced by a user may vary significantly depending on the user's own quality criteria and on factors such as printer condition, machine settings, and paper quality.

Printhead (P/N 7033524): The life expectancy** of the printhead is 300 million characters.

** Printhead life expectancy is derived from IBM - conducted tests. Printhead life experienced by a user may vary significantly depending on the user's own quality criteria and on factors such as printer condition, machine settings, and ribbon used.

3279 COLOR DISPLAY STATION MDLS 2A-3B

[NO LONGER AVAILABLE]

The 3279 Models 2A, 2B, 3A and 3B are no longer available. MES orders for model changes, features, released RPQs, and accessories are not affected. No new RPQs will be accepted. See other M3279 Model pages.

PURPOSE

A high quality color cathode ray tube (CRT) display station used in clusters with the 3274, the 3276, or the 4321 Processor and 4331 Processor for displaying alphameric data, and for entering data into and receiving data from a S/360, S/370, 4300, 4700 Finance Communication System, or 8100 Information System. In base color mode on all models data fields may be displayed in a choice from four colors. A keyboard, selector light-pen, or both, permit an operator to display and manipulate data on the screen in a flexible and efficient manner.

On extended color models 2B and 3B of the 3279, attached to a 3274, data may be displayed at both character and field level in seven colors, with a choice of highlighting modes. APL is provided. Customer specified symbols and shapes may be displayed in any character position using Programmed Symbols. With its set of basic and optional features the 3279 meets both general purpose and unique display requirements.

MODELS

Base color

Model 2A A02 — Displays up to 1,920 characters in 24 lines of 80 characters each

Model 3A A03 — Displays up to 2,560 characters in 32 lines of 80 characters each

Extended color

Model 2B B02 — Displays up to 1,920 characters in 24 lines of 80 characters each

Model 3B B03 — Displays up to 2,560 characters in 32 lines of 80 characters each

For use with 8100 Information System, see the *8100 System Configurator,* GA27-2876. For use with 4700 System, refer to M4701 pages.

Prerequisites: 3279 requires a keyboard and a 3274 or 3276 with appropriate features, or a 4321 or 4331 ... see M3274, 3276, 4321, or 4331 pages.

Customer Setup (CSU): The 3279 is designated Customer Setup thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM.

HIGHLIGHTS

Characters are displayed within a 9x12 character matrix on all mdls. On all mdls the basic 26 character upper case letters are presented in 7x9 character matrix. A 94-character set is displayed consisting of 26 upper case alphabetic, 26 lower case alphabetic, 10 numeric and 32 special characters. A monocase switch provides the capability of switching to uppercase alphameric mode. The 3279 uses 3270 field formatting capability that permits individual fields of data on the screen to be program defined with various attributes, such as protected/unprotected, normal/intensified, displayable/non-displayable and selector light-pen detection allowed/disallowed. An audible alarm is provided.

All 3279 mdls use the 3270 formatting attributes of protect and intensify for the additional purpose of displaying individual fields in base colors according to the following table.

Protected and intensified	–	White
Unprotected and intensified	–	Red
Protected and normal intensity	–	Blue
Unprotected and normal intensity	–	Green

Extensions to 3270 data stream supported by appropriate 3274 features and by 3279 mdls 2B and 3B and the optional Programmed Symbols (PS) features provide the following field and character attributes.

- Extended Color (red, blue, green, white, yellow, turquoise and pink)
- Extended Highlighting (reverse video, blink, underscore)
- Programmed Symbols (six sets with 190 loadable positions each)

Each attribute can be specified independently of any other. Special keyboards are provided to allow operator control of these attributes.

Programmed Symbols can use the whole character matrix for symbol definition.

In addition, three of the sets of Programmed Symbols allow symbols and shapes to be displayed using multiple colors within a single character location.

3270 Personal Computer Attachment enables the IBM Personal Computer, 5150, to be attached to the 3279 mdls 2A, 3A, 2B, 3B. The display station and associated keyboard become common to both the host processor and to the IBM Personal Computer, thus expanding the use of the display station and the applications available at the display station.

3279 mdls 2B and 3B provide Extended Color, Extended Highlighting and APL/Text. 3279 mdls 2B and 3B are supported on 3274 mdls 1A, 1C, 1D, 31A, 31C, 31D, 41A, 41C, 41D, 51C, or 61C, and on the 3276 for APL/Text operation.

APL/Text capability provides for display of a 222-character APL/Text character set including the 94 character EBCDIC set. An appropriate keyboard is available. APL/Text requires a 3274 mdl X1A, X1C, or X1D, customized to include the APL/Text control function, or a 3276 with APL/Text control feature and its prerequisite, Extended Function Base feature. APL/Text operates in EBCDIC mode only and is NOT compatible with ASCII.

For Extended Color and Extended Highlighting on the 3279 mdls 2B and 3B, the structured field and Attribute Processing option of Configuration Support C or D is required on the 3274. The 3279 PS features require in addition the Programmed Symbols option of 3274 Configuration Support C or D. Extended Color, Extended Highlighting and PS function operate in EBCDIC mode only and are not compatible with ASCII. The 3279 mdl 2A will attach to the Display/ Printer Adapter of the 4331 Processor.

For base color mode of operation, all mdls of the 3279 will attach to all mdls of the 3274. Configuration support on the 3274 must be at the following level or higher:

Configuration A - Release 11.1
Configuration B - Release 22.0
Configuration C
Configuration D
Configuration T.

On the 3276, for base color mode, 3279 mdls 2A and 2B will attach to all 3276 mdls except mdl 1 and 3279 mdls 3A and 3B will attach to all 3276 mdls except mdls 1 and 2.

The operator may initiate a local display-to-printer (monochrome or color 3287) copy function (i.e., without host intervention) from the keyboard of a 3279 (except for graphics use of PS). When the 3279 is attached to a 3274, the printer designation is controlled by operator use of the IDENT key and by:

1. A printer authorization matrix which is loaded into the 3274 through a user written host application program or
2. A customer definable matrix loaded from the System Diskette at IML time. For further details, see the *IBM 3270 Information Display System Planning and Setup Guide,* GA27-2827.

When the 3279 is attached to 3276, the printer designation is controlled by operator use of the IDENT key and by a configuration default matrix. This matrix is determined by the relative positions of devices attached to the 3276.

Operator Factors: The 3279 has an anti-glare screen to improve contrast and readability. Indicators are displayed in symbols on the bottom row of the screen, outside the data area and provide useful operator information. These symbols, except those indicating color attributes will appear in blue. Display of data on the screen is accomplished without refresh interrupt (except that transient patterns are displayed when data is being loaded to the Programmed Symbols buffers). The keyboard, which is low in profile, provides a palm rest area and has separators to help prevent accidental striking of control keys. The operator may select one of several cursor modes. The cursor is displayed in white on the 3279.

A base color switch allows the 3279 mdls 2A and 3A to run in 'monochrome mode' for 3278 compatibility. In this mode fields are displayed in green for normal intensity and in white for high intensity. The switch has the same function on the 3279 mdls 2B and 3B if no extended color attributes are specified in the data stream. When extended color attributes are specified, the switch setting is ignored. Extended color will be displayed for those fields and characters for which it is specified. Other fields and characters will be displayed in green with white for high intensity.

For comfortable viewing the CRT face is inclined and may be adjusted to 15 degrees, 17.5 degrees, or 20 degrees from the vertical.

The operator may adjust the color convergence quickly and easily using a simple keyboard procedure with a special screen test pattern.

Editing Functions: Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen) and cursor select keys are all basic for 3279 displays. All alphameric, special symbol, and cursor move keys have repeat action capability. Double speed cursor repeat action is attained with simultaneous depressing of the ALT key and a horizontal cursor positioning key.

Input Flexibility: A choice of keyboards and/or the selector light-pen provide input flexibility. A Magnetic Slot Reader (optional) and for a

3279 Color Display Station Mdls 2A-3B (cont'd)

3279 attached to a 3274, a Magnetic Hand Scanner (optional) are available for the input of magnetically coded data ... see "Special Features" and "Accessories" below. Fields of data can be selected by positioning the cursor and operating the cursor select key, instead of using the selector light-pen. 12 Program Function (PF) keys are basic with all typewriter keyboards. When attached to a 3274 with Configuration Support C with Entry Assist RPQ or with Configuration Support D with Entry Assist and with a typewriter or APL keyboard, the display provides capabilities which facilitate operator entry and editing of text material. The capabilities include margins, tabbing, workwrap, improved cursor positioning, improved character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended for use primarily with a specific set of host editor programs. See M3274 Sales pages for languages supported. See "Accessories" for 3274 Entry Assist keytops kits.

Keyboards: Refer to Type Catalog for a picture of the keyboard layouts. **Limitations:** Each 3279 Color Display Station must be equipped with a keyboard. Keyboards used on 3275/3277 machines are not interchangeable with keyboards used on 3276/3278/3279 machines. **Maximum:** One. **Field Installation:** Yes. The keyboard is set up by the customer. A 0.9 meter (3 foot) keyboard cable is provided as standard.

Overlay and Attribute Select Keyboards: These keyboards are equipped with highlight, PS and color select function keys (12 PF keys on right-hand side of the keyboard). They provide operator selection under program control, of highlight, PS and color attributes. Except for the color marking and annotation on the 12 PF keys on the right-hand side of the keyboard, the Overlay and Attribute Select keyboards appear identical to the equivalent non-Overlay and non-Attribute Select keyboards. Use of keys to select a feature not on the display will cause an error indication in the operator guidance row on the display. The upper case and alternate shift of these 12 PF keys are used for attribute selection and are, therefore, not available for normal program function use. **Limitations:** Attribute selection is NOT supported for keyboards on a 3279 mdl 2B or 3B attached to a 3276, OR for keyboards attached to a 3279 mdl 2A or 3A.

Security Functions: A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock (optional) prevents modification or display of data in the display terminal unless the key is turned to the 'on' position. These capabilities and the terminal's ability to identify itself to the host program allow customer-supplied security program routines to help control access to data and aid audit of actions. A Magnetic Slot Reader (optional), and for 3279 attached to a 3274, a Magnetic Hand Scanner (optional) are available to enter system user identification.

When attached to a 4321 or 4331 Processor via the Display/ Printer Adapter, functional support varies from that of the 3279-2A attached to a 3274 or 3276. See M4321 or M4331 Display/ Printer Adapter feature description for details of support.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer. This increased availability has been achieved through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided by the *Problem Determination Guide* manual that can be stored under the keyboard palm rest. Also, see "Customer Responsibilities".

Display Exception Monitoring Facility (DEMF), a software tool for network problem determination/isolation enhances the availability and serviceability of the 3274 and the 3276 in BSC mode. See "DEMF" in the SCP section for OS/VS1 and OS/VS2 (MVS).

Customer Responsibilities:

- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement of the 3279.
- Physical setup, connection of cables in customer access areas, switch setting and check out.
- Contacting Field Engineering to make cable connections of IBM CSU units to non-CSU units where customer access areas are not provided.
- Notifying IBM of intent to relocate and following IBM instructions for relocation.
- Using and following the problem determination procedures and filling out trouble report prior to calling for IBM service.
- Disconnection, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.

Note: 3279 attachment to 3274 may require increments of 3274 control storage. Refer to 3274 control storage requirement tables to ensure that adequate Extended Function Store is available if required.

Bibliography: See *KWIC Index,* G320-1621, or specific system bibliography.

SPECIFY

Specify codes may not be necessary to order a 3279. If codes are not specified, the machine is shipped with the following specifications:

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): Non-locking plug **#9891.**
- Power Cable Length: 2.8 meter (9 foot)
- Power Cable: If standard 2.8 meter (9 foot) power cable is not desired, specify **#9511** for 1.8 meter (6 foot) or **#9513** for 4.5 meter (15 foot).
- Keyboard Cable Length: 0.9 meter (3 feet).
- Terminal Cables - See "Accessories" for ordering instructions. For cable specifications, see *IBM 3270 Information Display System Installation Manual - Physical Planning,* GA27-2787.
- Power Cable Plug: If locking plug is required, specify **#9890.**

SPECIAL FEATURES

Not all of the following special features are supported for 3279-2As attached to a 4321 or 4331 processor via the Display/ Printer Adapter. See M4321, M4331 Display/ Printer Adapter feature description for details of support.

Switch Control Unit (#1720): This feature, when installed on a 3279, permits switching operational control of that display between two different control units. **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** Yes.

75-Key EBCDIC Typewriter Keyboard (#4621): Typewriter-like layout, movable, with 49 data keys and 26 control keys. 12 PF keys are included in the top row of data keys through use of an alternate shift key.

75-Key EBCDIC Data Entry Keyboard (#4622): Movable, with 35 data keys, 10 PF keys and 30 control keys.

75-Key EBCDIC Data Entry Keyboard (#4623): Keypunch layout, movable, with 35 data keys, 10 PF keys and 30 control keys. This is the recommended keyboard for data entry.

75-Key ASCII Typewriter Keyboard (#4624): ASCII typewriter-like layout, movable, with 49 data keys and 26 control keys. 12 PF keys are included in the top row of the data keys through use of an alternate shift key.

87-Key EBCDIC Typewriter/APL Keyboard (#4626): An 87-key EBCDIC Typewriter Keyboard (#4627) with modified keytops to allow entry of 81 APL-specific characters in addition to the 94-character EBCDIC set. An APL On/Off key controls whether the keyboard is in EBCDIC typewriter or APL mode. In contrast to the 87-key EBCDIC Typewriter Keyboard without APL (see #4627), this keyboard has only 12 PF keys (PF1 thru PF12) which are the group of 12 keys to the right of the main keyboard area. **Prerequisites:** 3279 mdl 2B or 3B.

87-Key EBCDIC Typewriter Keyboard (#4627): Typewriter-like layout, movable, with 49 alphameric data keys, 26 control keys, and 12 PF keys (24 total PF keys). 12 of the PF keys are included in the top row of data keys through the use of the alternate shift key.

87-Key ASCII Typewriter Keyboard (#4628): ASCII typewriter-like layout, movable with 49 alphameric data keys, 26 control keys, and 12 PF keys (24 total PF Keys). 12 of the PF keys are included in the top row of the data keys and are available through the use of an alternate shift key.

87-Key EBCDIC Typewriter/Text Keyboard (#4629): An 87-key EBCDIC Typewriter Keyboard (see #4627) with modified keytops to allow entry of 65 Text-specific characters in addition to the 94-character EBCDIC set. A Text On/Off key controls whether the keyboard is in EBCDIC typewriter of Text mode. In contrast to an 87-key EBCDIC Typewriter Keyboard without Text (see #4627), this keyboard has only 12 PF keys (PF1 thru PF12) which are the group of 12 keys to the right of the main keyboard area. **Prerequisites:** 3279 mdl 2B or 3B.

87-Key EBCDIC Typewriter Overlay Keyboard (#4640): This keyboard, without overlay, has the same layout and can be used in the same way as the 87-key EBCDIC Typewriter Keyboard (see #4627) with the 94-character EBCDIC set. This keyboard however, has special narrow keytops that permit the use of customer annotated overlays. Six overlays are supplied with each keyboard. Additional overlays can be obtained via MES. See "Accessories". These overlays are used to show the symbols associated with the keys when one of the Programmed Symbols is selected. The desired PS can be selected by the operator through use of the appropriate PF keys (12 PF keys on the right hand side of the keyboard) in upper case and alternate shift of this keyboard. Enhanced functions are NOT supported on 3279 mdls 2A and

3279 Color Display Station Mdls 2A-3B (cont'd)

3A. **Limitations:** Cannot be installed on a 3279 that is attached to a 3276.

87-Key EBCDIC Attribute Select Typewriter Keyboard (#4651): A typewriter layout, movable, similar to the 87-key EBCDIC Typewriter Keyboard #4627. Attribute select functions are shown on the 12 PF keys at the right-hand side of the keyboard. **Prerequisite:** 3279 mdl 2B or 3B. **Limitations:** Cannot be installed on a 3279 attached to a 3276.

87-Key EBCDIC Attribute Select Typewriter/APL Keyboard (#4652): A typewriter layout, movable keyboard, similar to the 87-key EBCDIC Typewriter Keyboard #4626. Attribute select functions are shown on the 12 PF keys at the right hand side of the keyboard. **Prerequisite:** 3279 mdl 2B or 3B. **Limitation:** Cannot be installed on a 3279 attached to a 3276.

Keyboard Numeric Lock (#4690): Provides keyboards #4621, #4622, #4623, #4624, #4626, #4627, #4628, #4629 with the ability to lock the keyboard, if a non-numeric key [other than 0-9, minus, decimal sign, or dup] is operated in a pre-defined numeric-only field. **Maximum:** One. **Field Installation:** Yes. Contact local Field Engineering Branch Office for installation. MES No. 999999 is to be used for Incident Report (IR) completion data. Note: The Numeric Lock Function is enabled on Keyboards #4640, #4651, #4652 as an option of 3274 customization in which case these keyboards will either all have, or all not have, the numeric lock function.

Magnetic Reader Control (#4999): Provides the capability of attaching a Magnetic Slot Reader or a Magnetic Hand Scanner which read encoded information from a magnetic stripe. The MSR can be used when the 3279 is connected to either a 3274 or 3276, but the MHS can only be used when the 3279 is connected to a 3274. **Maximum:** One. **Field Installation:** Yes. **Limitations:** Cannot be installed with #5325.

IBM Personal Computer Adapter (#5322, #5325, #5327): This entry is for information purposes only ... see Product Announcement Letter183-130 for ordering instructions and prices. Provides the capability of attaching an IBM Personal Computer, 5150, System Unit to the 3279. If only the IBM Personal Computer 5150 portion is required, order **#5322.** If only the 3279 portion is required, order **#5327.** The interconnection cables and user's guide with the Programming Diskette are included with the Personal Computer option **#5322.** A user's guide without the Programming Diskette may be ordered from Mechanicsburg, PA using Form # SA230169. **Maximum:** One. **Prerequisities:** (1) 3279 mdls 2A or 3A or 2B or 3B. (2a) IBM Personal Computer, 5150, mdl X14, X64, or X74 with Color/Graphics Monitor Adapter, or (2b) IBM Personal Computer System Unit with Color/Graphics Monitor Adapter, 5-1/4 inch Diskette Drive Adapter and one 5-1/4 inch Diskette Drive, and at least 64KB total user memory. (3) IBM Personal Computer DOS 1.1 or DOS 2.0. (4) a 3274 or 3276 control unit. **Limitations:** Cannot be installed with #4999, #6350 or #6351. **Field Installation:** Yes. ContactField Engineering Branch Office for installation.

Programmed Symbols (PS) (#5781 and #5782): These features provide storage and accessing for up to six 190-symbol sets whose shapes and codes are customer-definable. Symbol sets are loaded under program control and accessed for display through programming or by an operator from the display keyboard.

The number of symbols in any one set that can accessed from the display keyboard is 94 plus space.

PS-2, (#5781) Provides PS control and storage for two 190-symbol sets. **Prerequisites:** 3279 mdl 3B.

PS-4, (#5782) Provides control and storage for four additional 190-symbol sets. Three of these symbol sets can be displayed using multiple colors within a character block. **Prerequisites: #5781.**

Limitations: Can be used only with a 3274 having the PS Control and Structured Field and Attribute Processing options of Configuration Support C or D. **Maximum:** One of each. **Field Installation:** Yes. **Corequisites:** If display operator access to PS is required, #4640, #4651 or #4652 must be ordered. **Note:** If the 3279 is to be used with the Presentation Graphics Feature (PGF) of the Graphical Data Display Manager (GDDM) Program Product 5748-XXH, then both #5781 and #5782 must be installed.

Security Key Lock (#6340): A lock and key which prevents modification or display of data in the display terminal when in the 'off' position. **Maximum:** One. **Field Installation:** Not recommended.

Selector Light-Pen (#6350 mdls 3A and 3B, #6351 mdls 2A and 2B): Hand-held, pen-like device which permits the operator to select fields of data from a display for input to the host system. The selector light-pen will detect on any color. The selector light-pen, while not being used, can be placed in a recess of the keyboard, which is provided for user's incidental items. Selector light-pen (and cursor select) operations have been expanded to include a designator character "&". When this designator is used, the Read Modified operation returns both the addresses and the data of all modified fields on the screen. The selector light-pen (#6351) has a slightly wider field of view to facilitate operator use. **Maximum:** One. **Field Installation:** Yes. **Limitations:** Cannot be installed with #5325.

MODEL CONVERSIONS

Model changes from 2A to 2B and 3A to 3B are field installable. Model changes from 2A to 3A or 3B or from 2B to 3A or 3B are not recommended for field installation.

ACCESSORIES

For shipment with machine, order the feature number as shown below. See detailed descriptions below for additional information and for ordering by MES for field installation.

Item	Feature Number	P/N	Max Qty
Magnetic Hand Scanner	**#9440**	**4123495**	*
Magnetic Slot Reader	**#9441**	**4123500**	*

* A maximum of one magnetic reader or scanner may be ordered.

Magnetic Reader Extension Cable for use with Magnetic Hand Scanner or Magnetic Slot Reader:

Item	Feature Number	P/N	Max Qty
6 meter (20 feet)	**#9106**	**4832986**	**
12 meter (40 feet)	**#9107**	**4832987**	**

** A maximum of one extension cable may be ordered.

Item	Feature Number	P/N
Tilt/rotate accessory	N/A	**4422265**
Control Unit Switch	MES only	
Battery	N/A	

The following cable assemblies can be used to extend the Magnetic Hand Scanner and Magnetic Slot Reader distances. **Limitations:** Extension cables cannot be plugged into other extension cables. **Prerequisites: #4999.**

Item	Feature Number	P/N
6 meter (20 feet)	**#9106**	**4832986**
12 meter (40 feet)	**#9107**	**4832987**

Both the MHS and the MSR read magnetically encoded information from an alphanumeric character set. The MSR also reads the same 10-character numeric only set as the 3277 Operator Identification Card Reader (#4600) which is not a subset of the alphanumeric character set. For a further description of both character sets, see *IBM 3270 Information Display System Character Set Reference,* GA27-2837. Either (not both) the alphanumeric or the 10 numeric only 3277-like character set may be selected for the 3274 at customization time for attached 3278s and 3279s. The 3276 Control Unit Display Station and attached 3278s and 3279s support only the MSR and the 10 character numeric only set as used by the 3277.

Numeric and alphameric character capabilities are as follows:

MSR/MHS	Minimum number of Hex Codes between start sentinel and end sentinel characters	Maximum number of characters between start sentinel and end sentinel characters	Bit Density: Bits per inch	Bit Density: Bits per mm
3277 Like 10-numeric character set*	7 7	37 118	75 127	3 5
Alphameric character set*	7 7 7 7 7	37 numerics 18 non-numerics 118 numerics 59 non-numerics 37 numerics	75 75 127 127 210**	3 3 5 5 8.3

* 1 Hex code = 1 numeric character
2 Hex codes = 1 non-numeric character

** MSR only

Full width encoding is recommended for the MSR and is required for the MHS.

Maximums shown are ALL numeric or ALL non-numeric characters. If a combination of numeric and non-numeric characters is recorded, the total number of hex CODES must not exceed the numeric character maximum. For example, at 127 bpi, a combination of 60 numeric and 20 non-numeric character is permissible.

Limitations: 3277-like 10 character set numerics only magnetic cards coded with Alternate End or Message character (hexadecimal 'C'), cannot be read by the MSR or MHS. The alphanumeric character set and the MHS are only supported on 3278s and 3279s which are attached to 3274s. IBM Host Programming Support is provided for alphanumeric character set non-protected, display data entry. Protected, non-display data entry is supported by IMS and TSO. With this protected, non-display data entry support, all cards and documents which can be read by the 3630 Plant Data Communication System, up to 118 data characters, can be read by the 3270 System.

3279 Color Display Station Mdls 2A-3B (cont'd)

A variety of magnetic documents, tags and labels which the MSR and MHS can read, may be obtained from SSD, some of which, depending on length, can be encoded by devices such as the 3642 Encoder Printer.

Switch Control Unit: Permits switching operational control of a 3279 between two different control units. Customer is responsible for Procurement and installation of this accessory, and also for the replacement of a defective unit.

Warranty: The Switch Control Unit is warranted free from defects in workmanship and materials for 90 days.

Maintenance: There is no regularly scheduled maintenance recommended by IBM, and IBM Maintenance Agreements are not available.

Ordering Instructions: This accessory is ordered by P/N via MES for field installation only.

P/N **4419338** should be specified when ordering by MES for field installation. Enter one MES for multiple quantities of P/N ordered, using serial number zero (00000) on the MES.

Mercury Battery (P/N 1743456): Provides power to sustain the convergence parameters in a 3279 when normal power is not present. This supply item is a 4.14 volt non-rechargeable mercury battery. It has a shelf life of 18 months under normal conditions and can be expected to provide 3.5 years of normal operation. **Field installation:** Yes, by customer. Discharged battery should be returned to IBM.

Keyboard Overlay: A keyboard overlay is available on which customer-defined Programmed Symbols can be annotated. An annotated overlay can be placed over the narrow keytops of Overlay keyboards to associate specific keytops with specific symbols.

Keyboard Overlay **P/N 1742762**

Keys (P/N 4420756): The 3279 with Security Keylock #6340 is shipped with two keys. Additional keys may be purchased only from IBM. (Vendor will supply additional keys *only* to original purchaser). A letter of authorization, with key identification (on customer metal tag), must accompany each order. Allow two to three weeks for delivery.

Magnetic Hand Scanner (#9440, P/N 4123495): The Magnetic Hand Scanner (MHS) attaches by a 1.5 meter (5 foot) coiled cable to a 3279 that has an appropriate magnetic adapter feature. It allows the user to read magnetic stripe labels that are attached to shelves, cartons, machines, etc. It can also be used to read magnetic stripe tags which are hand-held or placed on a flat surface. The MHS has three lights and an audible buzzer which provide feedback to the user on the status of the scanned data. It can read a stripe in either direction. **Field Installation:** Yes. **Prerequisites: #4999.** See Note 1.

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Scanners will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare scanners which the customer may want to consider stocking ... for 50 scanners, 2 spares ... for 100, 3 ... for 150, 4 ... for 200, 5.

Warranty: The Magnetic Scanner Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service will be performed at the FE Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form (GZ27-2981), pack, and mail it and the defective Magnetic Hand Scanner to:

IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance will be done by the customer, following the problem determination and parts replacement procedures.

Optionally, the customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

Magnetic Slot Reader (#9441, P/N 4123500): The Magnetic Slot Reader (MSR) attaches by a 1.5 meter (5 foot) cable to a 3279 that has an appropriate magnetic adapter feature. The slot reader accommodates a wide range (height and length) of magnetic striped card stock and plastic badges including job tickets, magnetic striped 80-column cards, operator identification badges, large and small credit cards, etc. The MSR has three lights and an audible buzzer which provide feedback to the user on the status of scanned data. Holes in the bottom of the MSR allow optional attachment to an appropriate flat surface. **Field Installation:** Yes. **Prerequisites: #4999.** See Note 1.

Ordering Instructions: For ordering for delivery with machine, see appropriate machine page. To order via MES, order via MSORDER (Category = Supplies/ Accessories; Group Code = DP Supply Order). When ordering, use Machine Type 3279.

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking ... for 50 readers, 2 spares ... for 100, 3 ... for 150, 4 ... for 200, 5

Warranty: The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service will be performed at the FE Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form (GZ27-2981), pack, and mail it and the defective Magnetic Hand Scanner to:

IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance will be done by the customer, following the problem determination and parts replacement procedures.

Optionally, the customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

Magnetic Reader/Scanner Extension Cables: These cable assemblies can be used to extend the Magnetic Hand Scanner P/N 4123495 or Magnetic Slot Reader P/N 4123500 distances. Additional Extension Cable lengths other than those listed below are available.

MHS/MSR Extension Cables are warranted free from defects of workmanship or materials for 90 days.

Limitations: Extension cables cannot be plugged into other extension cables.

Ordering Instructions: For ordering for delivery with the machine, see appropriate machine page. To order via MES, order via MSORDER (Category = Supplies/ Accessories; Group Code = DP Supply Order). When ordering, use Machine Type 3279

6 meter (20 foot) **P/N 4832986**
12 meter (40 foot) **P/N 4832987**

MAGNETIC READER/SCANNER REPLACEMENT ASSEMBLIES

Description	P/N
MHS Sensor Head Assembly	**4832721**
MHS Handle and Feedback Assembly	**4832701**
MHS Amplifier Card and Cable Assembly	**4832727**
MSR Arm and Sensor Head Assembly	**4832963**
MSR Base and Feedback Assembly	**4832973**
MSR Amplifier Card and Cable Assembly	**4832962**
MSR Cover	**4832964**

The following tables list the number of Magnetic Reader/Scanner replacement assemblies which the customer may want to consider stocking:

MAGNETIC HAND SCANNER

Number of MHSs P/N 4123495	Sensor Head Assemblies P/N 4832721	Handle and Feedback Assembly P/N 4832701	Amplifier Card and Cord Assembly P/N 4832727
50	2	1	2
100	3	1	3
150	4	1	4
200	5	2	5

MAGNETIC SLOT READER

Number of MSRs P/N 4123500	Arm & Sensor Head Assembly P/N 4832963	Base and Feedback Assembly P/N 4832973	Amplifier Card and Cord Assem P/N 4832962	Cover P/N 4832964
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

Ordering Instructions: Order using DP Supply Order form Z170-6173 from Mechanicsburg.

Warranty: Magnetic scanner replacement assemblies are warranted free from defects of workmanship or materials for 90 days.

Display Station Keyboard Accessories: The following keyboard accessories allow customers to define and change the messages on single position keytops of the 3279 keyboards. These accessories

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supply keytops only and do not change any characters or functions of the display station. The accessories consist of legendable keytops, blank keytops for customer engraving, a keytop extractor, and an Entry Assist Keytop Kit.

These accessories may be ordered by P/N via a DP Supply Order from the Raleigh plant.

Legendable Keytop: The legendable keytop consists of two parts: a molded key base and a clear plastic cover. The user may define unique keytop messages by writing on a piece of paper, affixing the paper to the keytop base and sliding on the clear plastic cover. The keytop is available in three colors and with top keyboard row contour only. (Example: Clear Key.)

Legendable Keytops:	P/N
White	**5188775**
Charcoal Gray	**8627192**
Light Gray	**8542831**

Blank Keytop: The blank keytop is for a customer to engrave with desired nomenclature. The keytop comes in three colors and is available with top keyboard row contour only. (Example: Clear Key.)

Blank Keytops:	P/N
White	**1853775**
Charcoal Gray	**1853567**
Light Gray	**1853563**

Keytop Extractor (P/N 9900373): The keytop extractor is a small tweezer-like device which fits between the keytops. With a firm squeezing grip on a keytop, the keytop can be pulled off its stem. The customers should use the extractor whenever a keytop is to be removed from a keyboard.

Entry Assist Keytop Kit: [Non-overlay keyboards only] This kit provides eight sets of five keytops appropriately labelled for use with the Entry Assist capability together with a keytop extractor and keytop replacement instruction. Not for use on 3178 keyboards or overlay keyboards.

Entry Assist Keytop Kit **P/N 1742774**

Display Station Tilt/Rotate Accessory (P/N 4422265): An accessory which fits under the display station and provides a ball and socket type movement to allow the angle of the screen face to be adjusted for comfort of viewing position. The screen angle is normally 20 degrees from the vertical but with this device it can be adjusted between 25 degrees to the vertical and the vertical position. A locking device is provided to maintain the selected position. This accessory also allows the display station to be rotated plus or minus 90 degrees from the central position and this movement is independent of the tilt movement.

See SSD catalog for details of this supply item. Interested customers may order from IBM directly. Call toll free at 800-631-5582; in Alaska and Hawaii, call 800-526-2484. For further information, contact an SSD sales representative.

Warranty: The Tilt Rotate accessory is warranted free from defects in workmanship and materials for 90 days.

Maintenance: There is no regularly scheduled preventive maintenance recommended by IBM, and IBM Maintenance Agreements are not available.

Customer Responsibility: The customer is responsible for mounting the Display Station on this accessory.

Cables: Cables and or associated parts to attach the 3279 to the 3274 and 3276, may be purchased from IBM or from a customer-selected source. For the proper identification, installation, and application of the subject cables and parts, see *IBM 3270 Installation Manual - Physical Planning,* GA27-2787 . The customer is responsible for installation and maintenance of these cables and their associated parts.

Item	Number	Description
Assm	**2577672**	Cable Assembly In-Door
Bulk	**0323921**	Coax Wire (Note 1)
P/N	**1836418**	Connector Kit (Note 1)
Assm	**1833108**	Cable Assembly Out-Door
Bulk	**5252750**	Coax Wire (Note 2)
P/N	**1836419**	Connector Kit (Note 2)
P/N	**2621414**	Modification Kit (Note 3)
P/N	**1833106**	Station Protector Attachment Kit (Note 5)
P/N	**5252643**	Adapter (Note 7)
P/N	**1830818**	Station Protection Kit, Gas (Note 4)
P/N	**5252899**	Station Protector Element, Gas (Note 6)

Specify P/N, Assembly Number, or Bulk Number as appropriate. Allow a lead time of 6 weeks.

Notes:

1. Coax wire and one connector kit (includes two connectors P/N **1836446)** required for each indoor cable assembly.
2. Coax wire and one connector kit (includes two connectors P/N **1836447)** required for each outdoor cable assembly.
3. Customers replacing 2260 display stations may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
4. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
5. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
6. Replacement station protector elements.
7. Use to join two P/N **2577672** or two P/N **1833108** cable assemblies together.

SUPPLIES (None)

3279 COLOR DISPLAY STATION MDLS S2A-03X

PURPOSE

A high quality color cathode ray tube (CRT) display station used in clusters with the 3274, the 3276 , or the 4331 Processor for displaying alphameric data and presentation graphics data, and for entering data into and receiving data from a System/3, S/360, S/370, 30XX, 4300 or 8100 Information System, or 4700 Finance Communication System. In base color mode on all models, data fields can be displayed in four colors. A keyboard, selector light-pen, or both, permit an operator to display and manipulate data on the screen in a flexible and efficient manner.

On extended color models S2B, S3G, 02X or 03X with Extended Function feature, attached to a 3274, data may be displayed at both character and field level in seven colors with a choice of highlighting modes. APL/Text is provided. On extended color model S3G, or 03X with the requisite optional features, customer specified symbols and shapes may be displayed in any character position using Programmed Symbols. With its set of basic and extended models, the 3279 meets both general purpose and unique display requirements.

MODELS

Model S2A	Base Color	Displays up to 1,920 characters in 24 lines of 80 characters each.
Model S2B	Extended Color	Displays up to 1,920 characters in 24 lines of 80 characters each. 7 colors, extended highlighting and APL.
Model S3G	Extended Color Programmed Symbols	Displays up to 2,560 characters in 32 lines of 80 characters each. 7 colors, extended highlighting and APL, and programmed symbols.
Model 02X	Custom Model	Displays up to 1,920 characters in 24 lines of 80 characters each.
Model 03X	Custom Model	Displays up to 2,560 characters in 32 lines of 80 characters each.

For use with 8100 Information System, see the *8100 System Configurator,* GA27-2876. For use with 4700 System, refer to M4701 pages. **Note:** Mdls S2B, S3G, and 03X are not supported by System/3.

Prerequisites: 3279 requires a keyboard and a 3274, 3276, 4321 or 4331 ... see M3274, 3276, 4321 or 4331 pages.

Customer Setup (CSU): The 3279 is designated Customer Setup, thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM.

HIGHLIGHTS

Characters are displayed within a 9x12 character matrix on all mdls. On all mdls the basic 26-character upper case letters are presented in 7x9 character matrix. A 94-character set is displayed, consisting of 26 uppercase alphabetic, 26 lowercase alphabetic, 10 numeric and 32 special characters. A monocase switch provides the capability of switching to uppercase alphanumeric mode. The 3279 uses 3270 field formatting capability that permits individual fields of data on the screen to be program defined with various attributes, such as protected/unprotected, normal/intensified, displayable/non-displayable, and selector light-pen detection allowed/disallowed. An audible alarm is provided.

All 3279 mdls use the 3270 field attributes of protect and intensify for the additional purpose of displaying individual fields in base colors according to the following table:

Protected and intensified	White
Unprotected and intensified	Red
Protected and normal intensity	Blue
Unprotected and normal intensity	Green

Extensions to 3270 datastream supported by appropriate 3274 features and by 3279 mdls S2B, S3G, 02X and 03X provide the following field and character attributes:

- Extended Color (red, blue, green, white, yellow, turquoise and pink).
- Extended Highlighting (reverse video, blink, underscore).
- Programmed Symbols (six sets with 190 loadable positions each). (Mdl S3G or 03X with extended function feature #3850.)

Each attribute can be specified independently of any other. Special keyboards are provided to allow operator control of these attributes.

Programmed Symbols can use the whole character matrix for symbol definition. In addition, three of the sets of Programmed Symbols allow symbols and shapes to be displayed using multiple colors within a single character location.

3270 Personal Computer Attachment enables the IBM Personal Computer, 5150, to be attached to the 3279 mdls S2A, S2B, S3G, 02X, 03X. The 3279 and associated keyboard become common to both the host processor and to the IBM Personal Computer, thus expanding the use of the display station and the applications available at the display station - see "Special Features".

3279 mdls S2B and S3G, or mdls 02X or 03X with optional feature, provide Extended Color, Extended Highlighting and APL/Text. 3279 mdls S2B, S3G, 02X and 03X are supported on 3274 mdls 1A, 1C, 1D, 31A, 31C, 31D, 41A, 41C, 41D, 51C, or 61C and on the 3276 for APL/Text operation.

APL/Text capability provides for display of a 222-character APL/Text character set including the 94 character EBCDIC set. An appropriate keyboard is available.

APL/Text requires a 3274 mdl X1A, X1C, or X1D customized to include the APL/Text control function, or a 3276 with APL/Text control feature and its prerequisite, Extended Function Base feature. APL/Text operates in EBCDIC mode only and is NOT compatible with ASCII.

For Extended Color and Extended Highlighting on the 3279 mdls S2B, S3G, 02X and 03X, the Structured Field and Attribute Processing option of Configuration Support C or D is required on the 3274. The 3279 PS feature requires, in addition, the Programmed Symbols option of 3274 Configuration Support C or D. Extended Color, Extended Highlighting and PS function operate in EBCDIC mode only and are not compatible with ASCII. The 3279 mdl S2A, or mdl 02X without special features, will attach to the Display/Printer Adapter of the 4331 Processor.

For base color mode of operation, all mdls of the 3279 will attach to all models of the 3274. Configuration Support on the 3274 must be at the following level or higher:

Configuration Support A - Release 11.0
Configuration Support C
Configuration Support D
Configuration Support T

On the 3276 for base color mode, 3279 mdls S2A, S2B, 02X will attach to all 3276 mdls except mdl 1, and 3279 mdls S3G or 03X will attach to all 3276 mdls except mdls 1 and 2.

The operator may initiate a local display-to-printer (monochrome or color 3287) copy function (i.e., without host intervention) from the keyboard of a 3279 (except for graphics use of PS). When the 3279 is attached to a 3274, the printer designation is controlled by operator use of the IDENT key and by:

1. A printer authorization matrix which is loaded into the 3274 through a user-written host application program or
2. A customer definable matrix loaded from the System Diskette at IML time. For further details, see the *IBM 3270 Information Display System Planning and Setup Guide,* GA27-2827.

When the 3279 is attached to 3276, the printer designation is controlled by operator use of the IDENT key and by a configuration default matrix. This matrix is determined by the relative positions of devices attached to the 3276.

Operator Factors: The 3279 has an anti-glare screen to improve contrast and readability. Indicators are displayed in symbols on the bottom row of the screen outside the data area, and provide useful operator information. These symbols, except those indicating color attributes, will appear in blue. Display of data on the screen is accomplished without refresh interrupt (except that transient patterns are displayed when data is being loaded to the Programmed Symbols buffers). The keyboard, provides a palm rest area and has separators to help prevent accidental striking of control keys. The operator may select one of several cursor modes. The cursor is displayed in white on the 3279.

A base color switch allows the 3279 to run in "monochrome mode". In this mode, fields are displayed in green for normal intensity and white for high intensity. When extended color attributes are specified, the switch setting is ignored. Extended color will be displayed for those fields and characters for which it is specified. Other fields and characters will be displayed in green with white for high intensity.

For comfortable viewing, the CRT face is inclined and may be adjusted to 15 degrees, 17.5 degrees or 20 degrees from the vertical. A tilt/rotate accessory (P/N 4422265) increases this range of adjustment.

The operator may adjust the color convergence quickly and easily using a simple keyboard procedure with a special screen test pattern.

Editing Functions: Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen) and cursor select keys are all basic for 3279 displays. All alphameric, special symbol and cursor move keys have repeat action capability. Double speed cursor repeat action is attained with simultaneous depressing of the ALT key and a horizontal cursor positioning key.

Input Flexibility: A choice of keyboards on all mdls, and/or the selector light-pen on the mdls 02X and 03X provide input flexibility - see "Special Features" and "Accessories" below. Fields of data can be selected by positioning the cursor and operating the cursor select key, instead of using the selector light-pen. 12 Program Function (PF) keys

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are provided with all typewriter keyboards. When attached to a 3274 with Configuration Support C with Entry Assist RPQ or with Configuration Support D with Entry Assist and with a Typewriter or APL keyboard, the display provides capabilities which facilitate operator entry and editing of text material. The capabilities include margins, tabbing, wordwrap, improved cursor positioning, improved character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended for use primarily with a specific set of host editor programs. See M3274 sales pages for languages supported. See "Accessories" for 3274 Entry Assist Keytop kits.

Keyboards #4621, #4622, #4623 #4624, #4626, #4627 #4628, #4629 are supplied with Keyboard Numeric Lock function which provides the ability to lock the keyboard if a non-numeric key (other than 0-9, minus, decimal sign or dup) is operated in a pre-defined numeric only field. Numeric lock function is enabled on keyboards #4640, #4651, #4652 as an option of 3274 customization, in which case these keyboards will either all have, or all not have, the numeric lock function. **Limitations:** Each 3279 must be equipped with a keyboard. Keyboards used on 3275/3277 machines are not interchangeable with keyboards used on 3276/3278/3279 machines. **Field Installation:** Yes. The keyboard is set up by the customer. Some keyboards may require pre-requisites which are not customer installable. A 0.9 meter (3 foot) cable is provided as standard.

SUMMARY OF KEYBOARD AVAILABILITY:

		3279 Models				
Keyboard #	**No**	**S2A**	**S2B**	**S3G**	**02X**	**03X**
75-Key EBCDIC Tw	**#4621**	O	O	N	O	O
75-Key EBCDIC De	**#4622**	O	N	N	O	O
87-Key EBCDIC Tw/APL	**#4626**	N	O	N	O	O
87-Key EBCDIC Tw	**#4627**	O	O	O	O	O
87-Key EBCDIC Overlay	**#4640**	N	N	N	O	O
87-Key at Sel Tw	**#4651**	N	N	O	O	O
87-Key at Sel Tw/APL	**#4652**	N	N	O	O	O
75-Key ASCII Tpwr	**#4624**	N	N	N	O	O
87-Key ASCII Tpwr	**#4628**	N	N	N	O	O
75-Key EBCDIC De	**#4623**	N	N	N	O	O
87-Key Tpwr/Text	**#4629**	N	N	N	O	O

O = Optional
N = Not available

Overlay and Attribute Select Keyboards: These keyboards are equipped with highlight, PS and color select function keys (12 PF keys on right-hand side of keyboard). They provide operator selection under program control of highlight, PS and color attributes. Except for the color marking and annotation on the 12 PF keys on the right-hand side of the keyboard, the Overlay and Attribute Select keyboards appear identical to the equivalent non-Overlay and non-Attribute Select keyboards. Use of keys to select a feature not on the display will cause an error indication in the operator guidance row on the display. The uppercase and alternative shift of these 12 PF keys are used for attribute selection and are, therefore, not available for normal program function use. **Limitations:** Attribute Selection is not supported for keyboards on a 3279 attached to a 3276.

Security Functions: A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock prevents modification or display of data in the display terminal unless the key is turned to the ON position. These capabilities, and the terminal's ability to identify itself to the host program, allow customer-supplied security program routines to help control access to data and aid audit of actions.

A Magnetic Slot Reader (optional on 3279 mdls 02X or 03X only.), or for a 3279 attached to a 3274 , a Magnetic Hand Scanner (optional on 3279 mdls 02X or 03X only), are available to enter system user identification data.

Audible Alarm: An alarm, sounded under program control, to alert the operator to a special condition. This alarm, during keyboard operation, is also sounded when a character is entered into the next to last position on the screen. The operator may adjust the volume of the tone.

When attached to a 4331 Processor via the Display/Printer Adapter, functional support varies from that of the 3279 attached to a 3274 or 3276. See M4331 Display/Printer Adapter feature description for details of support.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer. This increased availability has been achieved through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided by the User Reference Summary. Also, see "Customer Responsibilities".

Display Exception Monitoring Facility (DEMF) and the Program Product, Network Problem Determination Application (NPDA), are software tools for network problem determination/isolation which can enhance the availability and serviceability of the terminals. See DEMF in the SCP section for OS/VS1 and OS/VS2 (MVS) and Program Number 5735-XX8, in the PP section for NPDA.

Customer Responsibilities:

- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement of the 3279.
- Physical setup, connection of cables in customer access areas, switch setting and check out.
- Contacting Field Engineering to make cable connections of IBM CSU units to non-CSU units where customer access areas are not provided.
- Notifying IBM of intent to relocate, and following IBM instructions for relocation.
- Using and following the problem determination procedures and filling out trouble report prior to calling for IBM service.
- Disconnection, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.

Refer to 3274 control storage requirement tables to ensure that adequate storage is available if required.

Bibliography: See *KWIC Index,* G320-1621, or specific system bibliography.

BASIC CONFIGURATION

The 3279 mdls S2A, S2B and S3G are only available with the following specifications. The 3279 mdls 02X and 03X will be shipped with these specifications unless alternative codes are specified.

Voltage: (120v AC 1-phase 3-wire 60 Hz): Non-locking plug.

Power cable length: 9 foot.

Terminal cables - see "Accessories" for ordering information. For cable specifications, see *IBM 3270 Information Display System Installation Manual - Physical Planning,* GA27-2787.

SPECIFY

- Power (AC 1-phase, 50/60 Hz).
- Power Cable: 3279 mdls 02X or 03X only, if the standard 2.8 meter (9 foot) power cable is not desired, specify: **#9511** for 1.8 meter (6 foot), or **#9513** for 4.5 meter (15 foot).
- Power cable plug: 3279 mdls 02X or 03X only, if locking plug required, specify **#9890.**

SPECIAL FEATURES

IBM Personal Computer Adapter (#5322, #5325, #5326, #5327, #5328): This entry is for information purposes only ... see Product Announcement Letter 183-130 for ordering instructions and prices. Provides the capability of attaching an IBM Personal Computer, 5150, System Unit to the 3279. For 3279 mdls S2A, S2B, 02X with serial numbers below E0000, and for mdls S3G, and 03X, order **#5325.** For mdls S2A, S2B, and 02X with serial numbers above E0000, order **#5326.** #5325 and #5326 contains material for both the 3279 and the IBM Personal Computer System Unit. If only the 3279 portion is required, then for the ranges of 3279 serial numbers quoted, order **#5327 or #5328** respectively. If only the IBM Personal Computer 5150 portion is required , order **#5322.** The interconnection cables and user's guide with the Programming Diskette are included with the Personal Computer option **#5322.** A user's guide without the Programming Diskette may be ordered from Mechanicsburg, PA using Form # SA230169. **Maximum:** One. **Prerequisities:** (1) 3279 mdls S2A or S2B or S3G or 02X or 03X. (2a) IBM Personal Computer, 5150, X14, X64, or X74 with Color/Graphics Monitor Adapter, or (2b) IBM Personal Computer System Unit, 5150 with Color/Graphics Monitor Adapter, 5-1/4 inch Diskette Drive Adapter and one 5-1/4 inch Diskette Drive, and at least 64KB total user memory. (3) IBM Personal Computer DOS 1.1 or DOS 2.0. (4) a 3274 or 3276 control unit. **Limitations:** Cannot be installed with #4999, #6360 or #8750 ... also see M3274 pages. **Field Installation:** Yes **Note:** This feature is not available for factory installation. Contact Field Engineering Branch office for installation. For installation of the feature on other 3279 mdls, refer to other M3279 pages.

Programmed Symbols (#5790): [Provided with 3279 mdl S3G]. This feature provides storage and accessing for up to six 190-symbol sets whose shapes and codes are customer-definable. Symbol sets are loaded under program control and accessed for display through programming or by an operator from the display keyboard. The number of symbols in any one set that can be accessed from the display keyboard is 94 plus space. **Prerequisites:** 3279 mdl 03X with **#3850.** **Maximum:** One. **Field Installation:** Yes, on 3279 mdl 03X only. **Limitations:** Mutually exclusive with Magnetic Reader Control #4999. See Note 1 below. Can be used only with a 3274 having the PS Control

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and Structured Field and Attribute Processing options of Configuration Support C or D. Transient patterns are displayed when data is being loaded to the Programmed Symbols buffers. **Corequisites:** If display operator access to PS is required, one of the following keyboards must be ordered:

- 87-key EBCDIC Typewriter Overlay Keyboard (#4640).
- 87-key EBCDIC Attribute Select Typewriter Keyboard (#4651) or 87-key EBCDIC Attribute Select Typewriter/APL Keyboard (#4652).

THE FOLLOWING SPECIAL FEATURES ARE ONLY AVAILABLE ON THE 3279 MDL 02X OR 03X.

Inhibit Keyboard Numeric Lock (#4691): This feature prevents the action of the Keyboard Numeric Lock function which is described at the beginning of the keyboard section. **Prerequisites:** 3279 mdls 02X or 03X only, and at least one of the following keyboards: #4621, #4622, #4623, #4624, #4626, #4627, #4628, #4629, . **Maximum:** One. **Field Installation:** Yes. Contact Field Engineering Branch Office for Installation. MES Number 999999 is to be used for IR (incident report) completion data.

Extended Function (#3850): [Provided with 3279 mdls S2B and S3G.] This feature provides Extended Color (red, blue, green, white, yellow, turquoise and pink) and Extended Highlighting (reverse video, blink, underscore). It also provides capability for display of 222 character APL/Text character set including the 94 character EBCDIC set. **Prerequisites:** 3279 mdls 02X or 03X. **Maximum:** One **Field Installation:** Yes, on 3279 mdls 02X and 03X only. **Limitations:** APL/Text requires a 3274 mdl X1A, X1C, or X1D, customized to include APL/Text control function, or a 3276 with APL/Text control feature and its prerequisite, Extended Function feature. Extended Color and Extended Highlighting require the Structured Field and Attribute Processing option of Configuration Support C or D on the 3274.

Magnetic Reader Control (#4999): Provides the capability of attaching a Magnetic Slot Reader or a Magnetic Hand Scanner which read encoded information from a magnetic stripe. The MSR can be used when the 3279 is connected to either a 3274 or 3276, but the MHS can only be used when the 3279 is connected to a 3274 Control Unit. **Prerequisites:** 3279 mdls 02X and 03X. **Limitations:** Mutually exclusive with Programmed Symbols #5790. See Note 1 below. **Maximum:** One. **Field Installation:** Yes, on 3279 mdls 02X and 03X only. **Limitations:** Cannot be installed with #5325 or #5326.

Selector Light-Pen (#6360): Hand-held, pen-like device which permits the operator to select fields of data from a display for input to the host system. The selector light-pen will detect on any color. The selector light-pen, while not being used, can be placed in a recess of the keyboard which is provided for user's incidental items. Selector light-pen (and cursor select) operations have been expanded to include a designator character '&'. When this designator is used, the Read Modified operation returns both the addresses and the data of all modified fields on the screen. **Prerequisites:** 3279 mdls 02X and 03X. **Maximum:** One. **Field Installation:** Yes, on 3279 mdls 02X and 03X only. **Limitations:** Cannot be installed with #5325 or #5326.

Video Output: This facility is now available by RPQ 7J0039.

Note 1: This limitation does not apply to field installation on machines below serial number M0000. These features are available for concurrent installation by RPQ 7J0089 factory only.

SUMMARY OF SPECIAL FEATURE AVAILABILITY:

Special Features	No	S2A	S2B	S3G	02X	03X
Magnetic Rdr Ctl	#4999	N	N	N	O	O
Programmed Symbols	#5790	N	N	S	N	O(1)
Selector Light Pen	#6360	N	N	N	O	O
Video Output	#8750	N	N	N	N	O
Inhibit Kbd Numlock	#4691	N	N	N	O	O
Extended Function	#3850	N	S	S	O	O
IBM Personal	#5325	O	O	O	O	O
Computer Adapter	#5326	O	O	O	O	O

N = Not Available
S = Standard
O = Optional

(1) **Prerequisites:** #3850.

75-key EBCDIC Typewriter Keyboard (#4621): Typewriter-like layout, movable, with 49 data keys and 26 control keys. 12 PF keys are included in the top row of data keys through of an ALT shift key. **Prerequisites:** 3279 mdls S2A, S2B, 02X and 03X.

75-key EBCDIC Data Entry Keyboard (#4622): Movable, with 35 data keys, 10 PF keys and 30 control keys. **Prerequisites:** 3279 mdls S2A, 02X and 03X.

75-key EBCDIC Data Entry Keyboard (#4623): Keypunch layout, with 35 data keys, 10 PF keys and 30 control keys. This is the recommended keyboard for high speed data entry. **Prerequisites:** 3279 mdl 02X or 03X.

75-key ASCII Typewriter Keyboard (#4624): ASCII typewriter-like layout, movable, with 49 data keys and 26 control keys. 12 PF keys are included in the top row of the data keys and are available through the use of an alternate shift key. **Prerequisites:** 3279 mdl 02X.

87-key EBCDIC Typewriter/APL Keyboard (#4626): An 87-key EBCDIC Typewriter Keyboard (#4627) with modified keytops to allow entry of 81 APL-specific characters in addition to the 94-character EBCDIC set. An APL ON/OFF key controls whether the keyboard is in EBCDIC typewriter or APL mode. In contrast to the 87-key EBCDIC Typewriter Keyboard without APL (see #4627), this keyboard has only 12 PF keys (PF1 through PF12) which are the group of 12 keys to the right of the main keyboard area. **Prerequisites:** 3279 mdl S2B or mdls 02X or 03X with #3850.

87-key EBCDIC Typewriter Keyboard (#4627): Typewriter-like layout, movable, with 49 alphanumeric data keys, 26 control keys and 12 PF keys (24 total PF keys). 12 of the PF keys are included in the top row of data keys through the use of the ALT shift key.

87-key ASCII Typewriter Keyboard (#4628): ASCII typewriter-like layout, movable, with 49 alphameric data keys, 26 control keys, and 12 PF keys (24 total PF keys). 12 of the PF keys are included in the top row of the data keys and are available through the use of an alternate shift key. **Prerequisites:** 3279 mdl 02X.

87-key EBCDIC Typewriter/Text Keyboard (#4629): An 87-key EBCDIC Typewriter Keyboard (see #4627) with modified keytops to allow entry of 65 text-specific characters in addition to the 94-character EBCDIC set. A Text ON/OFF key controls whether the keyboard is in EBCDIC typewriter or Text mode. In contrast to an 87-key EBCDIC Typewriter Keyboard without Text (see #4627), this keyboard has only 12 PF keys (PF1 through PF12) which are the group of 12 keys to the right of the main keyboard areas. **Prerequisites:** 3279 mdl 02X or 03X with **#3850.**

87-key EBCDIC Typewriter Overlay Keyboard (#4640): This keyboard, without overlay, has the same layout and can be used in the same way as the 87-key EBCDIC Typewriter Keyboard (see #4627) with the 94-character EBCDIC set. This keyboard, however, has special narrow keytops that permit the use of customer annotated overlays. Six overlays are supplied with each keyboard. Additional overlays can be obtained via MES (see "Accessories"). These overlays are used to show the symbols associated with the keys when one of the Programmed Symbols is selected. The desired PS can be selected by the operator through use of the appropriate PF keys (12 PF keys on the right-hand side of the keyboard) in uppercase and alternate shift of this keyboard. **Prerequisites:** 3279 mdls 02X and 03X. **Limitations:** Cannot be installed on a 3279 attached to a 3276.

87-key EBCDIC Attribute Select Typewriter Keyboard (#4651): A typewriter layout, movable, similar to the 87-key EBCDIC typewriter keyboard (#4627). Attribute select functions are shown on the 12 PF keys at the right-hand side of the keyboard. **Prerequisites:** 3279 mdls S3G or 02X or 03X with #3850. **Limitations:** Cannot be installed on a 3279 attached to a 3276.

87-key EBCDIC Attribute Select Typewriter/APL Keyboard (#4652): A typewriter layout, movable keyboard, similar to the 87-key EBCDIC typewriter/APL keyboard (#4626). Attribute select functions are shown on the 12 PF keys at the right-hand side of the keyboard. **Prerequisites:** 3279 mdls S3G or 02X or 03X with #3850. **Limitations:** Cannot be installed on a 3279 attached to a 3276.

MODEL CONVERSIONS

MES orders to change models S2A or S2B to 02X and S3G to 03X will be accepted 90 days after installation.

From/To	S2A	S2B	S3G	02X	03X
S2A	--	No	No	Yes	No
S2B	No	--	No	Yes	No
S3G	No	No	--	No	Yes
02X	No	No	No	--	No
03X	No	No	No	No	--

Note: Models S2B, S3G, and 03X are not supported by System/3.

ACCESSORIES

For shipment with machine, order the feature number as shown below. See detailed description below for additional information and for ordering by MES for field installation.

Item	Feature Number	P/N	Max Qty
Magnetic Hand Scanner	#9440	4123495	*
Magnetic Slot Reader	#9441	4123500	*

* A maximum of one magnetic reader or scanner may be ordered.

Magnetic Reader Extension Cable for use with Magnetic Hand Scanner or Magnetic Slot Reader:

Item	Feature Number	P/N	Max Qty

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6 meter (20 feet)	#9106	4832986	**
12 meter (40 feet)	#9107	4832987	**

** A maximum of one extension cable may be ordered.

Item	Feature Number	P/N
Tilt/rotate accessory	N/A	4422265
Control Unit Switch	MES only	
Battery	N/A	

The following cable assemblies can be used to extend the Magnetic Hand Scanner and Magnetic Slot Reader distances. **Limitations:** Extension cables cannot be plugged into other extension cables. **Prerequisites: #4999.**

Item	Feature Number	P/N
6 meter (20 feet)	#9106	4832986
12 meter (40 feet)	#9107	4832987

Both the MHS and the MSR read magnetically encoded information from an alphameric character set. The MSR also reads the same 10-character numeric only set as the 3277 Operator Identification Card Reader (#4600) which is not a subset of the alphameric character set. For a further description of both character sets, see *IBM 3270 Information Display System Character Set Reference,* GA27-2837. Either (not both) the alphanumeric or the 10 numeric only 3277-like character set may be selected for the 3274 at customization time for attached 3278s and 3279s. The 3276 and attached 3278s and 3279s support only the MSR and the 10-character numeric only set as used by the 3277.

Numeric and alphameric character capabilities are as follows:

MSR/MHS	Minimum number of Hex Codes between start sentinel and end sentinel characters	Maximum number of characters between start sentinel and end sentinel characters	Bit Density	
			Bits per inch	Bits per mm
3277 Like 10-numeric character set*	7 7	37 118	75 127	3 5
Alphameric character set*	7 7 7 7 7	37 numerics 18 non-numerics 118 numerics 59 non-numerics 37 numerics	75 75 127 127 210**	3 3 5 5 8.3

* 1 Hex code = 1 numeric character
2 Hex codes = 1 non-numeric character

** MSR only

Full width encoding is recommended for the MSR and is required for the MHS.

Maximums shown are ALL numeric or ALL non-numeric characters. If a combination of numeric and non-numeric characters is recorded, the total number of hex CODES must not exceed the numeric character maximum. For example, at 127 bpi, a combination of 60 numeric and 20 non-numeric character is permissible.

Limitations: 3277-like 10 character set numerics only magnetic cards coded with Alternate End or Message character (hexadecimal 'C'), cannot be read by the MSR or MHS. The alphanumeric character set and the MHS are only supported on 3278s and 3279s which are attached to 3274s. IBM Host Programming Support is provided for alphanumeric character set non-protected, display data entry. Protected, non-display data entry is supported by IMS and TSO. With this protected, non-display data entry support, all cards and documents which can be read by the 3630 Plant Data Communication System, up to 118 data characters, can be read by the 3270 System.

A variety of magnetic documents, tags and labels which the MSR and MHS can read, may be obtained from SSD, some of which, depending on length, can be encoded by devices such as the 3642 Encoder Printer. Except UK: For complete information on the availability of pre-encoded magnetic striped plastic cards, contact an SSD Sales Representative.

Switch Control Unit: Permits switching operational control of a 3279 between two different control units. Customer is responsible for Procurement and installation of this accessory, and also for the replacement of a defective unit.

Warranty: The Switch Control Unit is warranted free from defects in workmanship and materials for 90 days.

Maintenance: There is no regularly scheduled maintenance recommended by IBM, and IBM Maintenance Agreements are not available.

Ordering Instructions: This accessory is ordered by P/N via MES for field installation only.

P/N 4419338 should be specified when ordering by MES for field installation. Enter one MES for multiple quantities of part number ordered, using serial number zero (00000) on the MES.

Mercury Battery (P/N 1743456): Provides power to sustain the convergence parameters in a 3279 when normal power is not present. This supply item is a 4.14 volt non-rechargeable mercury battery. It has a shelf life of 18 months under normal conditions and can be expected to provide 3.5 years of normal operation. **Field installation:** Yes, by customer. Discharged battery should be returned to IBM.

Keyboard Overlay: A keyboard overlay is available on which customer-defined Programmed Symbols can be annotated. An annotated overlay can be placed over the narrow keytops of Overlay keyboards to associate specific keytops with specific symbols.

Keyboard Overlay **P/N 1742762**

Keys (P/N 4420756): The 3279 with Security Keylock is shipped with two keys. Additional keys may be purchased only from IBM. (Vendor will supply additional keys *only* to original purchaser). A letter of authorization, with key identification (on customer metal tag), must accompany each order. Allow two to three weeks for delivery.

Magnetic Hand Scanner (#9440, P/N 4123495): The Magnetic Hand Scanner (MHS) attaches by a 1.5 meter (5 foot) coiled cable to a 3279 that has an appropriate magnetic adapter feature. It allows the user to read magnetic stripe labels that are attached to shelves, cartons, machines, etc. It can also be used to read magnetic stripe tags which are hand-held or placed on a flat surface. The MHS has three lights and an audible buzzer which provide feedback to the user on the status of the scanned data. It can read a stripe in either direction. **Field Installation:** Yes. **Prerequisites: #4999.** See Note 1.

Ordering Instructions:

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Scanners will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare scanners which the customer may want to consider stocking ... for 50 scanners, 2 spares ... for 100, 3 ... for 150, 4 ... for 200, 5.

Warranty: The Magnetic Scanner Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service will be performed at the FE Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form (GZ27-2981), pack, and mail it and the defective Magnetic Hand Scanner to:

IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance will be done by the customer, following the problem determination and parts replacement procedures.

Optionally, the customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

Magnetic Slot Reader (#9441, P/N 4123500): The Magnetic Slot Reader (MSR) attaches by a 1.5 meter (5 foot) cable to a 3279 that has an appropriate magnetic adapter feature. The slot reader accommodates a wide range (height and length) of magnetic striped card stock and plastic badges including job tickets, magnetic striped 80-column cards, operator identification badges, large and small credit cards, etc. The MSR has three lights and an audible buzzer which provide feedback to the user on the status of scanned data. Holes in the bottom of the MSR allow optional attachment to an appropriate flat surface. **Field Installation:** Yes. **Prerequisites: #4999.** See Note 1.

Ordering Instructions: For ordering for delivery with machine, see appropriate machine page. To order via MES, order via MSORDER (Category = Supplies/ Accessories; Group Code = DP Supply Order). When ordering, use Machine Type 3279.

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking ... for 50 readers, 2 spares ... for 100, 3 ... for 150, 4 ... for 200, 5

Warranty: The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service will be performed at the FE Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form (GZ27-2981), pack, and mail it and the defective Magnetic Hand Scanner to:

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IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance will be done by the customer, following the problem determination and parts replacement procedures.

Optionally, the customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

Magnetic Reader/Scanner Extension Cables: These cable assemblies can be used to extend the Magnetic Hand Scanner P/N 4123495 or Magnetic Slot Reader P/N 4123500 distances. Additional Extension Cable lengths other than those listed below are available.

MHS/MSR Extension Cables are warranted free from defects of workmanship or materials for 90 days.

Limitations: Extension cables cannot be plugged into other extension cables.

Ordering Instructions: For ordering for delivery with the machine, see appropriate machine page. To order via MES, order via MSORDER (Category = Supplies/ Accessories; Group Code = DP Supply Order). When ordering, use Machine Type 3279

6 meter (20 foot) **P/N 4832986**
12 meter (40 foot) **P/N 4832987**

MAGNETIC READER/SCANNER REPLACEMENT ASSEMBLIES

Description	P/N
MHS Sensor Head Assembly	**4832721**
MHS Handle and Feedback Assembly	**4832701**
MHS Amplifier Card and Cable Assembly	**4832727**
MSR Arm and Sensor Head Assembly	**4832963**
MSR Base and Feedback Assembly	**4832973**
MSR Amplifier Card and Cable Assembly	**4832962**
MSR Cover	**4832964**

The following tables list the number of Magnetic Reader/Scanner replacement assemblies which the customer may want to consider stocking:

MAGNETIC HAND SCANNER

Number of MHSs P/N 4123495	Sensor Head Assemblies P/N 4832721	Handle and Feedback Assembly P/N 4832701	Amplifier Card and Cord Assembly P/N 4832727
50	2	1	2
100	3	1	3
150	4	1	4
200	5	2	5

MAGNETIC SLOT READER

Number of MSRs P/N 4123500	Arm & Sensor Head Assembly P/N 4832963	Base and Feedback Assembly P/N 4832973	Amplifier Card and Cord Assem P/N 4832962	Cover P/N 4832964
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

Ordering Instructions: Order using DP Supply Order form Z170-6173 from Mechanicsburg.

Warranty: Magnetic scanner replacement assemblies are warranted free from defects of workmanship or materials for 90 days.

Display Station Keyboard Accessories: The following keyboard accessories allow customers to define and change the messages on single position keytops of the 3279 keyboards. These accessories supply keytops only and do not change any characters or functions of the display station. The accessories consist of legendable keytops, blank keytops for customer engraving, a keytop extractor, and an Entry Assist Keytop kit. These accessories may be ordered by P/N via a DP Supply Order from the Raleigh plant.

Legendable Keytop: The legendable keytop consists of two parts: a molded key base and a clear plastic cover. The user may define unique keytop messages by writing on a piece of paper, affixing the paper to the keytop base and sliding on the clear plastic cover. The keytop is available in three colors and with top keyboard row contour only. (Example: Clear Key.)

Legendable Keytops:	P/N
White	**5188775**
Charcoal Gray	**8627192**
Light Gray	**8542831**

Blank Keytop: The blank keytop is for a customer to engrave with desired nomenclature. The keytop comes in three colors and is available with top keyboard row contour only. (Example: Clear Key.)

Blank Keytops:	P/N
White	**1853775**
Charcoal Gray	**1853567**
Light Gray	**1853563**

Keytop Extractor (P/N 9900373): The keytop extractor is a small tweezer-like device which fits between the keytops. With a firm squeezing grip on a keytop, the keytop can be pulled of its stem. The customers should use the extractor whenever a keytop is to be removed from a keyboard.

Entry Assist Keytop Kit: [Non-overlay keyboards only] This kit provides eight sets of five keytops appropriately labelled for use with the Entry Assist capability together with a keytop extractor and keytop replacement instruction. Not for use on 3178 keyboards or overlay keyboards.

Entry Assist Keytop Kit	P/N 1752774

Display Station Tilt/Rotate Accessory (P/N 4422265): An accessory which fits under the display station and provides a ball and socket type movement to allow the angle of the screen face to be adjusted for comfort of viewing position. The screen angle is normally 20 degrees from the vertical but with this device it can be adjusted between 25 degrees to the vertical and the vertical position. A locking device is provided to maintain the selected position. This accessory also allows the display station to be rotated plus or minus 90 degrees from the central position and this movement is independent of the tilt movement.

See SSD catalog for details of this supply item. Interested customers may order from IBM directly. Call toll free at 800-631-5582; in Alaska and Hawaii, call 800-526-2484. For further information, contact an SSD sales representative.

Warranty: The Tilt Rotate accessory is warranted free from defects in workmanship and materials for 90 days.

Maintenance: There is no regularly scheduled preventive maintenance recommended by IBM, and IBM Maintenance Agreements are not available.

Customer Responsibility: The customer is responsible for mounting the Display Station on this accessory.

Cables: Cables and or associated parts to attach the 3279 to the 3274 and 3276, may be purchased from IBM or from a customer-selected source. For the proper identification, installation, and application of the subject cables and parts, see *IBM 3270 Installation Manual - Physical Planning,* GA27-2787 . The customer is responsible for installation and maintenance of these cables and their associated parts.

Item	Number	Description
Assm	**2577672**	Cable Assembly In-Door
Bulk	**0323921**	Coax Wire (Note 1)
P/N	**1836418**	Connector Kit (Note 1)
Assm	**1833108**	Cable Assembly Out-Door
Bulk	**5252750**	Coax Wire (Note 2)
P/N	**1836419**	Connector Kit (Note 2)
P/N	**2621414**	Modification Kit (Note 3)
P/N	**1833106**	Station Protector Attachment Kit (Note 5)
P/N	**5252643**	Adapter (Note 7)
P/N	**1830818**	Station Protection Kit, Gas (Note 4)
P/N	**5252899**	Station Protector Element, Gas (Note 6)

Specify P/N, Assembly Number, or Bulk Number as appropriate. Allow a lead time of 6 weeks.

Notes:

1. Coax wire and one connector kit (includes two connectors P/N **1836446)** required for each indoor cable assembly.
2. Coax wire and one connector kit (includes two connectors P/N **1836447)** required for each outdoor cable assembly.
3. Customers replacing 2260 display stations may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
4. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
5. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
6. Replacement station protector elements.
7. Use to join two P/N **2577672** or two P/N **1833108** cable assemblies together.

SUPPLIES (None)

3279 COLOR DISPLAY CONSOLE MDL 2C

PURPOSE

A cathode-ray tube (CRT) Color Display Console which attaches to the 4321, 4331/4341/4361/4381 Model Group 1, and 4331/4341 Model Group 2 and provides for operator interaction for both normal operations and maintenance. An Operator Console Keyboard with an operator control panel is available with the primary Display Console and is the means to Power On (4341 ... see Special Features) Power Off, Initial Microcode Load (IML), and Start or Stop processor operations.

MODELS

Model 2C 2C

Prerequisites: An available console position on any 4321/4331/4341 Mdl Group 1 or 4331/4341 Mdl Group 2 ... See 4321/4331/4341/4361/4381.

The 3279-2Cs require an Operator Console Keyboard. The 3279-2C that is used as the primary console on a 4321/4331/4341 Mdl Group 1/4341 Mdl Group 2 must have an Operator Console Keyboard with an operator control panel.

HIGHLIGHTS

Displays characters in a 9x12 character matrix (uppercase alphabet is displayed in a 7x9 matrix), arranged in 24 rows of 80 characters each. Rows 1 through 20 are usable by the operator, rows 21 through 24 are used for system status information. A 96-character set is used, which consists of 26 upper case alphabetic, 26 lower case alphabetic, 10 numeric and 32 special characters, plus space and null.

Console messages are displayed in four colors (white, red, blue, or green) according to the status of the protected and intensified attributes. This gives the operator better perception of the system status.

When the 4300 is under control of VM/SP, the screen input area is green and the output area is blue. Input data that is redisplayed in the output area may be made white with the CP TERMINAL HILIGHT ON command. In addition, messages from other users are displayed white.

In addition to Power On/Off, IML and Start/Stop, the console allows the operator to manually control such functions as storage display and operation, address comparing, and normal versus instruction step processing. The console indicates to the operator both proper operations and malfunctions, should they occur.

For maintenance and service support the console can display the status of the Processor complex and other valuable servicing information. It also provides a means for using diagnostic tools.

The 3279 mdl 2C that is used as the primary console is normally installed concurrent with the installation of the 4321/4331/4341/4361/4381 Processors.

Operator Factors: The 3279 has an anti-glare screen to improve contrast and readability. Indicators are displayed in symbols and/or words on the bottom row of the screen. These symbols, except those indicating color attributes, will appear in blue. The keyboard, which is low in profile, provides a palm rest area and has separators to help prevent accidental striking of control keys. The cursor is displayed in white on the 3279. A base color switch allows the 3279 mdl 2C to run in monochrome mode for 3278 compatibility. In this mode fields are displayed in green for normal intensity and in white for high intensity. For comfortable viewing the CRT face is inclined and may be adjusted to 15 degrees, 17.5 degrees or 20 degrees from the vertical. The operator may adjust the color convergence quickly and easily using a simple keyboard procedure with a special screen test pattern.

Editing: Cursor move, tab, home, back tab, insert, delete, erase to end-of-field and erase all input keys are basic to the console keyboard. Alphanumeric, special symbol and cursor move keys have typamatic capability. 12 Program Function (PF) keys are basic.

Audible Alarm: An alarm sounded under program control to alert the operator to a special condition. This alarm, during keyboard operation, is also sounded when a character is entered into the next-to-last position on the screen. The operator may adjust the volume of the tone.

Security Function: The Security Keylock (optional) prevents modification or display of data in the display terminal unless the key is turned to the "on" position.

Problem Determination Procedures: Significant function has been designed into this unit to provide high availability to the customer. This high availability has been achieved through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided by the User Reference Summary.

Base Color Supported:

Protected and intensified	–	White
Unprotected and intensified	–	Red
Protected and normal intensity	–	Blue
Unprotected and normal intensity	–	Green

SPECIFY

BASIC CONFIGURATION

The 3279 mdl 2C will be shipped with these specifications unless alternative codes are specified:

Cabling: Fixed-length 7.6 meter (25 foot) cables from the Display Console to the Processor for Keyboards #4631, #4632 and #4634 will be furnished by IBM and shipped with the processor. For Keyboard #4633, up to 30.5 meters (100 feet) of signal cable is provided by IBM and ordered via normal procedures. Additional cable for this feature up to a maximum total cable length of 1,500 meters (4925 feet) must be provided by the customer as outlined in the 3279-2C specifications page in *IBM Input/Output Equipment Installation Manual - Physical Planning: System/360, System/370, 4300 Processors,* GC22-7064 and *Installation and Assembly of Coaxial Cable and Accessories for Attachment to IBM Products,* GA27-2805.

- Voltage (120V AC, 1-phase, 3 wire, 60 Hz): Non-locking plug.
- Power Cable Length: 2.8 meters (9 foot).
- Power Cable: If the standard 2.8 meter (9 foot) power cable is not desired, specify: **#9511** for 1.8 meter (6 foot) or **#9513** for 4.5 meter (15 foot)
- Power Cable Plug: If locking plug required, specify **#9890**.

SPECIAL FEATURES

Keyboards: Refer to Type Catalog for a picture of the Keyboard layouts.

Limitations: Keyboards used on 3279-2C are not interchangeable with keyboards used on 3279 mdls 2A, 2B, 3A and 3B. **Maximum:** One of the below. **Field Installation:** No.

#4631 - 75-Key Operator Console Keyboard with Channel-to-Channel: [4341 and 4381 only] Typewriter-like layout, movable, with 12 PF keys available on the top row through use of the Alternate Shift key. Provides 49 data keys and 26 control keys, and contains an operator control panel with 4 control keys (Power Off, Lamp Test, Power On/IML, Channel-to-Channel) and 6 LED indicators (Basic Check, System, Wait, Power in Process, Power Complete, Channel-to-Channel Disabled). Channel-to-Channel is required for systems having a channel-to-channel adapter feature.

#4632 - 75-Key Operator Console Keyboard, without Channel-to-Channel : [4341 and 4381 only] Same as #4631 but the operator control panel does not have the Channel-to-Channel control key or the Channel-to-Channel Disabled Indicator.

#4633 - 75-Key Operator Console Keyboard: [4341 and 4381 only] Same as #4631 but without an operator control panel.

#4634 - 75-Key Operator Console Keyboard, without Channel-toChannel or Power On: [4321 or 4331 or 4361 only] Same as #4631 but the operator control panel does not have the Channel-to-Channel control key, or the Channel-to-Channel Disabled Indicator or the Power On key.

Cabling: Cables will be furnished by IBM for Features #4631, #4632 and #4634.

For Feature #4633 the cables must be supplied by the customer as outlined for the 3279 mdl 2C in the *IBM 3270 Information Display System Installation Manual Physical Planning* GA27-2787.

Waterproof Power Connector (#8802): Provides a waterproof connector on the power cable to satisfy local ordinances requiring this type of termination in specific locations. **Limitations:** Available only for power cord lengths of 1.8 meters (6 feet) #9511, or 4.5 meters (15 feet) #9513. **Maximum:** One. **Field Installation:** No.

MODEL CONVERSIONS

Not recommended for field installation.

ACCESSORIES

Refer to M4300 pages of the Sales Manual for information pertaining to the 4300 Processors Console Table.

Mercury Battery (P/N 1743456): Provides power to sustain the convergence parameters in a 3279 when normal power is not present. A 4.14 volt non-rechargeable mercury battery. It has a shelf life of 18 months under normal conditions and can be expected to provide 3.5 years of normal operation. **Field Installation:** Yes, by customer. **Note:** Discharged battery should be returned to IBM.

Keyboard Overlay: A keyboard overlay is available on which customer-defined Programmed Symbols can be annotated. An annotated overlay can be placed over the narrow keytops of Overlay keyboards to associate specific keytops with specific symbols.

Keyboard Overlay **P/N 1742762**

3279 Color Display Console Mdl 2C (cont'd)

Locks and Keys (P/N 2577741): The 3279, with Security Keylock, is shipped with two keys. Additional keys may be purchased only from IBM. (Vendor will supply additional keys *only* to original purchaser). A letter of authorization, with key identification, must accompany each order. Allow two to three weeks for delivery.

3279 Display Station Tilt/Rotate Accessory (P/N 4422265): An accessory which fits under the display station and provides a ball and socket type movement to allow the angle of the screen face to be adjusted for comfort of viewing position. The screen angle is normally 20 degrees from the vertical but with this device it can be adjusted between 25 degrees to the vertical and the vertical position. A locking device is provided to maintain the selected position. This accessory also allows the display station to be rotated plus or minus 90 degrees from the central position and this movement is independent of the tilt movement.

See SSD catalog for details of this supply item. Interested customers may order from IBM directly. Call toll free at 800-631-5582; in Alaska and Hawaii, call 800-526-2484. For further information, contact an SSD sales representative.

Warranty: The Tilt Rotate accessory is warranted free from defects in workmanship and materials for 90 days.

Maintenance: There is no regularly scheduled preventive maintenance recommended by IBM, and IBM Maintenance Agreements are not available.

Customer Responsibility: The customer is responsible for mounting the Display Station on this accessory.

SUPPLIES (None)

3340 DIRECT ACCESS STORAGE FACILITY

[NO LONGER AVAILABLE as of March 1984: Models B01 and C02, B01 and C02 Model Changes, B01 and C02 Specify Features, B01 and C02 Special Features and Accessories for B01 or C02 are no longer available. RPQs have not been withdrawn.]

PURPOSE

Multiple capacity, high-speed, direct access storage for attachment to a System/3 model 12 or System/3 model 15 with B, C or D model Processing Unit, System/7 with E model Processing Unit, any virtual storage S/370 or 4300 processor.

MODELS

Model A2 A02 — Two disk storage drives and associated control. For attachment to a System/3 model 15, with B, C, or D model Processing Unit via native attachment, or a System/7 equipped with a 5988-T01, 3340 Attachment Module. It provides logic and power for the attachment of up to three 3340 model B units. Also for attachment to a 3115 or 3125 via their native attachments, to the 3135, 3135-3, 3138 via the IFA (#4655), to 3145 models GE, GFD, H, HG or I via the 3345 model 3, 4 or 5, to 3145 model H2, HG2, I2, IH2, J2, JI2 or K2, 3145-3, 3148 via the ISC (#4660), to the 4321 or 4331 via the 3340/3344 Direct Attach feature (#7851), to the 3158, 3158-3, 3168 or 3168-3 via the ISC (#4650), to the 3830 model 2, and to the 3880 model 1 or 2. It provides logic and power for the attachment of up to three 3340 model B units and/or 3344 units.

Model B1 B01 — [NO LONGER AVAILABLE as of March 1984] Contains one disk storage drive.

System/7, S/370 or 4300 processor: Up to three can be attached to a 3340 model A2 to provide 3-, 5- or 7-drive configurations. Can be combined with 3340 model A2, B2s and/or 3344 units for a 5-, 6- or 7-drive configuration.

System/3 model 15 with B, C, or D model processor: One can be attached to a 3340 model A2 to provide a 3-drive configuration.

Model B2 B02 — Contains two disk storage drives.

System/7, S/370 or 4300 processor: Up to three 3340 model B2s can be attached to a 3340 model A2 for a 4-, 6- or 8-drive configuration. Can be combined with 3340 model A2, B1s and/or 3344 units for a 5-, 6- or 7-drive configuration.

System/3 Model 15 with B, C, or D Model Processor: One can be attached to a 3340 Model A2 to provide a 4-drive configuration.

Model C2 C02 — [NO LONGER AVAILABLE as of March 1984] Contains two disk storage drives.

System/3 Model 12: One can be attached directly to the 5412 to provide a 2-drive configuration.

Maximum:
3115-0 – four 3340 drives
3115-2 – eight 3340 drives
3125-0 – eight 3340 drives
3125-2 – sixteen 3340 drives
Other S/370s, or 4300 processors – see M3135, 3135-3, 3138, 3145, 3145-3, 3148, 3158, 3158-3, 3168, 3168-3, 3031, 3032, 3033, 3345, 3830-2 or 3880-1,2 pages.

Maximum: System/3 mdl 12 – two 3340 drives (C2) System/3 mdl 15B, 15C, or 15D – four 3340 drives System/7 mdl E – eight 3340 drives.

Prerequisites: A 3340 facility requires: a 3340 mdl A2 (except System/3 mdl 12, which supports only 3340 mdl C2) ... a System/3 Mdl 15 with a B, C, or D mdl processor, System/7 with a 5998-TO1 Module ... a S/370 or 4300 processor with appropriate attachment and features ... each 3340 drive requires a 3348 Data Module. A 3145 requires Word Buffer (#8810) to attach 3340s.

System/3: For conversion of a 5415A mdl CPU to a 5415B, 5415C, or 5415D mdl CPU, the MES must indicate deletion of **#9400**, and if a second 5444 is installed, deletion of **#9401** or **#9402**.

See appropriate DASD storage control feature or machine to determine additional prerequisite specify and/or special features to attach 3340s.

HIGHLIGHTS

Each 3340 contains an air filtration system and the load/unload mechanism for the 3348 Data Module. Features low cost, multiple capacity, fast access and high data rate ... two drives (C2 only) attach to a System/3 mdl 12 ... up to 4 drives attach to a System/3 mdl 15 B, C or D, or a 3115-0 ... up to 8 drives attach to a System/7, to a 3115-2 or a 3125-0 ... up to 16 drives to a 3125-2 with 16 Drive Expansion **(#9315)**, and up to 16 drives to a 4331. See M3135, 3135-3, 3138, 3145, 3145-3, 3148, 3158, 3158-3, 3168, 3168-3, 3031, 3032, 3033, 3345, 4321, 4331, 4341, 3830 or 3880 pages for other S/370 or 4300 processor attachment capabilities.

The 3340 introduces a new design in which a sealed cartridge (3348 Data Module) contains the disks, access arms, read/write heads and spindle. Multiple capacity options on each drive become possible due to the modularity provided by this unique design. In addition, the 3348 mdl 70F contains fixed heads which provide low cost, fixed head capability for the 3340 user. Users may place selected components of IBM software as well as his own programs in the fixed head area to increase device performance. The 3348 mdl 70F requires the Fixed Head Feature (#4301) on the 3340. The 3348 mdl 70F is not available on the System/3 mdl 12 or mdl 15.

The 3340 supports the command set of the 3330. This is essentially the same as the 2314 command set with minor modifications.

Cylinder Concept:

	3348 mdl 35 (34.9 MB) (Note 1)	3348 mdl 70 or 70F (69.8 MB) (Note 1)	3348 mdl 70 (41.0 MB) (Note 2)
Bytes per Track	8,368	8,368	12,288
Tracks per Cylinder	12	12	20
Cylinders per Data Module	348	696	210*
Bytes per Cylinder	100,416	100,416	245,760

Note 1: Mdl 35, 70 or 70F for System/7, S/370 or 4300 processors.
Note 2: Mdl 70 on System/3 mdl 12 or mdl 15.
***Note:** For the mdl 12 or 15, these are "logical" cylinders rather than physical cylinders. For capacities on the System/7, see System/7 under 3348.

Data Rate: 885,000 bytes per second. See GA09-1004 for Data Rate on System/7.

Access Time: For the 3348 mdl 35 and 70, the average seek time is 25 ms with a minimum of 10 ms and a maximum of 50 ms. For the mdl 70F, the average seek time is 0 ms for cylinders 1 through 5 while all other cylinders retain the above seek timing. Rotation time is 20.2 ms and latency is 10.1 ms, the same as for the 3348 mdls 35 and 70.

Autoloading: Data modules are automatically loaded after the Data Module is placed in the drive, the drive cover is closed and a switch is turned on. The Data Module is a sealed unit and requires no cover removal. Start up time is less than 20 seconds.

Read-Only: A switch is provided on every 3340 drive. This switch is activated by inserting a latch in the Data Module. When the latch is *NOT* inserted, the Data Module is protected from being written upon or erased.

Data Modules: Each drive requires a Data Module to operate. These must be ordered separately ... see M3348 pages.

3348 Data Module mdl 35 provides 34,944,768 bytes of storage for the S/370 and 4300 processors.
3348 Data Module mdl 70 provides 69,889,536 bytes of storage for the S/370 and 4300 processors. For System/3 mdl 12 and mdl 15, it provides 41,041,920 bytes of main data storage plus 9,830,400 bytes for program support. Note: System/3 mdl 12 and mdl 15 can only utilize the 3348 Data Module mdl 70.
3348 Data Module mdl 70F provides 69,889,536 bytes of storage of which 502,080 are accessible by fixed heads.

Either the mdl 35 or 70 may operate on any drive and they are interchangeable between drives, including drives with the Fixed Head Feature (#4301, 4302) installed. The mdl 70F, however, requires the Fixed Head Feature on the drive.

Data written on a Data Module by S/3 cannot be retrieved by S/370, and vice versa. Data written on a Data Module by a System 3 Mdl 12 or 15 may be used by a 4331 using the S/3 Data Import feature (#6305).

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): [must be consistent with system voltage] **#9903** for 208V or **#9905** for 230V.
- Color: Blue **#9043** ... Gray **#9045** ... Red **#9041** ... White **#9046** ... Yellow **#9042**.
- System Attachment: One of the following must be specified on each 3340 mdl A2:

Attachment	Specify	Attachment	Specify
System/3 mdl 15*	#9589	3168 ISC	#9585
System/7 mdl E	#9590	3125 DDA	#9586
3830 mdl 2	#9581	3115 DDA	#9587
3135 IFA	#9582	3145 ISC	#9588
3135 mdl 3 IFA	#9582	3145 mdl 3 ISC	#9588

3340 Direct Access Storage Facility (cont'd)

3138 IFA	#9579	3148 ISC	#9580
3345 mdls 3, 4, 5	#9583	4321,	
3158 ISC	#9584	4331 3340 Direct Attach	#9606
3880 mdl 1 or 2	#9607		

* Note: Specify **#9589** must also be used for a mdl B1 or B2 attached to the 3340 A2 to provide a 3 or 4-drive system.

The following must be specified for a 3340 Mdl C2:

Attachment	Specify
System/3 mdl 12	#9600

- If String Switch (#8150) is ordered or installed on 3340 mdl A2, String Switch (**#9570**) must be specified on each 3340 mdl B1 or B2 in the string.

SPECIAL FEATURES

Fixed Head Feature (#4301,#4302): #4301 – for mdl A2 or B2 ... #4302 – for mdl B1. To operate the 3348 mdl 70F on the 3340. The Fixed Head Feature is available on System/7, S/370 VS systems from the 115 and up, and 4300 processors. Attachment is via the following: On System/7, via the 5998-TO1. On the 3115 and 3125 via their native attachment, the 3830 Storage Control mdl 2, the 3880 Control Unit, the 3330/3340 Series IFA (#4655) on the 3135, 3135-3, 3138, the 3345 Storage Control Frame mdl 3, 4 or 5, the ISC (#4660) on the 3145, 3145-3, 3148, the ISC (#4650) on the 3158 and 3168, and the 4321 or 4331 via the 3340/3344 Direct Attach feature (#7851). See appropriate machines for additional requirements. **Limitations:** Not available on 3340s attached to System/3 mdl 12 or mdl 15. Cannot be installed with either the 2311 mdl 1/3340 Series Compatibility (#8060) or the 2314/3340 Series Compatibility (#8070) on 3115 and 3125. Cannot be installed with Two-Channel Switch, Add'l (#8171) on the 3830 mdl 2 unless specify **#9317** or **#9310** is installed on the 3830. **Field Installation:** Yes.

Remote Switch Attachment (#6148): [Mdl A2] To attach the String Switch (#8150) to the configuration control panel of a 3158MP or 3168MP. **Field Installation:** Yes.

Rotational Position Sensing (#6201,#6202): #6201 – for mdl B1 ... #6202 – for mdl A2 or B2. Permits channel disconnect during most of the rotational latency period and thus contributes to increased channel availability. If required, it should be installed on every 3340 mdl A2, B2 or B1 in a string. **Limitations:** This feature may be installed but is not supported by the 4321 or 4331 processor 3340/3344 Direct Attachment Feature (#7851). **Field Installation:** Yes. **Prerequisites:** A block multiplexer channel on the system.

String Switch (#8150): [Mdl A2] To attach the 3340 mdl A2 to a second attachment. The two attachments may be on the same processor or different processors and may be any two of the following: 3830 Storage Control mdl 2, the 3880 Control Unit, the 3340 Direct Disk Attachment (DDA) on the 3115-2 or 3125-2, the 3330/3340 Series IFA (#4655) on the 3135, 3135-3, 3138, the 3345 Storage and Control Frame mdl 3, 4 or 5, the ISC (#4660) for attachment to the 3145, 3145-3, 3148, the ISC (#4650) for 3158 and 3168, and the 3340/3344 Direct Attachment Feature (#7851) on the 4321 or 4331. See appropriate machines for additional requirements. Switching between two attachments is under program control. The 3340 may also be dedicated to a single attachment with an enable/disable switch. **Field Installation:** Yes. **Specify:** To indicate the attachment to which this feature will be made, specify one of the following:

Attachment	Specify	Attachment	Specify
3880 mdl 1 or 2	#9707	4331	#9608
3830 mdl 2	#9591	3148 ISC	#9602
3135, 3135-3 IFA	#9592	3158 ISC	#9594
3138 IFA	#9601	3168 ISC	#9595
3345 mdls 3, 4, 5	#9593	3115-2 DDA	#9596
3145, 3145-3 ISC	#9593	3125-2 DDA	#9597

In addition, String Switch (**#9570**) must be ordered on each 3340 mdl B1 or B2 which will be attached to the 3340 mdl A2 with String Switch (#8150).

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3344 DIRECT ACCESS STORAGE

[NO LONGER AVAILABLE as of March 1984: Model B2F, B2F Model Changes, B2F Specify Features, B2F Special Features and Accessories for B2F are no longer available. RPQs have not been withdrawn.]

PURPOSE

Dual drive, large capacity, direct access storage for attachment via a 3340 model A2 to a System/3 model 15D, to any virtual storage S/370 or 4300 processor.

MODELS

Model B2 B02 2-drive disk storage unit which attaches to a 3340 model A2. It may be intermixed with 3340 model B units and/or 3344 model B2F units in any combination up to three B units per 3340 model A2. On System/3 model 15D, one 3344 B2 can be attached to a 3340 A2 to make a 4-drive system.

Model B2F B2F [NO LONGER AVAILABLE as of March 1984] 2-drive disk storage unit with the same attachment capabilities as the 3344 model B2. It features Fixed Heads which provide 1,004,160 bytes of zero seek time storage on each drive.

Limitations: A 3340 string containing the 3344 may not be intermixed with a 3330 string on a 3135, 3135-3, 3138 IFA or 3880 mdl 1 or 2. 3340 strings containing the 3344 cannot be intermixed with 3330 or 3350 strings on a 3145, 3145-3, 3148, 3345, 3158, 3168 ISC or 3830 mdl 2.

Data written by System/3 cannot be retrieved by S/370, 4341 or 4381 processors, and vice versa. For the 4321, 4331 or 4361, see System/3 Data Import Feature (#6305).

Maximum: One 3340 string on a 3115-2/3125-2 DDA or on a 3135, 3135-3, 3138 IFA may contain 3344s.

Up to two 3340 strings on a 3830 mdl 2, 3880 mdl 2, 3145, 3145-3, 3148 or 3345 ISC, on each path of a 3158 or 3168 ISC, on each DASD adapter of the 4321 or4331 or on each director of of 3880 mdl 1, 3880 mdl 1, may contain 3344s.

Prerequisites: A 3344 requires a 3340 mdl A2 and any virtual storage S/370 or 4300 processor with appropriate attachment and features. Control Store Extension (#2150) and Register Expansion (#6111) are prerequisite features on the 3830 mdl 2 and 3145, 3145-3, 3148, 3345, 3158, 3168 ISCs to attach 3344. On the 3115-2 and the 3125-2, 4K DASF Control Storage Extension (#4210) is required. On 3880, 3340/3344 Attachment feature is required.

For use with System/3 mdl 15D, a 5415D with specify **#9781** and **#9784** and a 3340 mdl A2 are required.

IMPORTANT: See the appropriate DASD storage control feature or machine to determine any additional prerequisite specify and/or special features to attach 3344.

HIGHLIGHTS

The 3344 features a large capacity, fixed storage medium. Each drive is equivalent in capacity and format to four logical 3348 mdl 70s. Each 3344 has two drives and requires eight logical device addresses. The Fixed Head storage capacity on the 3344 mdl B2F is associated with the first of the four logical volumes on each drive.

On S/3 mdl 15D, each drive is approximately equivalent to four logical 3348 mdl 70s - each logical volume features a larger main data area, and a smaller area reserved for simulation, than on a 3348 data module.

Cylinder concept: Except for System/3, each drive has 2,784 logical cylinders with 12 tracks per cylinder. Maximum track capacity is 8,368 bytes providing up to 100,416 bytes per logical cylinder.

For the System/3 mdl 15D, each drive has 828 logical cylinders with 20 tracks per cylinder. Maximum track capacity is 12,288 bytes providing up to 245,760 bytes per logical cylinder.

Maximum drive capacity is 203,489,280 bytes. Data Rate - 885,000 bytes per second.

The 3344 mdl B2 provides 279,558,144 bytes of storage per drive.

The 3344 mdl B2F provides 279,558,144 bytes of storage per drive of which 1,004,160 bytes are accessible by fixed heads.

Data Rate: 885,000 bytes per second.

Access Time: Average seek time is 25ms with a minimum of 10ms and a maximum of 50ms. Rotation time is 20.2ms and latency is 10.1ms. For the 3344 mdl B2F, logical cylinders 1 through 10 of the first logical volume on each drive have a seek time of zero ms while all other cylinders retain the above seek timing.

Read-Only: A 2-position switch is provided for each drive. When the switch is in the "read only" position, the drive is protected from being written upon or erased.

Rotational Position Sensing (RPS): A standard feature on the 3344 which permits channel disconnect during most of the rotational latency period and thus contributes to increased channel availability. Requires a block multiplexer channel on the system. If RPS is used, it is advisable for efficient operation to also have it on every 3340 in a string.

Data Recovery: [Plant only] Should data in the field prove unrecoverable, data recovery assistance at the plant of manufacture will be provided. The customer is required to provide a sufficient number of appropriate media (tapes, disk modules, etc.) to contain recovered data when returning the head and disk assembly to the plant for data recovery.

Alternate Tracks: Except for System/3, there are 96 alternate tracks per drive. The 3344 will be shipped from the plant with not more than five flagged tracks per drive. Therefore, a minimum of 91 alternate tracks per drive are available for customer use.

For the System/3 mdl 15D, there are 160 alternate tracks per drive (40 per logical volume). The 3344 will be shipped from the plant with not more than five flagged tracks per drive. Therefore, a minimum of 155 alternate tracks per drive are available for customer use.

Bibliography: S/370 and 4300 processors -- GC20-0001 ... System/3 -- GC20-8080

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): [must be consistent with that of the unit to which the 3344 is attached] **#9903** for 208V or **#9905** for 230V.
- Color: Blue **#9043** ... Gray **#9045** ... Red **#9041** ... White **#9046** ... Yellow **#9042**.
- System Attachment: One of the following must be specified on each 3344 mdl B2/B2F.

Attachment	Specify	Attachment	Specify
3830 mdl 2	**#9581**	3168 ISC	**#9585**
3135 IFA	**#9582**	3125 DDA	**#9586**
3135 mdl 3 IFA	**#9582**	3115 DDA	**#9587**
3138 IFA	**#9579**	3145 ISC	**#9588**
3345 mdls 3, 4, 5	**#9583**	3145 mdl 3 ISC	**#9588**
3158 ISC	**#9584**	3148 ISC	**#9580**
4331/4361	**#9606**	3880 mdl 1 or 2	**#9607**
System/3	**#9589**		

SPECIAL FEATURES (None)

MODEL CONVERSIONS

Changes from model B2 to model B2F are field installable. Note: Customer price quotations and customer acknowledgement letters for purchase MESs must state: "Installation of this model change involves removal of parts which become the property of IBM."

ACCESSORIES (None)

SUPPLIES (None)

3345 STORAGE AND CONTROL FRAME

[NO LONGER AVAILABLE]

PURPOSE

Additional processor storage and I/O control in a S/370 model 145.

MODELS

Model 1 001 — Used with the 3145 model HG to provide 393,216 bytes of processor storage.

Model 2 002 — Used with the 3145 model I to provide 524,288 bytes of processor storage.

Model 3 003 — Used with the 3145 models H and below to provide for the attachment of 3330, 3340, 3344 or 3350 series disk storage via its standard Integrated Storage Control ... see M3330, 3333, 3340, 3344, 3350 pages.

Model 4 004 — Used with the 3145 model HG to provide 393,216 bytes of processor storage and to provide for the attachment of 3330, 3340, 3344 or 3350 series disk storage via its standard Integrated Storage Control ... see M3330, 3333, 3340, 3344, 3350 pages.

Model 5 005 — Used with the 3145 model I to provide 524,288 bytes of processor storage and to provide for the attachment of 3330, 3340, 3344 or 3350 series disk storage via its standard Integrated Storage Control ... see M3330, 3333, 3340, 3344, 3350 pages.

Maximum: Only one 3345 can be attached to a 3145. For 3345 mdl 3, 4 or 5, see DASD Designation under "Specify" for maximum number of 3333/3340/3344/3350s which can be attached to the standard Integrated Storage Control.

Prerequisites: [1] Mdls 1 and 4 require a 3145 mdl HG ... mdls 2 and 5 require a 3145 mdl I ... mdl 3 is used with 3145 mdls H and below ... when 3345 mdl 3, 4 or 5 is to be installed with a 3145, **#9851** is required on the 3145 ... for mdls 1, 2, 4 and 5, a 3046 Power Unit is required. [2] For mdls 3, 4 and 5, the standard Integrated Storage Control requires an available control unit position on a system channel. A block multiplexer channel and one unshared subchannel per logical device are required for support of block multiplexing and rotational position sensing. If this support is not required, attachment to a system selector channel is permitted. Word Buffer (#8810) is prerequisite on 3145 to support 3340, or if Selector Channel, 3rd (#6983) is installed on the 3145 ... seeZM3145 pages.

HIGHLIGHTS

- 607.5 nanosecond "store" cycle with 0-4 byte capability
- 540 nanosecond "fetch" cycle with 8-byte parallel access
- Error checking with correction is an integral part of mdls 1, 2, 4, 5
- Store and Fetch Protect are provided by the 3145.

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V ... must be the same as 3145 voltage.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Cabling: **#9080** for below floor, **#9081** for on the floor.
- DASD Configuration [Mdls 3, 4, 5]: The available combinations of storage devices which can be attached are shown in the table below. One, two or three Xs in a vertical column indicate the type of machine(s) listed under DASD Configuration which can be attached when the "Required DASD Specify Features" are installed.

  Based on the DASD, and the Special Features listed below being ordered for them, order the Required DASD Specify Feature(s). (Note that **#9190** is 3340 Fixed Head Attachment for **#9314** and **#9315** and is *not* specified for **#9317** or **#9318.**)

SPECIAL FEATURES

Control Store Extension (#2150): [Mdls 3, 4, 5] Provides additional control store for microprogram use ... see DASD Configuration under "Specify" to determine when required. **Limitations:** Cannot be installed with Expanded Control Store (#2152). **Maximum:** One. **Field Installation:** Yes.

Expanded Control Store (#2152): [Mdls 3, 4, 5] Provides additional control store for microprogram use on the ISC ... see DASD Configuration under "Specify" to determine when required. **Limitations:** Cannot be installed with Control Store Extension (#2150). **Maximum:** One. **Field Installation:** Yes.

Register Expansion (#6111): [Mdls 3, 4, 5] Provides additional registers for microprogram use on the ISC ... see DASD Configuration under "Specify" to determine when required. **Maximum:** One. **Field Installation:** Yes.

Two-Channel Switch (#8100): [Mdls 3, 4, 5] To attach the standard Integrated Storage Control to a second channel ... the two channels may be on the same CPU or different CPUs. An available control unit position is required on each channel. Switching is under program control. The ISC can be dedicated to a single channel by means of an Enable/Disable switch. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See item [2] under "Prerequisites".

MODEL CONVERSIONS

The following 3345 model upgrades are field installable: Model 1 to model 2, 4 or 5 ... model 2 to model 5 ... model 4 to model 5. Model changes involving model 3 are not recommended for field installation.

ACCESSORIES (None)

SUPPLIES

Contact IBM.

3345 Storage and Control Frame (cont'd)

3345 MDL 3, 4 or 5 WITH ONE CHANNEL OR WITH TWO-CHANNEL SWITCH (#8100)

DASD Configuration		Required DASD Specify Features*															
		† 9313		† 9314		† 9314 9190	** † 9315			** † 9315 9190			+ † 9317		++ † 9318	
3333 Only	One or two 3333s with associated 3330s	x	x														
	Up to four 3333s with associated 3330s						x	x									
	String Switch (#8150) on any 3333		x				x										
3340 Only	One or two 3340 mdl A2s with associated mdl B1/B2s			x	x	x				x							
	Up to four 3340 mdl A2s with associated mdl B1/B2s							x	x		x	x					
	String Switch (#8150) on any 3340 mdl A2				x			x		x		x					
	Fixed Head feature (#4301/4302) on any 3340					x				x	x	x					
3340 3344	Up to four 3340 mdl A2s of which up to two may attach 3344s												x	x			
	String Switch (#8150) on any 3340 mdl A2 and/or Fixed Head feature (#4301/4302) on any 3340													x			
3333 3340 -not 3344	3333s and 3340 mdl A2s (any combination of 2, 3, or 4) each with associated drives								x	x			x	x			
	String Switch (#8150) on any 3333 or 3340 mdl A2								x				x				
	Fixed Head feature (#4301/4302) on any 3340												x	x			
3350 Only	Up to four 3350 mdl A2/A2Fs with associated mdl B2/B2Fs, C2/C2F														x	x	
	String Switch (#8150) on any 3350 mdl A2/A2F, C2/C2F														x		
3333 3340 3350 -not 3344	3333s, 3340 mdl A2s and 3350 mdl A2/A2Fs (any combination of 2, 3, or 4) with associated drives															x	x
	String Switch (#8150) on any 3333, 3340 mdl A2, or 3350 mdl A2/ A2F, C2/C2F and/ or Fixed Head feature (#4301/ 4302) on any 3340																x

† ISC diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

* Any change to an installed DASD configuration requires an MES *ONLY* if the new configuration indicates that a different Specify and/or Special Feature(s) is required. The MES must include addition of any new Specify and/or Special Features not previously installed *AND* removal of any not listed as required for the new configuration.

** Control Store Extension (#2150) is prerequisite. With **#9315**, the ISC of the 3345 requires 32 contiguous device addresses regardless of the number of drives attached.

\+ Control Store Extension (#2150) and Register Expansion (#6111) are prerequisites. For configurations in this group the ISC uses 64 contiguous device addresses irrespective of the number of drives attached. The 3340 mdl A2s on the first and third strings may attach up to three 3340 mdl B1s, B2s, and/or 3344s in any combination. The 3340 mdl A2 on the second string may attach up to three 3340 mdl B1/B2s. The 3340 mdl A2 on the fourth string may attach one 3340 mdl B1 or B2.

++ Expanded Control Store (#2152) and Register Expansion (#6111) are prerequisites. For configurations in this group the ISC uses 8 or 16 or 32 or 64 device addresses depending upon the DASD configuration installed and whether any 3350 drive is in 3330-1 compatibility mode.

Note: Customers who may elect to purchase Control Store Extension (#2150) and later upgrade to Expanded Control Store (#2152) should consider the purchase of Expanded Control Store (#2152) initially because this field upgrade requires replacement of Control Store Extension (#2150) and installation of Expanded Control Store (#2152). The prerequisite of Control Store Extension (#2150) for **#9315** or **#9317** can be satisfied by Expanded Control Store (#2152).

3348 DATA MODULE

SSD Product

PURPOSE

A removable and interchangeable Data Module for the 3340 Disk Drive family.

MODELS

Model 35	035	34,944,768 bytes
Model 70	070	69,889,536 bytes on system/370 and 41,041,920 bytes of main data storage plus 9,830,400 bytes for program support on System/3 model 12 and model 15.
Model 70F	70F	69,889,536 bytes of which 502,080 are accessible by fixed heads.

System/7 Capacities Mode of Recording	Capacity by Model (MB) 35	70	70F
5022 Emulation	29.4	48.9	58.9
Native Max Record Length 7,294 bytes	30.4	60.9	60.9
Native Optimum Record Length 4,100 bytes	34.2	68.4	68.4

Limitations: System/3 model 12 and model 15 use only the 3348 model 70.

HIGHLIGHTS

Data Module Concept: -- the 3348 Data Module within a sealed cartridge, contains the disks, the spindle, the read/write heads and the access arms. The access arms and heads are not part of the drive as in previous disk pack/disk drive interfaces. The sealed module design protects the disk surfaces by reducing outside contamination. Multiple capacity options on each drive become possible due to the modularity provided by this unique design. In addition, the mdl 70F contains fixed heads which provide low cost, fixed head capability for the 3340 user. The user may place selected components of IBM software as well as his own programs in the fixed head area to increase device performance. The 3348 mdl 70F requires that the Fixed Head Feature be installed on the 3340 ... see M3340 pages.

Removable: -- can be installed and removed from the 3340 by the operator.

Interchangeable: -- the mdl 35 or the mdl 70 may operate on any drive and are interchangeable between drives, including those with the Fixed Head Feature installed. The mdl 70F, however, requires that #4301 or #4302 be installed on the drive. System/3 mdl 12 and mdl 15 use only the 3348 mdl 70.

Auto-loading: -- Data Modules are automatically loaded after the Data Module is placed in the drive, cover is closed and a switch is turned on. Start-up time is less that 20 seconds.

Flag-Free: -- Data Modules are shipped from the plant flag-free. If within 90 days after receipt the customer is required to assign an alternate track (using DOS/VS System utilities), he may return the Data Module to IBM and it will be repaired at no cost to the customer.

Capacity Upgrade: -- [Plant only] -- the customer-owned mdl 35 may be capacity upgraded to a mdl 70. Data Modules must be returned to the plant of manufacture for the upgrade service. Downgrading is not available. Recorded data will not be recoverable. Upgrade of either the mdl 35 or 70 to the mdl 70F is not available.

Dimensions:	**Mdl 35**	**Mdl 70**	**Mdl 70F**
Height (inches)	8	8	8
Width (inches)	16	16	16
Maximum Length (inches)	18	18	18
Shipping Weight (lbs)	21	23	24

Covers are sealed at the plant and are unbreakable and nonflammable. A large handle is provided for ease of installation, removal and transportation. The Data Module has an aperture that is opened (or closed) automatically by the drive during loading (or unloading). The Data Module is then connected to the drive for power and communications.

A CE cylinder is assigned to facilitate maintenance of the 3340.

Data Recovery: [Plant only] -- should data in the field, for any reason, prove unrecoverable, a method for data recovery assistance at the plant of manufacture will be provided. The customer is required to provide a sufficient number of appropriate media (tapes, disk modules, etc.) to contain recovered data when returning the head and disk assembly to the plant for data recovery.

Initialization: -- the Data Module will be initialized at the plant. Home addresses and record zero will be written for each track.

3348 Data Module Repair Service: (Plant only)

	Mdl 35	Mdl 70	Mdl 70F
Replace one or more damaged disks (including servo disk) and heads, clean and lubricate, and retest to new data module performance specifications. (Does not include covers.)	**	**	**
Replace one or more damaged heads (including fixed head assembly on the 70F), clean and lubricate, and retest to new data module performance specifications.	**	**	**
Clean and lubricate and retest only. (This price will be charged if no disk/heads require replacement.)	**	**	**

Refer to IBM for all prices.

SPECIFY (None)

SPECIAL FEATURES (None)

ACCESSORIES (None)

SUPPLIES (None)

3350 DIRECT ACCESS STORAGE

PURPOSE

High-speed, large capacity, direct access storage for attachment to any virtual storage S/370 Processor (except 3115 or 3125), 4331 (Model Group 2), 4341, 4361 or 4381 Processor.

MODELS

Model A2 A02 — 2-drive disk storage and associated control for attachment to 3145 models GE, GFD, H, HG or I via the 3345 model 3, 4 or 5, to the 3145 models H2, HG2, I2, IH2, J2, JI2 or K2 via the ISC (#4660), to the 3145-3 or 3148 via the ISC (#4660), to the 3158 or 3168 via the ISC (#4650), to the 3830 model 2 or 3, to the 3880 model 1, 2 or 11. It provides logic and power for the attachment of up to three 3350 model B2/B2F units or up to two model B2/B2F units and one C2/C2F unit.

Model A2F A2F — 2-drive disk storage and associated control with the same attachment capabilities as the model A2. It features Fixed Heads which provide up to 1,144,140 bytes of zero seek time storage on each drive in lieu of the same capacity under the moving heads.

Model B2 B02 — 2-drive disk storage unit. Up to three 3350 model B2/B2Fs can be attached to a 3350 model A2/A2F.

Model B2F B2F — 2-drive disk storage unit with the same attachment capabilities as the model B2. It features Fixed Heads which provide up to 1,144,140 bytes of zero seek time storage in each drive in lieu of the same capacity under the moving heads.

Model C2 C02 — 2-drive disk storage and associated control. Provides an alternate controller function within a 3350 string. The model C2 functions as a model A2 or B2 depending upon the setting of a manual switch on the unit. A 3350 string containing a model C unit requires a model A unit with Primary Controller Adapter (#1320) and may include 0, 1 or 2 model B2/B2F units.

Model C2F C2F — 2-drive disk storage and associated control with the same attachment capabilities as the model C2. It features Fixed Heads which provide up to 1,144,140 bytes of zero seek time storage in each drive in lieu of the same capacity under the moving heads.

Maximum: See M3145, 3145-3, 3148, 3158, 3168, 3345 ISCs, 3830 model 2 or 3, 3880 pages.

Prerequisites: A 3350 DAS requires -- a 3350 model A2 or A2F; any virtual storage 4331 (Mdl Group 2), 4341, 4361 or 4381 processor or S/370 processor (except 3115 or 3125) with appropriate attachment and features. A 3145 requires Word Buffer (#8810) to attach 3350s. Expanded Control Store (#2151), Control Store Extension (#2150), and Register Expansion (#6111) are required on the 3830 mdl 2 or 3158, 3168 ISCs to attach 3350. Expanded Control Store (#2152) and Register Expansion (#6111) are required on the 3145, 3145-3, 3148 or 3345 ISCs, or 3830 mdl 3 to attach 3350.

IMPORTANT: See the appropriate DASD storage control feature or machine to determine any additional prerequisite Specify and/or Special Features to attach a 3350.

HIGHLIGHTS

The 3350 features high data rate, fast access, multiple formats and low cost per byte. It employs a fixed storage medium.

Selective Format: Drive format may be 3330 model 1 or 3330 model 11 compatibility mode or 3350 native mode. Format is specified at time of order by individual drive. Format changes may be made by CE in the field. In 3330 model 1 or model 11 compatibility mode the Fixed Head storage capacity on the models A2F, B2F and C2F is 742,710 bytes per drive. In 3330 model 1 compatibility mode this Fixed Head storage capacity is associated with the first of the two logical 3330 model 1 volumes on each 3350 drive. In 3350 native mode Fixed Head storage capacity on the models A2F, B2F and C2F is 1,144,140 bytes per drive.

Cylinder Concept:	**3330 model 1 Mode**	**3330 model 11 Mode**	**3350 Native Mode**
Bytes per Track	13,030	13,030	19,069
Tracks per Logical Cylinder	19	19	30
Logical Cylinders per Drive	2x404	808	555
Approx. capacity/drive (MB)	2x100	200	317.5

Data Rate: 1,198,000 bytes per second.

Access Time: Average seek time is 25ms with a minimum of 10ms and a maximum of 50ms. Average rotational delay is 8.4ms. For 3350 models A2F, B2F and C2F cylinders 1 and 2 (3350 Native Mode), or cylinders 1 through 3 (3330 model 11 compatibility mode), or cylinders 1 through 3 of the first of the two logical volumes on a drive (3330 model 1 compatibility mode), have a seek time of zero ms. All other cylinders retain the above seek timing.

Error Correction: Provides capability of correcting single data error bursts of up to four bits span as well as detecting all single error bursts of up to ten bits span.

Write Format Release: Frees the subsystem while the drive erases from the end of a formatted write record to the end of the track.

Rotational Position Sensing: Permits channel disconnect during period of rotational latency, thereby providing greater channel availability ... requires one unshared subchannel on a block multiplexer channel for each logical device.

Command Retry: Enables the storage control to recover from certain subsystem errors without recourse to system error recovery procedures.

Read Only: A two position switch is provided for each drive. When the switch is in the "read only" position, the drive is protected from being written upon or erased.

Data Recovery [Plant Only]: Should data in the field prove unrecoverable, data recovery assistance at the plant of manufacture will be provided. The customer is required to provide a sufficient number of appropriate media (tapes, disk modules, etc.) to contain recovered data when returning the head and disk assembly to the plant for data recovery.

Flag Free: The 3350 will be shipped flag free.

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V ... must be consistent with system voltage.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Format:

	First Drive	Second Drive
3330 model 1 Compatibility Mode	**#9731**	**#9732**
3330 model 11 Compatibility Mode	**#9741**	**#9742**
3350 Native Mode	**#9751**	**#9752**

- **#9608** must be specified for attachment to a 3880 model 1 or 11 Storage Control Unit.

  Note: In addition to the standard control attachment **(#9608)** for a 3880 model 1 or 11 Storage Control Unit, models A2/A2F with string switch **(#8150)** attaching to another 3880 model 1 or 11 Storage Control Unit must specify **(#9608)** a total of twice. Mdls C2/C2F with string switch **(#8150)** attaching to a 3880 model 1 Storage Control must specify **(#9608)** only once.

SPECIAL FEATURES

Primary Controller Adapter (#1320): [Mdls A2, A2F] Permits selection/deselection of the controller of the A2/A2F unit as the online controller via a manual switch on the C2/C2F unit in the string. **Maximum:** One per A2/A2F unit. **Field Installation:** Yes. **Corequisite:** One C2 or C2F unit in the string.

Remote Switch Attachment (#6148): [Mdls A2, A2F, C2, C2F] To attach the String Switch (#8150) to the configuration control panel of a S/370 mdl 158MP or 168MP. **Field Installation:** Yes.

String Switch (#8150): [Mdls A2, A2F, C2, C2F] To link the 3350 to a second attachment. The two attachments may be on the same CPU or different CPUs and may be any two of the following: 3830 Storage Control mdl 2 or 3, 3880 Storage Control mdl 1, 2 or 11, the 3345 Storage and Control Frame mdl 3, 4 or 5, or the ISC (#4660) for attachment to S/370 mdl 145, 145-3 or 148, or the ISC (#4650) for attachment to S/370 mdl 158 or 168 ... see appropriate machines for additional requirements. Switching between the two attachments is under program control. The 3350 may also be dedicated to a single attachment with an enable/disable switch. **Limitations:** See 3880 mdl D11 for restriction on use of #8150 when attached to the paging storage director. **Field Installation:** Yes. **Specify:** The attachment to which this feature will be made must be indicated ... see "Specify" for System Attachment.

3350 Direct Access Storage (cont'd)

MODEL CONVERSIONS

Model changes between 3350 mdl A and mdl B units, or mdl C and mdl B units are available at time of manufacture only. Model changes between 3350 mdl A and mdl C units are not recommended for field installation. Model changes between A2 and A2F units, or B2 and B2F units, or C2 and C2F units are field installable. **Note:** Customer price quotations and customer order acknowledgement letters for purchase MESs must state: "Installation of this mdl change involves the removal of parts which become the property of IBM."

ACCESSORIES (None)

SUPPLIES (None)

3370 DIRECT ACCESS STORAGE

PURPOSE

High-speed, large-capacity, fixed-media, direct access storage for attachment to a 4321, 4331, 4341, 4361 or 4381 Processor or System/38 5381 System Unit.

MODELS

Model A1 A01 Single drive disk storage with two actuators and associated control for attachment to the 4321, 4331, 4341, 4361 or 4381 Processors. It provides logic for the attachment of up to three 3370 model B1 units on the 4321 and 4331, and for the attachment of up to three model B1 and/or B2 units intermixed in any combination to the 4341, 4361, or 4381 processors.

Model A2 A02 Single drive disk storage with two actuators and associated control for attachment to 4341, 4361, and 4381 Processors. The model A2 provides logic for attachment of up to three 3370 model B1 or B2 units intermixed in any combination.

Model B1 B01 Single drive disk storage with two actuators. Up to three 3370 model B1 units may be attached to a 3370 model A1 or model A2.

Model B2 B02 Single drive disk storage with two actuators. Up to three 3370 model B2 units may be attached to a 3370 model A1, when attached to a 4341, 4361, or 4381; or 3370 model A2.

Model A11 A11 Single drive disk storage with two actuators and associated control for attachment to System/38 5381 System Unit (models 4, 5, 6, 7 and 8 only) with a 3370 Attachment Adapter. The model A11 provides logic and power for the attachment of up to three 3370 model B11 units or B12 units intermixed in any combination.

Model A12 A12 Single drive disk storage with two actuators and associated control for attachment to System/38 5381 System Unit (models 4, 5, 6, 7, and 8) with a 3370 attachment adapter. The model A12 provides logic and power for the attachment of up to three 3370 model B11 or B12 units intermixed in any combination.

Model B11 B11 Single drive disk storage with two actuators. Up to three 3370 model B11 units may be attached to a 3370 Model A11 or model A12.

Model B12 B12 Single drive disk storage with two actuators. Up to three 3370 model B12 units may be attached to a 3370 model A11 or A12.

Maximum: See M3880, 4331, 4341, 4361, 4381 or System/38 5381 pages.

Prerequisites: A 3370 mdl B1 or B2 requires a 3370 mdl A1, or A2, and a 3370 mdl B11 or B12 requires a 3370 mdl A11 or A12.

For a 4321 Processor -- a 3370 mdl A1 attached via a DASD Adapter base is standard on the 4321.

For a 4331 Processor Mdl Group 1 -- a 3370 mdl A1 requires a DASD Adapter (#3201) on the 4331.

For a 4331 Processor Mdl Group 2 or 4361 Processor -- a 3370 mdl A1 requires a DASD Adapter (#3201 or #3202) on the 4331 or 4361, or a 3880 Storage Control mdl 1, 2 or 4 attached to the High-Speed Block Multiplexer Channel (#143X) on the 4331 or 4361.

For a 4331 Processor Mdl Group 11 -- a 3370 mdl A1 attaches via a DASD Adapter which is standard on the 4331 Mdl Group 11.

For a 4361 -- a 3370 mdl A1 or A2 requires a DASD/8809 Adapter on the 4361, or a 3880 Storage Control mdl 1, 2 or 4 attached to a High-Speed Block Multiplexer Channel on the 4361.

For a 4341 or 4381 Processor -- a 3370 mdl A1 or A2 requires a 3880 Storage Control mdl 1, 2 or 4 connected to a 2.0 megabyte block multiplexer channel on the 4341 or 4381.

For a System/38 -- A 3370 mdl A11 or A12 requires attachment feature #1130 on the 5381 System Unit (mdls 4, 5, 6, 7, and 8), and a second 3370 mdl A11 or A12 on the 5381 System Unit mdl 8 requires attachment feature #1132. A specify code is also required on the 5381 System Unit to designate the 3370 units to be attached. An additional feature code #3000 is required when the first 3370 mdl A12 or B12 is added to an installed 5381 System Unit. See "Specify" in M5381 pages.

A cable order is required for each A mdl ordered.

HIGHLIGHTS

The 3370 features high data rate, fast access, fixed block format, and low cost per byte. It employs a fixed, sealed Head/Disk Assembly (HDA) as the storage medium. The HDA is a field replaceable unit. Two access arms per spindle, each separately addressable with overlapped operation -- locate-locate/read/write. Each arm accesses one-half the data. Reduced power and space requirements. Fixed block architecture allows the specification of DASD space in groups of blocks, making space definition independent of tracks and cylinders.

	Mdl Series	
Fixed Block Format	**01/11**	**02/12**
Data bytes per block	512	512
Blocks per actuator	558,000	712,752
Megabytes per actuator	285.6	364.9
Megabytes per spindle	571.3	729.8

Blocks are separately addressable and jointly form a contiguous address space.

	Mdl Series	
Performance Factors	**01/11**	**02/12**
Ave. Seek (arm motion)	20 ms	19 ms
Latency	10.1ms	10.1ms
Data Rate (+ or - 3%)	1.859 MB/sec.	1.859 MB/sec.

Error Correction: Error detection codes correct error bursts occurring in nine bits or less, and detect errors that span three bytes or less.

Automatic Position Sensing: Fixed Block Architecture provides for relative block addressing, each block separately addressable. When attached to the 4321, 4331, 4341, 4361, or 4381 Processor, the channel automatically disconnects during period of rotational latency providing greater channel availability. Requires one unshared subchannel on a 4321, 4331, 4341, 4361 or 4381 block multiplexer channel for each logical address.

Command Retry: [Not available with the System/38] Enables the storage control to recover from certain subsystem errors without recourse to system error recovery procedures.

Write Protect Function: A switch is provided for each Drive Address to select a Write Protect function. On the 3370 mdls A01, B01, A02, B02, this function provides the means to protect data from being rewritten or erased. When the read/write switch is in the read-only position, any write command is rejected. The switch state can be changed only when the device is not selected. On the 3370 mdls A11, B11, A12, B12 (System/38), when a write operation is called for with the switch in the read-only position, the system will halt with an operator prompt to return the switch to its read/write position.

HDA Data Recovery: [Plant only] Should data in the field prove unrecoverable, data recovery assistance at the plant of manufacture will be provided. The customer is required to provide a sufficient number of appropriate media (tapes, disk modules, etc.) to contain recovered data when returning the head and disk assembly to the plant for data recovery.

Bibliography: GA26-1657

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **Note:** 240V is compatible with a 230V system. Specify **#9903** for 208V, **#9915** for 240V. Specify **#9986** for power cable 6 ft., 60 Hz, Chicago only.

- Color: The color for the base enclosure is pearl white. For accent panel color (mdls A1, A2, A11 and A12) specify **#9060** for willow green, **#9061** for garnet rose, **9062** for sunrise yellow, **9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray.

SPECIAL FEATURES

String Switch (#8150): [Mdl A1, A2] To attach the 3370 to a second Storage Director or DASD Adapter. The two Storage Directors may be on the same processor or different processors. Switching between the two Storage Directors or DASD Adapter is under program control. The 3370 may also be dedicated to a single attachment with an enable/disable switch. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3375 DIRECT ACCESS STORAGE

PURPOSE

High-speed, large-capacity, direct access disk storage for attachment to a 145, 148, 155-II, 158, 165-II, 168 or 3031, 3032, 3033, 3042 Attached Processor Model 2, 3081, 3083, 3084, 4341, 4331 Mdl Group 2, 4361 or 4381 Processor.

MODELS

Model A1 A01 — A disk storage unit with one head and disk assembly (HDA), two actuators and associated control for attachment to a 3880 Storage Control model 1 or 2. It provides logic and power for attachment of up to three 3375 3375 model B1 units.

Model B1 B01 — A disk storage unit with one HDA and two actuators. Up to three 3375 model B1s can be attached to a 3375 model A1.

Model D1 D01 — A disk storage unit with one HDA, two actuators, and associated control. In a 3375 string, the model D1 provides a dual controller function with a second data path to each HDA. It may be attached to the same system as the model A1, or to a different system. A 3375 string containing a model D1 requires model A1 and two B1 units.

Limitations: 3375 units may attach only to 3880 Storage Control mdls 1, 2, or 4. For systems attachment, see 3031, 3032, 3033, 3081, 3083, 3084 or 4300 pages.

The mdl A1 and mdl D1 in the same string cannot be attached to the same storage director on the 3880, nor through the same channel on the processor.

Maximum: Up to three 3375 mdl B1 storage units may be attached to one 3375 mdl A1. In a dual controller string, two mdl B1 storage units and one 3375 mdl D1 storage unit may be attached to one mdl A1. Up to four mdl A1 or mdl D1 storage units may be attached to a 3880 storage director for a maximum of 32 addresses (actuators).

Prerequisites: A 3375 mdl A1 is required to attach 3375 mdl B1s. A 3880 Storage Control mdl 1, 2, or 4 required to attach a 3375 to a processor. Attachment of 3880 to a 4341, 4331 Mdl Group 2, 4361 or 4381 processor requires a block multiplexer channel with a data rate of at least 1.86MB. Attachment to 3031, 3032 or 3033 Processors or to a 3042 Attached Processor mdl 2 requires Data Streaming (#4850) installed on processor channel groups or Speed Matching Buffer feature (#6560) installed on the 3880. Attachment to a 3081, 3083 or 3084 processor is via any block multiplexer channel. Attachment to 145, 148, 155-II, 158, 165-II or 168 Processors require a Speed Matching Buffer (#6560) installed on the 3880.

A 3375 string containing a mdl D1 requires a mdl A1 and two mdl B1s. Each mdl A1 and B1 must have a mdl D1 attachment feature installed.

Write Protect Function: A switch for each drive address provides the means to protect data from being rewritten or erased. When the read/write switch is in the read-only position, any write command is rejected. The switch state can be changed only when the device is not selected.

HIGHLIGHTS

The 3375 features high data rate, fast access and low cost per byte of storage. Each 3375 unit contains one 819.7MB sealed and permanently mounted head and disk assembly. There are two actuators per HDA, each is separately addressable and accesses one-half of the HDA storage (409.8MB). Each seeking and rotational position sensing of any actuator can be overlapped with seeking, rotational position sensing, and data transfer of the other actuators.

With a mdl D1 installed, a data transfer operation from an actuator in any unit in the string may be overlapped with another data transfer operation from an actuator in any other unit in the string.

Characteristics:

General –		
Actuators per HDA	2	
HDAs per unit	1	
Capacity –		
per actuator	409.8	MB
per HDA	819.7	MB
per max string	3.27	GB
Access Time –		
Average seek (actuator motion)	19	ms
Average latency	10.1	ms
Data Rate –	1.859	MB/ sec.

Data Format: Count-key-data.

Error Correction: Capability is provided to correct as well as detect single data error bursts of up to sixteen bits if the burst spans no more than two contiguous bytes.

Rotational Position Sensing: Permits channel and storage director disconnect during period of rotational latency, thereby providing for improved channel utilization and system performance potential ... requires one unshared subchannel on a block multiplexer channel for each logical device address (each actuator).

Head and Disk Assembly Data Recovery: [plant only] Should data in the field prove unrecoverable, data recovery assistance will be provided at the plant of manufacture. Branch Office Field Engineering will initiate the recovery procedure. The customer is required to provide a sufficient number of appropriate media (tapes, disk modules, etc.) to contain recovered data when returning the head and disk assembly to the plant for data recovery.

Flag Free: The 3375 will be shipped Flag Free.

Bibliography: GC20-0001

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9915** for 240V.
- Color: [mdl A1] **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray.

SPECIAL FEATURES

Model D1 Attachment For Model A1 (#4951): This feature must be included on all mdl A1 boxes that are installed in a string that includes a mdl D1. **Field installation:** Yes.

NOTE: A mdl A1 with this feature installed will not operate in a string without a mdl D1.

Model D1 Attachment Feature For Model B1 (#4952): This feature must be included on all mdl B1 boxes that are installed in a string that includes a mdl D1. **Field Installation:** Yes.

NOTE: A mdl B1 with this feature installed will not operate in a string without a mdl D1.

String Switch (#8150): [mdl A1 and D1] - For use with 3880 Storage Controls mdls 1, 2 or 4 only. #8150 is used to attach the 3375 mdl A1 or mdl D1 to a second storage director. The two storage directors may be on the same processor or different processors. Switching between the two storage directors is under program control. The 3375 may also be dedicated to a single attachment through enable/disable switches. **Maximum:** One each on mdl A1 and mdl D1. **Field Installation:** Yes.

MODEL CONVERSIONS

Model changes between models A1 and B1 or between models A1 and D1 are available at time of manufacture only. A model change from a B1 to a D1 is permitted in the field. A model change from a D1 to a B1 is not recommended for field installation.

ACCESSORIES (None)

SUPPLIES (None)

3380 DIRECT ACCESS STORAGE

PURPOSE

High-speed, large-capacity, direct access disk storage for attachment to 4341, 4361, 4381, 3031, 3032, 3033, 3081, 3083, 3084 Processors, 3042 Attached Processor model 2 and S/370 models 158, 158-3, 168 and 168-3.

MODELS

Model A4 A04 — A disk storage unit with two head and disk assemblies (HDAs), four actuators and associated control for attachment to a 3880 model 2 or 3 storage director. It provides logic and power for attachment of up to three 3380 model B units.

Model AA4 AA4 — A disk storage unit with two HDAs, four actuators and associated controls for attachment to two 3880 model 2, 3 or 13 storage directors. 3380 actuators are arranged on multiple internal paths within a string, with up to four actuators sharing a path. Dynamic path selection controls access to the actuators. It provides access by both storage directors to all actuators in a 3380 string and enables concurrent data transfer operations, via each storage director, to actuators not sharing an internal data path. The logic and power are provided for attachment of up to three 3380 mdl B units.

Model B4 B04 — A disk storage unit with two HDAs and four actuators. Up to three 3380 model Bs can be attached to a 3380 model A.

Prerequisites: A 3380 mdl A is required to attach 3380 mdl Bs. A 3880 Storage Control mdl 2, 3 or 13 is required to attach a 3380 to a processor block multiplexer channel ... a 3380 mdl AA4 requires one storage director in a 3880 mdl 2 or 3 ... a 3380 mdl AA4 requires two storage directors that can be within the same 3880 mdl 3 or within two different 3880 mdl 2s or 3s. When attached to a 3880 mdl 13, the 3380 mdl AA4 must be attached to storage directors within the same 3880 mdl 13. Attachment of 3380 through 3880 mdl 2, 3 or 13 to 3031, 3032, 3033 Processors, and 3042 Attached Processor mdl 2 on 3.0MB/sec. block multiplexer channels requires Data Streaming (#4850) on those processor units. Operation at a 3.0MB/sec. data rate on the 4341, 4361 and 4381 Processor requires attachment to a 3.0MB/sec. channel. Attachment to 3031, 3032, 3033 Processors and 3042 Attached Processor mdl 2 without Data Streaming feature, to S/370 mdls 158, 158-3, 168 and 168-3, on 1.5MB/sec. block multiplexer channels, and to a 2.0MB/sec. block multiplexer channel on the 4341, requires Speed Matching Buffer for 3380 (#6550) on each 3880 mdl 2 or 3 storage director attaching the 3380 to a channel. Attachment to a 3081 Processor is via any block multiplexer channel for operation at 3.0MB/sec. Attachment to 4381 Processors via speed matching buffer (3380 #6550) in shared DASD environments requires attachment to a 3.0MB/sec. channel on the 4381.

Maximum: Up to three 3380 mdl B storage units may be attached to one 3380 mdl A. Two 3380 mdl A4s or two 3380 mdl AA4s can be attached to one 3880 storage director, allowing up to eight 3380 units per storage director. **Limitations:** Mdl A4 cannot be attached to same storage director as mdl AA4s ... If two mdl AA4s are attached to one storage director, they must both be attached to the same second storage director. For systems attachment, see S370 or M3880 pages.

HIGHLIGHTS

The 3380 features high data rate, fast access and low cost per byte of storage. Each 3380 unit contains two 1.26 billion byte (1.26 gigabytes) sealed and permanently mounted head and disk assemblies. There are two actuators per HDA -- each accessing one-half of the HDA storage (630 megabytes), each separately addressable. Seeking and rotational position sensing of any actuator can be overlapped with seeking, rotational position sensing, and data transfer of the other actuators. Mdl AA4 enables attachment of a 3380 string to a second storage director with dynamic path selection controlling access to the actuators, providing access via both storage directors to all data and storage control status in a string.

Characteristics:

General –		
Actuators per HDA	2	
HDAs per unit	2	
Capacities –		
per actuator	630	MB
per HDA (two actuators)	1.26	GB
per unit (four actuators)	2.52	GB
per max string (sixteen actuators)	10.08	GB
Access Times –		
Average seek (actuator motion)	16	ms
Average latency	8.3	ms
Data Rate –	3.0	MB/sec.

Processor Attachment Data Rate: The data transfer rate of the 3380 is 3.0MB/sec. This 3.0MB/sec. data rate can be attained on 3031, 3032 and 3033 Processors and 3042 Attached Processor mdl 2 that have the Data Streaming feature (#4850) installed or on a 3.0MB/sec. block multiplexer channel on a 3081/3083/3084 Processor, a 4341/4361/4381 Processor.

Attachment of the 3380 to 1.5MB/sec. block multiplexer channels on 3031, 3032 and 3033 Processors and 3042 Attached Processor mdl 2 that do not have the Data Streaming feature installed, to S/370 mdls 158, 158-3, 168 & 168-3 and to a 2.0MB/sec. block multiplexer channel on the 4341 is supported with installation of the Speed Matching Buffer for 3380 feature (#6550) on the 3880 mdls 2 and 3. Attachment of the 3380 to 4381 Processors in shared DASD environments via speed matching buffer (#6550) is supported only on 4381 3.0MB/sec. channel.

The Speed Matching Buffer for 3380 feature supports two speeds: 1.5MB/sec. and 3.0MB/sec, and may be installed on each 3880 storage director that attaches to a 3380. The Speed Matching Buffer for 3380 feature may be used for 3380 attachment to the processors having 1.5MB/sec. channel capability while also providing (using the optional switch features on the 3880 mdls 2 and 3) for 3380 attachment to the processors having 3.0MB/sec. channel capability. Establishment of either the 1.5 or 3.0MB/sec. data rate with the block multiplexer channel is done in the 3880. This dual-speed capability of the speed matching buffer retains the advantages of higher speed channels while sharing 3380 by processors having different channel speeds.

See 3880 mdls 2 and 3 with Speed Matching Buffer for 3380 feature for additional details and system performance considerations.

Data Format: Count-key-data provides format continuity with current IBM large systems direct access storage products.

Dynamic Path Selection: Incorporated in model AA4, which attaches to two 3880 storage directors. Dynamic path selection controls access to the actuators, providing paths via both storage directors to all actuators in a 3380 string ... designed to allow concurrent data transfer operations to actuators on different internal data paths in a 3380 string. When Dynamic Path Selection is used with the 370-XA channel subsystem, the 3380 can dynamically reconnect to the first available channel path identified by the originating processor. This has the potential of increasing effective throughput or improving response time.

Error Correction: Capability is provided to correct single data error bursts contained within three bytes as well as detecting all single data error bursts contained within five bytes.

Rotational Position Sensing: Permits channel and storage director disconnect during period of rotational latency, thereby providing for improved channel utilization and system performance potential ... requires one unshared subchannel on a block multiplexer channel for each logical device address (each actuator).

Format Write Release: Enables channel and storage director to disconnect while the remainder of a track is being erased following the end of a format written record.

Separate Actuator Maintenance: Enables the associated logic and controls of each actuator to be serviced independent of and concurrent with customer operation of the other actuators within the same HDA and string.

Head and Disk Assembly Data Recovery: [plant only] Should data in the field prove unrecoverable, data recovery assistance will be provided at the plant of manufacture. The customer is required to provide a sufficient number of appropriate media (tapes, disk modules, etc.) to contain recovered data when returning Head and Disk assembly to the plant for data recovery.

Flag Free: The 3380 will be shipped with all tracks flag free.

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9915** for 240V.
- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray.
- Tool Kit: Required for CE maintenance. Contact the account Field Manager for requirements.

  For Rental Customer: Specify **#9750** for first 3380 A04 or AA4 ordered for a customer. If required for a multiple machine installation, because of physical machine locations, an additional Tool Kit(s) is available on no-charge MES.

  For Purchase Customer: Specify **#9750** on each 3380 A04 and AA4 machine order. When installed 3380 A04s or AA4s are purchased, a Tool Kit is to be ordered on no-charge MES for each machine.

SPECIAL FEATURES (None)

3380 Direct Access Storage (cont'd)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3410 MAGNETIC TAPE UNIT
3411 MAGNETIC TAPE UNIT and CONTROL

PURPOSE

Magnetic tape units and controls for a System/3 models 8/10/12/15, System/38 or 3790 Communication System, S/370 models 115 through 158, a 3031 Processor, or a 4331, 4341 or 4361 Processor ... the 3410 model 1 can be used with a 3881 Optical Mark Reader model 2 or a 3886 Optical Character Reader model 2 ... the 3411 and 3410 model 3s can be used with a 3800 Printing Subsystem ... the 3411 model 1 can be used with a 3776 Communication Terminal model 3 or 4, or a 3777 Communication Terminal model 3 or 4.

MODELS

Model 1	001	20,000 8-bit bytes per second (1600 bpi)
Model 2	002	40,000 8-bit bytes per second (1600 bpi)
Model 3	003	80,000 8-bit bytes per second (1600 bpi)

Maximums: Interconnected 3410s and 3411s must be of the same mdl ... mdls cannot be intermixed. The maximum number of tape units (3410s) per 3411 are:

Mdl 1 - up to three 3410 mdl 1s ... a total of 4 drives.*
Mdl 2 - up to five 3410 mdl 2s ... a total of 6 drives.*
Mdl 3 - up to five 3410 mdl 3s ... a total of 6 drives.*

* For System/3 mdls 8/10/12/15 or S/38: Maximums for mdls 2 and 3 are the same as mdl1.

Limitations: A maximum of one 3410 mdl 1 can be attached to a 3881 or 3886; no 3411 is required. A maximum of 4 tape drives (any mdl) can be attached to a System/3 mdl 8/10/12/15 or System/38.

Prerequisites: Each 3411 requires the following:

For System/3 mdl 10/15: A 3411 Magnetic Tape attachment (#7951) on the 5410 or 5415 and System/3 mdl 8/10/12/15, System/38 Attachment (#7003) on the 3411... see "Special Features".

For System/3 mdl 8: A 3411 Magnetic Tape Attachment (#7960) on the 5408 and System/3 mdl 8/10/12/15, System/38 Attachment (#7003) on the 3411... see "Special Features".

For System/3 mdl 12: A Basic Attachment Feature (#4701) and a 3411 Magnetic Tape Attachment (#7960) on the 5412 and System/3 mdl 8/10/12/15, System/38 attachment (#7003) on the 3411 ... see "Special Features".

For System/38: A 3411 Magnetic Tape Adapter (#7960) on the System/38 and System/3 mdl 8/10/12/15, System/38 attachment (#7003) on the 3411 ... see "Special Features". Each 3410 requires and appropriate model of the 3411, except when a 3410 mdl 1 is attached to a 3881 or 3886.

For S/370 mdl 115, 125: A 3411 Magnetic Tape Adapter (#4675) on the 3115 or 3125 and S/370 mdl 115/125 Attachment (#7361) on the 3411 except with 3115 mdl HG2, 3125 mdl HG2 and I2. When attached to 3115 mdl HG2, or 3125 mdl HG2 or I2, RPQ 870061 is required on the 3411 ... see "Special Features".

For S/370 mdl 135 and up, and all 4300 processors: A control unit position on a system channel, plus S/370 Attachment (#7360) on the 3411 ... see "Special Features".

S/370 mdl 135: Multiplexer channel (standard), selector or block multiplexer channels (special features) ... see M3135 pages. *NOT* supported on byte multiplexer channel for concurrent operation with Integrated File Adapter, Integrated Communications Adapter or Selector Channel.

S/370 mdl 135-3: Byte multiplexer channel (standard), block multiplexer channels (special features) ... see M3135-3 pages. *NOT* supported on byte multiplexer channel for concurrent operation of Integrated File Adapter, Integrated Communications Adapter or Block Multiplexer Channel.

S/370 mdl 138: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3138 pages. *NOT* supported on byte multiplexer channel for concurrent operation of Integrated File Adapter, Integrated Communications Adapter, or Block Multiplexer Channel.

S/370 mdl 145: Multiplexer channel (standard), selector channels (one is standard), or block multiplexer channel (special feature) ... see M3145 pages.

S/370 mdl 145-3: Byte multiplexer channel (standard), block multiplexer channels ... see M3145-3 pages.

S/370 mdl 148: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3148 pages.

S/370 mdl 155, 158: Block multiplexer channel (first two are standard) ... see M3155, 3158 pages.

3031 Processor: Byte multiplexer channel (one is standard), block multiplexer channels (five are standard) ... see M3031 pages.

4300 Processors: Byte multiplexer channel ... block multiplexer channel ... see M4331, 4341, 4361, 4381 pages.

3776 Communication Terminal mdl 3 or 4, or 3777 Communication Terminal mdl 3 or 4: 3411 Magnetic Tape Unit and Control mdl 1 Attachment feature (#7801) on the terminal ... see "Special Features" in M3776 or 3777 pages. The 3411 requires System/3-3770/3790 Communication System Attachment feature (#7003).

3790 Communication System: A Magnetic Tape Attachment feature (#7840) on the 3791 Controller. The 3411 requires a 3790 Attachment feature (#7003).

3800 Printing Subsystem: Tape-to-Printing Subsystem Feature (#7810) on the 3800 ... see "Special Features" in M3800 pages. **Note:** A control unit position is not required. 3410 and 3411 mdl 3s only may be attached. Up to eight tape control units may be attached provided that power sequencing and control connection for all other than one are provided by a system.

3881 Optical Mark Reader: A 3881 mdl 2. One 3410 mdl 1 only may be attached.

3886 Optical Character Reader: A 3886 mdl 2. One 3410 mdl 1 only may be attached.

Magnetic Tape: IBM Multi-System Tape (MST) or equivalent, is recommended for optimum performance. The minimum properties required for satisfactory performance are described in *Tape Requirements for One-Half Inch Tape Units,* GA32-0006-5.

HIGHLIGHTS

The 3410 is a single tape unit controlled by a 3411. The 3411 is a single channel control unit with one tape drive.

- Efficient, compact, space-saving design.
- Dual Density feature ... allows processing of data recorded at 1600 bpi PE or 800 bpi NRZI.
- 7-Track feature ... tape written in 7-track format compatible with tapes written at 200, 556, 800 bpi by 729/7330/7335 and 2401/2402/2403/2404/2415/3420 tape drives equipped with 7-track read/write heads. **Note:** 7-track tapes cannot be read with a 3776 mdl 3 or 4, or a 3777 mdl 3.
- Radial attachment of tape unit permits limited off-line servicing.
- Simplified tape threading path.

Checking: During write operations, both parity and signal amplitude are checked. (When utilized with a 3881 Optical Mark Reader and the 3886 Optical Character Reader, both are checked in 800 bpi NRZI ... signal amplitude only in 1600 bpi.) During read operation, parity is checked.

Error Correction: In 1600 bpi PE recording format, single-track error correction in flight takes place. For 9-track 800 bpi NRZI, track in error (T.I.E.) is provided (not applicable when utilized with 3881 Optical Mark Reader and the 3886 Optical Character Reader).

Functions: The following table indicates feature numbers for corresponding functions:

Subsystem Function	Feature Name	3411 Control Unit	3410* Tape Unit (includes tape unit on 3411)
1600 bpi 9-track only	Single Density	Standard	#3211
1600 bpi PE/800 bpi NRZI 9-track	Dual Density	#9150	#3211 or #3221
1600 bpi PE/200-556-800 bpi NRZI 7-track	7-track	#9160**	#3211 or #6550

* Tape units must all be same mdl as 3411.
** Feature #9160 not available on System/38.

Characteristics	Mdl 1	Mdl 2	Mdl 3
Data rate (kb/sec)			
at 1600 bpi (PE)	20	40	80
at 800 bpi (NRZI)	10	20	40
at 556 bpi (7-track)	6.9	13.9	27.8
at 200 bpi (7-track)	2.5	5.0	10.0
Recording Density (bpi)	1600/800/556/200 (all mdls)		
Tape Speed (ips)	12.5	25	50
Nominal IBG (inch) -- 9-track	0.6	0.6	0.6
Nominal IBG (inch) -- 7-track	0.75	0.75	0.75
Nominal IBG Time (ms) -- 9-track	48	24	12
Nominal IBG Time (ms) -- 7-track	60	30	15
Nominal Rd/Wr Access Time (ms)	15	12	6
Rewind Time 2400 ft. Reel (min.)	3	3	2

3410/11 (cont'd)

Publications: S/370 -- GC20-0001, 3881 -- GA21-9127 and GA21-9143, System/3 -- GC20-8080, System/34 -- GC21-5754. Also, *IBM 3410/3411 Component Summary,* GA32-0015, GA32-0022.

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz): **#9902** for 208V, or **#9904** for 230V. If used with a 3881 Optical Mark Reader, a 3886 Optical Character Reader, or a 3800 Printing Subsystem, voltage must be consistent.
- Dual Density, Control (3411 only) - **#9150:** Permits attachment of 3410s equipped with Dual Density, Tape Unit (#3221) and installation of Dual Density, Tape Unit (#3221) on the 3411 itself. 3410s equipped with Single Density, Tape Unit (#3211) can also be attached. **Limitations:** Cannot be installed on same 3411 with **#9160.** **Field Installation:** Yes.
- 7-Track, Control (3411 only) - **#9160:** Permits attachment of 3410s equipped with 7-Track, Tape Unit (#6550) and installation of 7-Track, Tape Unit (#6550) on the 3411 itself. 3410s equipped with Single Density, Tape Unit (#3211) can also be attached. **#9160** includes the translator function which, when used, causes 8-bit bytes from the I/O interface to be written on tape as 6-bit BCD characters and 6-bit characters read from tape to be translated into their EBCDIC equivalents. The Data Conversion function, also included, allows reading and writing of 8-bit bytes on 7-track tape by converting four tape characters to three storage bytes and vice versa. **Limitations:** Cannot be installed with **#9150.** Cannot be used with a 3776 mdl 3 or 4, or a 3777 mdl 3 or 4, not available on System/38. **Field Installation:** Yes.
- Additional Tape Units (3411 only) - **#9001:** Required if the number of tape drives is to exceed four (one 3411 plus three 3410s). **Field Installation:** Yes.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Density Formats: The 3410/3411 subsystem can operate in three density formats - 1600 bpi PE, single density ... or 1600/800 bpi, dual density ... or 200/556/800 bpi, 7-track. With the exception of single density, which is standard on the control unit of the 3411, a feature number for the format desired must be specified for each tape unit and the control unit ... see "Special Features" for limitations. Dual Density, Control (**#9150**) is required on the 3411 for Dual Density, Tape Unit (#3221) on the 3411 and attached 3410s ... see Specify **#9150** above. 7-Track, Control (**#9160**) is required on the 3411 for 7-Track, Tape Unit (#6550) on the 3411 and attached 3410s ... see Specify **#9160** above.
- System Attachments: #7003 is required on all System/3 mdls 8/10/12/15, and S/38 Attachment S/370 Mdl 115/125 (#7361) is required for attachment to a 3115 (except mdl HG2) or 3125 (except mdl HG2 and I2). When attached to 3115 mdl HG2, 3125 mdl HG2 or I2, RPQ 870061 is required on the 3411 ... see "Special Features". S/370 Attachment (#7360) is required for attachment to a S/370 mdls 135, 135-3, 138, 145, 145-3, 148, 155, 158, a 3031 Processor, or any 4300 processor, and for attachment to a 3800 mdl 3. System/3-3770/3790 Communication System Attachment (#7003) is required for attachment to a 3776 mdl 3 or 4, or a 3777 mdl 3, or a 3790 system.

  Note: Not available without specifying one of the system attachments listed above.

SPECIAL FEATURES

Single Density, Tape Unit (#3211): [3410, 3411 any mdl] Permits the 3410 or the tape unit on the 3411 to operate at 1600 bpi PE only. **Limitations:** Cannot be installed with #3221 or #6550. **Field Installation:** Yes. **Prerequisites:** If installed on the 3886 Optical Character Reader, #6490 on the 3886.

Dual Density, Tape Unit (#3221): [3410, 3411 any mdl] Permits the 3410 or the tape unit on the 3411 mdl 1,2, or 3 to operate at 800 bpi NRZI as well as 1600 bpi PE. **Limitations:** Cannot be installed with #3211 or #6550. **Field Installation:** Yes. **Prerequisites:** **#9150** on the 3411 (see "Specify") or #3550 on the 3881 or #6485 on the 3886.

7-Track, Tape Unit (#6550): [3410, 3411 any mdl] Permits the 3410 or the tape unit on the 3411 to operate at 200, 556 or 800 bpi NRZI in the 7-track format compatible with 729, 7330, 7335 and 2401, 2402, 2403, 2404, 2415, 3420 tape units equipped with 7-track read/write heads. Tape units with this feature will only read or write 7-track tape. **Limitations:** Cannot be installed with #3211 or #3221, or on System/38. Cannot be used with a 3776 mdl 3 or 4 or a 3777 mdl 3. **Field Installation:** Yes. **Prerequisites:** **#9160** (see "Specify") on the 3411.

System/3 mdls 8/10/12/15/ and System/38 - 3770/3790 Communication System Attachment (#7003): [3411 mdl 1, 2, 3] To attach a 3411 with up to three 3410s to a System/3 mdl 8, 10, 12, 15 or System/38, or to a 3791 Controller, or to attach one 3411 mdl 1 to a 3776 Communication Terminal mdl 3 or 4, or a 3777 Communication Terminal mdl 3 or 4. **Prerequisites:** 3411 (#7960) on 5408 and 5412, or 3411 (#7951) on the 5410 and 5415, or 3411 (#7960) on System/38, or #7801 on the 3776 mdl 3, or 4 or 3777 mdl 3. **Maximum:** One. **Field Installation:** Yes. **Limitations:** Cannot be installed with #7360 or #7361.

S/370 - 3800 Attachment (#7360): [3411 mdl 1, 2, 3] To attach the 3411 to a S/370 mdl 135, 135-3, 138, 145, 145-3, 148, 155, 158, a 3031 Processor, or any 4300 processor.
[3411 mdl 3] To attach the 3411 mdl 3 to a 3800 Printing Subsystem. Up to eight control units may be attached to the 3800 provided that power sequencing and control connection for all other than one are provided by the system. **Limitations:** Cannot be installed with #7003 or #7361 or RPQ 870061. **Field Installation:** Yes. **Prerequisites:** A control unit position on a system channel of the 3135, 3135-3, 3138, 3145, 3145-3, 3148, 3155 or 3158.

S/370 Mdl 115/125 Attachment (#7361): [3411 mdl 1, 2, 3] To attach the 3411 to a S/370 mdl 115 (except mdl HG2) or 125 (except mdl HG2 or I2). When attached to 3115 mdl HG2 or 3125 mdl HG2 or I2, RPQ 870061 is required. **Limitations:** Cannot be installed with #7003, #7360 or RPQ 870061. **Field Installation:** Yes. **Prerequisites:** #4675 on 3115 or 3125.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3420 MAGNETIC TAPE UNIT MDLS 3, 5, 7

PURPOSE

Magnetic tape unit for S/360, S/370 or 4300 processors.

MODELS

Model 3	003	120,000 8-bit bytes/second; for use with any S/370 Processor, with all 4300 processors or 3800 Printing Subsystem.
Model 5	005	200,000 8-bit bytes/second; for use with any S/370 Processor, with all 4300 processors or 3800 Printing Subsystem.
Model 7	007	320,000 8-bit bytes/second; for use with any S/370 Processors except 3115 and 3125, with all 4300 Processors or 3800 Printing Subsystem.

Prerequisites: A 3803 Tape Control.

Limitations: 3420 mdl 7 cannot be attached to the S/370 mdl 115 or 125.

If the 3420 mdl 5 is to be ordered for attachment to a selector subchannel feature of the 2870, consult IBM.

Programming support for the extended diagnostic capabilities of the 3420 requires a minimum system size of 32K.

HIGHLIGHTS

Radial attachment of tape drives to the control unit via a switch located in the control unit, permitting offline service of individual tape units without disturbing the subsystem. 24-line multiplex interface provides advanced diagnostic capability. MST circuitry reduces card count while increasing functions: Expanded sense data, better diagnostic capability, unique device identification, EC level and feature identification.

Limitations: IBM Multi-System Tape (MST) or equivalent is recommended for optimum performance. The minimum properties required for satisfactory performance are described in *Tape Requirements for One-Half Inch Tape Units,* GA32-0006.

Automatic Threading and Cartridge Loading: Threading is automatic with or without the wraparound cartridge; automatic retry (with cartridge only) in case of load failure, stopping on the leader to prevent damage to the recorded surface. With the wraparound cartridge, tape is not exposed to contamination or damage.

9-track 1600 bpi Phase-encoding Operation: Data is recorded parallel by bit, serial by byte, at 1600 bytes/inch, phase-encoded, in nine tracks across the width of the tape. The data format uses eight of the nine bits for data; the ninth bit is a parity bit. Data is recorded in odd parity. The eight bits of one byte can represent an alphabetic character, zoned decimal digit, two decimal digits (packed), a special character, or eight binary bits. The recording format is compatible with the 1600 bpi PE recording of tape units 2401, 2402, 2403, 2404, 2415 mdls 4, 5 and 6, and 2420 mdls 5 and 7. For 9-track 1600 bpi PE operation only, specify Single Density, #6631. See "Special Features". **Prerequisites:** One of the following must be specified on the 3803 Tape Control: **#9570** ... #3551 ... #6407.

9-track 800 bpi NRZI Operation: Tape is written at 800 bpi in the 9-track NRZI format as well as in the 1600 bpi PE format. Data representation is the same as for 1600 bpi PE operation. For 9-track 800 bpi NRZI capability, Dual Density (#3550) is required on the tape unit. See "Special Features".

7-track Operation: Tape is written in the 7-track format compatible with tapes written at either 556 or 800 bpi by 729/7330/7335 and 2401/2402/2403/2404/2415 tape drives equipped with 7-track read/write heads. For 7-track operation, Seven-Track (#6407) is required on the tape unit. See "Special Features".

Checking: Each byte is parity-checked while tape is being read. Data written on tape is read back instantly and checked as in reading, with full parity check.

Error Correction: Single track drop-out errors are corrected "in flight" during 1600 bpi read operations.

Read Backward: All tapes (9- or 7-track) written on a 2401/2402/2403/2404/2415/2420 can be read by the 3420 in a forward or backward direction. The Data Conversion function is inoperative during backward read of 7-track tapes.

Characteristics	Mdl 3	Mdl 5	Mdl 7
Nominal Data Rate (Kb/sec)			
At 1600 bpi PE	120	200	320
At 800 bpi NRZI	60	100	160
At 556 bpi (7-tr.)	41.7	69.5	111.2
(Bytes/Inch) (1600/800/556)	Yes	Yes	Yes
Tape Speed (Inches/Sec.)	75	125	200
Nominal IBG (Inches)			
9-track	0.6	0.6	0.6
7-track	0.75	0.75	0.75
Nominal IBG Time (ms)			
9-track	8.0	4.8	3.0
7-track	10.0	6.0	3.8
Rewind Time (2400 ft. Reel, Seconds)	60	60	45
Rewind-Unload Time (2400 ft. Reel, Sec.)	66	66	51
Auto Threading Time* (Seconds)	10	10	7
Nominal Read/Write Access** Time (ms)	4.0	2.9	2.0

* From initiation (using mounted supply reel) to "Tape Drive Ready".

** Access time is the interval from initiation of a write or forward read command until the first data byte is read or written when tape is brought up to speed from a stopped status.

Publications: GC20-0001

SPECIFY

- Tape Density: One, and only one, of the following must be specified for each tape unit. This applies to MES orders (for field changes) as well. See "Special Features".
  - Single Density **#6631** for 9-track 1600 bpi PE operation only.
  - Dual Density **#3550** for 9-track 800 bpi NRZI operation as well as 1600 bpi PE.
  - Seven-Track **#6407** for 7-track 556 or 800 bpi NRZI operation.

  Note: MES orders for these features to effect field changes should consider that one of these three features must be installed on the 3420 or it is incomplete.
- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V ... must be consistent with system voltage.
- Altitude: If 3420 tape drives are to be installed or pneumatics replaced at high altitude (4,001 to 8,000 feet), **#9830** must be specified.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.

SPECIAL FEATURES

Dual Density (#3550): Permits the tape unit to operate at 800 bpi NRZI 9-track as well as at 1600 bpi PE. **Limitations:** Cannot be installed with either Single Density (#6631) or Seven-Track (#6407). **Field Installation:** Yes, except for machines with serial #9XXXX. **Prerequisites:** #3551 on the 3803 Tape Control.

Seven-track (#6407): Permits the tape unit to operate at either 556 or 800 bpi NRZI in the 7-track format compatible with 729, 7330, 7335, and 2401, 2402, 2403, 2404, 2415 tape units equipped with 7-track heads. **Field Installation:** Yes, only to replace Dual Density (#3550) ... otherwise available at time of manufacture only. **Limitations:** Cannot be installed with either Single Density (#6631) or Dual Density (#3550). **Prerequisites:** #6408 on the 3803.

Single Density (#6631): Permits the tape drive to read or write tapes at 1600 bpi PE. **Prerequisites:** One of the following features must be specified for the 3803 Tape Control Unit: **#9570**, #3551 or #6408. **Field Installation:** Yes. **Limitations:** Cannot be installed with either Dual Density (#3550) or Seven-Track (#6407).

MODEL CONVERSIONS

Can be made in the field.

From To	Mdl 4	Mdl 5	Mdl 6	Mdl 7	Mdl 8
Mdl 3	X	X	X	X	X
Mdl 5	X		X	X	X
Mdl 7	X		X		X

ACCESSORIES (None)

SUPPLIES

One standard 10-1/2" reel of magnetic tape in a wraparound cartridge is shipped with each tape unit. For additional reels of tape and cartridges, see IBM.

3420 MAGNETIC TAPE UNIT MDLS 4, 6, 8

PURPOSE

Magnetic tape unit for S/370 and 4300 processors.

MODELS

Model 4	004	470,000 8-bit bytes/second for use with any S/370 Processor except 3115 and 3125, any 4300 Processor and with a 3800 Printing Subsystem.
Model 6	006	780,000 8-bit bytes/second for use with any S/370 Processor except 3115 and 3125, 4331 Model Group 2 and 11, 4341, 4361, 4381 Processor and with a 3800 Printing Subsystem.
Model 8	008	1,250,000 8-bit bytes/second for use with any S/370 Processor except 3115 and 3125, 4331 Model Group 2 and 11, 4341, 4361, 4381 Processor and with a 3800 Printing Subsystem.

Limitations: 3420 mdls 4, 6 and 8 via a 3803 Control Unit mdl 2 are not supported on byte multiplexer, multiplexer or 2870 selector subchannels at either 1600 bpi or 6250 bpi.

3420 Models 6 or 8 cannot be attached to a S/360 mdl 50. When contemplating the attachment of 3420 mdls 6 or 8 to S/370 mdls 135, 135-3, 145 or 145-3, consult *System/370 Model 135 Channel Characteristics,* (GA33-3010), *System/370 Model 138 Channel Characteristics, System/370 Model 145 Channel Characteristics,* GA24-3573, or *System/370 Model 148 Channel Characteristics, IBM 4331 Channel Characteristics,* GA33-1527 (Mdl Group 1), GA33-1535 (Mdl Group 2) or GA33-1550 (Mdl Group 11).

Prerequisites: A 3803 Tape Control mdl 2.

HIGHLIGHTS

Nominal recording density of 6250 user bytes per inch with a 0.3-inch inter-block gap.

Radial Attachment: Attachment of tape drives to the control unit via a switch located in the control unit, permitting offline service of individual tape units without disturbing the subsystem. 24-line multiplex interface provides advanced diagnostic capability.

Cleaning Mechanism: A new cleaning mechanism is engaged during auto-threading, rewinding, and unloading operations to remove loose contaminants from the tape surface and to protect the recording head. This new cleaning mechanism makes tape cleaning a byproduct of tape processing. The cleaning mechanism does not, however, replace drive cleaning performed by the operator, nor does it replace the need for normal library maintenance.

Automatic Threading and Cartridge Loading: Threading is automatic with or without the wraparound cartridge; automatic retry (with cartridge only) in case of load failure, stopping on the leader to prevent damage to the recorded surface. With the wraparound cartridge, tape is not exposed to contamination or damage.

Automatic Read Amplification: Automatically adjusts the amplifier gain in the tape drive to each individual reel of tape when operating at 6250 bpi.

Checking: Data written on tape is read back instantly to ensure later readability.

Read Backward: Tapes written at 6250 bpi mode can be read in a forward or backward direction. Tapes written at 1600 bpi (phase-encoded) mode can be read in a forward or backward mode if the 3420 mdl 4, 5 or 8 is equipped with the 6250/1600 optional feature.

6250/1600: Optional feature allows the 3420 mdls 4, 6 or 8 to read and record at 1600 bpi (phase-encoded) density as well as 6250 bpi density.

Tape Media: IBM Multi-System Tape (MST) or equivalent is recommended for optimum performance. The minimum properties required for satisfactory performance are described in *Tape Requirements for One-Half Inch Tape Units,* GA32-0006.

Characteristics	Mdl 4	Mdl 6	Mdl 8
Tape Speed (ips)	75	125	200
Recording Density 6250/1600	Yes	Yes	Yes
Nominal Data Rate			
at 6250 Kb/sec.	470	780	1250
at 1600 Kb/sec.	120	200	320
Nominal IBG (in)			
at 6250	0.3	0.3	0.3
at 1600	0.6	0.6	0.6
Nominal Read/Write Access (ms)*			
at 6250	2.3/ 2.1	1.6/ 1.5	1.1/ .95
at 1600	4.0/ 3.0	2.6/ 2.0	1.7/ 1.3
Maximum Rewind Time (seconds)	70	60	45
Maximum Rewind-unload (seconds)	76	66	51
Maximum Auto Thread (seconds)**	10	10	7

* Access time is the time required to read or write the first byte of data in a block after a read/write instruction has been initiated from a stopped position (read/write head positioned in the IBG).

** From initiation (using mounted supply reel) to "Tape Drive Ready".

SPECIFY

- Tape Density: One and only one of the following must be specified for each tape unit (see "Special Features"):

  #6420 for 6250 bpi density only.

  #6425 for 1600 bpi density (phase-encoded) as well as 6250 bpi density.

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9905** for 230V ... must be consistent with system voltage.
- Altitude: If 3420 tape drives are to be installed or pneumatics replaced at high altitude (4,001 to 8,000 feet), **#9830** must be specified.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.

SPECIAL FEATURES

6250 Density (#6420): Permits the tape unit to operate at 9-track 6250 bpi. **Limitations:** Cannot be installed with 6250/1600 density (#6425).

6250/1600 Density (#6425): Permits the tape unit to operate at 6250 bpi density as well as 1600 (phase-encoded) density either this feature or #6420 must be specified. **Limitations:** Cannot be installed with 6250 Density (#6420).

MODEL CONVERSIONS

From To	Model 6	Model 8
Model 4	X	X
Model 6		X

ACCESSORIES (None)

SUPPLIES

One standard 10-1/2 inch reel of magnetic tape tested for 6250 bpi in an easy-load cartridge is shipped with each tape unit. For additional reels of tape and cartridges, see IBM.

3430 MAGNETIC TAPE SUBSYSTEM

PURPOSE

Magnetic tape Subsystem for System/38 models 4, 5, 6, 7, and 8, Virtual Storage S/370 models 135 - 168, 4321, 4331, 4341, 4361, 4381, 3031, 3032, and 3033.

MODELS

Model A01	Tape control and a single tape unit.
Model B01	Second, third, or fourth tape units which attach to the model A01.

Maximum Configuration: Up to three 3430 mdl B01s may be attached to a 3430 mdl A01 for a total of four drives.

Prerequisites:

- A 3430 mdl A01 must be the first drive of the string.
- 4321,4331 Mdl Group 1 and 2, 4361 - Block Multiplexer Channel (#1421).
- System/38 - 3430 Attachment (#7970).

The 3430 Tape Subsystem attaches via the selector, or the block multiplexer channels of 370 mdls 135 - 168, 4321, 4331, 4341, 4361, 3031, 3032 or 3033.

HIGHLIGHTS

- Dual-density 246/63 bytes per mm (6250/1600 bytes per inch).
- LSI components for improved reliability.
- Instantaneous data rate of 312,500 bytes per second at 246 bytes per mm (6250 bytes per inch).
- Radial attachment of tape drives for ease of service.
- Space saving as a result of compact packaging and control unit housed in first drive.
- Microdiagnostic package for offline diagnosis and repair verification.

Checking: During a write operation, both parity and signal amplitude are checked. During a read operation, parity is checked.

Error Correction: Reading at 246 bytes per mm (6250 bytes per inch), double-track errors are corrected automatically "in flight". Reading at 63 bytes per mm (1600 bytes per inch) single-track errors are corrected automatically "in flight".

Characteristics:

Data Rate, Instantaneous	
63 B/mm (1600 Bpi)	80 kb/sec
246 B/mm (6250 Bpi)	312.5 kb/sec
Recording Density	246/63 B/mm (6250/1600 Bpi)
Tape Speed	127 cm/s (50 ips)
Nominal IBG	
63 B/mm (1600 Bpi)	15 mm (0.6 in.)
246 B/mm (6250 Bpi)	
Write	11 mm (0.45 in.)
Read	8/11 mm (0.3/0.45 in.)
Nominal Read/Write Access Time *	
63 B/mm (1600 Bpi)	6.0 ms
246 B/mm (6250 Bpi)	6.0 ms
Rewind Time per Reel	
610 meters (2,400 feet)	2.7 minutes

* Access time is the time required to read or write the first byte of data in the block after a read/write instruction has been initiated from a stopped position in the IBG.

Magnetic Tape: IBM Multi-System Tape (MST), or equivalent, is recommended for optimum performance. The minimum properties required for satisfactory performance are described in *Tape Requirements for One-Half Inch Tape Units* (GA32-0006).

Publications:

IBM 3430 Magnetic Tape Subsystem Introduction (GA32-0069),
IBM I/O Equipment Installation Manual, Physical Planning for System/360 and System/370 (TNL to GC22-7064),
IBM Input/Output Device Summary (TNL to GA32-0039),
IBM 3430 Operator's Guide (Booklet) (GA32-0079),
IBM 3430 Magnetic Tape Subsystem Description (GA32-0076),
Tape Requirements for IBM One-Half Inch Tape Units (GA32-0006),
IBM System/38 Installation Manual - Physical Planning (GA21-9293),
IBM System/370 Installation Manual - Planning (GC22-7004).

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz): **#9902** for 208V, **#9914** for 240V.
- Color: **#9065** for Pebble Gray, **#9061** for Garnet Rose, **#9063** for Classic Blue, **#9060** for Willow Green, **#9064** for Charcoal Brown, **#9062** for Sunrise Yellow.

SPECIAL FEATURES

Multiple Drive Attachment Feature (#4991): If the number of tape units in the string exceeds two tape units (i.e., the second mdl B01 is to be attached), the multiple drive attachment feature must be specified to be installed in mdl A01, one feature per mdl A01. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3501 CARD READER

PURPOSE

Punched card input unit for the 3770 Data Communication System or 8100 Information System via 3289 Printer model 3.

MODELS

		Rated 80-column Card Speed
Model 1	001	50 cards/minute

Prerequisites: 3501 Card Reader Attachment (#8050) on the 3289 mdl 3, 3771, 3774, 3775 or 3776.

Limitations: Cannot be installed on a machine with a 2502 Card Reader.

HIGHLIGHTS

Used for automatic entry of punched card data. The 3289 Printer mdl 3 or 3770 System performs all format control and analysis.

Cards are read serially by a sensing mechanism which is checked for proper functioning in every card cycle. EBCDIC or ASCII (3770 System only) code can be read. Hopper and stacker capacity is approximately 400 cards.

The 3501 is packaged as a table-top device.

Card Limitationa: Generally, special feature cards require careful handling and a favorable environment. Use of the following has been approved:

External Scores (after separation): Column 1 edge: M-3, M-4, M-5. Column 80 edge: M-7. All edges: CF-11.

Corner Cuts: Any corner: C5. Upper left and upper right corners: C1, C2, C3.

Verified Cards: Approved cards with verify notch between rows 0 and 1, column 80 edge; or verify punch 2 and 3 in column 81 area.

Card Stock: Regular, edge-coated and heavy duty.

All other special feature cards may result in unsatisfactory performance.

Bibliography: GC20-0001

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9901.**
- Documentation: One must be specified. **#9101** for use with a 3771 ... **#9102** for use with a 3289 mdl 3, 3774 or 3775 ... **#9103** for use with a 3776.
- Cabling: Fixed-length cables are supplied as standard. Refer to *Installation Manual - Physical Planning,* GA27-3006.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Contact IBM.

3505 CARD READER

PURPOSE

Punched card input unit for a S/360 model 195, or all S/370, 4300 processors.

MODELS

Rated 80-Column Card Speed

Model B1	B01	800/minute
Model B2	B02	1200/minute

HIGHLIGHTS

The 3505 is a high-speed, fully buffered, card reader, containing its own control unit. With appropriate adapter and control features installed (see "Special Features"), the 3505 provides the power and logic to control one 3525 Card Punch.

All mdls have a 3,000-card capacity file feed and two 1,750-card capacity non-programmable stackers, which operate in an alternating mode. Feeding from the file feed hopper is by means of friction feed rolls with vacuum assist. Failure to feed a card from the hopper is followed automatically by up to three retries before the machine stops.

All mdls have read-column-eliminate capability, which provides the user with the ability, under program control, to suppress the reading of selected card columns. It is recommended to prevent reading in columns that could cause validity and read checks due to invalid codes or open-punched card scores.

Holes in the card are read by a light-sensing mechanism, which is checked for correct operation in every card cycle. Cards punched in either the Extended BCD Interchange Code (Data Mode 1) or Card Image (Data Mode 2) can be read. Machine checks are made for invalid codes (Data Mode 1 punching only), off-punching, and mispositioned cards.

Maximum: The number of 3505 mdls B1 and/or B2 that can be attached depends upon the number of system channel control unit positions available.

Prerequisites: Each 3505 requires an available control unit position on a system channel.

S/360 and S/370 mdl 195: Selector channel of 2860, basic multiplexer channel of 2870, block multiplexer channel of 2880 ... see M2860, 2870, 2880 pages.

S/370 mdl 115, 125: Byte multiplexer channel (special feature) ... see M3115, 3125 pages.

S/370 mdl 135: Byte multiplexer channel (standard), selector channels (special features), block multiplexer channels (special features) ... see M3135 pages.

S/370 mdl 135-3: Byte multiplexer channel (standard), or block multiplexer channels (special feature) ... see M3135-3 pages.

S/370 mdl 138: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3138 pages.

S/370 mdl 145: Byte multiplexer channel (standard), selector channels (first one is standard), block multiplexer channels (special features) ... see M3145 pages.

S/370 mdl 145-3: Byte multiplexer channel (standard), block multiplexer channels ... see M3145-3 pages.

S/370 mdl 148: Byte multiplexer channel (standard), or block multiplexer channels (standard) ... see M3148 pages.

S/370 mdls 155, 158: Byte multiplexer channel (standard), 2nd byte multiplexer channel (special feature), block multiplexer channels (first two are standard) ... see M3155 and 3158 pages.

S/370 mdls 165, 168: Selector channel of 2860, basic multiplexer channel of 2870, selector subchannels (special features) on 2870, block multiplexer channel of 2880 ... see M2860, 2870, 2880 pages.

3031, 3032 Processor: Byte multiplexer channel (one is standard), block multiplexer channels (five are standard) ... see M3031, 3032 pages.

3033 Processor: Byte multiplexer channel (two are standard), block multiplexer channels (ten are standard) ... see M3033 pages.

3081, 3083, 3084 Processor: Byte multiplexer channels, block multiplexer channels ... see M3081, 3083, 3084 pages.

4300 Processor: Byte multiplexer channel, block multiplexer channel. See M4331, 4341, 4361, 4381 pages.

Card Limitations: Generally, special feature cards require careful handling and a favorable environment. Use of the following card features has been approved:

Internal Scores (before separation): M-4, M-5, OM-2, OM-3, ID-1, ID-2, ID-3 and S-1. **Note:** When using OM-2 or OM-3, either reading must be terminated prior to the column that is scored, or, reading of the scored column and the two adjacent columns must be suppressed by means of the program-controlled Read Column Eliminate feature (see "Special Features"). S-2 may be used prior to folding, and after folding if the card is properly flattened.

External Scores (after separation): Column 1 and 80 end: M-3, M-4, M-5, M-6, M-7, M-11, OM-2, CF-4 and CF-11. Column 1 end only: OM-3. 12 and 9 edge: CF-1/9A. When using CF-1/9A scores on 51-column cards, consult IBM.

Corner Cuts: Any corner: C1, C2, C3, and C5.

Card Stock: Regular, edge-coated, and heavy duty.

Port-A-Punch®: Can be processed.

All other special feature cards may result in unsatisfactory performance and should be tested in an actual application prior to being recommended.

Publications: S/360 -- GC20-0360, S/370 -- GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V or **#9905** for 230V ... must be consistent with system voltage.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- High Altitude Group: **#9220** is to be specified when card reader is to be installed at an altitude exceeding 4,300 feet.

SPECIAL FEATURES

Interchangeable Read Feed, 51/80-Column (#3921): [mdl B2] For feeding and reading 51-column cards. The 51 columns of data appear in positions 1 through 51 of the 80-position buffer. A special card weight, file feed, hopper liners and stacker guide assemblies are provided so that the operator can adjust for 80- or 51-column operations. Intermixed cards on the same operation are not supported. Reading speed of the 3505 is maintained. With this feature installed, the capacity of each stacker is permanently reduced to 1,500 cards. Can be used with all other 3505 features. **Field Installation:** Not recommended.

Optical Mark Read (#5450): For reading up to 40 columns of marked data. Marked and/or punched-hole data can be read from a card. Columns in which marks are unacceptable are transmitted as Hex '3F' characters. Same validity checking applies as for holes. Can be used in Card Image Mode, in which case the validity check is suspended. **Note:** See GA21-9124 for card and format specifications. It is recommended that Selective Stacker (#6555) be installed for program-selecting poorly marked cards. **Limitations:** Cannot be used simultaneously with the Read Column Eliminate function. **Field Installation:** Yes.

Selective Stacker (#6555): Provides a third stacker (second logical stacker), which permits time-independent card selection under program control. Card capacity is 1,750 cards. When actually using this feature under DOS, the maximum speed of mdl B2 on the 3115 or 3125 is approximately 1,150 cards/minute. **Field Installation:** Yes.

3525 Card Print Control (#8100): Provides control for Basic Card Print (#1421) installed on a 3525 Card Punch. **Specify:** Either **#9791** for two-line, or **#9792** for multiline. **Prerequisites:** Either #8103 or #8105. **Field Installation:** Yes.

3525 Punch Adapter (#8103): Permits attachment of the 3525 Card Punch without Card Read (#1533). **Limitations:** Cannot be installed with #8105. **Field Installation:** Yes.

3525 Read Punch Adapter (#8105): Permits attachment of the 3525 Card Punch equipped with Card Read (#1533). **Limitations:** Cannot be installed with #8103. **Field Installation:** Yes.

MODEL CONVERSIONS

Field installable.

ACCESSORIES (None)

SUPPLIES (None)

3521 CARD PUNCH

PURPOSE

Punched card output for the 3770 Data Communication System or 8100 Information System (via 3289 Printer Model 3).

MODELS

Model 1 001

Prerequisites: A 3783 Card Attachment Unit mdl 1 for attachment to a 3289 mdl 3, 3771, 3774, 3775, 3776 or 3777 mdl 2, 3 or 4 equipped with 3782/3521 Card Punch Attachment (#8150).

HIGHLIGHTS

Used primarily for punched card output on the 3770 System or 8100 System, but can, when equipped with appropriate optional features, be used alternatively as a card reader and/or to print information on a card. The 3289 mdl 3, 3771, 3774, 3775, 3776 or 3777 mdl 2, 3 or 4 performs all format control and analysis.

Rated 80-column card speed is 50 cards per minute. Hopper and stacker capacity is approximately 400 cards. The 3521 is a table-top unit that is placed on top of the 3782 Card Attachment Unit mdl 1.

Card Limitations: Generally, special feature cards require careful handling and a favorable environment. Use of the following has been approved:

External Scores (after separation): Column 80 ends only: M-4 and M-6.

Internal Scores (before separation): M-4, M-5, OM-2, OM-3, ID-1, ID-2, ID-3, S-1, S-2 may be used prior to folding. **Note:** Also see limitations that apply for Card Read/Punch Check (#1521).

Corner Cuts (any corner): C1, C2, C3 and C5. **Note:** The use of corner cuts C1, C2, C3 in the lower left and lower right corners of the card is not recommended since these cards cannot be read by the 3501 Card Reader.

Card Stock: Regular, edge-coated, and heavy duty.

Verified Cards: Approved cards with verify notch between rows 0 and 1, column 80 edge; or verify punch 2 and 3 in column 81 area.

Color: Brown, red, blue, white, yellow, salmon, green and natural. With Card Print (#1501), print contrast will be reduced on brown, red, blue, salmon and green cards.

All other specify feature cards may result in unsatisfactory performance.

Publications: GC20-0001

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9901.**
- Documentation [One must be specified]: **#9101** for use with a 3771, or **#9102** for use with a 3289 mdl 3, 3774, 3775, 3776 or 3777 mdl 2 or 3.
- Cabling: Fixed length cables are supplied as standard. Refer to *Installation Manual - Physical Planning,* GA27-3006.

SPECIAL FEATURES

Card Print (#1501): For printing up to 80 positions along the top edge of the card. A 64-character set (including blank) is provided. Orders must specify **#9491** for EBCDIC or **#9494** for ASCII (3770 System only). Uses a black ink roll replaceable by the customer. See IBM. **Field Installation:** Yes.

Card Read/Punch Check (#1521): Allows the 3521 to be used alternatively as either a card punch or card reader. Read speed is the same as punch speed (50 cpm). This feature also provides for detection of punching errors by comparing the data read from the card with the punch data for each column. When an error is detected, the machines stops and an error indicator is lit. **Field Installation:** Yes. **Limitations:** [1] Punch checking must be inhibited using 3770 or 8100 job control when punching cards with internal scores or cards that have been prepunched ... [2] This feature is limited to the Punch Checking function only if the host 3289 mdl 3, 3774, 3775, 3776 mdl 1 or 2 is also equipped with a 2502 or 3501 Card Reader ... [3] This feature is limited to the Punch Checking function only when the 3521 is attached to a 3776 mdl 3 or 4, or a 3777 mdl 2, 3 or 4.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3525 CARD PUNCH

PURPOSE

Punched card output unit for a S/360 mdl 195, any S/370 processor, 4331 or 4341 Processor.

MODELS

		Rated 80-column Card Speed
Model P1	P01	100/minute
Model P2	P02	200/minute
Model P3	P02	300/minute

Maximum: S/360 mdl 195 and any S/370 (except mdl 125), 4300 processor: One 3525 can be attached via each 3505 Card Reader mdl B1 or B2. **S/370 mdl 125:** One 3525 can be natively attached via the appropriate adapter on the 3125 ... see M3125 pages.

Prerequisites: S/360 mdl 195 and any S/370, 4331 or 4341 processor: A 3505 Card Reader mdl B1 or B2 with a 3525 Punch Adapter (#8103), or 3525 Read Punch Adapter (#8105). **S/370 mdl 125:** Native attachment via the Integrated 3525 Card Punch Attachment (#4685) on the 3125.

HIGHLIGHTS

The 3525 is a full-function card punch which, when equipped with the appropriate special features, can read and/or print as well as punch 80-column cards in a single pass through the machine. The 3525 attaches natively to a S/370 mdl 125, or via (and within 20 feet of) a channel-attached 3505 Card Reader mdl B1 or B2 to a S/360 mdl 195, or any S/370, 4300 processor ... see "Prerequisites" above.

The basic unit has a 1,200 card capacity hopper and two 1,200 card capacity stackers. Either the EBCDIC (256 codes) or Card Image (Data Mode 2) can be punched. Punches parallel, row by row. Cards go to stacker 1 unless program directed to stacker 2.

Card punching is checked by monitoring the movement of all 80 punches. A card in which a punching error is detected is automatically directed to a dedicated 200-card capacity error stacker and followed by two automatic punching retries ... the first prepunched card is directed to the error stacker for analysis purposes ... the second prepunched card is directed to the stacker originally selected for the error card. **Note:** Because of automatic punch retry, it is recommended that prepunched or serially numbered preprinted cards not be used in a punch-only mode. When operating in a read/punch mode ... see Card Read in "Special Features" ... detected punching errors do not result in an automatic punching retry and prepunched or serially numbered preprinted cards can be used. In a read/punch mode, a detected punching error causes the machine to stop and manual error recovery procedures are required.

Card Limitations: Generally, special feature cards require careful handling and a favorable environment. Use of the following has been approved:

Internal Scores (before separation): M-4, M-5, OM-2, OM-3, ID-1, ID-2, ID-3 and S-1. When reading cards with internal OM-2 or OM-3 scores (Card Read feature installed), either reading must be terminated prior to the column that is scored, or reading of the scored column and the two adjacent columns must be suppressed by means of the program-controlled read-column-eliminate feature function provided standard with Card Read. S-2 may be used prior to folding, and after folding if the card is properly flattened.

External Scores (after separation): Column 1 and 80 end: M-3, M-4, M-5, M-6, M-7, M-11, OM-2, CF-4 and CF-11. Column 1 end only: OM-3. 12 and 9 edge: CF-1/9A.

Corner Cuts (any corner): C1, C2, C3 and C5.

Card Stock: Regular, edge-coated, and heavy duty.

Port-A-Punch®: Can be punched in unscored fields of the card. Scored columns of these cards cannot be read. If reading capability is required, contact IBM.

All other special feature cards may result in unsatisfactory performance and should be tested in an actual application prior to being recommended.

Publications: S/360 -- GC20-0360, S/370, 4300 -- GC20-0001

SPECIFY

- Voltage (AC, 60 Hz power provided by the 3125 for native attachment or by the 3505 mdl B1 or B2 for channel attachment): **#9903** for 208V or **#9905** for 230V ... must be consistent with 3505 or system voltage.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- S/370 mdl 125 Adapter (**#9690**): Required if the 3525 is to be attached via an Integrated 3525 Punch Attachment (#4685) on a 3125. **Field Installation:** Yes.
- Print Character Set: Required when Multiline Card Print (#5273) or two-line Card Print (#8339) is ordered. **#9677** -- for EBCDIC or **#9671** -- for ASCII. **Field Installation:** Yes.

Card Code	EBCD Code	EBCDIC	ASCII	Card Code	EBCD Code	EBCDIC	ASCII
	0100-				0110-	–	–
12-8-2	1010	¢	[	11	0000	/	/
12-8-3	-1011	.	.	0-1	-0001	blank	\
12-8-4	-1100	<	<	12-11	-1010	,	,
12-8-5	-1101	(	(	0-8-3	-1011	%	%
12-8-6	-1110	+	+	0-8-4	-1100	—	—
12-8-7	-1111	|	|	0-8-5	-1101	>	>
	0101-			0-8-6	-1110	?	?
12	0000	&	&	0-8-7	-1111		
11-8-2	-1010	!	]		0111-	:	:
11-8-3	-1011	$	$	8-2	1010	#	#
11-8-4	-1100	*	*	8-3	-1011	@	@
11-8-5	-1101	)	)	8-4	-1100	'	'
11-8-6	-1110	;	;	8-5	-1101	=	=
11-8-7	-1111	¬	¬	8-6	-1110	"	"
				8-7	-1111		

SPECIAL FEATURES

Basic Card Print (#1421): Provides a print station following the punch station. Print mechanism consists of a print chain, 64 hammers, and a card stepping device. **Field Installation:** Not recommended. **Prerequisites:** #8100 on 3505 or #4693 on 3125. Also requires #8339 or #5273 on 3525.

Card Read (#1533): Provides an optical hole-sensing station ahead of the punch station. Permits cards to be read in EBCDIC (Data Mode 1) or Card Image (Data Mode 2). Cards are read in parallel fashion (row by row) while the previous card is being punched. Data read is fully buffered and can be used to control later operations on the same card such as punching, printing, and stacker selection.

Read-column-eliminate is standard with the feature. Provides the ability, under program control, to suppress the reading of selected card columns. May be used to prevent reading in columns that could cause validity and read checks due to invalid codes or open-punched card scores. See Port-A-Punch under "Card Limitations" for restrictions. **Field Installation:** Yes. **Prerequisites:** #8105 on the 3505 mdl B1 or B2, or **#9794** on the 3125.

Multiline Card Print (#5273): Provides the ability to print, under program control, on any or all of 25 printing lines on the card. Each print line is 64 characters long and print locations are identical to that of the 2560 MFCM. Maximum speed, in cards/minute, when printing, is dependent upon the machine mdl, the average number of lines printed and the location of the printed lines. Typical speeds are as follows:

	P1	P2	P3
1 Line	100 cpm	200 cpm	300 cpm
2 Lines	100 cpm	200 cpm	240 cpm
3 Lines	67 cpm	133 cpm	150 cpm
4 Lines	67 cpm	114 cpm	133 cpm
6 lines	57 cpm	89 cpm	100 cpm
10 Lines	44 cpm	62 cpm	67 cpm
25 Lines	24 cpm	29 cpm	30 cpm

Limitations: Cannot be installed with #8339. **Field Installation:** Yes. **Prerequisites:** #1421. Also see "Specify" above for specifying the desired character set.

Two-Line Card Print (#8339): Identical in function to Multiline Card Print (#5273) with the exception that printing is limited to lines 1 and 3 (above the 12 punching row and between rows 12 and 11). Maximum speed in cards/minute, when printing, depends upon the machine mdl only. Speeds are as follows:

	P1	P2	P3
1 line	100 cpm	200 cpm	300 cpm
2 lines	100 cpm	200 cpm	300 cpm

Limitations: Cannot be installed with #5273. **Field Installation:** Yes. **Prerequisites:** #1421. Also see "Specify" above for specifying the desired character set.

MODEL CONVERSIONS

Field installable.

ACCESSORIES (None)

SUPPLIES (None)

3540 DISKETTE INPUT/OUTPUT UNIT

PURPOSE

Input/output device for use with any virtual storage S/370 processor except a 3081, 3083 or 3084 Processor.

MODELS

Model B1 B01 Has one drive.

Model B2 B02 Has two drives.

Limitations: The use of a 3540 on a S/370 and the 4300 processors does not eliminate the minimum configuration requirements for a card reader, except in a S/370 mdl 115 or 125 cardless configuration.

Maximum: The number of 3540 mdls B1 and/or B2 that can be attached depends upon the number of system channel control unit positions available.

Prerequisites: Each 3540 requires an available control unit position on a channel.

HIGHLIGHTS

The 3540 provides the ability to read or write IBM Diskettes on S/370 systems, 4300 processors. The diskette is the same recording medium used by the 3740 Data Entry System, and, as such, the 3540 provides a facility for entering data recorded by the 3740 directly into a S/370, 4300 processors. The IBM Diskette is organized into 75 tracks, 26 sectors per track, 128 bytes per sector. 73 tracks are used for data. The data capacity of the diskette is, therefore, 1,898 sectors, or 242,944 bytes.

The mdls provide a choice of one or two diskette drives. Each drive uses a stepping motor to control the positioning of its associated read/write head assembly. Each drive also has an associated diskette hopper and stacker. Diskettes are fed, one at a time, from the hopper and automatically mounted on a drive spindle for read/write operations. Following completion of reading or writing, the diskette is automatically removed from the spindle and stacked. Hopper and stacker capacities are 20 diskettes each. Disk speed is 360 revolutions/minute.

The 3540 has a self-contained control unit and provides double 128-byte buffers associated with each drive. The control unit operates the drives in a now-shared mode and thus each drive requires a separate subchannel when attached to a byte multiplexer channel. Effective speed depends upon the number of sectors read or written per revolution and upon the average number of sectors recorded on the diskettes. Maximum speeds per drive, including program Open Time (2 seconds/disk for Read; 10 seconds/disk for Write), and including time to feed and stock diskettes, are shown below for several combinations. For simultaneous processing on both drives, the realizable speed per drive is a function of the type of channel, speed of the channel, type of operating system, and the application programs.

Sectors/ Revolution	Sectors/Minute (read)			Sectors/Minute (write)		
	Full Disk	1/2 Disk	1/5 Disk	Full Disk	1/2 Disk	1/5 Disk
1	600	575	520	170	165	155
2	600	575	520	310	295	265
13	2620	2255	1595	1500	1250	835
26	3635	2970	1925	2210	1710	1020

The 3540 is supported as a sequential DASD device only.

S/370 mdl 115, 125: Byte multiplexer channel (special feature) ... see M3115, 3125 pages.

S/370 mdl 135: Byte multiplexer channel (standard), selector channels (special features), block multiplexer channel (special feature) ... see M3135 pages.

S/370 mdl 135-3: Byte multiplexer channel (standard), block multiplexer channels (special features) ... see M3135-3 pages.

S/370 mdl 138: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3138 pages.

S/370 mdl 145: Byte multiplexer channel (standard), selector channels (first one is standard), block multiplexer channels (special features) ... see M3145 pages.

S/370 mdl 145-3: Byte multiplexer channel (standard), block multiplexer channels ... see M3145-3 pages.

S/370 mdl 148: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3148 pages.

S/370 mdl 155II, 158: Byte multiplexer channel (standard), 2nd byte multiplexer channel (special feature), block multiplexer channels (first two are standard) ... see M3155, 3158 pages.

S/370 mdl 165II, 168: Selector channel of 2860, basic multiplexer channel of 2870, shared or non-shared subchannel of 2880 (non-shared is recommended) ... see M2860, 2870, 2880 pages.

3031, 3032 Processor: Byte multiplexer channel (one is standard), block multiplexer channels (five are standard) ... see M3031, 3032 pages.

3033 Processor: Byte multiplexer channels (two are standard), block multiplexer channels (ten are standard) ... see M3033 pages.

4300: Byte multiplexer channel, block multiplexer channel ... see M4331, 4341, 4361, 4381 pages.

Publications: S/370--GC20-0001

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz): **#9902** for 208V or **#9904** for 230V ... must be consistent with system voltage.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray.

MODEL CONVERSIONS

All model changes are field installable.

ACCESSORIES (None)

SUPPLIES

IBM Diskettes: Contact IBM. Refer to DMC.

3601 FINANCE COMMUNICATION CONTROLLER

THE 3601 IS NO LONGER AVAILABLE ... FEATURES AND ACCESSORIES MAY BE ORDERED.

PURPOSE

A programmable controller for attachment of 3600 Finance Communication System terminals to System/34 or System/36 (using the appropriate licensed programs), System/3 model 15 processors or to S/370, 303X, 308X or 4300 processors using appropriate virtual storage system control programs; or for attachment of certain 4700 Finance Communication System terminals to S/370, 303X, 308X, or 4300 processors using appropriate virtual storage system control programs, a 3602 Finance Communication Controller, System/34 or System/36 (using the appropriate licensed programs, or an 8100 Information System using DPPX licensed programs.

Attachment to System/34 is via SDLC transmission over various common carrier- or user-owned facilities.

Attachment to System/3 model 15 is via Binary Synchronous Communications (BSC) – see 3601/3602 RPQ 8K0598 and 8K0623 and 5415 RPQ S40156.

S/370, 303X, 308X, 4331, 4341, 4361 or 4381 processor attachment is via a 3704, 3705, or 3725 Communications Controller using synchronous data link control (SDLC) transmission over various common carrier or user-owned transmission facilities. Attachment is also possible via the Communications Adapter feature on a 4321, 4331 or 4361. See M4321, 4331 or 4361 pages for details. **Note:** See "Programming" and "SCP" pages for attachment capability.

8100 Information System attachment is via the 8130, 8140 or 8101 units using SDLC transmission protocols over various common carrier or nonswitched transmission facilities. Attachment to a System/34 or System/36 is via communication adapter using SDLC transmission protocol over various common carrier facilities. Attachment to a 3602 is via the Fan-Out Communication Feature. See M3602 pages for details.

MODELS

[NO LONGER AVAILABLE]

Model 1 001 — A programmable controller with a diskette drive which accommodates 1-sided removable diskettes, a maximum of six loops and a maximum of 56K bytes of user programmable storage.
Remote terminal attachments* are available.
Note: Mdl 1 not for System/34 or System/3.

Model 2A A02 — A programmable controller with a diskette drive which accommodates 1-sided removable diskettes, a maximum of three loops, and a maximum of 120K bytes of user programmable storage.
Remote terminal attachments* are available.

Model 2B B02 — A programmable controller with a diskette drive which accommodates 1- or 2-sided removable diskettes, a maximum of three loops, and a maximum of 120K bytes of user programmable storage.
Remote terminal attachments* are available.

Model 3A A03 — A programmable controller with a maximum of two diskette drives which accommodates 1-sided removable diskettes, a maximum of six loops, and a maximum of 120K bytes of user programmable storage.
Remote terminal attachments* and a Local device cluster attachment are available.

Model 3B B03 — A programmable controller with a maximum of two diskette drive which accommodates 1- or 2-sided removable diskettes, a maximum of six loops and a maximum of 120K bytes of user programmable storage.
Remote terminal attachments* and a Local cluster attachment are available.

* Remote terminal attachments can be achieved on total number of loops indicated by one or a combination of the following as applicable:

Device or Feature	Device or Feat. #	3601 1	2A	2B	3A	3B
1200 bps Loop Int Modem	#8001	5	–	–	5	5
Terminal Attach Unit	3603-1,2	6	3	3	6	6
EIA Interface	RPQ	5	2	2	5	5

Prerequisites: Communications Controller equipped with appropriate features (see M3704, 3705, 3725 or 4331 for Communications Adapter feature #1601 on the 4331 Processor), or via an 8100 Information System equipped with appropriate features (see M8130, 8140 and 8101 pages) , or via System/34 or System/36 with appropriate features (see M5340 or 5360 pages).

HIGHLIGHTS

Controls all the functions of 3600 Finance Communication System terminals. Controls data transmission between those terminals and the central processing site. Four SDLC Communications features are available, one of which is required for transmission to and from the Host. An SDLC Communications feature at speeds from 1200 bps to 4800 bps or an SDLC Communications (mdl 3A or 3B for System/34 or System/3) feature at speeds from 1200 bps to 9600 bps can be selected. Besides host link speed differences, the SDLC feature to 9600 bps allows a maximum controller aggregate bps rate of 12,000 bps for the loops independent of the host link speed. See "Communications Features". For System/34 and System/3, for Binary Synchronous Communications (BSC) – see 3601/3602 RPQs 8K0598 and 8K0623.

Mdl 1 -- Contains approximately 24K bytes of programmable storage. Four additional increments of 8K bytes of programmable storage (for a total of 56K) are available. The amount of programmable storage available for application programming depends upon the attached terminal configuration and user environment. See Add'l Storage Feature (#1005).

Mdls 2A, 2B, 3A and 3B -- Contain approximately 24K bytes of programmable storage. Six additional increments of 16K bytes or three increments of 32 bytes of programmable storage (for a total of 120K) are available. The amount of programmable storage available for application programming depends upon the attached terminal configuration and user environment. (See Add'l Storage Feature, #1006 or #1007.) For System/34 or System/3, specify **#9591** for Control Storage, specify **#9592** for User-Programmable Storage.

Mdls 1, 2A and 3A -- House a direct access diskette drive with a 1-sided removable diskette which provides permanent storage for control and user programs, plus temporary and permanent storage for user data (sequential logging, random retrieval of data records, etc.). The mdl 3A allows the attachment of two 1-sided diskette drives.

Mdls 2B and 3B -- House a direct access diskette drive with a 2-sided removable diskette which provides permanent storage for control and user programs, plus temporary and permanent storage for user date (sequential logging, random retrieval of data records, etc.). The mdl 3B allows the attachment of two 2-sided diskette drives.

All 3600 system terminals are attached by loops which operate at speeds of 1200, 2400 or 4800 bps for locally attached terminals and at 1200 and 2400 bps for remotely attached terminals The base unit provides one loop. Two additional loops are available on mdls 2A and 2B while five additional loops are available on mdls 3A and 3B. 1200 bps loop integrated modems are available on mdls 1, 3A and 3B only. See "Special Features". **Note:** Either one or two 4800 loops per 3601 may be specified.

The device cluster adapter feature may be attached to the 3601 mdls 3A and 3B.

For the System/34 and System/3:

Communication between the controller and the host may be through an external modem with Interface (#3701), or 1200 bps Integrated Modem (#5500). See "Modems" and "Special Features" below. Each 3601 operates in half-duplex mode. Duplex communication line operations are possible with multiple 3601s attached to the line (one 3601 transmitting while the other receives).

For attachment to System/3 mdl 15 – see 3601/3602 RPQs 8K0598 and 8K0623 and 5415 RPQ S40156.

Can be programmed to operate independently when the CPU is unavailable. Capable of controlling all terminal functions, executing arithmetic, and capturing data from the terminals for later transmission to the CPU. A keylock is provided for the removable diskette. One key is provided.

For the 3600 or 4700:

Communication between the 3601 and the 3704, 3705, 3725, or the Communications Adapter (#1601) feature on the 4331 Processor or 8130, 8140, 8101 may be either through the 1200 bps Integrated Modem (#5500) on the 3601

or through an external modem using the Interface (#3701) on the 3601 at speeds up to 9600 bps. Local attachment can be made to a 3704, 3705, or 3725 via its local attachment feature using #3701 on the 3601 at 1200 or 2400 bps. Local attachment can be made to a 4331 via its local attachment feature using #3701 on the 3601 at 1200, 2400, 4800 or 9600 bps. See "Modems" and "Special Features" below. Local attachment to a controlling 3602 at 9600 bps is via its Fan Out Communication Adapter Feature (#1551). Each 3601 operates in half-duplex mode. Duplex communication line operations are possible with multiple 3601s attached to the line, one 3601 transmitting while the other receives.

Can be programmed to operate independently when the S/370, 303X, 308X, 4300 Processor, controlling 3602, or 8100 Information System is unavailable. Capable of controlling all terminal functions, executing arithmetic, and capturing data from the terminals for later

3601 Finance Communication Controller (cont'd)

transmission to the S/370, 303X, 308X, or 4300 Processor, controlling 3602, or 8100 Information System.

A keylock is provided for the removable diskette. One key is provided.

Transmission: The 3601 operates over common carrier-provided or equivalent customer-owned communications facilities. For information concerning these facilities, see M2700 pages.

Modems: External modems operating at speeds up to 9600 bps may be used with SDLC features.

Modem	Speed (bps)	Facility
3863	2400	Switched or nonswitched voice-grade lines
3868-1	2400	Nonswitched voice-grade line
3864	4800	Switched or nonswitched voice-grade lines
3868-2	4800	Nonswitched voice-grade line
3865	9600	Nonswitched voice-grade line
3868-3,4	9600	Nonswitched voice-grade line
3872	2400	Switched or nonswitched voice-grade lines
*	9600	Nonswitched digital data service

* See RPQ for IBM DDSA.

Non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Policy. See M2700 pages for further information.

Note: Switched line operation is not supported by the 3601/3602 integrated 1200 bps modem.

Publications: GC20-0370 -- *IBM S/370 Bibliography* and GC27-0001 -- *IBM 3600 Finance Communication System, System Summary.*

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9880** for locking plug, or **#9881** for non-locking plug. **Field Installation:** Not recommended.
- Controller Designation: Media distribution of Controller Data. Specify **#9491** to identify the initial 3601 or 3602 ordered for use with a host system location, or specify **#9492** to identify additional 3601s per host system.

  If **#9491** is specified for the 3601, specify: **#9494** if there is no 3614/3624 with a first position designator attached to any 3601 on the same host system, or ... **#9493** if there is a 3614, with a first position designator and **#9002**, attached to any 3601 on the same host system, and/or ... **#9495** if there is a 3614 with a first position designation and **#9001** or a 3624 with a first position designator attached to any 3600 Controller on the same host system or if encryption capability via the Data Encryption Standard (DES), is desired on any 3600 Controller in the system. See 3614 Host Attachment Designation under "Specify" for the 3614, or Controller-Data Designation under "Specify" for the 3624.

  If **#9491** is specified, select the specify number of the desired media.

  #9412 9/800 Magnetic Tape
  #9413 9/1600 Magnetic Tape
  #9414 9/6250 Magnetic Tape

  If magnetic tape is not available on designated CPU, then select one of the following media. [DOS/VS users only]

  #9431 80-Column Cards
  #9432 96-Column Cards

  If card or tape inputs are not available at the host location, contact IBM.

  When feature **#9491** is specified, additional shipping information is required.

  Supplementary Specifications (via AAS MES entry) are to be entered exactly as follows to indicate shipping address of the HOST SYSTEM LOCATION.

  Line 1 -- IBM Programming Support Representative (PSR)
  Line 2 -- C/O (Name of customer)
  Line 3 -- Street Address (or P.O. Box)
  Line 4 -- City, State, Zip Code

  This is the address to which the first controller data tape will be automatically shipped for the first controller ordered with **#9491**. Whenever controller data is updated by an EC, it will be shipped to the most current TPC address.

  Caution: Specify code **#9491** is used to provide Controller Data Media for only the initial 3601 or 3602 attached to a host system location. Do not specify **#9491** for more than one 3601 or 3602 per host system as this will result in the unnecessary shipment of multiple DTR tapes or cards to the host system location.
- Cables: See Accessories for ordering instructions. Also see *Installation Manual - Physical Planning,* GA27-2766.
- If ordering a 3614 or 3624 with 1st position designator (see Host Attachment Designation under "Specify" for the 3614, or Controller-Data Designator under "Specify" for the 3624) to be added to any existing 3601, an MES order transaction should be used against the initial controller (3601 or 3602 with **#9491** and **#9494**) requesting to delete **#9494** and add **#9493** and/or **#9495** for the initial controller.

  Refer to IBM for further explanation of these specify codes and their use when (1) ordering a loop-attached 3614 in a network where no 3614s are previously attached, and (2) field installation of **#9001** on a loop-attached system.

  If all installed or on order 3614s or 3624s for loop attachment to the 3601 are removed or cancelled, an AAS order transaction should be used against the initial controller (3601 or 3602 with **#9491** and **#9493** and/or **#9495** requesting to delete **#9493** and/or **#9495** and add **#9494** for the initial controller.
- **Note:** The following specify features are field installable: **#9412, #9413, #9414, #9431, #9432, #9491, #9492, #9493, #9494, #9495.**

SPECIAL FEATURES

Non-Communications Features

Add'l Storage Feature (#1005): [Mdl 1] Provides an additional 8,192 bytes of control storage for device attachment or an additional 8,192 bytes of user-programmable storage. **Specify: #9581** for Control Storage for Device Attachment. Any combination of device types: 3603, 3604, 3606, 3608, 3610, 3611, 3612, 3614, 3615, 3616, 3618, 4704 mdl 1, 4710, 4720, and/or 3624 may be attached. Some combinations will require an optional 8,192 bytes of control storage provided by the use of feature #1005. To determine if #1005 is required, refer to the "Device Attachment Table - A" below. Calculate the sum of the attachment factors for the combination of devices to be attached. Add the attachment factor one time only for each device type. If the attachment factor sum is 3 or less, feature #1005 and **#9581** are not required. If the attachment factor sum is greater than 3 but does not exceed 11, #1005 and **#9581** are required. If the sum is greater than 11, but does not exceed 14, two #1005s and two **#9581**s are required. An attachment factor of greater than 14 is not allowed.

Note: Device Attachment table A is applicable to Controller data EC levels prior to EC749167.

Device Attachment Table - A

Device Type/Feature/Function	Attachment Factor
3604, 4704 mdl 1	0
Mag. Stripe Encoder-Reader (#4905/#4906)	0.6
3606	3.0
3608	5.8
3610, 3611 and/or 3612	2.4
3614 [with AET only]	2.2
3618	3.0

If additional function is required, or Controller data EC749167 or later is installed, utilize Device Attachment Table - B to determine if #1005 is required. Calculate the sum of the attachment factors for the combination of devices or function required. Add the attachment factor one time only for each device type. If the attachment factor sum is 2 or less, neither #1005 nor **#9581** is required. If the attachment factor sum is greater than two but does not exceed 10, #1005 and **#9581** are required. If the sum is greater than 10, but does not exceed 14, two #1005s and two **#9581**s are required. An attachment factor of greater than 14 is not allowed.

Device Attachment Table - B

A description of attachment factor functions not associated with a specify, machine or feature is given later in this section (See "Attachment Factor Functions".)

Device Type/Feature/Function	Attachment Factor
3603 or 3604 mdls 1-6, 4704 mdl 1	0
SDLC (#4501 or #4502)	0.7
Multiple Block I/O - Diskette	3.0
3614 or 3624 [Note 1]	1.2
3616, 4710, 4720 Part 1 [Note 5,6]	0.5
Optional Instruction Locator	0.3
Instruction Enhancements	1.7
Address Sharing [Note 5,8,9]	0.6
Secondary Logical Unit (LU) Assignment	0.5
3606 [Note 8,9]	2.4
LSEEKP [Note 2]	1.8
Translate Instruction (LTRT) [Note 2]	1.2
3270/3600 Datastream Mapping	8.0
Extended 3270/3600 Keyboard Mapping (Note 7)	1.5
Data Decompression/Decompression [Note 2]	1.2
Data Compression/Compaction [Note 2]	1.6
SCRPAD Instruction [Note 2]	1.7
Extended LLOAD Instruction	0.3
INTMR Instruction [Note 2]	1.0
Data Encryption Standard (DES) [Note 1]	1.5

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Alternate Encryption Technique (AET) [Note 1]	1.0
Priority Dispatching (LCHAP) [Note 2]	0.3
Data Sequencing	1.6
Extended Statistical Counter Recording [Note 2]	1.3
3618	3.0
3615	3.2
3616, 4710, 4720 Part 2 [Note 5,6]	4.0
3610, 3611 and/or 3612 [Note 3]	2.6
3608 Printer [Note 9]	2.8
Mag Stripe Encoder-Reader (#4905/#4906) [Note 4]	0.7
Set Diskette	0.9
3604 mdl 7	0.5

Notes

[1] Although both DES and AET may be included, a single 3614 may have either DES or AET but not both. A 3624 may have only DES.

[2] The optional instruction locator must be included if this function is used. If more than one function requiring the optional instruction locator is used, the attachment factor for the locator need be included only once.

[3] Any 3610, 3611 and 3612 combination constitutes one device type.

[4] The Magnetic Stripe Reader (#4901 or #4902) need not be considered in computing the attachment factor.

[5] Address sharing must be included if a 3616, 4704 mdl 1, 4710, or 4720 is used. If more than one device/RPQ requiring address sharing is used, the attachment factor for address sharing need be included only once.

[6] Both 3616, 4710, 4720 Part 1 and 3616, 4710, 4720 Part 2 must be included when any one of these devices is used. Any 3616, 4710, 4720 combination constitutes one device type. The Part 1 and Part 2 attachment factors need only be included once if more than one device or device type is used.

[7] 3270/3600 Datastream Mapping must be included if the Extended 3270/3600 Keyboard Mapping is used.

[8] Address sharing must be included if a 3606 is used.

[9] Address sharing must be included if a 3608 is used. The 3606 must also be included only once to utilize both the 3608 Printer and keyboard/display.

Maximum: For #1005 with **#9581** -- Two. **Field Installation:** Yes. **Specify: #9581** for user-programmable storage Add'l Storage Feature (#1005) provides an additional 8,192 bytes of user-programmable storage. **Maximum:** For #1005 with **#9582** -- Four. **Field Installation:** Yes.

Add'l Storage (#1006): Provides an additional 16,384 bytes of control storage for device attachment (mdls 2A, 2B, 3A and 3B only); or an additional 16,384 bytes of user-programmable storage (mdls 2A, 2B, 3A and 3B only).

This additional storage can be used for the following four purposes: (1) User-Programmable Storage, (2) User-Programmable Storage Expansion, (3) Control Storage, or (4) Control Storage Expansion. See below for description and limitations: **Specify: #9591** for Control Storage, or **#9592** for user-programmable storage.

Add'l Storage (#1007): [Mdls 2, 2B, 3A, 3B] Provides an additional 32,768 bytes of user-programmable storage. This additional storage can be used for (1) User-programmable storage, or (2) User-programmable storage expansion. See below for description and limitations. **Specify: #9602.**

[1] User-Programmable Storage: Used for configuration data and application programs.

Feature #1006, Specify **#9592** - Provides an additional 16,384 bytes of user-programmable storage. **Maximum:** For #1006 with **#9592** - Two. **Field Installation:** Yes.

Feature #1007, Specify **#9602** - Provides an additional 32,768 bytes of user-programmable storage. **Maximum:** For #1007 with **#9602** - One. **Field Installation:** Yes. **Prerequisites:** On controllers shipped prior to EC 745887, #6501 is required.

[2] User Programmable Storage Expansion: [Mdls 2A, 2B, 3A, 3B] Used in addition to two #1006 and two **#9592** increments or one #1007 and one **#9602** increment of user-programmable storage, described above, for the instruction sections of application programs and a limited amount of configuration data and application program constants. Most configuration data and application program constants cannot reside in expanded user-programmable storage.

Feature #1006, Specify **#9592** - Provides an additional 16,384 bytes of user-programmable storage. **Maximum:** (For user-programmable storage plus user-programmable storage Expansion): For #1006 with **#9592** specified and with Storage Expansion Features (#6501) - six. **Prerequisites:** If more than two Add'l Storage Features (#1006) with **#9592** are ordered, #6501 is required. **Field Installation:** Yes.

Feature #1007, Specify **#9602** - Provides an additional 32,768 bytes of User Programmable Storage. **Maximum:** (for user-programmable storage plus user-programmable storage expansion) For #1007 with **#9602** with Storage Expansion Feature (#6501) - three. **Field Installation:** Yes. **Prerequisites:** If more than one Add'l Storage Feature (#1007 with **#9602**) are ordered, or if in conjunction with any Add'l Storage Feature (#1006 with **#9592**), then #6501 is required.

[3] Control Storage: Used for attachment of any combination of device types/functions/features which have associated attachment factors. See "Device Attachment Table - C" below. Some combinations of device types can be accommodated with no further increments of control storage, while other combinations require additional increments of control storage.

Feature #1006, Specify **#9591** [Mdls 2A, 2B, 3A, 3B] - Provides one increment of 16,384 bytes of Control Storage for device attachment.

Two additional increments, for a total of 3 are available with Control Storage Expansion (see below). To determine whether and how many control storage increments (#1006 with **#9591**) are required, refer to "Device Attachment Table - C" below. Calculate the sum of the attachment factors for the combination of devices and/or functions required. Add the attachment factor one time only for each device type, feature or function. If the attachment factor sum is 10 or less, feature (#1006 with **#9591**) is not required. If the attachment factor sum is greater than 10, feature (#1006 with **#9591**) is required. An attachment sum greater than 22 is not allowed in this base attachment factor calculation. **Maximum** (for control storage): For #1006 with **#9591** -- One. **Field Installation:** Yes.

[4] Control Storage Expansion (CSE): [Mdls 2A, 2B, 3A, 3B] Feature #1006 with **#9591.** - Provides a greater attachment factor capability for certain features or devices which require an attachment factor. CSE supplements the base attachment factor limit of 22 by providing second and third increments of additional storage. An additional attachment factor capability of 12 can be obtained by utilizing the second increment of #1006 with **#9591** or 28 by utilizing the second and third increments of #1006 with **#9591.** Only the attachment factors associated with certain device types, features, or functions can be applied against this expanded attachment factor capability. (See "Device Attachment Table - C" below.)

While Control Storage Expansion provides additional attachment factor capability, the CSE attachment factor must be considered separately from the base attachment factor calculation. Specifically, the attachment factor for a given device or feature must be allocated against either the base or the expanded attachment factor but not both. **Maximum** (for Control Storage plus Control Storage Expansion): For #1006 with **#9591** specified and with Storage Expansion Feature (#6501) -- Three. **Field Installation:** Yes. **Prerequisites:** If more than one #1006 with **#9591** is ordered, then #6501 is required.

Limitations: The maximum number of #1006s (whatever the combination of **#9591** and **#9592**), is nine for controllers with serial numbers of 13100 or higher, or if the controller is a reconditioned unit incorporating EC 745887. For units with lower serial numbers, without EC 745887, the maximum number of #1006s is seven. The maximum number of #1006s commencing with units with EC 745887 is nine.

The maximum number of #1007s is three.

The maximum number of #1007 plus #1006 (whatever the combination of **#9602, #9591, or #9592**) for controllers shipped prior to 13100 without EC 745887 is:

	Feature Code #1007		Feature Code #1006
Qty	3	+	1
Qty	2	+	3
Qty	1	+	5
Qty	0	+	7

The maximum number of #1007 plus #1006 for controllers with serial numbers 13100 or higher, or reconditioned units with EC 745887 is:

Qty	3	+	3
Qty	2	+	5
Qty	1	+	7
Qty	0	+	9

Device Attachment Table - C

In the following table, attachment factors in the column labeled "Base" are applicable to the base attachment factor calculation only. Attachment factors in the column labeled "Base or Expanded" are applicable to either the base or expanded attachment factor calculation.

The 3600 controller loads support for devices/features into control storage in the sequence indicated by the following table. Those RPQs with an attachment factor are also loaded in a prescribed sequence, as indicated in the *IBM 3600 Finance Communication System Configura-*

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tor (GA27-2762). The controller will always attempt to load each device, feature or RPQ into base control storage. If a device, feature or RPQ is encountered that will not fit into base control storage and it is applicable to extend control storage, the controller will attempt to load it into expanded control storage. The above algorithm must be used to determine control storage requirements.

Refer to the *3600 Finance Communication System Configurator*, GA27-2762 for a comprehensive list of attachment factors and additional information regarding calculation of base and expanded attachment factors.

A description of attachment factor functions not associated with a specify, machine or feature is given later in this section: See "Attachment Factor Functions".

Device Type/Feature/Function	Attachment Factor	
	Base	Base Or Expanded
3603 or 3604 mdls 1-6, 4704 mdl 1	0	
SDLC (#4501 or #4502)	0.7	
Multiple Block I/O-Diskette	3.0	
3614 or 3624 [Note 1]	1.2	
3616, 4710, 4720 Part 1 [Note 5,6]	0.5	
Optional Instruction Locator	0.3	
Instruction Enhancements	1.7	
Address Sharing [Note 5,12,13]	0.6	
Secondary Logical Unit (LU) Assignment	0.5	
3606 [Note 12,13]	2.4	
Device Cluster Adapter [Note 8,9]		5.0
3278-2 Attachment [Note 9]		4.5
LSEEKP Instruction [Note 2]		1.8
Translate Instruction (LTRT) [Note 2]		1.2
3270/3600 Datastream Mapping		8.0
Extended 3270/3600 Keyboard Mapping [Note 7]		1.5
Data Decompression/Decompaction [Note 2]		1.2
Data Compression/Compaction		1.6
Extended LLOAD Instruction		0.3
SCRPAD Instruction [Note 2]		1.7
INTMR Instruction [Note 2]		1.0
Data Encryption Standard (DES) [Note 1]		1.5
Alternate Encryption Technique (AET) [Note 1]		1.0
Priority Dispatching (LCHAP) [Note 2]		0.3
Data Sequencing		1.6
Extended Statistical Counter Recording [Note 2]		1.3
Extended Diskette Access Method (EDAM) Base		5.5
EDAM Allocate/Deallocate (LDKT Instruction) [Note 10]		1.7
EDAM Temporary File Support [Note 11]		1.5
3616, 4710, 4720 Part 2, 3262/3287/3289 Part 1 [Note 5,6,8]		3.0
3262/3287/3289 Part 2 [Note 8]		1.5
3618		3.0
3615		3.2
3610,3611 and/or 3612 [Note 3]		2.6
3608 Printer [Note 12]		2.8
Mag Stripe Encoder-Reader (#4905/#4906) [Note 4]		0.7
Set Diskette		0.9
3604 mdl 7		0.5

Notes

[1] Although both DES and AET may be included, a single 3614 may have either DES or AET but not both. A 3624 may have only DES.

[2] The optional instruction locator must be included if this function is used. If more than one function requiring the optional instruction locator is used, the attachment factor for the locator need be included only once.

[3] Any 3610, 3611 and 3612 combination constitutes one device type.

[4] The Magnetic Stripe Reader (#4901 or #4902) need not be considered in computing the attachment factor.

[5] Address sharing must be included if a 3616, 4704 mdl 1, 4710, or 4720 is used. If more than one device/RPQ requiring address sharing is used, the attachment factor for address sharing need be included only once.

[6] Both 3616, 4710, 4720 Part 1 and 3616, 4710, 4720 Part 2 must be included if one of these devices is used. Any 3616, 4710, 4720 combination constitutes one device type. The Part 1 and Part 2 attachment factors need only be included once if more than one device or device type is used.

[7] 3270/3600 Datastream Mapping must be concluded if extended 3270/3600 Keyboard Mapping is used.

[8] The Device Cluster Adapter, 3262/3287/3289 Part 1, and 3287/3289 Part 2 must be included if a 3262, 3287 or a 3289 is used.

The attachment factor for the Device Cluster Adapter need be included only once if any combination of 3262, 3278-2, 3287 and 3289 is used.

The attachment factor for 3616, 4710, 4720 Part 2 and 3262/3287/3289 Part 1 need be included only once if more than one of these device types is used.

[9] Both the Device Cluster Adapter and 3278-2 Attachment must be included if a 3278-2 is used.

The attachment factor for the Device Cluster Adapter need be included only once if any combination of 3262, 3278-2, 3287 and 3289 is used.

[10] The EDAM Base must be included if the Allocate/Deallocate function is used.

[11] The EDAM Base must be included if EDAM Temporary File Support is used.

[12] Address sharing must be included if a 3606 is used.

[13] Address sharing must be included if a 3608 is used. The 3606 must also be included only once to utilize both the 3608 Printer and keyboard/display.

Auxiliary Diskette Drive .25 Megabyte (#1025): [Mdl 3A] Provides approximately 280,000 bytes of additional diskette storage via two diskette drives. No area of the diskette to be mounted in the auxiliary (or secondary) drive will be reserved for the control program. **Maximum:** One. **Field Installation:** Yes.

Auxiliary Diskette Drive .5 Megabyte (#1035): [Mdl 3B] Provides approximately 560,000 bytes of additional diskette storage via two diskette drives. No area of the diskette to be mounted in the auxiliary (or secondary) drive will be reserved for the control program. **Maximum:** One. **Field Installation:** Yes.

Note: Support for #1025 and #1035 is provided by Extended Diskette Access Method (EDAM) Base, EDAM Allocate/Deallocate (LDKT instruction) and EDAM Temporary File Support. Refer to "Device Attachment Table - C" and "Attachment Factor Functions" section.

This feature requires replacement of the diskette storage device. Adequate provision must be made for retaining data contained on the diskette by having the user remove it prior to the installation of this feature.

Device Cluster Adapter (#3101): [Mdls 3A, 3B] Provides for the local attachment of a mix of 3278-2 display stations, 3287 printers, 3262-3, 13 Printers and 3289-1, 2 printers up to a maximum of eight devices. When attaching the 3278-2 display station to the device cluster adapter, no-charge 3278 RPQ 8K0880 is required. **Limitations:** Maximum distance from controller to terminal is 1.5 KM (4,920 ft). When the device cluster adapter is installed, Loop number four is no longer available. The maximum number of loops available on the 3601-3 is therefore reduced to five. **Maximum:** One. **Field Installation:** Yes.

Loop Feature, Add'l (#4735): Provides the ability to attach additional 3600 Finance Communication System terminals. **Limitations:** A maximum of two loops (including the provided local loop) operating at 4800 bps per 3601 are allowed when one of the SDLC communication features (#4501 or #4502) are specified. Otherwise, the maximum is one loop operating at 4800 bps (including the provided local loop). Loop Integrated Modem (#8001) cannot be installed on mdls 2A and 2B. **Note:** The sum of the speeds of all loops in bits per second (bps) plus the speed of the SDLC link (#6301 or #6302) in bps cannot exceed 12,000 bps. When SDLC feature (#4501 or #4502) is installed, the sum of all loops cannot exceed 12,000 bps (do not use the host link speed). **Maximum:** Two per mdls 2A and 2B. Five per mdls 1, 3A and 3B. **Field Installation:** Yes. **Prerequisites:** For each loop with any remotely attached terminals, 1200 bps Loop Integrated Modem (#8001) on a terminal or a 3603 is required.

Storage Expansion Feature (#6501): [Mdls 2A, 2B, 3A, 3B] Provides capability of (1) expanding user-programmable storage (#1006) with **#9592** or #1007 with **#9602** beyond 56K bytes, and/or (2) adding add'l increments of #1006 with **#9591**, beyond 16K bytes. **Limitations:** If IR 4 and Controller Data ECs 745122 and 745123 are utilized, the controller will work properly with the Storage Expansion Feature (#6501) installed, but Control Storage Expansion cannot be utilized. If releases earlier than IR 4 and Controller Data ECs 745122 and 745123 are utilized, neither the Storage Expansion Feature (#6501) nor more than one Add'l Storage Feature (#1006) with **#9591** should be installed. **Maximum:** One. **Field Installation:** Yes. **Note:** #6501 is required when more than one Add'l Storage Features (#1006) with **#9592** and/or when more than one Add'l Storage Feature (#1006) with **#9591** are ordered. #6501 is required when more than one Add'l Storage Feature (#1006 with **#9591**), or more than two Add'l User-Programmable Storage Features (#1006 with **#9592**), or more than one Add'l Storage Feature or Add'l Storage Feature (#1007 with **#9602**) with User-Programmable Storage Feature (#1006 with **#9592**).

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Prerequisites: #6501 is a prerequisite for any #1007 on mdls 2A, 2B, 3A and 3B shipped prior to EC 745887.

Communications Features

Each 3601 must be equipped with one of the following SDLC features and either the EIA Interface (#3701) or the 1200 bps Integrated Modem (#5500) for communication with the host processor.

EIA Interface (#3701) : Provides the appropriate cables and interface logic necessary to attach an external IBM modem for communications to the host processor through the 3704, 3705, 3725, or the communications Adapter (#1601) feature on the 4331 Processor, or for communications to an 8100 Information System or for local attachment to the controlling 3602, 3704, 3705, 3725, or 4331 without requiring modems. See M3602, 3704, 3705, 3725, or 4331 pages for details. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Limitations:** Cannot be installed with a 1200 bps Integrated Modem (#5500) . **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #6301 or #4501 ... or #6302 or #4502.

SDLC Communications Feature With Business Machine Clocking (#4501): Required for attachment to communication lines through the 1200 bps Integrated Modem (#5500), oran EIA Interface (#3701) with any external modem which does not have internal clocking at 1200 bps or for local attachment to a 3704, 3705, or 3725 Communications Controller (#4716) at 1200 or 2400 bps. The SDLC link speed of this feature need not be included when calculating the sum of the speeds not to exceed the aggregate bps rate of 12,000 bps. **Limitations:** Cannot be installed with #6301, #6302 or #4502. **Maximum:** One. **Field Installation:** Yes.

SDLC Communications Feature Without Business Machine Clocking (#4502): Required for attachment to communication lines through an external modem which does have internal clocking at speeds up to 9600 bps. Also required for attachment to a controlling 3602 or for local attachment to a 4331 Processor (#4801) at 1200, 2400, 4800, or 9600 bps. The SDLC link speed of this feature need not be included when calculating the sum of the loop speeds not to exceed the controller aggregate bps rate of 12,000 bps. **Limitations:** Cannot be installed with #6301, #6302 or #4501. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3701 .

1200 bps Integrated Modem (#5500): An integrated modem for operation at 1200 bps over nonswitched half-duplex or duplex voice grade lines for communication to the processor through the 3704, 3705, 3725, or the Communications Adapter (#1601) feature on the 4331 Processor, or for communications to an 8100 Information System. **Limitations:** Cannot be installed with Interface (#3701) . **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4501 or #6301. **Specify:** **#9651** for 4-wire strapping, or **#9652** for 2-wire strapping.

SDLC Communications Feature With Business Machine Clocking (#6301): Required for attachment to communication lines through the 1200 bps Integrated Modem (#5500), oran EIA Interface (#3701) with any external modem which does not have clocking at 1200 bps, or for local attachment to a 3704, 3705, or 3725 Communications Controller (#4716) at 1200 or 2400 bps, or for communications to an 8100 Information System. **Limitations:** Cannot be installed with #6302, #4501 or #4502. **Maximum:** One. **Field Installation:** Yes.

SDLC Communications Without Business Machine Clocking (#6302): Required for attachment to communications lines through an external modem which does have internal clocking at speeds up to 4800 bps or for local attachment to a 4331 Processor (#4801) at 1200, 2400 or 4800 bps. **Limitations:** Cannot be installed with #6301, #4501 or #4502. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3701 .

1200 bps Loop Integrated Modem (#8001): [Mdls 1, 3A, 3B] An integrated modem for transmission to remotely located 3600 Finance Communication System terminals. Operates at 1200 bps over nonswitched normal quality voice grade lines. **Note:** Several remote loop configuration variations can be realized; e.g., see the *IBM 3600 FCS Configurator,* GA27-2762. However regardless of configuration, the interconnecting common carrier facilities are always point-to-point circuits; either 2-wire half-duplex or 4-wire duplex. The common carrier does not tariff 3600 "remote loops". The customer should be referred to the configurator or information in the M2700 pages for definition of the tariffed elements of the remote loop. **Maximum:** One per Add'l Loop Feature (#4735). **Field Installation:** Yes. **Prerequisites:** #4735. Each remote location must have either a 3604 Keyboard Display mdl 2, 3 or 4 equipped with #8001 or #8002, a 3606 mdl 2, a 3608 mdl 2, a 3614 consumer Transaction Facility with #8001 or a 3603 as the first attached remote unit in each physical (geographic) location.

MODEL CONVERSIONS

The following model changes are field installable:

From \ To	2B	3A	3B
2A	x*	x	x*
2B			x
3A			x*

* Requires replacement of the diskette storage device. Adequate provision must be made for retaining data contained on the diskette by having the user remove it prior to the start of any conversion. **Field Installation:** Yes.

Attachment Factor Functions

Data Sequencing -- Allows user application to sequence, in storage, a block of data items or to collate, in storage, data items from two separate blocks into a third block, according to a parameter list.

Set Diskette -- Allows user applications to reset the temporary files, to specify the type of start-up (i.e., warm or cold) to be performed on the next load, and/or to initiate a load of the controller.

Instruction Enhancements -- Provides the user application with the following new instructions:

Bit Manipulating - Test and Branch (LIFON, LIFOFF) - Provides a test set, and branch function in a single instruction. This reduces the 3600 AP processing and memory requirements when processing single bits.

Logical Compare Data Immediate (CCDI) - Compares immediate data to data in a specified field.

Move Data Immediate (MVDI) - Moves immediate data to a specified field.

Load Data Immediate (LDDI) - Loads immediate data into specified register.

SCALE - Formats an input string of characters into a conveniently processable numerical format. When used in processing monetary input, functions such as the removal of the monetary symbol, commas, and periods from the input data are automatically done. In the event that cents were not in the input data, zero padding is optionally provided. SCALE should significantly reduce the number of instruction required to process monetary input.

Segment Indexing (SETX, TESTX, SETXREG) - Provides an alternate method of referencing data within a segment. Only fixed operands of 3600 instruction may be indexed. This function can be used to reduce the number of SETFPL instructions executed by the AP, thereby enhancing performance and reducing AP size. This function also provides a pseudo DSECT facility, thereby enabling an AP to more readily reference (1) variably displaced data within segments and/or (2) data beyond 4K bytes from the beginning of a segment.

Branch on Index (BRANX) - Provides an index increment, compare and branch function in a single instruction. This instruction is used to control the number of times a series of AP instructions will be executed. Since the instruction algebraically increments a register, BRANX can be used in conjunction with the Segment Indexing facility to simplify the processing of tables.

Execute (LEXEC) - Provides a function similar to the S/370 EXECUTE instruction. The amount of data logically ORed into the target instruction may be 2, 4 or 6 bytes.

Priority Dispatching - Provides the ability to specify the order in which 3601/3602 workstations are dispatched. This function consists of the LCHAP instruction which activates or deactivates the dispatching priority specified in the table(s) generated by the PRIDSP macro.

Translate - The LTRT instruction processes an input data stream against user specifiable translate table(s) to generate a translated output data stream. The LTRTBEG, LTRTENT and LTRTGEN instructions assist the user application programmer in specifying the translate table(s).

Extended Statistical Counter Recording - Provides the option to enhance statistical counter recording facilities to assist in fault isolation of degraded loop segments. This facility is particularly useful when a loop consists of multiple remote locations.

Multiple Block I/O - Diskette - Permits multiple blocks to be accessed with a single execution of the LREAD and REPLACE instruction for permanent file and absolute addressing accesses. This may also result in enhanced performance when more than 3 blocks are read or 4 blocks are written.

3270/3600 Datastream Mapping - Provides, via four new 3600 assembler language instructions, 3600 controller assistance in converting 3270 output display datastreams into an output datastream processable by 3600 attached devices, and 3604 input datastreams into 3270 input datastreams. Input and output screen sizes are supported as specified by the application programmer. The 3270 Tab, Clear, PA and PF keys are simulated.

Extended 3270/3600 Keyboard Mapping - Provides simulation of the 3270 Insert, Delete, Erase To End Of Field and Erase Input keyboard functions.

LSEEKP Instruction - Locates a table entry which is "equal to" "greater than or equal to" or "less than or equal to" a search argument using a binary search algorithm. Table may be included in the

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instruction section of the controller application program, thereby permitting the tables to reside in expanded user programmable storage.

SCRPAD Instruction - Provides access to optional global work areas distant from segment storage which may reside in base or expanded user programmable storage.

Data Compression/Compaction - This function allows a controller application program to condense a data stream by compressing repeated characters and compacting frequently occurring characters according to a user defined table. This can reduce the amount of data actually transmitted over a host link or stored in the controller.

Data Decompression/Decompaction - This function allows a controller application program to decompress and/or decompact a data stream which had previously been compressed and/or compacted by a host or a controller application program.

Extended Diskette Access Method (EDAM) Base - Provides the capability to open, access (via the LREAD, LWRITE or REPLACE instructions) and close data sets on the primary or auxiliary diskette drive.

EDAM Allocate/Deallocate (LDKT Instructions) - Provides the capability to allocate and deallocate data sets in either the primary or auxiliary diskette drive.

EDAM Temporary File Support - Permits processing of a data set defined with a temporary file structure on the auxiliary diskette drive.

INTMR Instruction - Permits the collection of elapsed time for events initiated and terminated by a controller application program.

Extended LLOAD Instruction - Allows a controller application program to load data overlays into segments other than segment 14.

Secondary Logical Unit (LU) Assignment - Allows a controller application program to change the logical unit address associated with a given workstation.

ACCESSORIES

Cables (3600): Cables to attach 3600 units may be purchased from IBM or a customer-selected source. (See *Physical Planning Manual,* GA27-2766 for cable and connector specifications.) The customer is responsible for installation and maintenance of these cables. Assembled cables may be purchased from IBM. Specify bulk number, cable assembly number or part number as appropriate. Allow a lead time of six weeks 120 days.

Item No.	Description	Maximum Length
1563155	Loop Cable Assembly	609.6m (2,000')
4474809	Cable Assy (3609-2 to Modem)	2.08m (82 in)
1745372	Cable Assy (Loop Repeater to Loop Terminal Box)	7.62m (25 ft)
1745350	Cable Assy (3603 to Leased Lines)	7.62m (25 ft)
1745349	Cable Assy (DDA to 3603)	7.62m (25 ft)
1741656	Cable Assy (joining 2 telephone lines)	N/A
1142961	Bulk Cable (12 Conduct.)	N/A
5252781	Bulk Cable (4 Conductor)	N/A
5252920	Bulk Cable (2 Conductor)	N/A
765294	Connector Assy (EIA)	N/A
5252769	Bulk Cable (2 Conductor)	N/A
5252913	Bulk Cable (4 Conductor)	N/A
1561344	Strain Relief	
1745363	Conductor Assembly (3603)	
5252763	Male Plug	
5252765	Female Plug	
5420242	Mini-Ty (used with 1745363)	

Locks and Keys: The 3601 is shipped with two keys. Additional keys may be purchased from IBM. Indicate serial number of lock.

Loop Repeater (P/N 4400002): Plugs into the Loop cable and redrives all signals being transmitted in a 3600 Finance Communication System. Each Loop Repeater contains Loop redriving capabilities which allow for the extension of the Loop cable length by 2,000 feet. Loop Repeaters may be employed on a Loop to extend its overall length to a maximum of 20,000 cable-feet. The unit can be physically mounted on a wall in an out-of-the-way location. Prerequisites: An operating 3600 System Local Loop or Remote Subloop. Publications: GC22-0005.

Customer Responsibilities: The customer may be advised that: (1) The customer is responsible for making certain that the use of the equipment complies with all Federal, State, and Local Laws, Regulations, and Ordinances; (2) The customer is responsible for price quotations, installation and cost (initial and recurring) of common carrier equipment and service; (3) The customer is responsible for the set-up of the unit; (4) The customer will determine the failing unit (see "Maintenance" below); (5) The customer is responsible for determining the required number of spares.

Physical Planning and Setup: Physical planning and setup is the responsibility of the customer. Attachment to the Loop cable is provided by ordering External Signal Cable Assembly (P/N 174372), or equivalent. (See *IBM 3600 Finance Communication System Installation Manual - Physical Planning,* GA27-2766.)

Spares: The customer may wish to replace a failing unit with a spare and must be advised to purchase sufficient spare units for such use. The number of spare units recommended is dependent upon the number of units the customer has installed, application requirements, physical locations and layouts. However, the minimum number of spare units recommended is shown in the following table:

# of Loop Repeaters Installed	Minimum # Spares Recommended
100	2

Warranty: Service is available at the designated IBM Repair Center during the 90 day warranty period, which commences 30 days following date of shipment from the plant of manufacture (Raleigh). It shall be the customer's responsibility to set up the equipment. It shall be the customer's responsibility to determine the failing unit and remove it from the Loop, and if the unit is still under warranty, to pack it in the designated shipping container and ship it prepaid to the designated IBM Repair Center. IBM will return the serviced unit, shipping charges prepaid. There is no regularly scheduled preventative maintenance recommended by IBM on these units. Maintenance agreements are not available. FE on-site service will not be provided.

Ordering: Order P/N **4400002** .

Diskettes: The following diskettes may be obtained by contacting IBM.

Diskette 1 (single-sided) 3601/3602
256 byte format **P/N 2305845**
128 byte format **P/N 2305830**

Diskette 2 (double-sided) 3601-2B/3B, 3602-1A/2A
256 byte format **P/N 2736700**
128 byte format **P/N 1766870**

SUPPLIES (None)

3602 FINANCE COMMUNICATION CONTROLLER

PURPOSE

A programmable controller for attachment of 3600 Finance Communication System terminals to System/34 and System/3 model 15 processors and for attachment of 3600 Finance Communication System terminals or certain 4700 Finance Communication System terminals and to S/370, 303X, 308X, or 4300 processors using appropriate virtual storage system control programs or an 8100 Information System using DPPX licensed programs.

Attachment to System/34 is via SDLC transmission over various common carrier or user-owned facilities.

Attachment to System/3 model 15 is via Binary Synchronous Communications (BSC) - see 3601/3602 RPQs 8K0598 and 8K0623 and 5415 RPQ S40156.

S/370, 303X, 308X, or 4300 Processor attachment is via a 3704, 3705, or 3725 Communications Controller or the Communications Adapter (#1601) feature on the 4331 Processor using Synchronous Data Link Control (SDLC) transmission over various common carrier or user-owned transmission facilities. 8100 Information System attachment is via the 8130, 8140 and 8101 units using SDLC transmission protocols over various common carrier or nonswitched transmission facilities.

Note: See "Programming" and "SCP" pages for attachment capability.

MODELS

Model 1A A01 — A large-file programmable controller with a 5.2 meg (floating head) disk, a drive which accommodates 1- or 2-sided removable diskettes, 16K or 32K increments of storage, and a maximum loop capability of eight, of which seven can be remote.

Model 1B B01 — A large-file programmable controller with a 9.3 meg (floating head) disk, a drive which accommodates 1- or 2-sided removable diskettes, 16K or 32K increments of storage, and a maximum loop capability of eight, of which seven can be remote.

Prerequisites: Communications with a S/370, 303X, 308X, or 4300 processor with virtual storage capability via 3704, 3705, or 3725 Communications Controller equipped with appropriate features or the Communications Adapter (#1601) feature on the 4331 Processor (see M3704, 3705, 3725, or 4331 pages) or via an 8100 Information System equipped with appropriate features (see M8130, 8140 and 8101 pages).

HIGHLIGHTS

Controls all the functions of the 3600 Finance Communication System or certain 4700 Finance Communication System terminals. Controls data transmission between those terminals and the central processing site. Four SDLC Communication features are available, one of which is required for transmission to the host. An SDLC Communications feature at speeds of from 1200 bps to 4800 bps or an SDLC Communications feature at speeds of from 1200 bps to 9600 bps can be selected. Besides host link speed differences, the SDLC feature that is used at 9600 bps allows a maximum controller aggregate bps rate of 12,000 bps for the loops independent of the host link speed ... see "Communication Features". For Binary Synchronous Communications (BSC), see RPQs 8K0598 and 8K0623.

Contains approximately 24K bytes of programmable storage. Six additional increments of 16K bytes or three increments of 32K bytes of programmable storage (for a total of 120K) are available. The amount of programmable storage available for application programming depends upon the attached terminal configuration and user environment ... see Add'l Storage (#1006 or #1007) under "Special Features".

Houses a direct access diskette (contact head) drive with 2-sided removable diskette which provides permanent storage for control and user programs, plus temporary and permanent storage for user data (sequential logging, random retrieval of data records, etc.). With Auxiliary Diskette Drive .5MB (#1015), the 3602 permits attachment of two 2-sided diskette drives.

Houses a floating head disk storage device for storage of user data. This storage device is not removable except by service personnel. Includes a fixed head feature which will provide eight additional heads with access to disk data on eight tracks ... see Add'l Disk Heads (#1010, #1011) under "Special Features".

All 3600/4700 system terminals (except 4704 mdls 2 and 3) are attached by loops which operate at speeds of 1200, 2400 or 4800 bps for locally attached terminals and at 1200 or 2400 bps for remotely attached terminals. The base unit provides one loop. Seven additional loops are available. Integrated modems are available on both mdls ... see "Special Features". **Note:** Either one or two 4800 bps loops per 3602 may be specified. **Note:** Only one 4800 bps loop per 3602 may be specified for System/3 Host attachment.

Can serve as a cluster controller for attachment of the 3600 Controllers, attachment of 3662 or 3287 Printers for full-page high-speed printing or attachment of 3278 mdl 2 Display Stations.

Communication between the controller and the 3704, 3705, or 3725 or the Communications Adapter (#1601) feature on the 4331 Processor or 8130, 8140, 8101 may be either through an integrated 1200 bps modem or through an external modem using Interface (#3701) on the 3602. Local attachment can be made to a 3704, 3705, 3725 or the Communications Adapter (#1601) feature on the 4331 Processor via its local attachment feature using #3701 on the 3602 at 1200 or 2400 bps. Local attachment can be made to a 4331 via its local attachment feature using #3701 on the 3602 at 1200, 2400, 4800 or 9600 bps. See "Modems" and "Special Features" below. Each 3602 operates in half-duplex mode. Duplex communication line operations are possible with multiple 3601/3602s attached to the line ... 3602 transmitting while the other receives. For attachment to System/3 mdl 15, see 3601/3602 RPQ 8K0598 and 5415 RPQ S40156.

Can be programmed to operate independently when the processor is unavailable. Capable of controlling all terminal functions, executing arithmetic, and capturing data from the terminals for later transmission to the S/370, 303X, 308X, or 4300 processor or 8100 Information System.

Transmission: The 3602 operates over common carrier-provided or equivalent customer-owned communication facilities. For information concerning these facilities, see M2700 pages.

Modems: External modems operating speeds up to 9600 bps may be achieved with SDLC feature. External modems operating at up to 4800 bps may be attached when used with SDLC Feature #6301 or #6302. Speeds up to 9600 bps may be achieved with SDLC Feature #4501 or #4502.

Modem	Speed bps	Facility
3863	2400	Switched or nonswitched voice-grade lines
3868-1	2400	Nonswitched voice-grade lines
3864	4800	Switched or nonswitched voice-grade lines
3868-2	4800	Nonswitched voice-grade lines
3865	9600	Nonswitched voice-grade lines
3868-3,4	9600	Nonswitched voice-grade lines
3872	2400	Switched or nonswitched voice-grade lines
*	9600 bps	Nonswitched digital data service

* See RPQ for IBM DDSA.

See M2700 pages for further information. Non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Policy.

Note: Switched line operation is not supported by the 3601/3602 integrated 1200 bps modem.

Bibliography: *IBM System/370 Bibliography,* GC20-0370, and *IBM 3600 Finance Communication System, System Summary,* GC27-0001.

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): Locking plug -- **#9880** for 115V, **#9884** for 208V, **#9886** for 230V. Non-locking plug -- **#9881** for 115V, **#9885** for 208V, **#9887** for 230V. **Field Installation:** Not recommended.
- Controller Designation: Media distribution of Controller Data. Specify **#9491** to identify the initial 3601 or 3602 ordered for use with a host system location, or specify **#9492** to identify additional 3602s per host system.

  If **#9491** is specified for the 3602, specify:

  a. **#9494** if there is no 3614 or 3624 with a first position designator attached to any 3602 on the same host system, or

  b. **#9493** if there is a 3614 with a first position designator and **#9002** attached to any 3602 on the same host system, and/or

  c. **#9495** if there is a 3614 with a first position designator and **#9001** or a 3624 with a first position designator attached to any 3602 on the same host system; or if encryption capability, via the Data Encryption Standard (DES), is desired in the 3600 Controller.

  See 3614 Host Attachment Designation under "Specify" for the 3614.

  If **#9491** is specified, select the specify number of the desired media.

  9/800 Magnetic Tape (**#9412**)
  9/1600 Magnetic Tape (**#9413**)
  9/6250 Magnetic Tape (**#9414**)

  If magnetic tape is not available on designated processor, then select one of the following media (DOS/VS users only):

  80-Column Cards (**#9431**)
  96-Column Cards (**#9432**)

  If card or tape inputs are not available at the host location, contactIBMfor guidance. When feature **#9491** is specified, additional shipping information is required. Supplementary

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specifications are to be stated exactly as follows to indicate shipping address of the host system location:

Line 1 -- IBM Programming Support Representative (PSR)
Line 2 -- C/O (Name of customer)
Line 3 -- Street Address (or P.O. Box)
Line 4 -- City,State, Zip Code

This is the address to which the first controller data tape will be automatically shipped for the first controller ordered with specify **#9491**. Whenever controller data is updated by an EC, it will be shipped to the most current TPC address.

Caution: **#9491** is used to provide Controller Data Media for only the initial 3601 or 3602 attached to a host system location. Do not specify **#9491** for more than one 3601 or 3602 per host system as this will result in the unnecessary shipment of multiple DTR tapes or cards to the host system location.

- Cables: See "Accessories" for ordering instructions. Also see *Installation Manual-Physical Planning,* GA27-2766.
- If ordering a 3614 or 3624 with first position designator (see Host Attachment Designation under "Specify" for the 3614, or Controller - Data Designation under "Specify" for the 3624) to be added to any existing 3602, an order transaction should be used against the initial Controller (3601 or 3602 with **#9491** and **#9494** requesting to delete **#9494** and add **#9493** and/or **#9495** for the initial Controller.

  If all installed or on order 3614s or 3624s for loop attachment to the 3602 are removed or cancelled, an AAS

  order transaction should be used against the initial Controller (3601 or 3602 with **#9491** and **#9493** and/or **#9495** requesting to delete **#9493** and/or **#9495** and add **#9494** for the initial controller).

  Refer to DP Letter 275-43 and 276-102

  for further explanation of these specify codes and their use when (1) ordering a loop-attached 3614 in a network where no 3614s are previously attached, and (2) field installation of feature **#9001** on a loop-attached 3614.
- The following specify codes are field installable: **#9412, #9413, #9414, #9431, #9432, #9491, #9492, #9493, #9494, #9495.**

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES

Add'l Storage (#1006): Provides an additional 16,384 bytes of control storage for device attachment or an additional 16,384 bytes of user-programmable storage. Additional storage can be utilized for the following purposes: (1) User-Programmable Storage, (2) User-Programmable Storage Expansion, (3) Control Storage and (4) Control Storage Expansion (see below for description and limitations). **Specify: #9591** for Control Storage -- **#9592** for User-Programmable Storage.

Add'l Storage (#1007): Provides an additional 32,768 bytes of User-Programmable Storage. Additional storage can be used for (1) User-Programmable Storage or (2) User-Programmable Storage expansion (see below for description and limitations). Specify **#9602.**

[1] User-Programmable Storage: Used for configuration data and application programs.

Feature #1006, specify **#9592** - Provides an additional 16,384 bytes of User-Programmable Storage. **Maximum:** for #1006 with **#9592** - two. **Field Installation:** Yes.

Feature #1007, specify **#9602** - Provides an additional 32,768 bytes of User-Programmable Storage. **Maximum:** for #1007 with **#9602** - one. **Field Installation:** Yes.

[2] User-Programmable Storage Expansion: - Used in addition to two #1006 and two **#9592** increments or one #1007 with one **#9602** increment of User-Programmable Storage described above, for the instruction sections of application programs, and a limited amount of configuration data and application program constants. Most configuration data and application program constants *CANNOT* reside in expanded user-programmable storage.

Feature #1006, specify **#9592** - Provides an additional 16,384 bytes of User-Programmable Storage. **Maximum:** (for User-Programmable Storage plus User-Programmable Storage Expansion): For #1006 with **#9592** and with Storage Expansion Feature (#6501) - six. **Prerequisites:** If more than two additional Storage Features (#1006 with **#9592**) are ordered, #6501 is required. **Field Installation:** Yes.

Feature #1007, specify **#9602** - Provides an additional 32,768 bytes of User-Programmable Storage. **Maximum:** (for User-Programmable Storage plus User-Programmable Storage Expansion): For #1007 with **#9602** and with Storage Expansion Feature (#6501) - three. **Prerequisites:** If more than one Add'l Storage Feature (#1007 with **#9602**) is ordered, or if in conjunction with any Add'l Storage Feature (#1006 with **#9592**), then #6501 is required. **Field Installation:** Yes.

[3] Control Storage: Feature #1006, specify **#9591.** Used for the attachment of any combination of device types/functions/features, which have associated attachment factors (see "Device Attachment Table"). Some combination of device types can be accommodated with no further increments of control storage, while other combinations require additional increments of control storage provided by the use of feature #1006 with **#9591.** One additional increment of control storage is available without utilizing Control Storage Expansion. Three additional increments, for a total of four, are available with Control Storage Expansion. To determine whether and how many control storage increments (#1006 with **#9591**), refer to the "Device Attachment Table" (below). Calculate the sum of the attachment factors for the combination of devices or function required. Add the attachment factor one time only for each device type, feature, or function. If the attachment factor sum is 10 or less, feature #1006 or **#9591** is not required. If the attachment factor sum is greater than 10, features #1006 and **#9591** are required. An attachment factor greater than 22 is not allowed in this base attachment factor calculation.

[4] Control Storage Expansion (CSE): Feature #1006, specify **#9591.** Used to provide a greater attachment factor capability for those features or devices which require an attachment factor. CSE supplements the base attachment factor limit of 22 by providing second, third and fourth increments of Add'l Storage (#1006 with **#9591**). An additional attachment factor capability of 12 can be obtained by utilizing the second increment of Add'l Storage, or 28 by utilizing the second and third increments, or 44 by utilizing the second, third and fourth increments of Add'l Control Storage. Only the attachment factors associated with certain device types, features, or functions can be applied against this expanded attachment factor capability (see "Device Attachment Table" below). While Control Storage Expansion provides additional attachment factor capability, the CSE attachment factor must be considered separately from the base attachment factor calculation. Specifically, the Attachment Factor for a given device or feature must be allocated against either the base or the expanded attachment factor but not both. Maximum (for Control Storage plus Control Storage Expansion): For #1006 with **#9591** and without #6501 ... one. For #1006 with **#9591** and with #6501 ... four . **Limitations:** The maximum number of #1006s (with any combination of **#9591** and **#9592**) is ten . The maximum number of #1007s is three. **Field Installation:** Yes. **Prerequisites:** If more than one Control Storage Feature (#1006 with **#9591**) is ordered, the Storage Expansion Feature (#6501) is required.

The maximum number of #1007s plus #1006s, whatever the combination of **#9602, #9591** or **#9592,** is:

	Feature Code #1007		Feature Code #1006
Qty	3	+	4
Qty	2	+	6
Qty	1	+	8
Qty	0	+	10

In the following table, attachment factors in the column labeled 'Base' are applicable to the base attachment factor calculation only. Attachment factors in the column labeled 'Base or Expanded' are applicable to either the base or expanded attachment factor calculation.

The 3600 controller loads support for devices/features into control storage in the sequence indicated by the following table. Those RPQs with an attachment factor are also loaded in a prescribed sequence, as indicated in the *IBM 3600 Finance Communication System Configurator* (GA27-2762). The controller will always attempt to load each device, feature or RPQ into base control storage. If a device, feature or RPQ is encountered that will not fit into base control storage and it is applicable to expanded control storage, the controller will attempt to load it into expanded control storage. The above algorithm must be used to determine control storage requirements.

Refer to the *3600 Finance Communication System Configurator* (GA27-2762) for a comprehensive list of attachment factors and additional information regarding calculation of base and expanded attachment factors.

A description of attachment factor functions not associated with a specify, machine or feature is given later in this section: See "Attachment Factor Functions".

Device Attachment Table

Device Type/Feature/Function	Attachment Factor	
	Base	Base or Expanded
SDLC (#4501 or #4502)	.7	–
Multiple Block I/O Diskette	3.0	–
3614 or 3624 [Note 1]	1.2	–
3616, 4710, 4720 [Note 5,6]	3.5	–
Optional Instruction Locator	.3	–
Instruction Enhancements	1.7	–
Address Sharing [Note 5,14,15]	–	.6
Secondary Logical Unit (LU) Assignment	–	.5

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3606 [Note 14,15]	2.4	–
Alternative Line Attachment Base [Note 8]	–	5.4
Dynamic Control [Note 9]	–	1.5
SDLC Link Diagnostics [Note 8]	–	0.8
SDLC/SNA Attachment Part 1 [Note 8]	–	8.0
SDLC/SNA Attachment Part 2 [Note 8]	–	5.8
Device Cluster Adapter [Notes 10,11]	–	5.0
3278 Mld 2 Attachment [Note 11]	–	4.5
LSEEKP [Note 2]	–	1.8
Translate Instruction (LTRT) [Note 2]	–	1.2
3270/3600 Datastream Mapping	–	8.0
Extended 3270/3600 Keyboard Mapping [Note 7]	–	1.5
Data Decompress/Decompaction [Note 2]	–	1.2
Data Compression/Compaction [Note 2]	–	1.6
SCRPAD Instruction [Note 2]	–	1.7
Extended LLOAD Instruction	–	.3
INTMR Instruction [Note 2]	–	1.0
Data Encryption Standard (DES) [Note 1]	–	1.5
Alternate Encryption Technique (AET) [Note 1]	–	1.0
Priority Dispatching (LCHAP) [Note 2]	–	.3
Data Sequencing	–	1.6
Extended Statistical Counter Recording [Note 2]	–	1.3
Disk File (5.2 or 9.3 meg)	–	10.0
Extended Diskette Access Method (EDAM) Base	–	5.5
EDAM Allocate/Deallocate (LDKT Instruction) [Note 12]	–	1.7
EDAM Temporary File Support [Note 13]	–	1.5
3616, 4710, 4720 Part 2, 3262/3287 Part 1 [Note 5,6,10]	–	3.0
3262/3287 Part 2 [Note 10]	–	1.5
3618	–	3.0
3615	–	3.2
3610, 3611 and/or 3612 [Note 3]	–	2.6
3608 Printer [Note 15]	–	2.8
Mag Stripe Encoder-Reader (#4905/#4906) [Note 4]	–	.7
Set Diskette	–	.9
3604 mdl 7	–	.5

Notes:

[1] Although both DES and AET may be included, a single 3614 may have either DES or AET but not both. A 3624 may have only DES.

[2] The optional instruction locator must be included if this function is used. If more than one function requiring the optional instruction locator is used, the attachment factor for the locator need be included only once.

[3] Any 3610, 3611 and 3612 combination constitutes one device type.

[4] The Magnetic Stripe Reader (#4901 or #4902) need not be considered in computing the attachment factor.

[5] Address Sharing must be included if a 3616, 4710, 4720 or 4704 mdl 1 is used. If more than one device/RPQ requiring address sharing is used, the attachment factor for address sharing need be included only once.

[6] Both 3616, 4710, 4720 Part 1 and 3616, 4710, 4720 Part 2 must be included when any of these devices is used. Any 3616, 4710, 4720 combination constitutes one device type. The Part 1 and Part 2 attachment factors need only be included once if more than one device or device type is used.

[7] 3270/3600 Datastream Mapping must be included if the extended 3270/3600 Keyboard Mapping is used.

[8] The Alternative Line Attachment Base, SDLC Link Diagnostics, SDLC/SNA Attachment Part 1, and SDLC/SNA Attachment Part 2 together comprise the SNA Primary Interface support required in the controlling 3602 for controller to controller (3600 to 3602) communication via an SNA/SDLC interface. When used, these functions must all be loaded into the same controller storage (i.e., Base or Expanded). This SNA primary function is used in conjunction with the Fan-Out Communication Adapter (#1551) and the SDLC Communications Feature Without Business Machines Clocking (#4502) with specify **#9551** for Controller Attachment.

[9] The Alternative Line Attachment Base must be included and loaded into the same controller storage (i.e., Base or Expanded) if Dynamic Control is used.

[10] The Device Cluster Adapter, 3262/3287 Part 1, and 3262/3287 Part 2 must be included if a 3262 and/or 3287 is used.

The attachment factor for the Device Cluster Adapter need be included only once if any combination of the 3278 mdl 2, or 3262/3287 is used. The attachment factor for 3616, 4710, 4720 Part 2 and 3262/3287 Part 1 need be included only once if more than one of these device types is used.

[11] Both the Device Cluster Adapter and 3278 mdl 2 Attachment must be included if a 3278 mdl 2 is used. The attachment factor for the Device Cluster Adapter need be included only once if any combination of 3278 mdl 2, 3262 or 3287 is used.

[12] The EDAM Base must be included if the Allocate/Deallocate function is used.

[13] The EDAM Base must be included if EDAM Temporary File Support is used.

[14] Address sharing must be included if a 3606 is used.

[15] Address sharing must be included if a 3608 is used. The 3606 must also be included to use the 3608 Keyboard/Display. Address sharing need be included only once to utilize both the 3608 Printer and Keyboard/Display.

Add'l Disk Heads (#1010, #1011): (#1010 for mdl 1A ... #1011 for mdl 1B.) Provides eight additional disk heads for the disk file as specified by mdl type selected. **Maximum:** One. **Field Installation:** Not recommended.

Auxiliary Diskette Drive (#1015): Provides approximately 560,000 bytes of additional diskette storage capacity via a second diskette drive. No area on the auxiliary (or secondary) drive will be reserved for the control program. **Maximum:** One. **Field Installation:** No **Note:** Support for feature #1015 is provided by Extended Diskette Access Method (EDAM) Base, EDAM Allocate/Deallocate (LDET) instruction), and EDAM Temporary File Support. Refer to Device Attachment Table and Attachment Factor Functions section. The EDAM function is not required to use the Auxiliary Diskette Drive feature. The level of support provided without EDAM is limited to direct (absolute) addressing at the track and sector level.

Fan-Out Communication Adapter (#1551): Required to attach 3600 System Controllers (3601/3602) to a controlling 3602. Up to nine controllers may be attached per feature. (See M3601 pages for features required on the attaching 3601s.) **Limitations:** (1) Can only be installed on 3602s with B/M 4406687 installed. (2) Attached controllers must be within 30.4m (100 cable-feet) of the 3602. **Maximum:** Two. **Field Installation:** Yes. **Prerequisites:** Each Fan-Out Communications feature #1551 requires special feature SDLC Communications Without Business Machines Clocking (#4502) with specify #9551 for controller attachment. **Note:** Support for feature #1551 is provided by Alternative Line Attachment Base, SDLC Link Diagnostics, SDLC/SNA Attachment Part 1 and SDLC/SNA Attachment Part 2. Refer to "Device Attachment Table", above.

Device Cluster Adapter - DCA (#3101): Provides for local attachment of a mix of up to eight 3262 or 3287 printers and 3278-2 display stations on a 3602. The number operable in a given application is dependent upon the user application program. When attaching the 3278 mdl 2 to the Device Cluster Adapter, no-charge RPQ 8K0880 is required. **Limitations:** (1) Maximum distance from controller to terminal is 1,500m (4,920 ft.). (2) When the Device Cluster Adapter feature is installed, loops number 4 and 8 are no longer available. **Maximum:** One. **Field Installation:** Yes.

Add'l Loop (#4735): Provides the ability to attach additional 3600 Finance Communication System terminals. **Limitations:** A maximum of two loops (including the provided local loop) operating at 4800 bps per 3602 are allowed when one of the SDLC communication features (#4501 or #4502) are specified and Fan-Out Communications Adapter (#1551) is not specified. Otherwise the maximum is one 4800 bps loop. **Maximum:** Seven without #3101, five with #3101. **Field Installation:** Yes. **Prerequisites:** For each loop with any remotely attached terminals, #8001 or #8002 on a terminal, or a 3603 is required. **Note:** The sum of the speeds of all loops in bits per second (bps) plus the speed of the SDLC link (#6301 or #6302) in bps cannot exceed 12,000 bps (each Fan-Out Communications Adapter (#1551) reduces the 12,000 bps limit by 1200 bps). When SDLC feature #4501 or #4502 (without **#9551**) is installed, the sum of all loops cannot exceed 12,000 bps.

Storage Expansion (#6501): Provides capability of (1) expanding user-programmable storage (#1006 with **#9592** or #1007 with **#9602**) beyond 56K bytes; and/or (2) adding additional increments of #1006 with **#9591**, beyond 16K bytes. **Limitations:** If IR 4 and Controller Data ECs 745122 and 745123 are utilized, the Controller will work properly with #6501 installed, but Control Storage Expansion cannot be utilized. If releases earlier than IR 4 and Controller Data ECs 745122 and 745123 are utilized, neither the Storage Expansion Feature (#6501) nor more than one Add'l Storage feature (#6501 with **#9591**) should be installed. **Maximum:** One. **Field Installation:** Yes. **Note:** #6501 is required when more than 16K of additional control storage, Add'l Storage Feature (#1006 with **#9591**) or more than 32K of additional user-programmable storage, Add'l Storage Feature (#1006 with **#9592**) or Add'l Storage Feature (#1007 with **#9602**) are ordered.

COMMUNICATIONS FEATURES

Each 3602 must be equipped with one of the following SDLC features and either the EIA Interface (#3701) or the 1200 bps Integrated Modem (#5500) for communication with the host processor.

3602 Finance Communication Controller (cont'd)

EIA Interface (#3701): Provides the appropriate cables and interface logic necessary to attach an external IBM modem for communications to the host processor through the 3704, 3705, 3725 or the Communications Adapter (#1601) feature on the 4331 Processor or for communications to an 8100 Information System or for local attachment to the 3704, 3705, 3725 or the Communications Adapter (#1601) feature on the 4331 Processor without requiring modems ... see M3704, 3705, 3725 or 4331 pages, feature #4716. Non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Policy. **Limitations:** Cannot be installed with a 1200 bps Integrated Modem (#5500) . **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #6301 or #4501 ... #6302 or #4502.

SDLC Communications With Business Machine Clocking (#4501): Required for attachment to communication lines through the 1200 bps Integrated Modem (#5500) or any 1200 bps external modem which does not have internal clocking or for local attachment to a 3704, 3705, or 3725 at 1200 or 2400 bps (#4716). The SDLC link speed of this feature need not be included when calculating the sum of the loop speeds not to exceed the controller aggregate bps rate of 12,000 bps. **Limitations:** Cannot be installed with #6301, #6302 or #4502 (unless #4502 has **#9551** for controller attachment). **Maximum:** One. **Field Installation:** Yes.

SDLC Communications Without Business Machine Clocking (#4502): Required for attachment to communication lines through an external modem which does have internal clocking at speeds up to 9600 bps or for local attachment to a 4331 Processor (#4801) at 1200, 2400, 4800 or 9600 bps. The SDLC link speed of this feature need not be included when calculating the sum of the loop speeds not to exceed the controller aggregate bps rate of 12,000 bps. **Limitations:** For host connection without **#9551**. Cannot be installed with #6301, #6302 or #4501. **Maximum:** One for host connection (without **#9551**) plus two with **#9551** for controller attachment. **Field Installation:** Yes. **Prerequisites:** #3701 when ordered without **#9551** and Fan-Out Communication Adapter #1551 when order with **#9551**. **Specify:** When used in conjunction with #1551 for attachment of 3601s, specify **#9551**.

1200 bps Integrated Modem (#5500): An integrated modem for operation at 1200 bps over nonswitched half-duplex or duplex voice grade lines for communication to a host processor through the 3704, 3705, 3725 or the Communications Adapter (#1601) feature on the 4331 Processor or for communications to an 8100 Information System. This integrated modem must communicate with another IBM 1200 bps Integrated Modem. **Limitations:** Cannot be installed with EIA Interface (#3701) . **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #6301 or #4501. **Specify:** **#9651** for 4-wire strapping, or **#9652** for 2-wire strapping.

SDLC Communications With Business Machine Clocking (#6301): Required for attachment to communication lines through the 1200 bps Integrated Modem (#5500) or any 1200 bps external modem which does not have internal clocking, or for local attachment to the 3704, 3705, or 3725 at 1200 or 2400 bps (#4716) or for communications to an 8100 Information System. **Limitations:** Cannot be installed with #6302, #4501 or #4502 (unless #4502 has **#9551** for controller attachment). **Maximum:** One. **Field Installation:** Yes.

SDLC Communications Without Business Machine Clocking (#6302): Required for attachment to communication lines through an external modem which does have internal clocking at speeds up to 4800 bps or for local attachment to a 4331 a Processor (#4801) at 1200, 2400, 4800 or 9600 bps. **Limitations:** Cannot be installed with #6301, #4501 or #4502 unless #4502 has **#9551** for controller attachment. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3701 .

1200 bps Loop Integrated Modem (#8001): An integrated modem for transmission to remotely located 3600 Finance Communication System Terminals. Operates at 1200 bps over nonswitched normal quality voice-grade lines. **Note:** Several remote loop configuration variations can be realized; e.g., see the *IBM 3600 FCS Configurator,* GA19-0063. However, facilities are always point-to-point circuits, either 2-wire half-duplex or 4-wire duplex. The common carrier does not tariff 3600 "remote loops". The customer should be referred to the configurator or information in the M2700 pages for definition of the tariffed elements of the remote loop. **Maximum:** One per Add'l Loop (#4735). **Field Installation:** Yes. **Prerequisites:** #4735. Each remote location must have either a 3604 Keyboard Display mdl 2, 3 or 4 equipped with a 1200 bps Loop Integrated Modem (#8001 or #8002), a 3614 or 3624 Consumer Transaction Facility with a 1200 bps Loop Integrated Modem (#8001) or a 3603 as the first attached remote unit in each physical (geographic) location.

MODEL CONVERSIONS

Model 1A can be changed to model 1B. This upgrade requires replacement of the disk storage (not diskette) device. Adequate provision must be made for retaining data contained on disk storage and elimination of user proprietary information. **Limitations:** If model 1A does not have Add'l Disk Heads (#1010) installed, field installation of the Add'l Disk Heads - for model 1B (#1011) concurrently with a model change from model 1A to model 1B requires the submission of an RPQ.

Attachment Factor Functions

Data Sequencing: Allows user applications to sequence, in storage, a block of data items or to collate, in storage, data items from two separate blocks into a third block, according to a parameter list.

Set Diskette: Allows user applications to reset the temporary files, to specify the type of start-up (i.e., warm or cold) to be performed on the next load, and/or to initiate a load of the controller.

Instruction Enhancements: Provides the user application with the following new instructions:

- Bit Manipulation - Test and Branch (LIFON, LIFOFF) - provide a test, set, and branch function in a single instruction. This reduces the 3600 AP processing and memory requirements when processing single bits.
- Logical Compare Data Immediate (CCDI) - compares immediate data to data in a specified field.
- Move Data Immediate (MVDI) - moves immediate data to a specified field.
- Load Data Immediate (LDDI) - loads immediate data into specified register.
- SCALE- formats an input string of characters into a conveniently processable numerical format. When used in processing monetary input, functions such as the removal of the monetary symbol, commas, and periods from the input data are automatically done. In the event that cents were not in the input data, zero padding is optionally provided. SCALE should significantly reduce the number of instructions required to process monetary input.
- Segment Indexing (SETX, TESTX, SETXREG) - provides an alternate method of referencing data within a segment. Only fixed operands of 3600 instructions may be indexed. This function can be used to reduce the number of SETFPL instructions executed by the AP, thereby enhancing performance and reducing AP size. This function also provides a pseudo DSECT facility, thereby enabling an AP to more readily reference (1) variable displaced data within segments and/or (2) data beyond 4K bytes from the beginning of a segment.
- Branch on Index (BRANX) - provides an index increment, compare and branch function in a single instruction. This instruction is used to control the number of times a series of AP instructions will be executed. Since the instruction algebraically increments a register, BRANX can be used in conjunction with the Segment Indexing facility to simplify the processing of tables.
- Execute (LEXEC) - provides a function similar to the S/370 EXECUTE instruction. The amount of data logically ORed into the target instruction may be 2, 4 or 6 bytes.

Priority Dispatching: Provides the ability to specify the order in which 3601/2 workstations are dispatched. This function consists of the LCHAP instruction which activates or deactivates the dispatching priority specified in the table(s) generated by the PRIDSP macro.

Translate: The LTRT instruction processes an input data stream against user specifiable translate tables(s) to generate a translated output data stream. The LTRTBEG, LTRTENT and LTRTGEN instructions assist the user application programmer in specifying the translate table(s).

Extended Statistical Counter Recording: Provides the option to enhance statistical counter recording facilities to assist in fault isolation of degraded loop segments. This facility is particularly useful when a loop consist of multiple remote locations.

Multiple Block I/O - Diskette: Permits multiple blocks to be accessed with a single execution of the LREAD and REPLACE instruction for permanent file and absolute addressing accesses. This may also result in enhanced performance when more than three blocks are read or four blocks are written.

3602 Dynamic Sector Relocate: This facility provides a means of recovery when a Write Sector CRC check occurs. This facility, in most cases, replaces the offline manual procedure which requires a special test diskette to reassign failing sectors.

3270/3600 Datastream Mapping: Provides, via four 3600 assembler language instructions, 3600 controller assistance in converting 3270 output display datastreams into an output datastream processable by 3600 attached devices, and 3604 input datastreams into 3270 input datastreams. Additionally, these instructions can aid in converting 3604 output display datastreams into 3270 output display datastreams.

Extended 3270/3604 Keyboard Mapping: Provides simulation of the 3270 Insert, Delete, Erase To End Of Field and Erase Input keyboard functions.

LSEEKP Instruction: Locates a table entry which is "equal to" "greater than or equal to" or "less than or equal to" a search argument using a

3602 Finance Communication Controller (cont'd)

binary search algorithm. Tables may be included in the instruction section of the controller application program, thereby permitting the tables to reside in expanded user programmable storage.

SCRPAD Instruction: Provides access to optional global work areas distinct from segment storage which may reside in base or expanded user programmable storage.

Data Compression/Compaction: This function allows a controller application program to condense a data stream by compressing repeated characters and compacting frequently occurring characters according to a user defined table. This can reduce the amount of data actually transmitted over a host link or stored in the controller.

Data Decompression/Decompaction: This function allows a controller application program to decompress and/or decompact a data stream which had previously been compressed and/or compacted by a host or a controller application program.

INTMR Instruction: Permits the collection of elapsed time for events initiated and terminated by controller application program.

Extended Diskette Access Method (EDAM) Base: Provides the capability to open, access and close data sets on the primary or auxiliary diskette drive.

EDAM Allocate/Deallocate (LDKT Instruction): Provides, via the LDKT Instruction, capability to allocate and deallocate data sets in either the primary or auxiliary diskette drive.

EDAM Temporary File Support: Permits processing of a data set defined with a temporary file structure on the auxiliary diskette drive.

Dynamic Control: Provides additional LCNTRL instruction functions to assist in controlling access to devices attached to the 3602 through the SNA Primary interface.

Extended LLOAD Instruction: Allows a controller application program to load data overlay into segments other than segment 14.

Secondary Logical Unit (LU) Assignment: Allows a controller application program to change the logical unit address associated with a given workstation.

ACCESSORIES

Cables: Cables to attach 3600 units may be purchased from IBM or a customer-selected source ... see *Physical Planning Manual,* GA27-2766 for cable and connector specifications. The customer is responsible for installation and maintenance of these cables. Assembled cables may be purchased from IBM. Specify bulk number, cable assembly number or part number as appropriate. Allow a lead time of six weeks .

Item No.	Description	Maximum Length
1563155	Loop Cable Assembly	609.6m (2,000')
4474809	Cable Assy (3609-2 to Modem)	2.08m (82 in)
1745372	Cable Assy (Loop Repeater to Loop Terminal Box)	7.62m (25 ft)
1745350	Cable Assy (3603 to Leased Lines)	7.62m (25 ft)
1745349	Cable Assy (DDA to 3603)	7.62m (25 ft)
1741656	Cable Assy (joining 2 telephone lines)	N/A
1142961	Bulk Cable (12 Conduct.)	N/A
5252781	Bulk Cable (4 Conductor)	N/A
5252920	Bulk Cable (2 Conductor)	N/A
765294	Connector Assy (EIA)	N/A
5252769	Bulk Cable (2 Conductor)	N/A
5252913	Bulk Cable (4 Conductor)	N/A
1561344	Strain Relief	
1745363	Conductor Assembly (3603)	
5252763	Male Plug	
5252765	Female Plug	
5420242	Mini-Ty (used with 1745363)	

For attachment of a 3262 or 3287 to a 3694 or a 3602:

2577672 or	Cable Assy Indoor	1,500m(4,920ft)
323921 and	Coax Wire	1,500m(4,920ft)
1836418	Connector Kit	N/A

Loop Repeater (P/N 4400002): Plugs into the Loop cable and redrives all signals being transmitted in a 3600 Finance Communication System. Each Loop Repeater contains Loop redriving capabilities which allow for the extension of the Loop cable length by 2,000 feet. Loop Repeaters may be employed on a Loop to extend its overall length to a maximum of 20,000 cable-feet. The unit can be physically mounted on a wall in an out-of-the-way location. **Prerequisites:** An operating 3600 System Local Loop or Remote Subloop. **Publications:** GC22-0005.

Customer Responsibilities: The customer may be advised that: (1) The customer is responsible for making certain that the use of the equipment complies with all Federal, State, and Local Laws, Regulations, and Ordinances ... (2) The customer is responsible for price quotations, installation and cost (initial and recurring) of common carrier equipment and service ... (3) The customer is responsible for the set-up of the unit ... (4) The customer will determine the failing unit (see "Maintenance" below) ... (5) The customer is responsible for determining the required number of spares.

Physical Planning and Setup: Physical planning and setup is the responsibility of the customer. Attachment to the Loop cable is provided by ordering External Signal Cable Assembly (P/N 174372), or equivalent ... see *IBM 3600 Finance Communication System Installation Manual - Physical Planning,* GA27-2766.

Spares: The customer may wish to replace a failing unit with a spare and must be advised to purchase sufficient spare units for such use. The number of spare units recommended is dependent upon the number of units the customer has installed, application requirements, physical locations and layouts. However, the minimum number of spare units recommended is shown in the following table:

# of Loop Repeaters Installed	Minimum # Spares Recommended
100	2
200	2
300	3
500	4
1000	6
1500	9
2000	10
2500	12
3000	14
3500	16
4000	18
4500	19
5000	21

Warranty: Service is available at the designated IBM Repair Center during the 90 day warranty period, which commences 30 days following date of shipment from the plant of manufacture (Raleigh). It shall be the customer's responsibility to set up the equipment. It shall be the customer's responsibility to determine the failing unit and remove it from the Loop, and if the unit is still under warranty, to pack it in the designated shipping container and ship it prepaid to the designated IBM Repair Center. IBM will return the serviced unit, shipping charges prepaid. There is no regularly scheduled preventative maintenance recommended by IBM on these units. Maintenance agreements are not available. CE on-site service will not be provided.

Ordering: Order P/N 4400002 .

Diskettes: The following diskettes may be obtained by contacting IBM.

Diskette 1 (single-sided) 3601/3602
256 byte format **P/N 2305845**
128 byte format **P/N 2305830**

Diskette 2 (double-sided) 3601-2B/3B, 3602-1A/2A
256 byte format **P/N 2736700**
128 byte format **P/N 1766870**

SUPPLIES (None)

3603 TERMINAL ATTACHMENT UNIT

PURPOSE

Attaches all 3600 System Controllers or 4700 Systems and terminals to the communication facilities. The 3603 enables remote subloop operation by connecting the controller loop feature to the communication facilities which connect to a remote 3603 with the subloop of terminals.

MODELS

Model 1	001	Provides 1200 bps integrated circuitry for attachment to communication facilities and has switched network backup capability for use if the nonswitched communication line fails.
Model 2	002	Provides an EIA RS232C interface to an external asynchronous modem (1200, 2400 bps), or with clocking feature (#6352) to an external synchronous modem (1200, 2400 bps).

Prerequisites: A 3601 or 3602 with an Add'l Loop Feature (#4735) or a 4701 with or without Add'l Loop (#4745) is required for each remote loop that is attached with a 3603.

The 3602 mdl 2 without clocking requires an asynchronous modem. The 3603 mdl 2 with Clocking (#6352) requires a synchronous modem that accepts Transmit Signal Element Timing from the 3600 System or 4700 System equipment. Before ordering the 3603 mdl 2, customer must check with modem manufacturer to determine their mode of operation. As an alternate to a 3603, a 1200 bps Loop Integrated Modem (#8001) in the 3601 or 3602 may be used.

Note: The loop is unidirectional. Therefore, if there is only one 3603 attached, there must be a 4-wire duplex communication channel interconnecting the 3601/3602/4701 and the 3603. If there is more than one 3603 location attached to a single loop, there must be a 2-wire line linking all the 3603s in the loop, plus a 2-wire line from the 3601/3602/4701 to the first 3603 and from the last 3603 to the 3601/3602/4701. The 3603 attaches to normal quality voice grade lines. When using a 3603 on a loop, it is recommended that a 3603 be used at the 3601/3602/4701 to maximize backup capabilities.

HIGHLIGHTS

- Can be physically installed on a wall.
- Has self-test facilities to establish valid operation of the 3603 on a remote/local loop exclusive of the nonswitched network.

Publications: GC20-0370

Customer Responsibilities: The customer must be advised that:

(1) He is responsible to make certain that the use of the equipment complies with all Federal, State, and local laws, regulations, and ordinances.
(2) He is responsible for price quotations, installation and cost (initial and recurring) of common carrier equipment and service.
(3) He is responsible for setup of the unit.
(4) The customer will determine the failing unit (see "Maintenance" below).
(5) He is responsible for ascertaining the number of spares required.
(6) The purchaser agrees that IBM is relieved of responsibility for all claims including, but not limited to, loss of funds contained in, dispensed by or associated with the 3603.

The customer is also responsible for the provision of a telephone local loop conditioned for data above 300 bps, for FCC registered protective circuitry of the CDT type (or equivalent) in order to use the Switched Network Backup function and, with the 3603 mdl 2, an appropriate modem. A cable is available from IBM for a fee, for the protective circuitry attachment. A similar cable is available, also for a fee, to connect the 3603 to the nonswitched line connector. Installation of the cable is also a customer responsibility.

The *IBM 3600 Finance Communication System Installation Manual - Physical Planning,* GA27-2766, and the *IBM 3600 Finance Communication System Services Terminal - Terminal Installation Guide,* GA27-2796, should be ordered for each customer installation.IBM Financial Services Terminals: Complementing the *IBM 3600 Finance Communication System Summary* GC27-0001.

Spares: The customer may wish to replace a failing 3603 with a spare and must be advised to purchase sufficient spare units for such use. The number of spare units recommended is dependent upon the number of units the customer has installed, his application requirements, physical locations, and layouts. However, the minimum number of spare units recommended is shown in the following table:

Number of 3603s Installed	Minimum Number of Spares Recommended	
	Mdl 1	Mdl 2
100	2	3
200	3	4
300	4	6
500	6	8
1000	10	14
1500	14	19
2000	17	24
2500	20	28
3000	23	33
3500	27	38
4000	30	42
4500	33	47
5000	36	51

Maintenance: Maintenance of the 3603 will normally be at a designated IBM Repair Center. All maintenance, parts replacement, adjustments, and repair shall normally be performed at the designated IBM Repair Center. It shall be the customer's responsibility to set up the equipment and to determine when remedial maintenance is required. When remedial maintenance is required, it shall be the customer's responsibility to determine the failing unit, pack the unit in the designated shipping container and ship it prepaid to the designated IBM Repair Center. IBM will pay the transportation charges for return of the repaired unit. There is no regularly scheduled preventive maintenance recommended by IBM on these units.

The repair service is available under an IBM Repair Center Maintenance Supplement to the IBM Maintenance Agreement or on a time and material basis.

IBM Repair Center Service: The 3603 is eligible for maintenance coverage immediately following expiration of the service and parts warranty at the monthly charge shown under MMMC in Price List.

If maintenance coverage is not contracted for immediately following expiration of any service and parts warranty and the customer now wants maintenance coverage, he may ship the machine(s) to the designated IBM Repair Center for an inspection.

If, on the basis of an inspection, the repair center concludes that a machine is not repairable, no further work will be performed and the machine will be returned to the customer without charge.

In all other cases, a minimum charge per machine to cover handling, inspection, cleaning, adjustments, and testing will be applied. In addition, all aprts needed will be billed at IBM's prevailing parts prices and the additional time required for repairs will be billed at IBM's applicable service rates. The machine will then be eligible for maintenance coverage. Maintenance of the 3603 will normally be at a designated IBM Repair Center.

Customers with machines not under an IBM Maintenance Agreement have the option to ship the machines to the designated IBM Repair Center for repair under the IBM Machine Repair Authorization Form, GX27-2981, in which case repair will be made (if the machine is repairable). Alternatively, upon request, IBM will provide, for a minimum charge, an estimate of repair charges. This charge covers handling, inspection, cleaning, adjustments, testing, and estimating of repair charges.

IBM Repair Center Service: The repair service is available under an IBM Repair Center Maintenance Supplement to the IBM Maintenance Parts Agreement at the applicable MMMC, or on a time and material basis.

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9901. Field Installation:** Not recommended.
- Cables: See M3601 and 3602 pages for prices and ordering instructions. See also *3600 Installation Manual, Physical Planning,* GA27-2766.

SPECIAL FEATURES

Clocking (#6352): [Mdl 2] Provides Transmit Signal Element Timing to synchronous modems (1200, 2400 bps). This feature is required for all synchronous modems (including Western 201C and equivalent modems). **Field Installation:** Not recommended.

MODEL CONVERSIONS (None)

ACCESSORIES

Accessories for the 3603 may be purchased from IBM or a customer selected source. Allow a lead time of 120 days.

P/N	Description
78999	Fuse (0.5 Slow Blow)
1745353	Jumper Assembly (Signal Attenuation or Loop Speed)
5929886	Loop Plate (Loop Connector Assy)

SUPPLIES (None)

3684 POINT-OF-SALE CONTROL UNIT

PURPOSE

A user-programmable input/output, data collection and processing terminal with a 985,088 byte integrated diskette for the 3680 Programmable Store System. Model 1 of the 3684 is designed for single terminal stores. The 3684 model 1 contains a single programmable segment with appropriate features to allow the user to perform the point-of-sale, data collection, credit authorization, price look-up, inquiry, data entry and host communication functions. The point-of-sale features and functions are similar to the 3683 Point-of-Sale Terminals.

Model 2 of the 3684 is designed to perform the Point of Sale function and to act as a master control in multiple terminal stores. There are two self-contained programmable segments, one to perform the point-of-sale function similar to the 3683, and the second to perform the control function for communication with its own point-of-sale segment and with additional loop-attached 3683 (models 1, 2 or 3) terminals. In addition, the control segment controls the diskette and host communication input/output functions. The 3683 models 1A, 2A or 3A are not program-supported for attachment to the 3684 model 2 loop.

MODELS

Model 1	001	Single unit
Model 2	002	Master unit

Prerequisites:

1. A 3704, 3705 or 3725 in 2701, 2703 Emulation Mode (or Integrated Communications Adapter) for BSC system and in NCP/VS mode for SDLC systems (with appropriate features ... see M3704, 3705 and 3725 pages) attached to any virtual storage S/370 or 4300 processor.
2. A Keyboard (#4921 or #4922 or #4923) and a display (#3331, #3332, #3336 or #3337) must be ordered for each 3684.

HIGHLIGHTS

A modular input/output unit with features that provide for an integrated or a limited distributed (cash drawer and display) package. It features data entry by keyboard or from a magnetic, non-IBM EAN/UPC, or non-IBM OCR hand-held reader and data output by an 8-digit numeric display, with up to 32 indicators for operator guidance and machine status conditions, or an alphameric display with 36 character positions and printing of input or output data under program control. It features a cash drawer with removable till and adjustable divider option. An integrated diskette is used for customer program storage, data and table storage, diagnostic programs and error logging. The minimum configuration must include a base unit plus a keyboard and a display. (See "Prerequisites".)

Base Unit: Consists of [1] programmable segments and storage (56K for mdl 1; mdl 2 has 32K for the point-of-sale segment and 56K for the control segment.); [2] a matrix printer with a cash receipt station; and [3] a 985,088 byte diskette drive. An audible alarm, activated when predetermined events require operator attention or intervention for system operation, is also part of the base unit.

Printer: A matrix, bidirectional printer which prints a 38-character print line at 15 characters per 25.4mm (inch) spacing. Vertical line spacing is 6.3 lines per 25.4mm (inch) at a line space rate of 20 lines per second. It uses an easily replaceable cartridge ribbon. In addition to the standard character sets, an all-points addressable capability allows (by customer programming) printing of logos and special graphics . Additional print stations can be ordered by special feature. The cash receipt station will accept 88.9mm (3.5") diameter roll paper, 69.85mm (2.75") wide.

Diskette: A 985,088 byte Diskette 2D is used on both mdls. The diskettes are formatted to 256 byte blocks. The diskette is removable and interchangeable.

Communications: All 3684 mdls may have BSC or SDLC communication capability. Depending on customer selection at system generation, either or both protocols may reside in the terminal and either may become active when loaded from the diskette.

System Attachment: The 3684 mdls 1 and 2 attach to any virtual storage S/370 or 4300 processor via a 3704, 3705 or 3725 Communications Controller in 2701, 2703 Emulator Mode (or Integrated Communications Adapter) for BSC systems and in NCP/VS mode for SDLC systems. Attachment is over communication lines at speeds of 1200, 2400 or 4800 bps. The 3684 has the capability of concurrent host communication and point-of-sale function, which allows store operations to continue when transmitting or receiving data from the host processor.

The 3684 mdl 1 and 2 can communicate with the 8100 System over nonswitched communication facilities using SDLC, and with the Series/1 over switched, nonswitched point-to-point or multipoint facilities using BSC. The Host Command Processor (HCP) Facility in the 3684 can communicate with a user program in the 8100 executing at the Data Stream Interface, or with a user program in the Series/1 using Read/Write support of the Realtime Programming System. A user-written program in the 3684 can communicate with a user program in the 8100 at the DSI level or in the DPPX/DTMS environment, or with a user program in the Series/1 using RPS Read/Write communications support.

Communications Facilities: The 3684 operates in data half-duplex point-to-point or multipoint mode on half-duplex or duplex facilities at transmission speeds of 1200/600, 2400/1200, 4800/2400 bps on nonswitched facilities. In addition, the 3684 also operates in half-duplex point-to-point mode at transmission speeds of 1200/600, 2400/1200 and 4800/2400 bps on switched facilities. See M2700 pages.

Modems: A 1200 bps Integrated Modem feature (#5530) or an external modem may be attached to a 3684. External modems require the External Modem Interface feature (#3701).

IBM Modem	Speed (bps)
3863 mdl 1, mdl 2	2400/1200
3868 mdl 1	2400/1200
3864 mdl 1, mdl 2	4800/2400
3868 mdl 2	4800/2400
3872 mdl 1	2400/1200

Switched network backup mode of operation is possible using an appropriately featured external modem. For communications capabilities, product utilization and special features, see M2700, 3863, 3864, 3872 pages.

In-Store Communications: The 3684 mdl 2 performs a master control function for 3683s that are attached to the 3684 by a 2400 bps loop. Interactive communication capability exists between the 3684 and 3683s for data collection, price look-up, credit, and diagnostic facilities.

All mdls of the 3684 receive their initial machine load (IML) from a S/370 or 4300 host processor either by physical diskette transport or by teleprocessing. The 3684 IML and the IMLs for 3683s associated with a 3684 mdl 2 are maintained on the diskette. The 3684 mdl 2 transmits the 3683 IML when requested by the 3683.

Limitations: The 3684 mdl 2 has a limited number of optional feature positions available to the customer. If Storage Expansion-POS (#6991) is required by your customer, then a maximum of two feature positions are available. When selecting the features to be installed, the sum of their unit values should not exceed 2 and specify code **#9444** should be indicated. If Storage Expansion-POS (#6991) is not required, then a maximum of four feature positions are available. When selecting the features to be installed, the sum of their unit values should not exceed 4 and specify code **#9445** should be indicated.

If your customer does not initially install Storage Expansion-POS (#6991) and specifies **#9445** to provide additional feature capability and decides after installation that he required Storage Expansion-POS (#6991), then the feature capability provided by **#9445** will have to be replaced at customer expense. When this occurs you must recalculate the unit value to ensure you have not exceeded a sum total of 2.

Feature	Unit Value
Non-IBM Coin Dispenser Adapter (#5431)	1
Non-IBM Scale Adapter (#5433)	1
*Non-IBM OCR Hand-Held Reader Adapter (#5422)	1
*Magnet Wand Reader (#4945)	1
IML Write Adapter (#4634)	1
*Non-IBM EAN/UPC Wand Attachment (#4946)	2

* = Mutually Exclusive

See RPQ 8Q0322 for additional feature position configurations applicable to the External Storage Attachment Feature #4500.

Customer Responsibilities:

Proposal/Acknowledgement Letter Statements: Each proposal and acknowledgement letter must include the following statement:

> "It is agreed that IBM will have no responsibility to provide warranty or maintenance service on any 3684 which contains cash or other valuables. It will be the customers' responsibility to remove, control and replace cash so that IBM can fulfill its warranty and maintenance obligations.
>
> When a failure occurs in the cash drawer of any 3684 and it cannot be opened prior to maintenance by IBM, the Customer will assign one of its personnel to assume responsibility for removal of the cash or other valuables when the drawer is opened."

Customer Setup: The 3684 will be shipped with customer setup instructions. The customer is responsible for:

- Unpacking, placement, set up and checkout of the 3684 at time of delivery, or when relocating the 3684.
- Relocation of the 3684 (if required) to allow IBM service access.
- Using and following the problem determination procedures.
- Physical set up and connection of cables to TP lines/modems and loop.

Maintenance: 3684s located in the immediate sales area may preclude the acceptability of repair due to the public scrutiny and loss of the

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selling location for customer service. In these cases, the customer should remove the unit to a repair facility located within the store for subsequent repair. At this location the CE will repair and test the unit.

Storage Increments

Note: 1. Storage Increments--8K (#7710) and 24K (#7730) apply to the Point-of-Sale segment of the 3684 mdl 2 only. Storage Increment--16K (#7720) applies to the 3684 mdl 1 and 2 when Storage Expansion (#6990) is installed. If #6990 is not installed, then #7720 applies only to the Point-of-Sale segment of the 3684 mdl 2.

2. When storage is upgraded by field installation, the new Storage Increment feature displaces the old. Removed parts belong to the customer. Prior to using a removed module in another 3684, the compatibility of the part should be verified and an RPQ must be submitted to allow reinstallation on another machine.

SPECIFY

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): **#9890** for locking plug or **#9891** for nonlocking plug. If standard 2.8 meter (9 foot) power cable is not desired, specify **#9511** for 1.8 meter (6 foot) cable.

  Note: 120V AC, 60 Hz is compatible with existing 115V Systems.

- Store Loop Polarity Tester: Order Store Loop Polarity Tester, P/N 1859559, on MES (group 91) from Raleigh Order Department.

  One is furnished at no charge to each 3684 mdl 2 site for testing store loop wiring.

  Note: The customer must provide (purchase, install and maintain) all necessary 3680 store loop communication lines within the store. Bulk loop cable is available from IBM.

- Controller Designation: Specify **#9491** on the first 3684 to be used with a host system location and specify **#9492** on each additional 3684 in the network. Specification of **#9491** will result in 3684 controller and 3683 terminal code (DTR) being sent to specified host location.

  When **#9491** is specified, additional information must be specified as follows:

  1) Specify one of the following to indicate magnetic tape density (media) used at the host system location. This tape media is available under DOS/VS, OS/VS1 and OS/VS2 only.

     #9412 -- 9 track, 800 bpi
     #9413 -- 9 track, 1600 bpi

     #9414 -- 9 track, 6250 bpi

     The 3684 controller and 3683 terminal data will be sent via the specified media to the IBM Programming Systems Representative at the host system location for installation.

  2) Supplemental Specs (via Terminal Entry) are to be entered exactly as follows to indicate mailing address of host system location:

     Line 1 -- IBM Programming Systems Representative
     Line 2 -- c/o (Name of Customer)
     Line 3 -- Street Address (or P.O. Box)
     Line 4 -- City, State, Zip Code

     This is the address to which the first controller data tape will be automatically shipped for the first controller ordered (with specify code **#9491**). Whenever controller data is updated by an EC, the EC will be shipped to the most current microcode control (MC) address.

- Storage Expansion: If Storage Expansion-POS (#6991) is required specify **#9444** ... if Storage Expansion-POS (#6991) is not required, specify **#9445**. See "Limitations" above.

- If **#9491** is specified and there is a storage requirement that prevents 3683 operation with the current level of control code, specify **#9490** with **#9491**. **#9490** provides 3683 Control Code level EC 320503 which operates in the same control storage allocation as is required for 3683 Control Code level EC 320502. It is strongly recommended that new customers and 3687 customers do not take this specify option.

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES

Cash Drawer Integrated - 1st (#1572): Provides a cash drawer with removable till that is contained within the 3684 base unit. The cash drawer has a media slot that will accommodate approximately a 25mm (1 inch) stack of documents. Opening the cash drawer is under program control. A cash drawer lock is provided. See note below for special ordering instructions for lock and till with adjustable dividers. **Maximum:** One. **Limitations:** Only one additional cash drawer may be ordered - either Cash Drawer Integrated-2nd (#1573), Cash Drawer-Distributed (#1575) or non-IBM Cash Drawer Attachment (#1577). **Field Installation:** Yes.

Cash Drawer Integrated - 2nd (#1573): Provides a second Integrated Cash Drawer with housing and removable till and is installed directly below Cash Drawer Integrated-1st (#1572). Functionally equivalent to Cash Drawer Integrated-1st (#1572). **Maximum:** One. **Prerequisites:** #1572. **Field Installation:** Yes.

Cash Drawer-Distributed (#1575): Provides a distributed cash drawer with housing and removable till that can be located up to 3.6 meters (12 feet) from the 3684 base. Functionally equivalent to Cash Drawer Integrated-1st (#1572). **Maximum:** Two if no other cash drawer is ordered. One if Cash Drawer Integrated-1st (#1572) or one non-IBM Cash Drawer Attachment (#1577) is ordered. **Field Installation:** Yes.

Non-IBM Cash Drawer Attachment (#1577): Provides an IBM-defined interface with cable and plug for attaching an non-IBM Cash Drawer. **Maximum:** Two if no IBM Cash Drawer is installed. One if a Cash Drawer Integrated-1st (#1572) or Cash Drawer-Distributed (#1575) is ordered. **Limitations:** An attached non-IBM Cash Drawer must meet the IBM-defined interface. **Field Installation:** Yes.

Notes:
(1) For cash drawer tills and covers, see "Accessories" in the M3683 and 3684 pages.
(2) Cash Drawer Lock: Each IBM Cash Drawer (#1572, #1573 or #1575) is equipped with a lock. A group of 25 unique lock numbers has been reserved to allow the customer to specify identical lock types on all terminals. This allows all cash drawers to be opened with the same key. If this is desired, specify one of the following features on the cash drawer order:
(3) Specify **#9799** for each IBM Cash Drawer ordered (#1572, #1573 or #1575) if a till with movable bill dividers is desired.

#9101	**#9106**	**#9111**	**#9116**	
#9102	**#9107**	**#9112**	**#9117**	**#9122**
#9103	**#9108**	**#9113**	**#9118**	**#9123**
#9104	**#9109**	**#9114**	**#9119**	**#9124**
#9105	**#9110**	**#9115**	**#9120**	**#9125**

If none is specified, a lock will be selected at random from a larger group of lock types. Each cash drawer will be shipped with two cash drawer keys.

Distributed Keyboard Attachment (#3240): Provides for locating the keyboard up to 3.6 meters (12 feet) from the 3684 base. **Prerequisites:** #4921 or #4922 or #4923 . **Maximum:** One. **Field Installation:** Yes.

Diskette Cover Lock (#3310): Provides a lock for the diskette cover. (See Note below for special lock selection.) **Maximum:** One. **Field Installation:** Yes.

Note: Three groups of 10 unique specify numbers have been reserved to allow a customer to order a specific journal lock, manager keylock or diskette cover lock for each terminal. (The 3683 and 3684 uses the same journal lock and manager lock numbers, therefore all terminals within a store could have the same lock if desired.) If the same lock is desired on the journal, manager keylock and diskette cover, specify the respective locks with the same value in the last digit. That is, if **#9203**, **#9303** and **#9213** are specified, the same lock **#9203** will be installed at all locations.

Journal Lock	Manager Keylock	Diskette Cover Lock
#9201	**#9301**	**#9211**
#9202	**#9302**	**#9212**
#9203	**#9303**	**#9213**
#9204	**#9304**	**#9214**
#9205	**#9305**	**#9215**
#9206	**#9306**	**#9216**
#9207	**#9307**	**#9217**
#9208	**#9308**	**#9218**
#9209	**#9309**	**#9219**
#9210	**#9310**	**#9220**

If none is specified, a lock will be selected at random from a larger group of lock types. Each lock feature will be shipped with two keys. For additional or replacement keys, see "Accessories".

Display, 1-Sided (#3331): An operator display and guidance unit consisting of an 8-digit numeric display and 32 indicators for operator guidance and machine status. The display is used to display numeric

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input or output data such as item number, credit number, totals, amount due, etc. The 32 indicator lights point to labels that describe: (1) machine status such as: Ready, Wait, Offline, etc. (2) step-by-step guidance to lead the operator through a transaction or procedure. The unit will be shipped with the indicators labeled. However, the customer may relabel all but five indicators and, under customer program control, define their use. A legend sheet with a variety of legends will be shipped with each machine. **Maximum:** One. **Limitations:** Cannot be installed with Display, 2-Sided (#3332), Alphameric Display (#3336), Remote 2nd Alphameric Display (#3337) or Distributed Alphameric Display Attachment (#3338). **Field Installation:** Yes.

Display, 2-Sided (#3332): An operator and customer display guidance unit which contains all the functions of Display, One-Sided (#3331) plus an 8-digit numeric display with six indicators on the back of the unit for customer viewing. **Maximum:** One. **Limitations:** Cannot be installed with Display, 1-Sided (#3331), Display-Customer Remote (#3333), Alphameric Display (#3336), Remote 2nd Alphameric Display (#3337) or Distributed Alphameric Display Attachment (#3338). **Field Installation:** Yes.

Display-Customer Remote (#3333): A customer display and status indicator unit that is connected to the 3684 by a 3.6 meter (12 foot) cable. The unit consists of an 8-digit numeric display and 12 indicators (six are shipped with labels and six without). All are relegendable. The display and indicators are under customer program control. **Maximum:** One. **Prerequisites:** #3331. **Limitations:** Cannot be ordered with Display, 2-Sided (#3332), Alphameric Display (#3336), Remote 2nd Alphameric Display (#3337) or Distributed Alphameric Display Attachment (#3338). **Field Installation:** Yes.

Distributed Display Attachment (#3335): Provides for distributing Display, 1-Sided (#3331) or Display, 2-Sided (#3332) up to 3.6 meters (12 feet) from the 3684 base. **Maximum:** One. **Prerequisites:** #3331 or #3332. **Limitations:** Cannot be installed with Alphameric Display (#3336), Remote 2nd Alphameric Display (#3337) or Distributed Alphameric Display Attachment (#3338). **Field Installation:** Yes.

Alphameric Display (#3336): An operator/customer display consisting of two rows of eighteen characters each for a total of thirty-six characters. The display is used to display numeric as well as alphabetic data such as item number, description, guidance information, etc. The display is connected locally to the 3684. **Maximum:** One. **Limitations:** Cannot be installed with a numeric display (#3331, #3332, #3333 or #3335). **Field Installation:** Yes.

Remote 2nd Alphameric Display (#3337): A customer display that is connected to the 3684 by a 3.6 meter (12 foot) cable. The display consists of two rows of eighteen characters, each for a total of thirty-six characters and is used to display numeric as well as alphabetic data such as item number description, etc. **Maximum:** One. **Prerequisites:** #3336. **Limitations:** Cannot be installed with numeric display (#3331, #3332, #3333 or #3335). **Field Installation:** Yes.

Distributed Alphameric Display Attachment (#3338): Provides a cable for distributing the Alphameric Display (#3336) up to 3.6 meters (12 feet) from the 3684 base. **Maximum:** One. **Prerequisites:** #3336. **Limitations:** Cannot be installed with numeric display (#3331, #3332, #3333 or #3335). **Field Installation:** Yes.

External Modem Interface (#3701): Provides an EIA interface for attachment of an IBM or other external modem. **Limitations:** Cannot be ordered with 1200 bps Integrated Modem (#5530). **Maximum:** One. **Field Installation:** Yes. Specify the following as applicable:

1. Specify **#9695** if the 3684 is required to provide clocking (1200 bps maximum).
2. Specify **#9126** if the 3683, 3684, 3872 Modem is to be attached.

Expansion Feature (#3890): Provides additional facilities on the 3684 mdl 1 to accommodate features that cannot be installed on the base unit. **Maximum:** One. **Limitations:** Applies to 3684 mdl 1 only. **Prerequisites:** This feature is a prerequisite to install #4945, #4946, #5422, #5431 or #5433. **Field Installation:** Yes. **Note:** No expansion feature is required on the 3684 mdl 2 to install its applicable features.

External Storage Attachment (#4500) : Provides the ability to attach the External Disk Drive Feature (#4501). **Maximum:** One. **Limitations:** Mutually exclusive with IML-Write adapter (#4634). Applies to 3684 mdl 2 only. **Field Installation:** Yes.

External Disk Drive (#4501) : Provides a 10MB file for attachment to the 3684 mdl 2 for storage of user data files. Cable attached to the 3684. **Limitations:** Applies to 3684 mdl 2 only. **Prerequisites:** #4500. **Field Installation:** Yes. When this feature is field installed the customer is responsible for performing the customer set up procedure.

IML-Write Adapter (#4634): Provides the 3684 mdl 2 with the ability to write an IML (Initial Machine Load) tape on a user-provided tape cassette recorder (refer to *IBM 3680 Planning and Site Preparation Guide,* GA27-3213, for Cassette Recorder interface requirement) which can be read by a 3683 Point-of-Sale terminal equipped with an IML-Read Adapter (#4633) feature. **Maximum:** One. **Limitations:** Applies to 3684 mdl 2 only. Mutually exclusive with 4800 bps Loop (#4710) and with External Storage Attachment (#4500). **Field Installation:** Yes.

Journal Lock (#4690): Provides a special lock and security cover over the printed journal. (See Note below for special lock selection.) **Maximum:** One. **Prerequisites:** #4695. **Field Installation:** Yes.

Journal Printer (#4695): Provides a journal print station with a journal roll take-up mechanism. Print line length is 38 characters at 15 characters per 25.4mm (inch) spacing. Vertical line spacing is 6.3 lines per 25.4mm (inch) at a line space rate of 20 lines per second. The all-points addressable characteristics of the printer permit the customer to highlight exceptions through special graphics designed and controlled by user programming. A 12.7mm (.5") signature window is provided. **Maximum:** One. **Field Installation:** Yes. The journal station will accept 88.9mm (3.5") diameter roll paper, 69.85mm (2.75") wide.

4800 bps Loop (#4710): Provides a 3684 mdl 2 loop speed of 4800 bps in place of the standard loop speed of 2400 bps. Loop speed for 3683s to be attached must be specified as same speed. **Maximum:** One. **Limitations:** The sum of the communication speeds of all operational communications attachments to a 3684 mdl 2 must not exceed 7200 bps. These attachments include the store loop, host communications, and Serial I/O RPQ MN2257. Mutually exclusive with IML-Write adapter (#4634). Applies to 3684 mdl 2 only. **Field Installation:** Not recommended.

Manager Keylock (#4905): Provides a keylock mounted on the keyboard that allows customer programming to interrogate the position of the keylock when the key is operated. Possible uses include the enforcement of a manager override to a restricted security function. (See note below for special lock selection.) **Maximum:** One. **Prerequisites:** #4921 or #4922 or #4923. **Field Installation:** Yes.

Keyboards, General: All keyboards except Feature #4922 and #4923 with Specify **#9250** have customer-legendable keybuttons except for the 11 keybuttons which have molded legends. All single- and double-function keys are under customer program control. Double keys may be moved, added or deleted by the user. Several colors and sizes of decal sheets with common legends will be shipped with the 3684. See "Accessories" section for released keybuttons that may be ordered for any unique customer requirement. **Maximum:** One #4921 or #4922 or #4923. **Field Installation:** Yes.

Specify Option: An option is available for #4922 and #4923 that provides pre-defined keytops with the 3663/3683/3684 Supermarket nomenclature. The keytops provided with this option are the engraved type and are not customer-legendable. For a description of the nomenclature of the keytops provided, refer to *IBM 3680 Programmable Store System Introduction Manual,* GA27-3199. Specify: **#9250.**

35-Key Modifiable Keyboard (#4921): A 35-key keyboard that includes:

5-Legended system control keys.
19-Unlegended function keys.
11-Keys with dual legends on each keybutton, "numeric" and "transaction type" in the data entry arrangement.

48-Key Modifiable Keyboard (#4922): [Data Entry] A 48-key keyboard that includes:

5-Legended system control keys.
32-Unlegended function keys.
11-Keys with dual legends on each keybutton, "numeric" and "transaction type" in the data entry arrangement.

48-Key Modifiable Keyboard (#4923): [Adding Machine] A-48 key keyboard that includes:

5-Legended system control keys.
32-Unlegended function keys.
11-Keys with round numeric legended keybuttons in the adding machine arrangement.

Note: No Expansion Feature is required on the 3684 mdl 2 to install any applicable features.

Magnetic Wand Reader (#4945): A hand-operated wand used to read single track delta distance encoded magnetic merchandise tickets, credit cards, employee badges, etc. The small lightweight wand attached via a 1.2 meter (4 foot) long flexible cord allows encoded merchandise tickets to be read without removing them from the merchandise. See Note. **Prerequisites:** #3890 must be installed on 3684 mdl 1. **Limitations:** Cannot be installed with an non-IBM EAN/UPC Wand Attachment (#4946) or an non-IBM OCR Wand Adapter (#5422). **Maximum:** One. **Field Installation:** Yes. **Note:** The minimum encoding specifications that must be met by suppliers of credit cards, merchandise tickets and employee badges will be furnished upon request.

Non-IBM EAN/UPC Wand Attachment (#4946): Provides an adapter to support the attachment of a non-IBM EAN/UPC Bar Code hand-held wand reader. This feature provides an external connector to attach the non-IBM wand reader. The types of wand readers that can attach to this feature are either analog output wand readers (Intermac 1233R or equivalent) or digital output wand readers (Hewlett-Packard

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HEDS 3000 or equivalent) that meet the requirements stated in the non-IBM EAN/UPC Wand Attachment Product Attachment Information for the 3650/3680. This document can be ordered by the marketing representative after FCS from IBM. **Prerequisites:** On the 3684 mdl 1, Expansion Feature #3890. The IBM Multiple Supplier Systems Bulletin (G120-6648) applies to the non-IBM wand reader. **Limitations:** When this attachment is used with an analog output wand reader, it is possible that this feature may experience failures if operated within five miles of a high power AM transmitter of the type used for television broadcasting. Cannot be installed with the Magnetic Wand Reader (#4945), non-IBM OCR Hand-Held Reader Adapter (#5422). **Maximum:** One. **Field Installation:** Yes. **Specify: #9660** for analog wand interface or **#9661** for digital wand interface.

Non-IBM OCR Hand-Held Reader Adapter (#5422): Provides an adapter to support the attachment of a non-IBM OCR hand-held wand reader that meets the requirements stated in the *Non-IBM OCR Wand Reader to IBM 3653 Product Attachment Information* document. This feature provides a 1.83 meter (6 foot) cable with an ITT--Cannon DBC-25S type connector to attach the non-IBM OCR Hand-Held Reader unit. **Prerequisites:** #3890 must be installed on 3684 mdl 1. **Limitations:** Cannot be installed with an non-IBM EAN/UPC Wand Attachment (#4946) or a Magnetic Wand Reader (#4945). **Maximum:** One. **Field Installation:** Yes.

Non-IBM Coin Dispenser Adapter (#5431): Provides an IBM-defined serial interface for attaching a non-IBM Manufactured Coin Dispenser that meets the requirements stated in the "3680 PSS System non-IBM Coin Dispenser Adapter Product Attachment Information" document which is available from IBM. For further information on the attachment, contact IBM. **Prerequisites:** #3890 for 3684 mdl 1 only. **Maximum:** One. **Field Installation:** Yes.

Non-IBM Scale Adapter (#5433): Provides an IBM-defined serial or parallel interface for attaching a non-IBM Manufactured Scale that meets requirements stated in the "IBM 3680 PSS non-IBM Scale Adapter Product Attachment Information" document which is available from Corporate Industry Relations. For further information on the attachment, contact IBM. Specify: **#9385** if Serial Interface is to be installed; **#9386** if Parallel Interface is to be installed. On Parallel Interface, specify **#9387** if scale is a 10K metric scale. On Serial Interface, specify **#9388** if scale is a 5-digit scale. Otherwise, scale is assumed to be a 4-digit scale. **Prerequisites:** #3890 for 3684 mdl 1 only. **Maximum:** One. **Field Installation:** Yes.

COMMUNICATIONS FEATURES

A 3684 may be equipped with either the External Modem Interface (#3701) or the 1200 bps Integrated Modem (#5530) features.

Note: A 6.1 meter (20 foot) communication cable is provided for attachment to a standalone modem or to a communications facility when an integrated modem is used. If a standard 6.1 meter communication cable is not desired, specify **#9061** for 3.0 meter (10 foot) cable, **#9062** for 9.1 meter (30 foot) cable or **#9063** for 12.2 meter (40 foot) cable.

1200 bps Integrated Modem (#5530): Provides an integrated modem for operation over switched or nonswitched communication facilities at 1200 bps. Auto answer is provided when operating over switched network. No external modem is required. **Limitations:** Cannot be installed with External Modem Interface (#3701). **Maximum:** One. **Field Installation:** Yes. Specify the following when ordering this modem:

Specify one:
- **#9481** for Switched Network
- **#9482** for Nonswitched Network

If **#9481** Switched Network is specified, also specify (one):

- **#9777** for 2025 Hz answer tone frequency required for operation at 1200 bps with non-IBM modems with Automatic Calling features.
- **#9778** for 2100 Hz answer tone frequency required for operation with host IBM 1200 bps integrated modems with Automatic Call Originate function.

If **#9482** Nonswitched Network is specified, also specify (one):

- **#9651** for 4-wire facility
- **#9652** for 2-wire facility

Note: If Switched Network (**#9481**) is specified, FCC registered protective circuitry of the CBS type (or equivalent) provided by the user is required. See "Accessories" section for additional information.

Storage Expansion (#6990): Provides the capability of expanding the storage capacity of the 3684 mdl 1 and the control segment of the 3684 mdl 2 from a maximum of 56K to a maximum of 120K bytes. See configurator chart for maximum storage. **Maximum:** One. **Field Installation:** Yes. **Limitations:** Applies only to the 3684 mdl 1 and to the control segment of the 3684 mdl 2.

Storage Expansion-POS (#6991): [Mdl 2] Provides the capability of expanding the storage capacity of the point-of-sale segment of the 3684 mdl 2. The storage capacity of the point-of-sale segment is expanded from a maximum of 56K bytes to a maximum of 120K bytes. This feature permits the installation of up to four Storage Increment-16K (#7720) per #6991. **Maximum:** One. **Field Installation:** Yes. **Limitations:** Storage Retention (#7785) cannot be installed on a 3684 mdl 2 that has Storage Expansion (#6990) and Storage Expansion-POS (#6991) installed at the same time. **Note:** This limitation is removed for machines shipped after August 1981. **Prerequisites:** #7730.

Storage Increment--8K (#7710): Provides an additional 8,192 bytes of storage. **Maximum:** One. **Limitations:** Cannot be installed with Storage Increments--16K (#7720) or Storage Increment--24K (#7730). **Field Installation:** Yes.

Storage Increment--16K (#7720): Provides an additional 16,384 bytes of storage. **Maximum:** One per 3684 mdl 2 point-of-sale segment; without Storage Expansion-POS (#6991) installed; four per 3684 mdl 1 or 2 control segment with Storage Expansion (#6990). **Limitations:** Cannot be installed with Storage Increment--8K (#7710) or Storage Increment--24K (#7730) in point-of-sale segment of 3684 mdl 2. Cannot be installed in the 3684 mdl 1 or the control segment of the 3684 mdl 2 without #6990. **Specify: #9588** if increment is to be installed in point-of-sale segment of 3684 mdl 2; **#9589** if increment is to be installed in control segment of 3684 mdl 2. **Field Installation:** Yes.

Storage Increment--24K (#7730): Provides an additional 24,576 bytes of storage. **Maximum:** One. **Limitations:** Cannot be installed with Storage Increment--8K (#7710) or Storage Increment--16K (#7720). **Field Installation:** Yes.

3684 Mdl 1 Storage Configurator

56K	Base Storage
	Storage Expansion #6990
72K	16K - #7720
88K	16K - #7720 (2)
104K	16K - #7720 (3)
120K	16K - #7720 (4)

3684 Mdl 2 Storage Configurator

Total Stge Size	Storage Increment Feature	POS Segment					Control Segment	
		w/o #6990 or #6991		with #6990 Only		with #6991	w/o #6990	with #6990
		Stge Incre Only	Stge Incre and #9588	Stge Incre Only	Stge Incre and #9588	Stge Incre and #9588	Stge Incre	Stge Incre and #9589
32K	–	Base	Base	Base	Base	Base		
40K	8K-#7710	x	–	x	–	–		
48K	16K-#7720	–	x	–	x	–		
56K	24K-#7730	x	–	x	–	Req'd x	Base	Base
72K	16K-#7720					x		x
88K	16K-#7720 (2)					x		x
104K	16K-#7720 (3)					x		x
120K	16K-#7720 (4)					x		x

Note: The number of #7720s must equal the sum of specify code **#9588s** and **#9589s** when #6990 and/or #6991 is ordered.

Storage Retention (#7785): Provides an internal battery and charger to power storage during a power interruption. All data and programs are protected so that a transaction in process when power was interrupted will continue when primary power is restored. The duration of storage retention depends on the charged state of the battery. When fully charged, storage will be retained for approximately 12 minutes for mdl 1 and approximately six minutes for mdl 2. If Storage Expansion (#6990) and Storage Expansion-POS (#6991) are installed on the same 3684 mdl 2, a fully charged battery will retain storage for approximately three minutes. The number of times the battery is discharged greatly affects battery life; therefore, facilities are provided to allow the customer through programming, to deactivate the battery for scheduled power off conditions such as store closing.

Replacement batteries are to be provided, installed, and removed by the customer. IBM will replace the battery if requested by the customer on a time and material basis. Replacement batteries may be ordered through IBM or through other sources that meet the battery specifications as defined by IBM. **Maximum:** One. **Limitations:** Cannot be installed on a 3684 mdl 2 that has Storage Expansion on both the point-of-sale segment and control segment. This limitation is removed for machines shipped after August 1981. If Storage Retention (#7785) is required on machines installed prior to August 1981, an RPQ will

3684 Point-of-Sale Control Unit (cont'd)

have to be submitted. Any parts removed due to this RPQ will be retained by IBM as property of IBM. **Field Installation:** Yes.

Totals Retention (#8010): Provides an additional 240 bytes of customer programmable storage that are powered by its own battery to protect loss of information such as totals, transaction number, terminal address, etc., when power is turned off or power interruptions occur. An early warning status condition will be given to the program when the battery needs replacing. Replacement batteries to be provided, installed, and removed by the customer. IBM will replace the battery if requested by the customer on a time-and-material basis. See "Accessories" for battery life characteristics and the types of batteries required for replacement. **Maximum:** One. **Limitations:** Applies to 3684 mdl 1 and to the Point-of-Sale segment of the 3684 mdl 2. **Field Installation:** Yes.

Validation Printer (#8725): Provides a flat-bed document validation station for printing on inserted forms. Prints 38 characters per line at 15 characters per 25.4mm (1 inch). Vertical line spacing is 6.3 lines per 25.4mm (1 inch) at a line space rate of 20 lines per second. The all-points addressable characteristics of the printer allow logos, special graphics and highlighting to be designed and printed by user programming. **Maximum:** One. **Limitations:** Cannot be installed with Label Printer (#8726). **Field Installation:** Yes.

Label Printer (#8726): Provides a flat-bed station capable of printing on inserted forms or labels. Includes the capabilities of the Validation Printer Feature (#8725) and in addition includes the capability of printing labels. Prints 38 characters per line at 15 characters per 25.4mm (1-inch). Vertical line spacing is 6.3 lines per 25.4mm (1-inch) at the rate of 20 lines per second. The all points addressable characteristics of the printer allow logos, special graphics, and highlighting to be designed and printed by user programming. Label printing capabilities include "card stock" shelf labels and gummed labels on a carrier. **Maximum:** One. **Limitations:** Cannot be installed with Validation Printer feature (#8725). **Field Installation:** Yes. **Note:** If the Label Printer is to be field installed in place of the Validation Printer (#8725), removed parts belong to the customer.

MODEL CONVERSIONS

Field installable. The parts removed for a model change become the property of IBM.

ACCESSORIES

Cables (P/N 5165886): Bulk Indoor Loop Cable to attach 3680 units may be purchased from IBM or a customer-selected source. See *Physical Planning Manual,* GA27-3074, or *3680 Site Planning and Site Preparation Guide,* GA27-3201, for bulk loop specifications. The customer is responsible for installation and maintenance of these cables. The bulk loop cable may be purchased from IBM. Bulk Indoor Loop Cable is available for duct or plenum installation. The following information pertains to this cable only: Indoor Cable: UL approved for duct and plenum installation. (NEC Art. 725-2b). Maximum allowable cable temperature range is -34 C to 105 C.
Ordering Instructions: Interior cable (P/N 7838695) should be ordered in multiple lengths of 304.8m (1,000 ft). **Warranty:** Loop Cable is warranted free from defects of workmanship and materials for 90 days.

The following items are available on a purchase-only basis. For shipment concurrent with the machine, order the Feature Number as shown below.

Item	Feature Number	Maximum Quantity
Protective Coupler (DAA)	#9344	No maximum
Cash Till Cover (with lock and key)	#9355	No maximum

Note: The Protective Coupler (DAA) will not be shipped from the same location, but concurrent ship dates can now be scheduled.

Protective Coupler (DAA) (#9344 P/N 1649100): The Protective Coupler (DAA) #9344 is an FCC registered device that can be used to connect the 3684 to the public switched network facilities. The coupler is powered by a provided transformer (calculator type) which plugs into a 110 volt, 60 Hz, wall outlet and is attached to the unit with a 6 foot cord. The coupler connects to the switched network facilities via an USOC RJ41S data jack provided by the telecommunication common carrier service supplier. The modem, to which the coupler is attached, is required to transmit at -2.0dBM. The FCC registration number is AA9987-62186-PC-E and the ringer equivalence is 0.8B. **Prerequisites:** Switched Network **(#9481). Field Installation:** Yes. **Note:** See above for Customer Responsibilities, Site Preparation and Repair Center information.

For other available accessories, see "Accessories" in the M3683 pages.

SUPPLIES

Ribbons: A black ribbon cartridge, P/N 7034640 or equivalent, is required.

Diskette: Diskette 2D, P/N 1766872, or equivalent, formatted with 256 byte blocks, is required for 3684 mdls 1 and 2.

Paper: Roll paper, 88.9mm (3.5 inch) diameter, 69.85mm (2.75 inch) wide, is required at the Cash Receipt and Journal print stations.

3687 CHECKOUT SCANNER

PURPOSE

A fixed head optical reader which attaches to the 3683 (mdls 1A, 2A and 3A) in the 3650 Programmable Store System. It is particularly adaptable to all modes of checkout and it accommodates both standing and seated operators.

MODELS

Model 1 001

HIGHLIGHTS

The 3687 is 216.0mm (8.50 in) high, not including the rails; 508.0mm (20.00 in) wide; and 278.0mm (10.94 in) deep, and reads the UPC regular (Version "A"), UPC zero suppression (Version "E"), EAN-13, and EAN-8 bar code symbols on supermarket items that are manually fed past the window of the 3687. Packaged as part of the total checkstand design, one 3687 can operate with one 3683 Supermarket Terminal mdl 1A, 2A or 3A.

The 3687 is a Class 1 laser product which complies with the safety standards of the United States Department of Health, Education, and Welfare (Performance Standard for Laser Products, August 2, 1976 - Class 1, CFR Subchapter J).

The product reads the Universal Product Code (UPC) which has been adopted in the United States as an industry specification for supermarket items identification. It also reads the European Article Numbering (EAN) symbol which has been adopted in World Trade countries as an industry specification for merchandise identification.

Prerequisites: Each 3687 requires a 3683 mdl 1A, 2A or 3A, and operates only under the 3650 Programmable Store System.

Customer Responsibilities: Window replacement is a customer responsibility. See S3650 pages for general description of customer responsibilities.

Copies of the UPC Symbol Specifications and the UPC Guidelines are avilable at a charge from the UPC Council. Write to:

Uniform Product Code Council, Inc.
7061 Corporate Way, Suite 106
Dayton, Ohio45459
513-435-3870

For copies of the General Specifications for the Article Symbol Marking (EAN), write to:

Secretaire General, E.A.N.
Rue Des Colonies 54, BTE 8
1000 Bruxelles, Belgigue

For each 3687, the customer must provide a switchable on and off power outlet for locking plug. A 1.8m (6 ft) power cord and locking plug will be shipped with each machine.

Refer to *IBM 3650 PSS Installation Manual - Physical Planning*, GA27-3167, for requirements for mounting the 3687 in a checkstand.

A number of states presently have, and others are considering the adoption of, regulations governing the use of laser products. Users should determine the extent of regulation in the states where the 3687 is to be installed.

SPECIFY

- Voltage 120V AC, 1-phase, 3-wire, 60 Hz.
- Packing: If machine is to be installed in N. Y. State, specify **#9550** for additional labeling to meet current regulations. If machine is to be installed in Texas, specify **#9551** for additional labeling to meet current regulations.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Scratch-Resistant Window Kit (P/N 7032261): A scratch-resistant window in an installation kit. Intended to be permanently installed by the user. User installable only. Replaces the expendable window with which the 3687 is equipped. It fits the 3687 only.

Window (P/N 1749143): The 3687 Checkout Scanner is equipped with a replaceable window. With use, it will get scratched and need to be replaced. Window replacement is a customer responsibility.

SUPPLIES

Contact IBM.

3689 STORE COMMUNICATIONS UNIT

PURPOSE

To provide communications for the 3650 Programmable Store System over common carriersupplied communications network facilities.

MODELS

Model 1 001

Prerequisites:

A 3650 Programmable Store System with (minimum requirements):

- A 3651 Store Controller mdl A75, B75, C75 or D75 with the 4800 bps Loop Adapter (#4895) and the 3669/3689 Attachment (#8069).
- Access to an appropriate switched network communications facility.
- A store loop equipped with at least one 3683 Point of Sale terminal with 4800 bps specify feature **#9430.**
- Communications with any virtual storage S/370 or 4331 or 4341 processor via a properly equipped 3704 or 3705 or a Communications Adapter on a 4321 or 4331.

Customer Setup: The 3689 is designated for Customer Setup (CSU). This provides the customer with early availability. This also allows relocation of the unit without requiring IBM service personnel assistance.

HIGHLIGHTS

The 3689 mdl 1 provides communications between a 3651 Store Controller mdl A75, B75, C75 or D75 and:

- The host S/370 or 4331 or 4341 processor via a 3864 Modem mdl 2 attached to a 3704, 3705 or 3725 Communications Controller with switched line features or a Communications Adapter feature on a 4321 or 4331.
- The store loops at another predesignated store location via another 3689 mdl 1 at that location, to provide backup operation for the store in case its 3651 Store Controller mdl A75, B75, C75 or D75 is inoperative.
- The 3651 Store Controller mdl A75, B75, C75 or D75 via another 3689 mdl 1 in another predesignated store in a controller-to-controller operation via Auxiliary Communications Adapters (#6185) for the purpose of data transfer or data reconciliation when the backup operation is terminated.

Addtional characteristics of the 3689 mdl 1 are:

- Operates in half-duplex mode over 2-wire switched telecommunication networks. Operating mode is point-to-point.
- A microprocessor for signal processing.
- Auto Answer: Automatic Answering of Switched Network calls.
- Automatic Speed Selection: The transmission speed of the 3689 mdl 1 follows the transmission speed (4800/2400 bps) of the Host 3684 mdl 2. Note: There is no Automatic Speed Selection when loop communication is involved.
- Automatic and Adaptive Equalization: Equalization is automatically performed by the modem and continues to adapt in data mode.
- Operator Panel with operational status indicators and data quality (Good/Poor) indications.
- When operating with a Host S/370 or 4331 or 4341 processor via a 3864 mdl 2, the modem diagnostic functions, referred to as Link Problem Determination Aid (LPDA), operate with Systems Network Architecture (SNA) and associated program products. Under control of these programs, the modems accept commands and initiate tests that help isolate problems to the line, local or remote modem, or elsewhere in the network and provide the network operator with the most probable cause of network problems. These program products are:
  1. Network Communication Control Facility (NCCF) Release 1 or 2 (5735-XX6).
  2. Network Problem Determination Application (NPDA) Release 2 (5735-XX8).
  3. ACF/NCP Release 2.1 (5735-XX1).
- The protective circuits required for FCC Registration are built into the 3689 mdl 1 to allow direct attachment to the Public Switched Network.

Diagnostics: Built-in diagnostics - The 3689 mdl 1 will respond to diagnostic commands from the Host system and provide its status and the quality of the received signal over the communication facility. Test requests and responses utilize the same data path and controls that are used by S/370 for data transmission. This diagnostic status/test requests can be interspersed with data requests without interrupting 3651 sessions.

The Network Problem Determination Application (NPDA) program product is an example of an IBM program product offering the capability to utilize the modem diagnostic functions for the collection, storage and retrieval of network error/management data. NPDA implemented under the Network Communication Control Facility (NCCF) program product has both summary and detailed level information for determining probable cause of network errors. Probable cause differentiates between errors in the communications controller, line, modem or modem interface.

NPDA will utilize the modem facilities to provide alert messages on error threshold and display formatted modem test results.

In addition, tests can also be executed from the 3689 operator panel. These manual tests include:

- Self-test -- this includes an extensive test of modem microcode, plus a data wrap with reduced thresholds for received data.
- Modem/line transmit and receive tests -- allow testing of modem and line for switched network.
- Lamp test -- tests all indicator lights on the operator panel.

Communication Facilities

Public Switched Networks: The customer must be informed that satisfactory transmission of data depends upon the characteristics of the particular switched network connection being used. Refer to M2700 pages for further details.

Privately-owned Communication Facilities: Equivalent to above.

International Facilities: Transmission of data between the United States and Canada on switched facilities is supported.

Attachment to Facilities: Attachment of the 3689 mdl 1 to the public switched network is by a cable, supplied with the 3689 mdl 1 which is terminated with a miniature 8-position keyed plug for connection to a programmed data jack (USOC RJ45 or RJ41 or equivalent) which is provided by the telecommunications service supplier. (A data jack is installed only on a dedicated data line; not on customer-owned switching equipment.) The protective circuitry required by the FCC for direct attachment to the public switched network is contained in the modem. The FCC registration number is:

3689 mdl 1 AN09SA-67992-DP-N

The ringer equivalence is 0.8B.

Note: Telephone sets (handsets) are required with switched facilities at all 3689 mdl 1 locations.

Customer Responsibilities: The customer must be informed of his responsibilities as detailed in the M2700 pages, and in the site preparation section of the *3650 Programmable Store System Installation Manual - Physical Planning* (GA27-3167).

The customer is also responsible for:

1) Arrangements for price quotations, installation, and all costs of common carrier equipment and services.
2) Switched Telecommunication Network -- arranging for the telecommunication service supplier to install the appropriate communication service equipped with the required connecting device as described in "Attachment to Facilities" and for attaching the IBM-provided cable to the connecting device. The customer must also inform the telecommunication service supplier that the rate of data transmission will be faster than 1200 bps.
3) If the 3689 is to be attached to a non-IBM product, the interconnecting cable between the business machine and the modem must be supplied by the business machine.
4) Unpacking and placing of the 3689, physical setup, and connection of cables at setup time.
5) Notifying IBM of intent to relocate the unit, and following IBM instructions for relocation.
6) Disconnecting, packing and movement to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be supplied by IBM.
7) All three of the following program products at the current release must be installed for LPDA to function between the Host and the 3689 mdl 1 if the customer requires the LPDA function.

   NCCF (5735-XX6)
   NPDA (5735-XX8)
   ACF/NCP (5735-XX1)

8) Obtaining, installing and testing the store loops.

3689 Store Communications Unit (cont'd)

SPECIFY

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): **#9890** for locking plug, **#9891** for non-locking plug. If standard 3.0 meter (10 foot) power cable is not required, specify **#9986** for 1.8 meter (6 foot) cable.
- Telecommunication Cable (modem to telecommunication line): Specify **#9710** for 3m (10 foot) cable .

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3694 DOCUMENT PROCESSOR

PURPOSE

A programmable MICR Reader-Inscriber-Sorter for remote processing of documents used primarily in the Finance Industry. As a member of the 3600 Finance Communication System, the 3694 combines the programming and host communication facilities of the 3601 Finance Communication Controller with MICR document handling capabilities.

Can attach to S/370 or 4300 processors via a 3705 or 3725 Communications Controller (to 4331 also via the Communications Adapter) using Synchronous Data Link Control (SDLC) transmission over various common carrier or user-owned transmission facilities.
Can attach to System/34 or System/36 Processors via communications adapter using Synchronous Data Link Control (SDLC) transmission over various common carrier or user-owned transmission facilities.
Application support for System/34 is provided by the following Check Processing Executive/General Support FDPs, or user supplied programming. Document Control Section Edit (5698-RFL), Table Preparation Facility (5798-RFK), File Translation Facility (5798-RFJ), and Communication Support Facility (5798-RKH).
Note: See "Programming" and "SCP" pages for attachment capability.

The 3262 models 3 and 13 line printers may be attached to a 3694 for high-speed report printing. The 3287 models 1 and 2 and 3268 model 2 printers may also be attached for lower volume printing.

The 3694 is available in eight models: Models 1A, 1B, 1C and 1D and models 2A, 2B, 2C and 2D. They perform identical functions except that the model 2s have an automatic document feed and high-speed sorter path for program controlled sorting and/or data capture at up to 400 6-inch documents per minute.

Multiple 3694s can be attached to a given 3694 or to a 3602 Finance Communication Controller for data concentration and control.

MODELS

Model 1A	A01	One Distribution Stacker Module - 6 pockets
Model 1B	B01	Two Distribution Stacker Modules - 12 pockets
Model 1C	C01	Three Distribution Stacker Modules - 18 pockets
Model 1D	D01	Four Distribution Stacker Modules - 24 pockets (Pockets are also known as Stackers)

All models include a compact diskette drive supporting Diskette 1 or Diskette 2, an operator console, a master list printer, a keyboard, MICR read and inscribe capability, a document correction station, item identification and numbering capability, an endorser, and approximately 81,000 bytes of user-programmable storage. User storage can be expanded, optionally, up to a maximum of approximately 113,000 bytes. A second compact diskette drive can also be added, optionally, providing an additional 270,000 or 568,000 bytes of storage, depending upon whether Diskette 1 or Diskette 2 is used.

Model 2A	A02	One Distribution Stacker Module - 6 pockets
Model 2B	B02	Two Distribution Stacker Modules - 12 pockets
Model 2C	C02	Three Distribution Stacker Modules - 18 pockets
Model 2D	D02	Four Distribution Stacker Modules - 24 pockets

All models also have a compact diskette drive supporting Diskette 1 or Diskette 2, an operator console, a master list printer, a keyboard, MICR read and inscribe capability, a document correction station, item identification and numbering capability, an endorser, approximately 81,000 bytes of user-programmable storage, plus an automatic feeding device and high-speed document path for operations at rates up to 400 documents per minute for 6-inch documents. User storage can be expanded, optionally, up to a total of approximately 113,000 bytes. A second compact diskette drive can also be added, optionally, providing an additional 270,000 or 568,000 bytes of storage, depending upon whether Diskette 1 or Diskette 2 is used.

HIGHLIGHTS

Combines document inscribing (E13B), reading, sorting, identifying and endorsing functions with data capture and storage accumulation, and communication capabilities under program control. Can communicate with a host system using any one of two SDLC communication features and an EIA Interface feature with an external modem, or by direct attachment to a 3705 or 3725 or 4331 or System/34 Communications Adapter.

Houses a diskette drive which can accommodate 2-sided diskettes offering storage of user data and programs, i.e., sort table, all items file and cluster summary data.

Accommodates up to four Distribution Stacker Modules with each containing six distribution pockets. Each distribution pocket has a capacity of approximately 400 documents. Depending upon the mdl, a 3694 can have one, two, three or four such modules. Optional distribution list printers may be dynamically assigned under program control to individual pockets to list the contents of each pocket as the document enters, or on a deferred basis.

An optional microfilm feature is available to record images of documents processed on the full function path (mdls 1 and mdls 2) and documents processed on the sorter path (mdls 2). Film image format is duplex mode (front and rear of documents recorded adjacent to each other). Film record includes header data, item sequence numbers and frame marks (blips). An optional PAID stamp feature is available on 3694 mdls 2 for face cancelling items as PAID for items processed on the sorter path.

A 3694 mdl 2A, 2B, 2C or 2D is equipped with an automatic feed/high-speed path. It can capture data and fine-sort documents at a rate of up to 400 documents per minute (for 6-inch documents).

The 3262 (mdls 3 and 13), 3287 (mdls 1 and 2) printers and 3268 (mdl 2) may be attached to offer, with appropriate programming support, an ability to print host, diskette or program-supplied print line images.

Clusters of up to four 3694s may be attached to another 3694 for communications concentration and control. Depending upon the applications and operational considerations, up to 18 3694s may be attached to a 3602 Finance Communication Controller for large cluster concentration and control. (For attachment of more than eight 3694s to a controlling 3602, Systems Assurance approval is required.)

Transmission: The 3694 can operate over common carrier-provided or equivalent customer-owned facilities. For information concerning these facilities, see the M2700 pages.

Modems: External modems operating at up to 9600 bps may be attached when used with SDLC feature #4502. For information concerning modem attachment support, see the M2700 pages.
Prerequisites: If Host Connected - a communications controller with appropriate features -- see M3705, 3725 or 4331 (for Communications Adapter #1601 on the 4331) 5340, or 5360 pages.

Typical Configuration Guideline: As a reference, the most typical 3694 featured machine configuration is as follows:

3694 mdl 2B	Base machine with 12 pockets and Autofeed/Sorter path
#1015	Additional diskette storage
2X #3201	Two distribution list printers
#3701	EIA Interface
#4502	SDLC communication without clocking

Other features commonly ordered are:

#5121	Microfilm
#5450	PAID Stamp

Required Specify's must also be ordered.

The following is a more detailed guide to configuring specific 3694 machines. It is based upon the operational diskette levels provided by the IBM 3694 application program product, CHX/3694 (PP 5748-F53):

Basic 3694 Configuration: This configuration is for 3694s which communicate directly with S/370, System/34, System/36 or 4300 processors. This configuration also applies to a 3694 which is attached to another controlling 3694 or 3602 controller (clustered configurations).

Cluster Controller 3694 Configuration: This configuration is for 3694s which communicate directly with S/370 or 4300 processors, and have other 3694s attached for concentration and control.

3694 Document Processor (cont'd)

Application/Use	Required Feature/Mdls: Basic 3694	Required Feature/Mdls: 3694 Cluster Controller
Communication to host through modem which does not have internal clocking, or for direct attachment to 3705 or 3725 at speeds of 1200 or 2400 bps.	#3701 and #4501	#3701 and #4501
Communication to host through modem which has internal clocking speeds up to 9600 bps, to 4331 Communication Adapter without modems, System/34 Communication Adapter or to controlling 3694 or 3602 without modems.	#3701 and #4502	#3701 and #4502
Cluster control	–	#1015,#4401, #1007,**#9601** and #1007,**#9602**
Attachment of printers (See note, 3262, 3287s, 3268s)	#3101	#3101
Additional disk storage for increased MICR item data storage.	#1015	–
In-line Microfilming.	#5121	#5121
Paid Stamping (mdl 2 only).	#5450	#5450
Printing of pocket distribution list: – Typical application uses one printer per six stacker/pockets.	#3201 (multiple)	#3201 (multiple)
High-speed sorter path: – Typical application uses twelve or more pockets (mdls 2B, 2C or 2D).	Mdl 2s	Mdl 2s
Pocket-full lights: – Typical application uses one such feature per six stacker/pockets.	#5540 (multiple)	#5540 (multiple)

Note: Printer mdl description
(Not for use with System/34 and System/36 host systems).

3262-13	325 lpm
3262-3	650 lpm
3287-1	80 cps
3287-2	120 cps
3268-2	340 cps

Bibliography: GC20-0370, *IBM S/370 Bibliography*, and GC27-0001, *IBM 3600 Finance Communication System, System Summary.*

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

When ordering 3694s for use by Federal Reserve Banks, RPQ 8V0218, Hold & View Window-Federal Reserve, must be ordered. This RPQ is available without charge and provides a hold and view window designed for Federal Reserve Bank processing requirements. **Field Installation:** No.

- Voltage (1-phase, 60 Hz): All machines will be shipped for 208V service. If necessary the IBM customer service representative can convert machines to 240V service at customer location.
- Power Cord: Select appropriate length power cord, and specific type of cord.
  - 1.83m (6 foot) cord, specify **#9986** with one of the following:

    #9080, water-tight plug (Russell and Stoll 3720-U2) for below-floor power installation.

    #9081, locking plug (L6-15P Nema).
  - 4.27m (14 foot) cord, specify **#9987** with one of the following:

    #9080, water-tight plug (Russell and Stoll 3720-U2) for below-floor power installation.

    #9081, locking plug (L6-15P Nema).
- Controller Designation: Media distribution of controller data. Specify **#9491** to identify the initial controller (3601, 3602 or 3694) ordered for use with a host system location, or specify **#9492** to identify additional controllers (3601, 3602 or 3694s) per host system. **#9491** should only be ordered when host media DTR tape containing microcode is required. If a pre-configured diskette is specified when ordering the CHX/3694 Application Program Product (PP 5748-F53), then specify **#9492** for the controller designation.

  The following specify numbers (**#9493**, **#9494** and **#9495**) are provided to enable the user to attach a 3614 or a 3624 to additional 3601 or 3602 controllers, when the initial controller is a 3694.

  If the initial controller (with specify **#9491**) is a 3694, and if there is a 3614 with a first position designator and a specify **#9002** attached to any 3601 or 3602 on the same host system, then specify **#9493** is required.

  If the initial controller (with specify **#9491**) is a 3694, and if there is no 3614 or 3624 with a first position designator attached to any 3601 or 3602 on the same host system, then specify **#9494** is required.

  If the initial controller (with specify **#9491**) is a 3694, and if there is a 3614 with a first position designator and a specify **#9001**, or a 3624 with a first position designator attached to any 3601/3602 on the same host system, or if encryption capability via the data encryption standard (DES) is desired on a 3601 or 3602 on the same host system, then specify **#9495** is required.

  Both specify **#9493** and **#9495** may be ordered with the initial 3694 (with specify **#9491**).

  If **#9491** is specified, select the specify number of the desired media:

#9412	9/800 Magnetic Tape
#9413	9/1600 Magnetic Tape
#9414	9/6250 Magnetic Tape

  If magnetic tape is not available on designated CPU, then select one of the following media (DOS/VS or VSE users only):

#9431	80-column cards
#9432	96-column cards

  If card or tape inputs are not available at the host location, contact Finance Industry Marketing for guidance.

  When feature **#9491** is specified, additional shipping information is required.

  Supplement Spec (via AAS entry) is to be entered exactly as follows to indicate shipping address of the Host System location:

  Line 1 -- IBM Programming Support Representative (PSR)
  Line 2 -- c/o (Name of customer)
  Line 3 -- Street address (or P.O. Box)
  Line 4 -- (etc.) -- City, State, Zip

  This is the address to which the first controller (3601, 3602 or 3694) data tape will be automatically shipped for the first controller ordered (with specify **#9491**). Whenever controller data is updated by an EC, it will be shipped to the most current MC address.
- Cables: See "Accessories" for ordering instructions for 3262 or 3237 printer cables. Communication cables for the 3694 are provided without charge when feature #3701 (EIA Interface) is ordered through the normal AAS procedure. Also see *Installation Manual - Physical Planning,* GC31-2010.
- **Frames:** The number of frames for shipping purposes will be determined by the manufacturing plant based on the specific mdl and configuration ordered. See the *3694 Document Processor Installation Manual - Physical Planning*, GC31-2010, for details.
- **#9580** to request shipping by air (required for areas outside Canada and the Continental U.S.). All air shipments are in three frames (four, if a 3- or 4-stacker module configuration is ordered, mdls C and D).

  If air shipment is required within the Continental U.S. or Canada, the branch office must send a request for premium transportation to the IBM Charlotte plant of manufacture (form #625-3433-01).
- **#9481** for system operation without host CPU, host 3694, or host 3602 attachment. **Note:** MANDATORY for all orders without hosts.
- Tool Kits: Required for CE Maintenance. For Rental Customer -- specify on first 3694 order for each customer site. If required for multiple machine sites, an additional Tool Kit(s) is available on a no-charge MES. For Purchase Customers -- specify on each 3694 order. When installed rental 3694s are purchased, a Tool Kit is to be ordered on a no-charge MES for each machine. Specify **#9766** for Base Machine Service tools.

  Specify **#9441** for microfilm feature service tools. The microfilm tool kit consists of a 3694 microfilm cassette, a set of test documents, and a roll of film. Individual microfilm tool kit parts are available from Mechanicsburg.

3694 Document Processor (cont'd)

SPECIAL FEATURES

NON-COMMUNICATION FEATURES

Add'l Storage (#1007): Provides an additional 32,768 bytes of control storage or additional 32,768 bytes of user-programmable storage. Specify **#9601** for control storage, or **#9602** for user storage. A maximum of one additional storage feature for control storage (**#9601**), and a maximum of one additional storage feature for user programming (**#9602**) may be ordered for a 3694 mdl 1 or 2.

Auxiliary Compact Diskette Drive (#1015): The Auxiliary Compact Diskette Drive supporting Diskette 1 and Diskette 2 provides an additional storage capacity of approximately 270,000 or 568,000 bytes. No area on the auxiliary (or secondary) drive will be reserved for the control program. **Maximum:** One. **Field Installation:** Yes. **Note:** Support for feature #1015 is provided by Extended Diskette Access Method (EDAM) Base, EDAM Allocate/Deallocate (LDKT instruction), and EDAM Temporary File Support. Refer to "Device Attachment Factors Table" and "Attachment Factor Functions" section.

Device Cluster Adapter (DCA) (#3101): Permits attachment of any combination of one or two 3262 (mdls 3, 13), 3268 (mdl 2) or 3287 (mdls 1, 2) printers to a 3694. **Limitations:** Maximum distance from 3694 to terminal is 1,500m (4,920 feet). Not for use with System/34 and System/36 host systems. **Note:** Attachment of two printers requires Systems Assurance Review. **Maximum:** One. **Field Installation:** Yes.

Distribution List Printer Module (#3201): The Distribution List Printer (DLP) prints two distribution lists, each containing up to 18 characters per line. Independent paper movement allows either list, or both, to be printed at up to 180 lines per minute. Each list is dynamically assignable to distribution pockets to print, under program control, data from, or relative to, documents selected to corresponding distribution pockets. **Maximum:** Six distribution list printers (for up to 12 distribution lists) may be ordered per 3694. The maximum is dependent upon the number of Stacker Modules. **Field Installation:** Yes.

One "Drawer Position" is available in the base of each of the first three stacker modules for installation of distribution list printer drawers. Drawers can contain one or two distribution list printers (providing 2 or 4 distribution lists).

The positioning options of the distribution list printers modules is as follows, and is predetermined by the quantity ordered:

	Stacker Module 1	Stacker Module 2	Stacker Module 3	Stacker Module 4
Position	1A 1B	2A 2B	3A 3B	N/A

N/A = Not available

Quantity of Printers Installed	Required Positioning of Installed Printers
1	1A
2	1A,1B
3	1A,1B,2A
4	1A,1B,2A,2B
5	1A,1B,2A,2B,3A
6	1A,1B,2A,2B,3A,3B

When ordering additional distribution list printer modules for field installation, the next sequential position must be ordered in accordance with the chart above. The position(s) must be indicated by the following specify code(s):

Position	Specify
1A	**#9101**
1B	**#9102**
2A	**#9105**
2B	**#9106**
3A	**#9109**
3B	**#9110**

Controller Attachment (#4401): Required to attach up to four 3694s to a controlling 3694 at a link speed of 9600 bps. This feature is required in the controlling 3694 only. **Limitations:** Attached 3694s must each be placed within 100 cable-feet of the controlling 3694. **Note:** Support for feature #4401 is provided by Alternative Line Attachment Base, SDLC Link Diagnostics, SDLC/SNA Attachment Part 1, and SDLC/SNA Attachment Part 2. Refer to "Device Attachment Factors Table" for the 3694. **Maximum:** One. **Field Installation:** Yes.

Microfilm (#5121): Provides for filming front and rear of documents processed on 3694 mdls 1 and mdls 2 in duplex format (front and rear of item recorded adjacent to each other on film). Item sequence number is recorded (exposed) on film for every other item filmed. Frame marks (blips) are recorded on film for each item filmed. Indicative data can be recorded on film as header film records. Minimum image resolution is 110 lines per millimeter. Camera reduction is 50:1. Users specify that microfilming is active on a 'per-run' basis. Rated filming speed is the same as processing speed for the mdl 2 sorter path (400 documents per minute for 6-inch documents). A film cassette to house the film supply and film take-up reel is provided with the feature. Additional film cassettes can be ordered from "Accessories" below. The microfilm feature uses 16mm, medium- to high-speed, unperforated film, and can accept either 100-foot (thick-base) or 215-foot (thin-base) film supply reels. Capacity of film is approximately 13,300 items (front and rear) per 100 feet of film. **Maximum:** One **Field Installation:** Yes. **Note:** A CE microfilm tool kit is required to install this feature. Refer to "Tool Kit" description under "Specify" for ordering information.

Paid Stamp (#5450): Provides for face cancelling items as PAID on 3694 mdl 2 only. Stamping mechanism is located on sorter path of mdl 2s and is activated on a user-specified 'per-run' basis. At least one full stamping of the word PAID will appear on each document, and additional partials may also appear. **Limitations:** 3694 mdl 2s only. **Maximum:** One #5450 per 3694 mdl 2s. **Field Installation:** Yes. **Prerequisites:** #5121.

Stacker Lights (#5540): This feature provides six individual pocket lights per Stacker Module which may be installed on any Module as required. An individual light on a pocket illuminates when a pocket is approximately three quarters full. The light is switched off when the pocket is cleared. If the transport has stopped due to a full pocket, the operator must restart via the green start button. **Limitations:** Can only be installed on machine serial number 10023 and above. **Maximum:** One per Stacker Module. **Field Installation:** Yes. **Prerequisites:** Specify **#9501** on Stacker Module 1 ... **#9502** on Stacker Module 2 ... **#9503** on Stacker Module 3 ... **#9504** on Stacker Module 4.

Control Storage (#9601): Used for attachment of certain device types, functions, and features which have associated attachment factors. See "Device Attachment Table" below. Some combinations of device types, functions, and features can be accommodated with no additional control storage. Other combinations require additional control storage as provided by the Add'l Storage feature #1007 with the Control Storage specify **#9601**. Refer to Attachment Factor Functions and Device Attachment Table sections for a further explanation of attachment factors and required control storage.

User-Programmable Storage (#9602): Used for the instruction sections of application programs and a limited amount of configuration data and application program constants. Most configuration data and application program constants cannot reside in this additional user-programmable storage. **Maximum:** One. **Field Installation:** Yes.

COMMUNICATION FEATURES

For operation without attachment to either a host processor or a controlling 3602 or 3694, specify **#9481** must be used.

For communications with a controlling 3602 or 3694, each attached 3694 must be equipped with the EIA Interface (#3701) and the SDLC Communications Feature without Business Machine Clocking (#4502).

For communications with a S/370, System/34, System/36 or 4300 series host processor, each 3694 must be equipped with one of the following SDLC features and the EIA Interface (#3701).

EIA Interface (#3701): Provides the appropriate cables and interface logic necessary to attach an external IBM modem for communications to the host processor through the 3704, 3705 or 3725 the Communications Adapter (#1601) feature on the 4331 Processor ... or the Communication Adapter on the System/34 or System/36 ... or for direct local attachment to the 3705, 3725 4331 Communications Adapter or a controlling 3602 or 3694 without requiring modems ... see M3602, 3705, 3725 (#4716), 4331 or System/34 pages. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Maximum:** One. **Field Installation:** Yes. Cable length from this feature to the controlling 3602/3694 cannot exceed 30.4m (100 feet). Cable length for attachment to an external modem cannot exceed 8.1m (20 feet). See the *3694 Installation Manual - Physical Planning,* GC31-2010, for details. **Prerequisites:** #4501 or #4502.

SDLC Communications With Business Machine Clocking (#4501): Required for attachment to communication lines through the EIA Interface (#3701) at 1200 bps or 2400 bps with any external modem which does not have internal clocking, or for local attachment to a 3705 or 3725 Communications Controller at 1200 or 2400 bps (feature #4716). **Limitations:** Cannot be installed with #4502. **Maximum:** One. **Field Installation:** Yes.

SDLC Communications Without Business Machine Clocking (#4502): Required for attachment to communication lines through an external modem which does have internal clocking at speeds up to 9600 bps or for local attachment to a 4331 or System/34 Communications Adapter without Modems. It is also required in 3694s which attach to a controlling 3694 or 3602. **Limitations:** Cannot be installed with #4501. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3701.

Note: SDLC as used in the 3694 Document Processing system conforms to a subset of both the ISO HDLC and NASI ADCCP

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Standards. For details of the conformance, see *IBM Synchronous Data Link Control General Information Manual*, GA27-3093-2.

MODEL CONVERSIONS

3694 model 1s shipped beginning November 13, 1982 can be field upgraded to model 2s. Model 1s shipped prior to November 13, 1982 cannot be upgraded to model 2s but model 2s cannot be field-changed to model 1s. Model 2s can be changed to model 1s at time of manufacture only. Model suffix upgrades and downgrades (e.g., 1A to 1B, 2A to 2B, 1B to 1A, 2B to 2A, etc.), can be field-changed.

Attachment Factor Information

A 'base' attachment factor capability of 26 and an 'expanded' attachment factor capability of 24 is standard on all mdls of the 3694. An 'expanded' attachment factor capability of 49 can be obtained by adding feature #1007 with specify **#9601**.

To determine if feature #1007 with specify **#9601** is required, the attachment factor for each device type, function, or feature required must be allocated, one time only, against either the 'base' or the 'expanded' attachment factor sum, but not both. (The 'base' and 'expanded' attachment factor sums must be calculated separately.)

The 'base' attachment factor sum may not exceed 26. If the 'expanded' attachment factor sum is 24 or less, feature #1007 with specify **#9601** is not required. If the 'expanded' attachment factor sum is greater than 24, but does not exceed 49, feature #1007 with specify **#9601** is required. An 'expanded' attachment factor sum of greater than 49 is not allowed. **Maximum:** One. **Field Installation:** Yes.

Device Attachment Table: In the following table, attachment factors in the column labeled BASE are applicable to the 'base' attachment factor calculation only. Attachment factors in the column labeled BASE OR EXPANDED are applicable to either the 'base' or 'expanded' attachment factor calculation.

The 3694 loads support for devices/features into control storage *in the sequence* indicated by the following table. The 3694 will *always* attempt to load each device or feature into 'base' control storage. If a device or feature is encountered that will not fit into 'base' control storage and it is applicable to 'expanded' control storage, the controller will load it into 'expanded' control storage if space is available.

Refer to the *IBM 3694 Document Processor Description and Configuration,* GC31-2009, for a comprehensive list of attachment factors and additional information regarding calculation of base and expanded attachment factors.

A description of attachment factor functions not associated with a specify, machine or feature is given later in this section. See "Attachment Factor Functions".

Device Attachment Factors Table

DEVICE TYPE/FEATURE/FUNCTION	ATTACHMENT FACTOR BASE	BASE OR EXPANDED
3694 Operator Console	2.8	
SDLC (#4501 or #4502)	0.7	
Multiple Block I/O - Diskette	3.0	
Optional Instruction Locator	0.3	
Instruction Enhancements	1.7	
3694 Document Processor Base [Note 1, 4]		21.5
Alternative Line Attachment Base [Note 3]		5.4
Dynamic Control [Note 5]		1.5
SDLC Link Diagnostics [Note 3]		0.8
SDLC/SNA Attachment Part 1 [Note 3]		8.0
SDLC/SNA Attachment Part 2 [Note 3]		5.8
Device Cluster Adapter [Note 2]		5.0
LSEEKP Instruction [Note 1]		1.8
Translate Instruction (LTRT) [Note 1]		1.2
Data Decompression/Decompaction [Note 1]		1.2
Data Compression/Compaction [Note 1]		1.6
SCRPAD Instruction [Note 1]		1.7
Priority Dispatching (LCHAP) [Note 1]		0.3
Data Sequencing		1.6
Extended Statistical Counter Recording [Note 1]		1.3
Extended Diskette Access Method (EDAM) Base		5.5
EDAM Allocate/Deallocate (LDKT Instruction) [Note 6]		1.7
EDAM Temporary File Support [Note 7]		1.5
3262/3287 Part 1 [Note 2]		3.0
3262/3287 Part 2 [Note 2]		1.5
Set Diskette		0.9

Notes:

(1) The Optional Instruction Locator must be included if this function is used. If more than one function requiring the Optional Instruction Locator is used, the attachment factor for the Locator need be included only once.

(2) The device cluster adapter, 3262/3287 Part 1, and 3262/3287 Part 2 must be included if a 3262 and/or 3287 is used.

(3) The Alternative Line Attachment Base, SDLC Link Diagnostics, SDLC/SNA Attachment Part 1 and SDLC/SNA Attachment Part 2 together comprise the SNA Primary interface support required in the controlling 3694 for controller-to-controller (3694-to-3694) communication via an SNA/SDLC interface. When used, these functions must all be loaded into the same controller storage (i.e., base or expanded). This SNA primary function is used in conjunction with the controller attachment feature (#4401).

(4) The 3694 Operator Console function must be included if the 3694 Document Processor Base function is included.

(5) The Alternative Line Attachment Base must be included and loaded into the same controller storage (i.e., base or expanded) if Dynamic Control is used.

(6) The EDAM Base must be included if the Allocate/Deallocate function is used.

(7) The EDAM Base must be included if EDAM Temporary File Support is used.

ATTACHMENT FACTOR FUNCTIONS

Data Sequencing: Allows user applications to sequence, in storage, a block of data items or to collate, in storage, data items from two separate blocks into a third block, according to a parameter list.

Extended Statistical Counter Recording: Allows user applications, via the STATS instruction, to access the basic statistical counters of the 3694 and attached devices.

Set Diskette: Allows user applications to reset the temporary files, to specify the type of start-up (i.e., warm or cold) to be performed on the next load, and/or to initiate a load of the controller.

Instruction Enhancements: Provides the user application with the following instructions:

Bit Manipulating - Test and Branch (LIFON, LIFOFF) -- provide a test, set and branch function in a single instruction. This reduces the 3600 AP processing and memory requirements when processing single bits.

Logical Compare Data Immediate (CCDI) -- compares immediate data to data in a specified field.

Move Data Immediate (MVDI) -- moves immediate data to a specified field.

Load Data Immediate (LDDI) -- loads immediate data into specified register.

Scale -- formats an input string of characters into a conveniently processable numerical format. When used in processing monetary input, functions such as the removal of the monetary symbol, commas, and periods from the input data are automatically done. In the event that cents were not in the input data, zero padding is optionally provided. Scale should significantly reduce the number of instructions required to process monetary input.

Segment Indexing (SETX, TESTX, SETXREG) -- provides an alternate method of referencing data within a segment. Only fixed operands of 3600 instruction may be indexed. This function can be used to reduce the number of SETFPL instructions executed by the AP, thereby enhancing performance and reducing AP size. This function also provides a pseudo DSECT facility, thereby enabling an AP to more readily reference: (1) Variably displaced data within segments and/or (2) data beyond 4K bytes from the beginning of a segment.

Branch on Index (BRANX) -- provides an index increment, compare and branch function in a single instruction. This instruction is used to control the number of times a series of AP instructions will be executed. Since the instruction algebraically increments a register, BRANX can be used in conjunction with the Segment Indexing facility to simplify the processing of tables.

Execute (LEXEC) -- provides a function similar to the S/370 EXECUTE instruction. The amount of data logically ORed into the target instruction may be 2, 4 or 6 bytes.

Priority Dispatching: Provides the ability to dynamically specify the order in which controller workstations are dispatched. This function consists of the LCHAP instruction which activates or deactivates the dispatching priority specified in the table(s) generated by the PRIDSP configuration macro.

Translate: The LTRT instruction processes an input data stream against user-specifiable translate table(s) to generate a translated output data stream. The LTRTBEG, LTRTENT and LTRTGEN instructions assist the user application programmer in specifying the translate table(s).

Multiple Block I/O - Diskette: Permits multiple blocks to be accessed with a single execution of the LREAD and REPLACE Instruction for permanent file and absolute addressing accesses. This may also result

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in enhanced performance when more than three blocks are read or four blocks are written.

Data Compression/Compaction: This function allows a controller application program to condense a data stream by compressing repeated characters and compacting frequently-occurring characters according to a user-defined table. This can reduce the amount of data actually transmitted over a host link or stored in the controller.

Data Decompression/Decompaction: This function allows a controller application program to decompress and/or decompact a data stream which had previously been compressed and/or compacted by a host or a controller application program.

Extended Diskette Access Method (EDAM) Base: Provides the capability to open, access and close data sets on the primary or auxiliary diskette drive.

EDAM Allocate/Deallocate (LDKT Instruction): Provides, via the LDKT instruction, capability to allocate and deallocate data sets in either the primary or auxiliary diskette drive.

EDAM Temporary File Support: Permits processing of a data set defined with a temporary file structure on the auxiliary diskette drive.

Dynamic Control: Provides additional LCNTRL instruction functions to assist in controlling access to devices attached to the 3694 through the SNA Primary interface.

LSEEKP Instruction: Locates a table entry which is 'equal to', 'greater than or equal to', or 'less than or equal to' a search argument using a binary search algorithm. Tables may be included in the instruction section of the controller application program.

SCRPAD Instruction: Provides access to optional global work areas distinct from segment storage.

ACCESSORIES

Belts - Ink Roll - Ribbons: These Accessories may be purchased from IBM or a customer-selected source. Allow a lead time of 120 days.

7032508	MLP/PLP Ribbon-Purple
7032562	MLP/PLP Ribbon-Blue/Black
7032505	MLP/PLP Ribbon-Black
423653	Endorser Ink Roll-Red
423654	Endorser Ink Roll-Black
423656	Endorser Ink Roll-Purple
7034365	ID Printer Ribbon Assembly
7032878	MICR Ribbon
7032759	Restraint Belt
7032760	Picker Belt
7032761	Feed Drum Belt
7032763	Read-Head Belt

Cables: Cables are provided without charge when EIA Interface (#3701) is ordered. Detailed information about these cables is provided in *IBM 3694 Document Processor Installation Manual - Physical Planning,* GC31-2010. See the 3287 or 3262 Printers Accessories section for cable attachment to the 3694. Efective April 1, 1984, communication cables and attachment cables will be shipped with the machine. If the 3694 is to attach to or communicate directly with a host system, then **#9201** must be specified. The cable will be 40 ft. long. Shorter cable lengths may be ordered through AAS by ordering cable group 0681 in lieu of specifying **#9201.** Allow eight weeks for ASS orders. **Field Installation:** Yes. **Prerequisites:** #3701.

If the 3694 is ordered for attachment to another 3694 via the controller attach feature (#4401) then **#9202** must be specified. This cable will be 50 ft. long. Shorter or longer cables up to 100 ft. in length may be ordered through AAS by ordering cable group 3684 in lieu of specifying #9202. **Field Installation:** Yes. **Prerequisites:** #3701.

Microfilm Cassette - MES Orders (P/N 5682436): This cassette provides space for both microfilm supply reel and take-up spool. Cassette utilizes standard 16mm supply reels (100-foot or 215-foot film length). Cassette includes one take-up spool. **Note:** A single cassette is provided with the ordering of the microfilm feature (#5121).

Documents: E13B magnetic characters, print quality and codeline arrangement on the documents must meet the specifications recommended by the American Bankers Association. Intermixed paper and card documents within the following specifications can be processed:

Length: 146.05 to 225.4mm (5.75 to 8.875")
Width: 66.68 to 107.95mm (2.625 to 4.25")
Document Thickness: 0.09 to 0.14mm (0.0035 to 0.0055")

Carrier Envelope: Carrier envelopes containing mutilated documents should not exceed total thickness of 0.356mm (0.014"). **Note:** The use of carrier documents may cause a higher than normal jam stop frequency.

Base Weights: 75 to 120 grams per square meter (basic weight is the weight of 500 sheets of 17" x 22" paper), 20 to 32 pounds. Standard column card stock may also be processed (must meet ABA RS-147-R3 specification). **Note:** Insertion of an occasional 16 pound document is allowed. Insertion of concentrations of 16 pound documents is not recommended.

Grain: Preferably long grain.

SUPPLIES

To ensure that consumables are on-hand when the 3694 is shipped and received at the installation, care should be taken to have the customer submit an order to IBM for 3694 supplies well ahead of installation time. **Customer Responsibilities:** The customer is responsible for changing all consumable supplies listed above. If the customer desires to have an IBM CE replace or install any of the consumable supplies, the CE time involved will be billed to the customer. Special note should be taken of Section 5, Belts ... the customer must be informed of the need to keep spares on hand and have his operators trained in their replacement.

Consult IBM for information regarding the following consumable supplies required for the 3694:

1. Diskette 1 (128 Bytes) P/N 2305830
   Diskette 2 (128 Bytes) P/N 1766870
   Diskette 2 (256 Bytes) P/N 2736700

2. Ribbons: **Note:** Ribbon inks for the Master List Printer and Distribution List Printer ribbons are formulated to minimize printer wire damage.

   Master List Printer Ribbons:
   Ribbon - Purple P/N 7032508
   Ribbon - Blue/Black P/N 7032552
   Ribbon - Black P/N 7032505

   Distribution List Printer Ribbons:
   Ribbon - Purple P/N 7032508
   Ribbon - Blue/Black P/N 7032552
   Ribbon - Black P/N 7032505

   Sequence Number Printer Ribbon Assembly:
   Ribbon Assembly P/N 7034635

   MICR Ribbon:
   MICR Ribbon P/N 7032878

3. Endorser and PAID Stamp Ink Rolls:
   Red P/N 423653
   Black P/N 423654
   Purple P/N 423656

4. Endorser Plates: Endorser plates are made to the customer's specifications. See IBM for ordering procedures and prices.

5. Belts:
   Restraint Belt P/N 7032759
   Picker Belt P/N 7032760
   Feed Drum Belt P/N 7032761
   Read-Head Belt P/N 7032763

6. Vacuum Cleaner Supplies:
   Vacuum Bags P/N 1245561
   Filter P/N 1245562

7. Microfilm Lamps:
   Package of 4 Lamps P/N 7032252

8. 3694 Customer
   Convenience Kit: P/N 7032998

   Starter Supply Kit, approximately 6 months supply of all consumables. See IBM for details.

9. Paper Specifications:
   Master List Printer:
   Single-part Fan Fold P/N 7034710
   *Width: 89mm +/- 1mm (3.5")
   Weight: 16 lb Bond
   Length of Fold: 140mm (5.5")
   Number of Folds/Pack: 500

   Master List Printer:
   Single-part Roll P/N 7034714
   Double-part Roll P/N 7034713
   *Width: 89mm +/- 1mm (3.5")
   Weight: 16 lb Bond
   Max. Dia.: 83mm (3.27")
   Thickness: 0.07-0.20mm (max.) (0.0028-0.0079")

   Distribution List Printer:
   Single-part roll (only) P/N 7034712
   *Width: 44.5mm +/- 0.5mm (1.75")
   Weight: 16 lb Bond
   Max. Dia.: 83mm (3.27")
   Thickness: 0.07-0.20mm (max.) (0.0028-0.0079")

* Use of paper less than 88.9mm (3.5") wide on the MLP and 44.45mm (1.75") wide on the DLP may damage the print mechanism.

Paper Roll Core: Paper sensing mechanisms require that the core of the paper roll have an inside diameter of 11.10mm +/-

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1.01mm (0.437" +/- 0.04") and an outside diameter of 22.25mm +/- 1.01mm (0.875" +/- 0.04").

3704 COMMUNICATIONS CONTROLLER

The 3704 is one of a series of Communications Controllers. The following is a brief summary of the Communications Controllers.

Comm Controller	Maximum Lines *	Maximum Storage	Host Program	Comm Control Program
3704	32	64K	BTAM	EP
3705 II	255 352	512K 512K	BTAM VTAM/TCAM	EP ACF/NCP-PEP
3705-80	16 16	256K 256K	VTAM/TCAM BTAM	ACF/NCP-PEP EP
3725-1	256	1024K	VTAM/TCAM BTAM	ACF/NCP-PEP EP
3725-2	24	512K	VTAM/TCAM BTAM	ACF/NCP-PEP EP

* Maximum lines that can physically attach, CF3705 is required to determine actual line attachment capabilities.

See individual pages for each Communications Controller for information on additional features.

PURPOSE

The 3704 attaches to any S/370, 4300 Processor, or in 2701/2702/2703 Emulation Mode only, to S/360 models 30 (submodels E or F), 40, 50, 65, 67 (in 65 mode), 75 and 195 for communication with local or remote I/O devices over various common-carrier provided or customer-owned communication facilities.

Note: See "Programming" and "SCP" pages for attachment capabilities.

MODELS

The 3704 is available in four models:

Model		Storage (bytes)	Maximum Communication Lines
A1	A01	16K	32
A2	A02	32K	32
A3	A03	48K	32
A4	A04	64K	32

Prerequisites: The 3704 requires a control unit position on a processor's Byte Multiplexer Channel. See the machine pages of the processor to which the 3704 will attach.

HIGHLIGHTS

The 3704 is a modular, programmable unit which greatly expands the communications capabilities of S/360, S/370, 30XX, 4300 Processors. By virtue of its modularity and programmability, the 3704 boasts a high degree of flexibility in tailoring to a teleprocessing system's requirements.

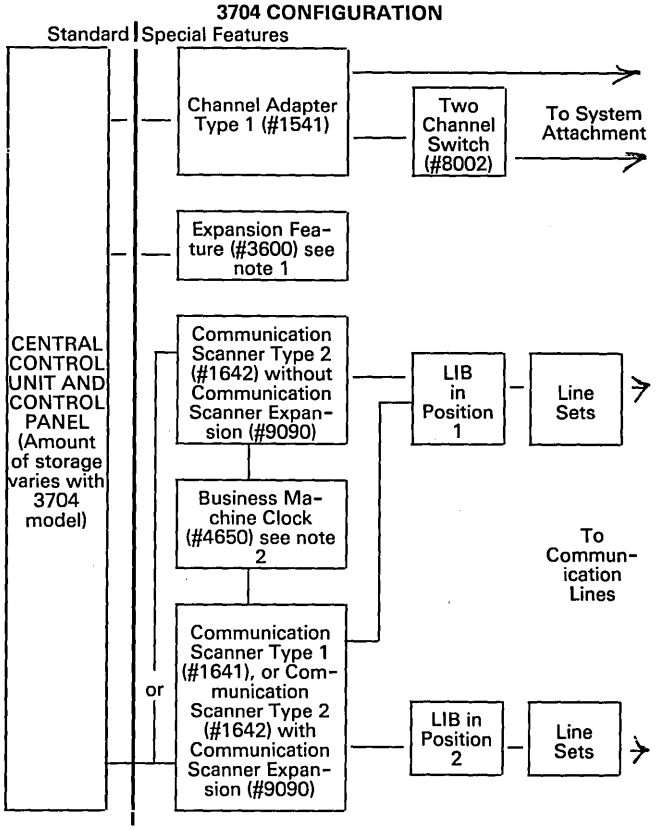
The 3704 is housed in a 36x24x57-inch cabinet which contains the Central Control Unit (CCU), the Control Panel (CP), storage (as indicated above), a Channel Adapter (CA), a Communication Scanner (CS), Line Interface Bases (LIB), and Line Sets (LS) to allow attachment of up to 32 communications lines.

The maximum number of communication lines attachable is a function of the speed of the lines, the CS installed and the mode of operation.

The HONE Configurator is available to assist in configuring the 3704 to the requirements of a specific TP network.

Customer Responsibilities: See the M2700 pages. Also see the 3704/3705 Programming pages for attachment capability, and the host systems programming pages for possible restrictions to the above.

3704 CONFIGURATION



Notes:

1) Required for mdls A2, A3 and A4, or CS Type 2 (#1642) on mdl A1.

2) A minimum of one Business Machine Clock (#4650) is required. See "Special Features".

Communication Facilities : The 3704 operates over common-carrier-provided or equivalent customer-owned communication facilities. For information concerning these facilities, see the M2700 pages.

3704 Local Attachment (Start/Stop): In addition to terminals being attached to the 3704 through common carrier-provided facilities, they may also be connected directly to the 3704 using LS Type 1C (#4713). The cable groups selected from the *Physical Planning Manuals* or the device must have the 25-pin data set interface. LS Type 1C (#4713) allows only two terminals to be attached; one per 3704 25-pin data set interface. There must be corresponding Business Machine Clocks (BMC) in both the terminal and the 3704.

3704 Local Attachment (Synchronous): In addition to the synchronous terminals being attached to the 3704 throughcommon-carrier-provided facilities, they may also be connected directly to the 3704 using LS Type 1F #4716. The cable groups selected from the *Physical Planning Manuals* for the device must have the 25-pin data set interface. LS Type 1F #4716 allows only two terminals to be attached; one per 3704 25-pin data set interface. There must be corresponding BMCs in both the terminal and the 3704.

3704 Line Interface Bases: Communication lines are attached to the 3704 through 'LIBs', of which there are several different types, to accommodate the various types of line terminations. Depending on type, these LIBs will house from one to eight "Line Sets" each, which will allow the attachment of from one to 16 communication lines. The 3704 will accommodate a maximum of two of these LIBs, allowing up to 32 lines to be attached. **Note:** The LIB position in the 3704 must be specified. See 'LIB Position Designator' following special feature #1642.

Bibliography: S/360 -- GC20-0360 ... S/370 -- GC20-0001

SPECIFY

- Voltage (AC, Single phase, 3-wire, 60 Hz): **#9902** for 208V or **#9904** for 230V. If a 4.3 meter (14 foot) power cable is not desired, specify **#9986** for a 1.8 meter (6 foot) power cable. **Field Installation:** Not recommended.
- For mdls A2, A3 or A4, Expansion Feature **#3600** is required. See "Special Features".

3704 Communications Controller (cont'd)

- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white. **Field Installation:** Not recommended.
- Prior to submitting an MES order, the FE Branch Manager should be consulted for any software/hardware compatibility requirements resulting from order.
- Cabling: Specify **#9080** for below floor, or **#9081** for on the floor.

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES

Two-Channel Switch (#8002): Provides for the attachment of a 3704 CA Type 1 (#1541) to two S/360, S/370, 303X, 4331 or 4334 Processor channels (which may be on the same processor, or on two different processors). The CA so equipped will, however, be capable of operation on only one channel at a time. A manual switch on the CP selects the channel which is to be made operable. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1541.

Unit Protection (#8510): Provides a lock on the 3704 which deactivates all switches (except power-off and power-on) when key is removed. Two keys are included. For additional or replacement keys, see "Accessories". **Maximum:** One. **Field Installation:** Yes.

COMMUNICATIONS FEATURES

Channel Adapter Type 1 (#1541): Provides for communication with a S/360, S/370, 303X, 4300 Processor Byte Multiplexer Channel. All such communications are accomplished via 1, 2, 3 or 4-byte transfers, with de-selection and re-selection between each transfer. Data transfer rates are primarily dependent on the 3704's internal processing requirements. **Maximum:** One. **Field Installation:** Yes.

Communication Scanner Type 1 (#1641): Provides the interface between the communication line attachment features and the Central Controller. The CS Type 1 (#1641) uses the 3704 interrupt facilities to allow the program to perform character assembly and disassembly, and allows for program control of line control, control character recognition, code translation and error recovery functions. **Limitations:** This Scanner may not be installed if a CS Type 2 is to be installed. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** At least one #4650.

Communication Scanner Type 2 (#1642): Provides the interface between the communication line attachment features and the Central Controller. The CS Type 2 (#1642) assembles and disassembles characters automatically, provides character buffering for each line and allows for program control of line control, control character recognition, code translation and error recovery functions. The basic scanner is operational with one LIB Type A1 only. **Limitations:** This scanner may not be installed if a CS Type 1 is to be installed. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** At least one #4650 and #3600. **Specify:** CS Expansion (**#9090**) to permit installation of two LIBs of any types except two LIB Type 1s (#4701). **Note:** See "Specify" section for CSB II additional attachment capability.

LIB Position Designator: The position of the LIBs within the 3704 must be specified in accordance with the table below:

	Communication Scanner Type 1 (#1641)		Communication Scanner Type 2 (#1642)	
LIB TYPE	Position 1	Position 2	Position 1	Position 2
1	----	----	#9501	#9502
1	#9311	#9312	#9511	#9512
8	#9381	#9382	#9581	#9582
9	#9391	#9392	#5991	#5992
10	#9401	#9402	#9701	#9702

The LIBs *should* be assigned to position in numerical order: that is, LIB Type A1s *should* be assigned to the lowest numbered positions, LIB Type 1s next lowest, etc., so that the highest type numbered LIB is in the highest numbered position. Each order submitted must indicate the Feature number for each LIB desired plus a location specify code (position number, from above table) based on the LIB Type.

The positions of the line sets within the LIB will be automatically assigned.

Cables: The cables that are included in each line set (except **#4719**) are listed in the *IBM Input/Output Equipment Installation Manual - Physical Planning,* GC22-7064. These cables must be ordered separately from the 3704 order on a cable order.

To obtain cables longer than 15 meters (50 feet), select the required cable below and order the cable assembly P/N and the required cable length in meters. These longer cables are ordered by P/N on an MES. The cable price includes installation charges. Maintenance charges are included in the associated Line Sets. Inquire into the QSLM file for prices.

To order a cable for a RS-232-C/CCITT V.24 Modem Interface Attachment:

Duplex (Line Set Type 1H **#4714**)
Order cable assembly P/N **1785928**
(See Note 1)

Half Duplex (Line Set Type 1D **#4714**)
Order cable assembly P/N **1785929**
(See Note 1)

To order a cable for a Autocall Originate (RS-366-A/CCITT V.25) Attachment:

(Line Set Type 1E **#4715**)
Order cable assembly P/N **1753439**
(See Note 2)

Note 1: Maximum Length: 30 meters (100 feet).

Note 2: Maximum Length: 45 meters (150 feet).

Expansion Feature (#3600): Required for mdls A2, A3, and A4 or CS Type 2 (#1642) on mdl A1. **Maximum:** One. **Field Installation:** Yes.

Business Machine Clock (#4650): Provides clocking when the attached external modem or internal IBM line adapter does not provide this clocking. The speed of this clocking must be specified for each Business Machine Clock (#4650) ordered from the following table:

Speed (bps)	Specify
100	#2716
110	#9605
134.5	#9606
200	#2717
300	#9612
600	#9607
1200	#9608
2400	#9610

Limitations: Required only when modem does not provide clocking except that each CS requires at least one BMC, which must be at a speed less than one-half that of the lowest speed modem clocked line. **Maximum:** Four per CS Type 1 (#1641) or Type 2 (#1642). **Field Installation:** Yes. **Prerequisites:** #1641 or #1642. **Note:** Individual BMCs may be assigned by the program to one or more communication lines.

Line Interface Base Type A1 (#4700): For attachment of up to four LSs 1A, 1C, 1F, 1E, or 1D in any combination. **Limitations:** See CS Type 2 (#1642). When installed in combination with other type LIBs, the maximum of two applies to the total number of LIBs. **Maximum:** Two if CS Expansion (**#9090**) is specified with CS Type 2 (#1642). Without (**#9090**), maximum is one. **Field Installation:** Yes. **Prerequisites:** #1642.

Line Interface Base Type 1 (#4701): Provides for the attachment of up to eight LS 1A, 1C, 1D, 1F. **Limitations:** When installed in combination with other type LIBs, the maximum of two applies. **Maximum:** Two with CS Type (#1641); one with CS Type 2 (#1642). **Prerequisites:** #1641 or #1642 with **#9090. Field Installation:** Yes.

Line Interface Base Type 8 (#4708): Provides for the attachment of up to two Modem Attachment Bases - 1200 bps (**#5103**). **Limitations:** When installed in combination with other type LIBs, the maximum of two applies to the TOTAL number of LIB. **Maximum:** Two per 3704. **Field Installation:** Yes. **Prerequisites:** #1641 or #1642 with CS Expansion (**#9090**).

Line Set Type 1A (Low-Speed External Line Interface) (#4711): Provides for the attachment of two start/stop communication lines at speeds up to 1200 bps, each of which has an EIA RS-232-C interface for attachment to an external modem. **Limitations:** When installed in combination with other type LSs, the maximum above applies to the total number of LSs. **Maximum:** Eight per LIB Type 1 (#4701), or four per LIB Type A1 (#4700). **Field Installation:** Yes. **Prerequisites:** #4701 or #4700 and a Business Machine Clock (or clocks) (#4650), assigned by the program to this LS.

Line Set Type 1C (Low-Speed Local Attachment) (#4713): Provides for the local attachment of two half-duplex IBM Start/Stop terminals at speeds up to 1200 bps via IBM-provided cables. Modems are not required. **Note:** The attached terminal must provide a BMC and external modem cable to which the 3704 LS 1C cable will connect. Total cable length must not exceed 200 feet. **Limitations:** When installed in combination with other type LSs, the maximum above applies to the total number of LSs. **Maximum:** Eight per LIB Type 1 (#4701), or four per LIB Type A1 (#4700). **Field Installation:** Yes. **Prerequisites:** #4701 or #4700 and a Business Machine Clock (or clocks) (#4650) specified for the same speed as the terminal's clock.

Line Set Type 1D (Medium-Speed External Line Interface) (#4714): Provides for the attachment of two start/stop or synchronous communication lines at speeds up to 9600 bps, each of which has an EIA RS-232-C interface for attachment to an external modem. **Limitations:** When installed in combination with other type LSs, the maximum above applies to the total number of LSs. **Maximum:** Eight per LIB Type 1 (#4700) or four per LIB Type A1 (#4701). **Field**

3704 Communications Controller (cont'd)

Installation: Yes. **Prerequisites:** #4701 or #4700. **Note:** For speeds in excess of 4800 bps, see Address Substitution and Scan Limits under "Specify".

Line Set Type 1E (Auto Call Unit) (#4715): Provides two RS-366 interfaces for attachment of external automatic calling units. **Limitations:** When installed in combination with other type LSs, the below maximums apply to the total number of LSs per LIB. **Maximum:** Eight per LIB Type 1 (#4701) or four per LIB Type A1 (#4700). **Field Installation:** Yes. **Prerequisites:** #4701 or #4700.

Line Set Type 1F (Medium-Speed Local Attachment) (#4716): Provides for the local attachment of two half-duplex, synchronous IBM terminals at speeds up to 2400 bps via IBM-provided cables. Modems are not required. This LS requires different cable groups depending upon terminal type. For cabling information, see *IBM System/370 Installation Manual - Physical Planning,* GC22-7004; for Remote, see *Multiplexers,* GA27-3006. **Note:** The attached terminal must be equipped with a BMC, and must provide a standard external modem cable to which the 3704 LS 1F external cable will connect. Total cable length must not exceed 100 feet. **Limitations:** When installed in combination with other LSs, the maximum below applies to the total number of LSs per LIB. **Maximum:** Eight per LIB Type 1 or four per LIB Type A1. **Field Installation:** Yes. **Prerequisites:** #4701 or #4700 and a Business Machine Clock (or clocks) (#4650) specified for the same speed as the terminal's BMC.

Line Set Type 1J (#4719): [External Mil Std 188C Modem] For attachment of one start/stop or synchronous communication line at a speed of up to 50.0K bps via an external modem having an interface that conforms to the requirements in Section 7.2.1 of Mil Std 188C. **Maximum:** Two. **Field Installation:** Yes. **Prerequisites:** #4700 and #1642. CS Type 2 (#1642). If CS Expansion **#9090** is ordered with #1642, see "Address Substitution" under "Specify".

Line Set Type 8A (1200 bps Leased Integrated Modem) (#4781): Provides for the attachment of one start/stop line up to 600 bps or one synchronous line at 1200 bps. This line set includes one 1200 bps Integrated Modem. No external modems are required. This integrated modem must communicate with another 1200 bps Integrated Modem. **Limitations:** When installed in combination with LS Type 8B, the maximum below applies to the total number of lines per Modem Attachment Base (#5103). **Maximum:** Two per Modem Attachment Base - 1200 bps (#5103). **Field Installation:** Yes. **Prerequisites:** #5103 and a Business Machine Clock (#4650) assigned by the program to this LS.

Line Set Type 8B (1200 bps Switched Integrated Modem) (#4782): For attachment of one start/stop switched line at speeds up to 600 bps or one synchronous switched line at speeds of 600 bps or 1200 bps. This feature is to be used in conjunction with the Public Switched Network via FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. This LS includes one 1200 bps Switched Line Modem with Automatic Answer capability ... no external modem is required. *This integrated modem must communicate with another 1200 bps Integrated Modem.* **Limitations:** When installed in combination with LS Type 8A, the maximum of two applies to the total number of lines per Modem Attachment Base (#5103). **Maximum:** Two per Modem Attachment Base - 1200 bps (#5103). **Field Installation:** Yes. **Prerequisites:** #5103 and a Business Machine Clock (#4650) assigned by the program to this LS.

Modem Attachment Base 1200 bps (#5103): Provides for the attachment of up to two of LSs 8A, 8B, or 8D (in any combination). **Maximum:** Two per LIB Type 8 (#4708). **Field Installation:** Yes. **Prerequisites:** #4708.

MODEL CONVERSIONS

May be made in the field.

ACCESSORIES

Keys: A 3704 with Unit Protection (#8510) is shipped with two keys. Additional or replacement keys may be purchased only from IBM. A customer letter of authorization with key identification number (stamped on key) must accompany each order. Allow 6 to 7 weeks for shipment.

SUPPLIES (None)

3776 COMMUNICATION TERMINAL MDL 1, 2

PURPOSE

The 3776 is a medium speed remote job entry terminal and is a member of the 3770 Data Communication System. The 3776 mdls 1 and 2 are SNA Single Logical Unit (SLU) and BSC terminals. A keyboard is used for terminal control and for operator communication with the host processor. The 3776 is not designed as an interactive terminal. The printer contains an engraved character font belt (48-, 64-, or 94 character set) which can be interchanged by the operator. A special feature provides for paper insertion from either the front or rear of the machine. Special features permit one or two diskette storage devices, one card reader and one card punch. One of three card readers can be selected for operation at speeds of 50, 150 or 300 cards per minute. The card punch operates at 50 cpm.

Communication features permit operation over switched or non-switched facilities at speeds up to 4800 bps using SDLC or BSC transmission techniques and an appropriate modem.

MODELS

		Maximum Lines Per Minute	Character Set
Model 1	001	300	48
		230	64
		160	94
Model 2	002	400	48
		300	64
		230	94

Prerequisites:

For SDLC Communications with S/370, 4331 or 4341 Processor: A 3704, 3705 or 3725 Communications Controller operating under Network Control Program (NCP/VS) and attached to any virtual storage S/370 or 4300 Processor operating under DOS/VS, OS/VS1 or OS/VS2; or these operating systems running under VM/370.

For BSC Communications with S/360, S370 or 4300 Processor: A virtual storage S/370 or 4300 Processor operating under DOS/VS, OS/VS1 or OS/VS2; or under RSCS and VM/370; or any of these operating systems running under VM/370. The 3776 Communication Terminals use 2770/3780 BSC programming support when operating in BSC mode. Operation with S/360, S/370 or 4300 Processors using 2770/3780 BSC programming is also permitted. See GA27-3097 for BSC compatibility considerations. The customer may have to modify existing 2770/3780 application programs for operation with 3776. BSC attachment can be via a 3704, 3705, or 3725 Communications Controller, or a 2701 Data Adapter Unit attached to a channel of any S/370, 4331, 4341 or 4381 Processor; or via an Integrated Communications Adapter on S/370 mdl 115, 125, 135-3 or 138; or via a Communications Adapter feature on the 4331 or 4361 Processor. BSC attachment can be made via a 3704/3705 attached to a channel of a S/360 mdl 30, 40, 50, 65, 67 (in 65 mode), 75 or 195; via a 2701 attached to a channel of a S/360 mdl 22, 25, 30, 40 44, 50, 65, 67 (in 65 mode), 75 or 195; or via an Integrated Communications Attachment on S/360 mdl 25. **Note:** The 3725 is not connectable to S/360.

For BSC Communications with System/38: All mdls of S/38 running under CPF (5714-SS1) featured with Communications Attachment (#1501 or #1502) and Communications Control, SDLC/BSC (#2001 or #2003). See *IBM System/38 Data Communications Programmer's Guide,* SC21-7825, for BSC function and compatibility considerations.

Limitations: The input/output capabilities outlined under "Highlights" are dependent on appropriate configurations of the terminal. Keyboard and printer are standard. For other configurations, refer to "Special Features" below.

HIGHLIGHTS

Keyboard -- EBCDIC arrangement with 44 data keys (produces 88 characters). Underscore/Hyphen, Backspace, Space, and Character Advance keys have typamatic operation. Associated with the keyboard are: indicator lights, function keys, operating mode switches, and a 3-position numeric display.

Printer -- line printing is from characters engraved on a revolving belt. Included as standard is one interchangeable print belt (either 48-, 64-, , or 94-character set) ... see "Specify" ... variable width forms tractor for feeding continuous forms up to 15 inches wide, paper jam detection, and 132 print positions. Character spacing is 10 per inch, line spacing is 6 or 8 per inch. Maximum print lines are 127 lines per page. Refer to GA24-3488 for forms design considerations.

Buffers -- transfer data between the input and output devices and the communication line. Buffers also transfer data between input and output devices during offline operation. The buffers alternate in providing input and output service to permit overlapped operation. Dual 256-byte or dual 512-byte buffers are used to BSC or SDLC operation and are under operator control.

Printer Format Controls -- facilitate the formatting or printed data. Vertical and horizontal control characters in data initiate vertical and horizontal tabbing.

Compression/Expansion -- provides a means for improving the efficiency of data transmission. For BSC, the compression option can be invoked at the terminal for a job that reads non-transparent data from cards or diskette. A 2-byte sequence is substituted for each occurrence or three or more consecutive blanks (63 consecutive blanks is the upper limit). A second 2-byte sequence is appended if more than 63 consecutive blanks are read. The terminal monitors received non-transparent data that is destined for the printer or attached card punch and automatically expands this 2-byte sequence to the correct number of blanks.

SDLC implementation provides a compression option at the terminal for a job that reads data from cards or diskette to the line. An identifying sequence is substituted for each occurrence of two or more consecutive duplicate characters. The terminal automatically expands the compression sequence to the correct number of blanks or duplicate characters for compressed transparent or non-transparent data received.

Transmission Reversal -- permits keyboard initiation of interrupt of host data transmission for terminal data transmission and for resumption of the host transmission upon completion of the terminal transmission. The function is dependent upon associated host programming.

Record Compress -- using two special feature diskette storage devices permits offline compression of Basic Exchange diskette records onto a single 3776 diskette for subsequent batch transmission. The compressed records are written on the 3776 diskette in 3770 mode. Record Compress using one diskette storage device permits the compression of Basic Exchange diskette records into blocks of 256 bytes of 512 bytes for transmission.

Dual Data Path -- provides for concurrent operation of a line-to-printer job and a card reader-to-diskette, or diskette-to-card punch, or diskette-to-diskette job. The line-to-printer job uses either the dual 256-byte or dual 512-byte alternating buffers to accept data from the line and transfer it to the printer. A single 256-byte or single 512-byte buffer is used for data buffering between card I/O and diskette or diskette and diskette. Throughput for both online and offline jobs is degraded when run concurrently using dual data path.

Automatic Card to Line Job -- when an online job is completed and the 3776 goes into Standby Status, a reader-to-line job is automatically started. The Start-Job procedure is not required provided the terminal has a 2502 Card Reader and it is in Ready Status.

Input/Output Form Definitions -- can be operator- or terminal-defined. Up to five operator-defined forms can be read from diskette or card reader to facilitate rapid job setup when the terminal is equipped with either of the special features; otherwise they can be entered from the keyboard. Printer format controls can be part of the job definition. An appropriately configured 3776 will permit input/output job designations as follows:

Input	Output
Offline Jobs	
Diskette[1]	Printer, Diskette or Card Punch
Card Reader[1]	Printer, Diskette or Card Punch
Online Batch Jobs	
Diskette or Card Reader[1]	Line
Line[1]	Printer, Diskette or Card Punch
Dual Data Path Jobs	
Line[2]	Printer
Card Reader[2]	Diskette
Diskette[2]	Card Punch
Diskette[2]	Diskette

[1] One input device and one output device per job.
[2] Line-to-printer occurs concurrently with card reader-to-diskette, or diskette-to-card punch, or diskette-to-diskette.

Performance Considerations: Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression characteristics, characters read/printer, forms skipping, application processing, etc., must all be considered in determining actual throughput. See *IBM 3770 Data Communication System.* GA27-3097, for additional information.

Problem Determination Procedures: Significant function has been designed into this unit to help provide greater availability to the customer. This has been done through the use of problem identification routines and procedures that are easily understood and used by the operator. See *IBM 3776 Operating Procedures Guide,* GA27-3107.

Customer Responsibilities: It will be a customer's responsibility to use and follow the Problem Determination Procedures and to fill out the trouble report prior to calling IBM for service. Also refer to M2700 pages.

3776 Communication Terminal Mdl 1, 2 (cont'd)

Communications: See "Special Features". Transmission speeds up to 4800 bps over switched or nonswitched facilities are allowed by selecting the appropriate modem and communication facility. Refer to M2700 pages for information on customer responsibilities, communication facilities, and other attachment information. Also refer to M3863, 3684, 3868 and 3872 pages. The 2400 bps Integrated Modem and 3872 Modem when appropriately configured can be intermixed on the same communication facility.

Bibliography: GC20-0001

SPECIFY

- Voltage (115V AC, 1-phase, 3-wire, 60 Hz): **#9880** for locking plug, or **#9881** for non-locking plug.

- Color Group: One only must be specified. Available at time of manufacture only. **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray.

- Print Belt Character Set: Specify one. Available at time of manufacture only (specify for print belt to be shipped with machine. See "Print Belt" in "Accessories" for print belts available in addition to belt specified on order entry.

  #9489 -- 48-character set EBCDIC (HN Character Set)*
  #9490 -- 48-character set EBCDIC (Standard Character Set)*
  #9491 -- 64-character EBCDIC
  #9492 -- 94-character set EBCDIC
  #9493 -- 48-character set ASCII†
  #9494 -- 64-character set ASCII†
  #9495 -- 94-character set ASCII†

  † ASCII Feature (#1201) is required.

  * These belts are identical except for the special character differences:

HN Character Set has	) (=
Standard Character Set has	% # @

  Print Belts are interchangeable by the operator. The internal code structure adapts to the belt installed as follows:

	Data Stream Character	Printed Character
HN Character Set Specified		
HN Belt Installed	) (=	) (=
HN Belt Installed	% # @	) (=
Std Belt Installed	) (=	% # @
Std Belt Installed	% # @	% # @
Std Character Set Specified		
Std Belt Installed	% # @	% # @
Std Belt Installed	) (=	- - -
HN Belt Installed	% # @	) (=
HN Belt Installed	) (=	- - -

- Cabling: Fixed-length cables are supplied as standard. Refer to *Installation Manual - Physical Planning,* GA27-3006.

- Remote Power Off (**#9501**): This specify feature can be used to conserve energy used by the terminal by providing the capability for the host processor application program to initiate power down at the terminal by sending a controlled data sequence over communication facilities. The terminal must also be equipped with the appropriate communication special features. This capability is in addition to the standard power down switch which can be manually operated.

MODEL CONVERSIONS

Changes from model 1 to model 2, 3 or 4 and from model 2 to model 4 are field installable. **Note:** Customer price quotations and customer order acknowledgment letters for purchase MESs must state: "Installation of this model change involves removal of parts which become the property of IBM".

SPECIAL FEATURES

All special features can be field installed , except #1201 for which field installation is not recommended.

For Communication Capability -- select one Communication Feature (#1460, #1461 or #1470); a Communication Driver (#1481); one Integrated Modem (#5600, #5602, #5610, #5700, #5702, #5710) or EIA Interface (#3701). #1462 is required in addition to #1460 or #1461 for multipoint operation using BSC.

ASCII Feature (#1201): A 48 data key keyboard (produces 94 ASCII graphics) is provided in place of the standard EBCDIC keyboard. This feature also provides for operation with diskette storage features (ASCII is written on the diskette) and with BSC features #1460, #1461 or #1462 or with SDLC features #1460 or #1470. **Maximum:** One

Field Installation: Not recommended. **Specify:** Orders for #1201 must also specify one print belt, **#9493** for 48-character ASCII, **#9494** for 64-character ASCII, or **#9495** for 94-character ASCII.

Audible Alarm (#1390): Sounds an alarm that alerts the operator of conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. **Maximum:** One.

SDLC/BSC, Switch Control (#1460): Provides communication procedure using SDLC or BSC under operator switch control. SDLC allows point-to-point or multipoint operation. BSC operation is point-to-point without #1462, multipoint with #1462. **Limitations:** Cannot be installed with #1461 or #1470. See GA27-3097 for BSC compatibility considerations. **Maximum:** One.

BSC, Point To Point (#1461): Provides for point-to-point BSC operation over switched or nonswitched facilities. **Limitations:** Cannot be installed with #1460 or #1470. See GA27-3097 for BSC compatibility considerations. **Maximum:** One.

BSC Multipoint (#1462): Required for BSC multipoint operation over nonswitched facilities. **Limitations:** See GA27-3097 for BSC compatibility considerations. **Maximum:** One. **Prerequisites:** #1460 or #1461.

SDLC (#1470): Provides for switched or nonswitched SDLC procedures. For record purposes, also identify the primary CPU/Program Environment code. Specify one of the following: **#9977** for DOS/VS VTAM, **#9988** for OS/VS1 VTAM, **#9989** for OS/VS2 VTAM, or **#9993** for all other combinations of operating systems and access methods. **Limitations:** Cannot be installed with #1460 or #1461. **Maximum:** One.

Communication Driver Without Business Machine Clocking (#1481): Provides communication driver without clocking. **Maximum:** One. **Prerequisites:** #1460, #1461 or #1470.

Door Keylock (#3401): Provides one keylock and two keys for the desk-console cabinet door. **Limitations:** The keys provided for this lock can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. **Maximum:** One.

Door Keylock, Dual (#3402): Provides two keylocks and four identical keys for both desk-console cabinet doors. **Limitations:** The keys provided with these locks can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. **Maximum:** One. **Prerequisites:** Diskette Storage, 2nd (#4902).

EIA Interface (#3701): Provides a cable and interface compatible with EIA RS-232C for attachment to a modem. Speeds up to 4800 bps for switched or nonswitched operation are permitted. This feature in combination with #1481 can be used to attach to Modem Fan-Out (#3902) on an adjacent terminal, or on an IBM 3863, 3864, 3872 or 3874 Modem. **Limitations:** Cannot be installed with any Integrated Modem Feature. **Maximum:** One. **Prerequisites:** #1481.

Modem Fan-Out (#3901): Equips the 2400 bps Integrated Modem, Nonswitched, Multipoint (#5602) with the capability to be shared by up to two other terminals in addition to the host. **Limitations:** This feature can be used at a tributary station in a centralized multipoint network. In this configuration, BSC multipoint programming discipline or SDLC nonswitched programming discipline will provide the selection/control of the terminal without any additional user involvement. **Maximum:** One. **Prerequisites:** #5602.

Modem Fan-Out (#3902): Equips the 4800 bps Integrated Modem, Nonswitched, Multipoint (#5702) with the capability to be shared by up to two other terminals in addition to the terminal containing the integrated modem. **Limitations:** This feature can be used at a tributary station in a centralized multipoint network. In this configuration, BSC multipoint programming discipline or SDLC nonswitched programming discipline will provide the selection/control of the terminal without any additional user involvement. **Maximum:** One. **Prerequisites:** #5702.

Forms Stand: Integrated into the machine covers for the 3776 mdl 1 and 2.

Front Feed (#3951): Enables the operator to insert paper forms in the front or rear of the machine. A forms entry chute is provided under the keyboard for front loading. The paper supply is placed on the floor either under the keyboard in the front of the machine for front loading, or underneath the forms enclosure for rear loading.

Keylock (#4650): Provides a mechanical keylock to activate controls that disable all operator activity related to input, output, or control of data at the terminal. Each machine will have its own unique key. Two identical keys are supplied with the feature. See "Accessories" for information on additional or replacement keys. **Maximum:** One.

Diskette Storage, 1st (#4901): Provides one device with a customer removable diskette placed in the left cabinet. Additional diskettes are available from IBM . Characteristics of the diskette storage device are: one movable read/write head; one read/write surface; 73 data tracks; 26 sectors per track and 128 bytes per sector. Up to 949 256-byte records or up to 474 512-byte records can be stored on the diskette (one 256-byte data record is reserved for forms control information). Each 256-byte record is stored in two consecutive numbered sectors in

3776 Communication Terminal Mdl 1, 2 (cont'd)

interchange mode, or in two non-consecutive sectors in 3770 mode. Each 512-byte record is stored in four consecutive sectors in interchange mode, or four non-consecutive sectors in 3770 mode. Diskette data is code insensitive in SDLC mode, non-transparent only in BSC mode. **Maximum:** One.

Diskette Storage, 2nd (#4902): Provides a second diskette storage device with the same characteristics as the 1st. It is placed in the right desk cabinet which is also supplied by this feature. *The second diskette allows additional capabilities for: *Copy* - data can be copied from Diskette 1 to Diskette 2 (single data set or all active data sets - 3770 mode only) ... *Concatenate* (pool) - the ability to concatenate on a data set basis ... *Continue* -- allows a read or write operation to automatically continue to Diskette 2 if it has been placed in a Ready condition. **Maximum:** One. **Prerequisites:** #4901. Orders for field installation must specify color -- **#9081** for red. **#9082** For yellow, **#9083** for blue, or **#9085** for gray. Color must be the same as that specified for the base machine.

Operator ID Feature (#5450): Provides for reading magnetic stripe cards encoded in the ABA format to permit reading of 40 characters of which 37 are discretionary. Each character contains four bits plus odd parity. Card size 3-3/8" ranging from 0.007" to 0.045" thick may be read. See SSD Sales Manual for magnetically striped and encoded identification cards. With BSC, a read operation can be initiated during a keyboard-to-line job only. Data read from the magnetic stripe card cannot be printed. **Limitations:** The operator must position and slide the card through the reader-slot at a steady rate between 5 and 40 inches per second for a read operation. BSC programming for 2770 and 3780 does not support this feature. **Maximum:** One.

2400 bps Integrated Modem, Nonswitched, Point-To-Point (#5600): This self-clocked modem provides for point-to-point operation over nonswitched communication facilities. Operator controls provide for half-speed operation and for adjusting receive equalization. **Limitations:** Cannot be installed with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** #1481.

2400 bps Integrated Modem, Nonswitched, Multipoint (#5602): This self-clocked modem provides for multipoint operation over nonswitched communication facilities. Operator controls provide for half-speed operation and for adjusting transmit and receive equalization. **Limitations:** Cannot be installed with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** #1481.

2400 bps Integrated Modem Switched, With Auto Answer (#5610): This self-clocked modem provides for point-to-point operation over switched network facilities using manual originate/auto answer for establishing connection. Operator controls provide for half-speed operation. **Limitations:** Cannot be installed with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** #1481. Attachment to the Switched Network is via FCC registered protective circuitry of the CBS type (or equivalent) provided by the user.

4800 bps Integrated Modem, Nonswitched, Point-To-Point (#5700): This self-clocked modem provides for point-to-point operation over 4-wire nonswitched communication facilities. This modem features automatic equalization and manual half-speed select. **Limitations:** Cannot be installed with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** #1481.

4800 bps Integrated Modem, Nonswitched, Multipoint (#5702): This self-clocked modem provides for multipoint operation over 4-wire nonswitched communication facilities. This modem feature automatic equalization and manual half-speed select. **Limitations:** Cannot be installed with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** #1481.

4800 bps Integrated Modem, Switched, With Auto Answer (#5710): This self-clocked modem provides for point-to-point operation over switched network facility using manual originate/auto answer for establishing connection. This modem features automatic equalization and manual half-speed select. **Limitations:** Cannot be installed with #3701, or with another Integrated Modem. **Maximum:** One. **Prerequisites:** #1481. Attachment to the Switched Network is via FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. **Note:** Attachment to the switched telephone network is via common carrier-provided data connector equipment type 1001A (CBS) or equivalent provided by the user.

Switched Network Backup (#7951): Provides the capability of attaching 2400 bps Integrated Modem (#5600 or #5602) to the switched network facility as a backup to the primary nonswitched facility. Operation over the switched network is in manual originate/manual answer mode to establish the connection. It can communicate at 2400/1200 bps with an IBM 3872 Modem equipped for operation over the public switched network (#7941, #7951 or #7952) attached to a 3704, 3705 or ICA of a 3115 or 3125. **Note:** To use this feature, operator intervention at the terminal is required. Operator intervention, program modification, or both, may be required at the using system. This feature can be used with BTAM programs for DOS/VS, OS/VS1 and OS/VS2 in certain configurations. Additional customer program routines will be required in existing BTAM programming to fully utilize the capabilities of this feature. **Limitations:** Cannot be installed with #3701. **Maximum:** One. **Prerequisites:** 2400 bps Integrated Modem (#5600 or #5602). Attachment to the Switched Network is via FCC registered protective circuitry of the CDT type (or equivalent) provided by the user. **Note:** Attachment to the switched telephone network is via common carrier-provided data connector equipment type 1001A (CBS) or equivalent provided by the user.

Switched Network Backup (#7952): Provides the capability of attaching 4800 bps Integrated Modem (#5700 or 5702) to the switched network facility as a backup to the primary nonswitched facility. Operation over the switched network is in manual originate/manual answer mode to establish the connection. It can communicate at 4800/2400 bps with an IBM 3874 Modem equipped for operation over the public switched network (#7941, #7951 or #7952) attached to a 3704, 3705 or ICA of a 3115 or 3125. **Note:** To use this feature, operator intervention at the terminal is required. Operator intervention, program modification, or both, may be required on the using system. Additional customer program routines will be required in existing programming to fully utilize the capabilities of this feature. **Limitations:** Cannot be installed with #3701. **Maximum:** One. **Prerequisites:** #5700 or #5702. Attachment to the Switched Network is via FCC registered protective circuitry of the CDT type (or equivalent) provided by the user. **Note:** Attachment to the switched telephone network is via common carrier-provided data connector equipment type 1001A (CBS) or equivalent provided by the user.

3501 Card Reader Attachment (#8050): To attach a 3501 Card Reader. **Limitations:** Cannot be installed with #8149. If a 3521 is also attached (#8150), the Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. **Maximum:** One.

3782/2502 Card Reader Attachment(#8149): To attach a 3782 Card Attachment Unit mdl 2 and a 2502 Card Reader mdl A1 or A2. **Limitations:** Cannot be installed with #8050. If a 3521 is also attached via #8150, the Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. **Maximum:** One.

3782/3521 Card Punch Attachment (#8150): To attach a 3782 Card Attachment Unit Mdl 1 and a 3521 Card Punch. The 3521 can be equipped with special features for Card Read/Punch Check and/or Card Print . **Limitations:** If a 2502 or 3501 Card Reader is also attached (#8149 or 8050), the Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. **Maximum:** One.

ACCESSORIES

The following accessories are available on a purchase-only basis. For shipment with machine, order the feature or P/N indicated below.

Print Belt, Add'l: Supplies a print belt in addition to the one that is provided as standard with the machine (see "Specify").

48-character ASCII (**#5811**)*	48-character EBCDIC (**#5821**)
64-character ASCII (**#5812**)*	[Standard Character Set]
94-character ASCII (**#5813**)*	64-character EBCDIC (**#5822**)
48-character EBCDIC (**#5820**)	94-character EBCDIC (**#5823**)
[HN Character Set]	

* ASCII Feature (#1201) is a prerequisite @SS@

Locks and Keys: The Keylock (#4650) special feature is shipped with two identical keys. Additional or replacement keys may be obtained only from IBM. A customer letter of authorization with key identification number must accompany each order. Allow seven weeks for shipment.

Mercury Battery (P/N 1743456): Provides power to sustain the master key of the Encrypt/Decrypt feature (#3680) when normal power is not present. This accessory is a 4-volt non-rechargeable mercury battery. This battery has a shelf life of 1 year under normal conditions, and can be expected to provide 3.5 years of normal operation. Additional or replacement batteries can be ordered from IBM. **Note:** Discharged batteries should be returned to IBM for disposal. Return information is printed on the label of the battery.

SUPPLIES

Ribbons: A black ribbon, P/N 1136670, or equivalent, is required. Alternate P/N 1299160, or equivalent, incorporates a twist in the ribbon which may improve ribbon life if the major portion of printing is in the first 60 print positions. Contact IBM.

3776 COMMUNICATION TERMINAL MDLS 3, 4

PURPOSE

The 3776 is a medium speed remote job entry terminal and is a member of the 3770 Data Communication System. The 3776-3 and 3776-4 are SNA Multiple Logical Unit (MLU) terminals. A keyboard and a console display are used for terminal control and for operator communication with the host processor. Terminal operation may be controlled by the storage of operating procedures, terminal setups and local utility programs in terminal storage for use by the terminal operator. The 3776 is not designed as an interactive terminal. The printer contains an engraved character font belt (48-, 64-, or 94character set) which can be interchanged by the operator. A special feature provides for paper insertion from either the front or rear of the machine. Special features permit one or two diskette storage devices, one magnetic tape unit, one card reader and one card punch. One of three card readers can be selected for operation at speeds of 150, 300 or 400 cards per minute. The card punch operates at 50 cpm.

MODELS

		Maximum Lines Per Minute	Character Set
Model 3	003	300	48
		230	64
		160	94
Model 4	004	400	48
		300	64
		230	94

Limitations: The input/output capabilities outlined under "Highlights" are dependent on appropriate configurations of the terminal. Keyboard, console display, terminal storage and printer are standard. One communications feature (#3701, #4501, #5605 or #5651) is required. For other configurations, refer to "Special Features" below. The duplex data communications capability of the 3776-3, -4, 3777-3 is operational on nonswitched full-duplex communications facilities only.

Prerequisites for SDLC Communications with S/370 or 4300 Processor: A 3704, 3705 or 3725 Communications Controller operating under Network Control Program (NCP/VS) and attached to any virtual storage S/370, 4331 or 4341 Processor operating under VS1, MVS or DOS/VS using RES, JES2, JES3, POWER/VS or VTAM.

An appropriately featured 3705 operating under the appropriate level of Network Control Program (ACF/NCP/VS) is required for Duplex data stream operation.

HIGHLIGHTS

Communications -- Transmission speeds from 2400 bps to 9600 bps and at 19.2K bps are provided using the appropriate modems and communications facilities. Duplex -- simultaneous inbound/outbound -- data transmission is provided on nonswitched full duplex communication facilities only when communicating with an appropriately equipped 3705 or 3725 Communication Controller with the supporting ACF/NCP/VS level. May also be locally attached in either a duplex or half-duplex mode to a 3705 at 14.4K bps or a 3725 at 19.2K bps.

Keyboard -- EBCDIC arrangement with 44 data keys. The keyboard, in conjunction with a standard console display, indicator lights, function keys, operating mode switches and a 3-position numeric display, provides operator control. Host application commands, System Services Control Point (SSCP) commands and local functions are entered from the keyboard. Data entered on the keyboard is displayed. If a keying error is made, Character Backspace and Character Advance may be used for editing. Character Backspace and Advance are non-destructive. Character Advance is typamatic. Reset returns to the position from which the Character Backspace began.

Console Display -- contains 16 lines of 64 characters each for a total of 1024 characters. The 3776-3 and 3776-4 reserve the bottom three lines of the display for operator keying, display of system information and prompting for information required for the execution of functions. The remaining 13 lines of the display are used to display messages between the terminal and the host application or the SSCP and to display information regarding terminal operations such as host input. Lower case alphabetics are converted to upper case before displaying. When the cursor is beneath a character, any new data keystroke will cause the new character to replace the old. Overstrikes are not permitted.

Each message is displayed as it is received except as described below. Each message is also written in terminal storage. At power on time, the operator is prompted to specify date and time. As messages are received, they are time-stamped prior to display and storage. Messages longer than a display line will wrap around to the next line with an indent to aid readability. The display fills from top to bottom. Subsequent new message lines replace the oldest message lines. The most recent message received is identified by the Greater Than sign (>) in the first position. The following line is blanked to assist the operator with message identification.

Function keys on the keyboard allow the operator to control the display function. The display can be held while incoming messages are sent to terminal storage and not displayed. If messages arrive during the 'hold' state, a message alert light notifies the operator. The operator may subsequently display the desired message group. A terminal utility program is available for listing or copying the message contents of terminal storage for external message retention and reference.

Printer -- line printing is from characters engraved on a revolving belt. Included as standard is one interchangeable print belt (either 48-, 64-, or 94character set) ... see "Specify". Also standard are a variable width forms tractor for feeding continuous forms up to 15 inches wide, paper jam detection, and 132 print positions. Character spacing is 10 per inch, line spacing is 6 or 8 per inch. Maximum print lines are 127 lines per page. Refer to GA24-3844 for forms design considerations.

Forms Stand -- is integrated into the machine covers for the 3776 mdl 3 and 4.

Terminal Storage -- is standard for message spooling, terminal control, utility programs and user-generated procedures.

Diskette Storage -- There are two diskette storage devices available as special features. While the devices are physically identical to those on the 3776-1 and 3776-2, additional operational facilities such as data set concatenation enhance the use of the special feature diskette storage devices. Also, each special feature diskette storage device may be assigned individually to an independent host SNA session or used locally for input or output. Diskette operation is concurrent with other terminal functions.

Magnetic Tape -- may be used as either an input or as an output device. One 3411-1 Magnetic Tape Unit and Control attachment is available as a special feature. The 3411-1 provides 9-track tape with recording densities of 1600 bpi Phase Encoded or 800 bpi NRZI. 7-track tape operation is not provided. The 3411-1 may be assigned to an independent host SNA session or used locally for input or output. Labeled and unlabeled tapes are supported. Records are fixed or variable length and may be unblocked or blocked to a maximum block size of 4000 bytes. Maximum record size is 255 bytes.
A block size of up to 2000 bytes automatically provides dual buffering. Magnetic tape operation is concurrent with other terminal functions. Refer to G232-0004 for detailed information on operation of the 3411-1. Refer to M3411 for ordering information. Feature #7003 is required on the 3411 mdl 1.

Buffers -- transfer data between the input and output devices and the communication line. SDLC communications uses a customer-defined Request/Response Unit (RU) of 256 or 512 byte buffer. The actual transmission is dependent on session pacing values, data length, buffer availability and data availability. Buffers also transfer data between input and output devices during local operation.

Printer Format Controls -- facilitate the formatting of printed data. Vertical control characters in data initiate vertical tabbing. Carriage control definition provides for specification of a variable number of line numbers per carriage stop with a maximum of 60 lines per carriage control definition. Carriage control definition may be defined at the terminal or may be sent dynamically by the host application. Extended Forms Definition is standard and utilizes terminal storage.

Compression/Expansion -- implementation provides a compression option at the terminal for a job that reads data from cards, magnetic tape, or diskette to the line. An identifying sequence is substituted for each occurrence of two or more consecutive duplicate characters. Trailing blank truncation is standard. The terminal automatically expands the compression sequence to the correct number of blanks or duplicate characters for compressed transparent or non-transparent data received.

Decompaction -- provides the decompaction function associated with the receipt of a compacted data stream whereby a pair of consecutive alphameric characters is represented by a single transmission byte. Function depends upon transmission by the host of a decompaction table corresponding to the compaction table used by host programming in creating the compacted job data stream. Decompaction occurs for data directed to the printer, card punch, magnetic tape and diskette (except 3770 format). Compaction by the terminal of data inbound to the host is not provided.

Automatic Card Reading -- capability is under the control of the operator. The "hot reader" function may be enabled/disabled at any appropriate operational time.

Job Control -- initiated by the operator, pertains to online jobs with the host and local utility jobs run concurrently with the online jobs. Online job submission may be initiated at any time there is an SNA session available for data transmission. The terminal may have up to six concurrent sessions that are controlled by the operator. Online job input may consist of card, diskette or magnetic tape data. Data from different devices or data sets may be concatenated into a single input data stream as one job execution. Online job output may consist of printer, card, diskette or magnetic tape data.

Local utility jobs may be defined by the operator and stored in terminal storage to provide the following functions:

3776-3, -4 (cont'd)

Input	Output
Card	Printer, Magnetic Tape, Diskette, Card Punch
Magnetic Tape	Printer, Diskette, Card Punch
Diskette	Printer, Magnetic Tape, Diskette, Card Punch

Record Formats -- consist of card image, print image and 3770 format. Card image and print image, in addition to being applicable to card reader, card punch, printer and magnetic tape data sets, are also applicable to diskette as a function of Basic Exchange data sets (128 byte maximum).

Basic Exchange diskettes may be read by the terminal. Basic Exchange diskettes may also be written by the terminal, thereby creating a diskette for further Basic Exchange mode processing.

3770 format is applicable to diskette data recording which is to be subsequently printed or punched. 3770 format recording results in more efficient diskette utilization than does card or print image. Basic Exchange (card or print image) or 3770 format is a user specification in job control.

Input record size from both magnetic tape and diskette may be limited to 80 or 120 bytes, because of host programming considerations. In addition, the ability to concatenate multiple data sets, with different record lengths, into a single input job stream requires host programming support of a CDS-FM Header type 1 (Continue Destination Select).

Remote Power Off -- see **#9501** under "Specify" below.

Encrypt/Decrypt Feature -- available to provide secure data transmission in conjunction with ACF VTAM Encrypt/Decrypt Feature (Program Number 5735-RC2) (Feature Number 6010) and Programmed Cryptographic Facility Program Product (Program Number 5740-XY5).

Performance Considerations -- The line-to-printer performance of the 3776-3 is up to 300 lpm with a 48-character set print belt. The line-to-printer performance of the 3776-4 is up to 400 lpm with a 48-character set print belt.

The 3776-3 and 3776-4 MLU terminals will operate, however, with concurrent input-output processing in either a Duplex or Half Duplex data communications mode as a function of the base Multiple Logical Unit capability. The card reader, punch, diskette storage devices, magnetic tape unit and display console may have a degrading effect on printer performance during concurrent operations. The degree of degradation which may occur will tend to be greater when Half Duplex communications are employed as opposed to Duplex communications and system facilities in support of the concurrent inbound-outbound data stream capability of the terminal.

Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression characteristics, characters read/printed, forms skipping, application processing, SNA pacing, cryptographic processing, etc., must all be considered in determining actual throughput.

In general, Duplex data communications operation will tend to provide greater terminal throughput under concurrent input/output functions than a Half Duplex communications mode. The 3776-3 or 3776-4 operating Duplex at 19.2K bps on a terrestrial link may, however, present a variance of from greater to degrade overall terminal throughput when compared to comparable operation in a Half Duplex mode.

Problem Determination Procedures: Function has been designed into this unit to help provide availability to the customer. See *IBM 3770 Multiple Logical Unit Operator's Guide for 3776-3, 3776-4, 3777-3,* GA27-3125.

Customer Responsibilities: It will be a customer's responsibility to use and follow the Problem Determination Procedures and to fill out the trouble report prior to calling IBM for service. Also refer to M2700 pages.

Communications: See "Special Features" ... Transmission speeds from 2400 bps to 9600 bps and at 19.2K bps. Point-to-point and multipoint transmission capability over switched or nonswitched facilities is allowed by selecting the appropriate modem and communication facility. Speeds above 4800 bps are on nonswitched facilities. Direct local attachment to 3705-II at 14.4K bps or a 3725 at 19.2K bps. EBCDIC is the standard transmission code. ASCII is available as a special feature. Refer to M2700 pages for information on customer responsibilities, communication facilities, and other attachment information.

For 19.2K bps, the 3776-3 and 3776-4 may use either the EIA Interface or the High-Speed Digital Interface to communicate through an appropriate modem and communication facility with a 3704, 3705, or 3725 Communications Controller Line Set Type 1G (#4717) at the central processor. This type of communication requires modems which are line compatible (suitable for inter-connection) and which provide optional EIA RS-232-C or High-Speed Digital Interface DTE interfaces. Also attaches via Communications Adapter feature on a 4321 or 4331 processor ... see M4321, 4331 pages for details.

IBM Modem	Speed	Switched	Nonswitched
3863 - I/II	2400	X	X
3864 - I/II	4800	X	X
3865 - I/II	9600		X

Communications Adapter without Business Machine Clocking: Standard -- integrated to provide SDLC communications over switched or nonswitched facilities.

Bibliography: GC20-0001

SPECIFY

- Voltage (115V AC, 1-phase, 3-wire, 60 Hz): **#9880** for locking plug, or **#9881** for non-locking plug. See M3411 for Magnetic Tape Unit voltage requirements.
- Color Group: Blue is supplied as standard except for field model conversions where installed color groups will be matched (do not specify).
- Print Belt Character Set: Specify one. Available at time of manufacture only (specify for print belt to be shipped with machine). See "Print Belt" in "Accessories" for print belts available in addition to belt specified on order entry. Print belts are interchangeable by the operator.

  #9489 -- 48-character set EBCDIC (HN Character Set)*
  #9490 -- 48-character set EBCDIC (Standard Character Set)*
  #9491 -- 64-character EBCDIC
  #9492 -- 94-character set EBCDIC
  #9493 -- 48-character set ASCII†
  #9494 -- 64-character set ASCII†
  #9495 -- 94-character set ASCII†

  † ASCII Feature (#1201) is required.

  * These belts are identical except for the special character differences:

HN Character Set has	) (=
Standard Character Set has	% # @

  Print belts are interchangeable by the operator. The internal code structure adapts to the belt installed as follows:

	Data Stream Character	Printed Character
HN Character Set Specified		
HN Belt Installed	) (=	) (=
HN Belt Installed	% # @	) (=
Std Belt Installed	) (=	% # @
Std Belt Installed	% # @	% # @
Std Character Set Specified		
Std Belt Installed	% # @	% # @
Std Belt Installed	) (=	- - -
HN Belt Installed	% # @	) (=
HN Belt Installed	) (=	- - -

- Cabling: Fixed-length cables except for 3411 Magnetic Tape and Control are supplied as standard. Refer to *Installation Manual - Physical Planning,* GA27-3006. 3411 cables must be separately ordered.
- Remote Power Off (**#9501**): This specify feature can be used to conserve energy used by the terminal by providing the capability for the host processor application program to initiate power down at the terminal by sending a controlled data sequence over communication facilities. The terminal must also be equipped with the appropriate communication special features. This capability is in addition to the standard power down switch which can be manually operated.
- EIA RS-232C 19.2K bps Line Speed: **#9481** ... provides support of 19.2K bps.
- Alternate Address (#9011): Order this optional feature to specify that diskettes containing terminal control code updates are to be mailed to an alternate address supplied by Field

  Engineering using a Teleprocessing Control number (TPC). The alternate address selected is usually the central site location.

SPECIAL FEATURES

All special features can be field installed , except #1201 for which field installation is not recommended.

ASCII Feature (#1201): A 48-data key keyboard (produces 94 ASCII graphics) is provided in place of the standard EBCDIC keyboard. This feature also provides for operation with diskette storage features (ASCII is written on the diskette). **Maximum:** One. **Field Installation:** Not recommended. **Specify:** Orders for #1201 must also specify one print belt, **#9493** for 48-character ASCII, **#9494** for 64-character ASCII, or **#9495** for 94-character ASCII.

3776-3, -4 (cont'd)

Audible Alarm (#1390): Sounds an alarm that alerts the operator of conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. **Maximum:** One.

Door Keylock (#3401): Provides one keylock and two keys for the desk-console cabinet door. **Limitations:** The keys provided for this lock can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. **Maximum:** One.

Door Keylock, Dual (#3402): Provides two keylocks and four identical keys for both desk-console cabinet doors. **Limitations:** The keys provided with these locks can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. **Maximum:** One. **Prerequisites:** #4902.

Encrypt/Decrypt (#3680): Provides cryptographic data transmission in conjunction with program support in the host. Includes a security keylock. Each machine will have its own unique key. Two identical keys are supplied with the feature. **Maximum:** One. **Prerequisites:** A mercury battery, IBM P/N 1743456 or equivalent is required. A battery is shipped with this feature. See "Accessories" for additional or replacement battery. Replacement of the discharged battery is the customer's responsibility.

EIA Interface (#3701): Provides a cable and interface compatible with EIA RS-232C for attachment to a modem. Speeds from 2400 bps to 9600 bps and at 19.2K bps are permitted. **Limitations:** Cannot be installed with DDS Adapter, Point-to-Point (#5650), DDS ADapter, Multipoint (#5651), High-Speed Digital Interface (#4501), or V35 Interface (#4720). **Maximum:** One. **Prerequisites:** For 19.2K bps operation, **#9481** is required ... see "Specify".

Front Feed (#3951): Enables the operator to insert paper forms in the front or rear of the machine. A forms entry chute is provided under the keyboard for front loading. The paper supply is placed on the floor either under the keyboard in the front of the machine for front loading, or underneath the forms enclosure for rear loading.

High-Speed Digital Interface (#4501): Provides a cable and interface for attachment to a modem which permits point-to-point and multipoint synchronous operation at 19.2K bps on a Type 5703 or 8803 wideband channel. **Limitations:** Cannot be installed with #3701 or #4720 or #5650 or #5651 . **Maximum:** One.

Keylock (#4650): Provides a mechanical keylock to activate controls that disable all operator activity related to keyboard control of data at the terminal. Each machine will have its own unique key. Two identical keys are supplied with the feature. See "Accessories" for information on additional or replacement keys. **Maximum:** One.

V35 Interface (#4720): Required for direct High-Speed Local Attachment to 3705-II at 14.4K bps with a maximum cable distance of 170 feet or a 3725 at 19.2K bps with a maximum cable distance of 150.0m (491 ft). **Limitations:** Cannot be installed with #3701, #4501. **Field Installation:** Yes.

Diskette Storage, 1st (#4901): Provides one device with a customer removable diskette placed in the left desk cabinet. Additional diskettes are available from IBM. Contact IBM. Characteristics of the diskette storage device are: one movable read/write head; one read/write surface; 73 data tracks; 26 sectors per track and 128 bytes per sector. Up to 1898 128-byte records. Data may be stored in either a Basic Exchange data set or in a 3770 format data set. Diskette capabilities allow for: *Concatenate* (pool) - the ability to concatenate on a data set basis ... *Multivolume* - allows a read or write operation to automatically continue to diskette 2 if it has been placed in ready condition or it may continue on the current drive. **Maximum:** One.

Diskette Storage, 2nd (#4902): Provides a second diskette storage device with the same characteristics as the 1st. It is placed in the right desk cabinet which is also supplied by this feature. The second diskette allows additional capabilities for: *Copy* - data can be copied from Diskette 1 to Diskette 2. **Maximum:** One. **Prerequisites:** #4901.

Operator ID Feature (#5450): Provides for reading magnetic stripe cards encoded in the ABA format to permit reading of 40 characters of which 37 are discretionary. Each character contains four bits plus odd parity. Card size 3-3/8" x 2-1/8" ranging from 0.007" to 0.045" thick may be read. Data read from the magnetic stripe card cannot be printed or displayed. **Limitations:** The operator must position and slide the card through the reader-slot at a steady rate between 5 and 40 inches per second for a read operation. **Maximum:** One.

DDS Adapter (DDSA) (#5650 -- For Point-to-Point Operation ... #5651 -- For Multipoint Operation): Provides adapter for SDLC data transmission at speeds of 2400, 4800, or 9600 bps over the AT&T nonswitched Dataphone® Digital Service network. The DDSA interfaces to a DDS channel service unit, the customer site termination of the DDS network. **Limitations:** Cannot be installed with #3701 or #4501 or #4720. **Maximum:** One. **Specify:** **#9822** for 2400 bps, **#9823** for 4800 bps, **#9825** for 9600 bps.

3411 Magnetic Tape Unit And Control Mdl 1 Attachment (#7801): To attach one 3411 Magnetic Tape Unit and Control mdl 1. **Maximum:** One. **Prerequisites:** #7003 on the 3411-1.

3782/2502 Card Reader Attachment (#8149): To attach a 3782 Card Attachment Unit Mdl 2 and a 2502 Card Reader Mdl A1, A2, or A3. **Limitations:** OMR is not supported. **Maximum:** One.

3782/3521 Card Punch Attachment (#8150): To attach a 3782 Card Attachment Unit Mdl 1 and a 3521 Card Punch. The 3521 can be equipped with special features for Card Read/Punch Check and/or Card Print. **Limitations:** The Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. **Maximum:** One.

MODEL CONVERSIONS

Changes from model 3 to model 4 are field installable.

Note: Customer price quotations and customer order acknowledgement letters for purchase MESs must state: "Installation of this model change involves removal of parts which become the property of IBM."

ACCESSORIES

The following accessories are available on a purchase-only basis. For shipment with machine, order the feature or P/N indicated below.

Print Belt, Add'l: Supplies a print belt in addition to the one that is provided as standard with the machine (see "Specify").

48-character ASCII (**#5811**)*	48-character EBCDIC (**#5821**) [Standard Character Set]
64-character ASCII (**#5812**)*	
94-character ASCII (**#5813**)*	64-character EBCDIC (**#5822**)
48-character EBCDIC (**#5820**) [HN Character Set]	94-character EBCDIC (**#5823**)

* ASCII Feature (#1201) is a prerequisite @SS@

Locks and Keys: The Keylock (#4650) special feature is shipped with two identical keys. Additional or replacement keys may be obtained only from IBM. A customer letter of authorization with key identification number must accompany each order. Allow seven weeks for shipment.

Mercury Battery (P/N 1743456): Provides power to sustain the master key of the Encrypt/Decrypt feature (#3680) when normal power is not present. This accessory is a 4-volt non-rechargeable mercury battery. This battery has a shelf life of 1 year under normal conditions, and can be expected to provide 3.5 years of normal operation. Additional or replacement batteries can be ordered from IBM. **Note:** Discharged batteries should be returned to IBM for disposal. Return information is printed on the label of the battery.

SUPPLIES

Ribbons: A black ribbon, P/N 1136670, or equivalent, is required. Alternate P/N 1299160, or equivalent, incorporates a twist in the ribbon which may improve ribbon life if the major portion of printing is in the first 60 print positions. Contact IBM.

3777 COMMUNICATION TERMINAL MDL 1

PURPOSE

The 3777 mdl 1 is a high-speed remote job entry terminal and is a member of the 3770 Data Communication System. A keyboard is used for terminal control and may be used for operator communication with the host CPU. A printer is used for output. The 3777 mdl 1 is not designed as an interactive terminal. The printer is not integrated into the 3777 mdl 1 but is a stand-alone IBM 3203 mdl 3 printer which is cable-attached to the 3777 mdl 1. The 3203 mdl 3 uses the IBM 1416 Interchangeable Train Cartridge which can be interchanged by the operator. Special features permit one or two diskette storage devices, and provide for the attachment of one card reader. One of three card readers can be selected for operation at 150, 300 or 400 cards per minute. A minimum configuration includes a 3777 mdl 1 Communication Terminal and a 3203 Printer mdl 3.

Communication features permit operation at speeds of up to 9600 bps and at 19.2K bps using BSC or SDLC transmission techniques and an appropriate modem. Direct Local Attachment to 3705-II at 14.4K bps or to a 3725 at 19.2K bps via appropriate features.

Maximum Lines Per Minute		
Standard 3203-3	**Featured 3203-3**	**Character Set**
1000	1200	48 AN, HN
870	1020	60 PN

See Type Catalog for additional character sets and speeds. See M3203 pages for 1200 lpm Speed Enhancement feature information.

MODELS

Model 1 001

Limitations: The input/output capabilities are dependent upon appropriate configurations of the terminal. Keyboard is standard on the 3777 mdl 1, while the 3203 Printer mdl 3 is a stand-alone unit. A minimum configuration includes a 3777 mdl 1 Communication Terminal and a 3203 Printer mdl 3.

Prerequisites:

For SDLC Communications With S/370 or 4300 Processor: A 3704, 3705, or 3725 Communications Controller operating under Network Control Program (NCP/VS) and attached to any virtual storage S/370 or 4300 Processor operating under VTAM or TCAM through VTAM with OS/VS1 or OS/VS2, VTAM with DOS/VS; or these operating systems running under VM/370.

For BSC Communications With S/360, S/370 or 4300 Processors: A virtual storage S/370 or 4300 Processor operating under BTAM or VTAM and DOS/VS, or under BTAM, TCAM or VTAM and OS/VS1 or OS/VS2; or under RSCS and VM/370; or any of these operating systems running under VM/370. The 3777 mdl 1 Communication Terminals use 2770/3780 BSC programming support when operating in BSC mode. Operation with S/360 or 4300 processor using 2770/3780 BSC programming is also permitted. See GA27-3097 for BSC compatibility considerations. The customer may have to modify existing 2770/3780 application programs for operation with 3777 mdl 1. BSC attachment can be via a 3704, 3705, or 3725 Communications Controller, or a 2701 Data Adapter Unit attached to a channel of any S/370 processor; or via an Integrated Communications Adapter on S/370 mdls 115, 125, 135, 135-3 or 138; or via a Communications Adaptor, feature on the 4331 or 4361 Processor. BSC attachment can be made via a 3704/3705 attached to a channel of a S/360 mdl 30, 40, 50, 65, 67 (in 65 mode), 75 or 195; via a 2701 attached to a channel of a S/360 mdl 22, 25, 30, 40, 44, 50, 65, 67 (in 65 mode), 75 or 195; or via an Integrated Communications Attachment on S/360 mdl 25.

For BSC Communications With System/38: All mdls of S/38 running under CPF (5714-SS1) featured with Communications Attachment (#1501 or #1502) and Communications Control, SDLC/BSC (#2001 or #2003). See *IBM System/38 Data Communications Programmer's Guide*, SC21-7825, for BSC function and compatibility consideration.

HIGHLIGHTS

Keyboard: EBCDIC arrangement with 44 data keys (produces 88 characters). Underscore/Hyphen, Backspace, Space and Character Advance keys have typamatic action. Associated with the keyboard are indicator lights, function keys, operating mode switches, and a 3-position numeric display.

Printer: A stand-alone 3203 mdl 3 Printer cable-attached to the 3777. The 3203 mdl 3 uses the 1416 Interchangeable Train Cartridge. The 3777 mdl 1 supports fifteen Print Train Arrangements (AN, HN, OAA, ONA, ODA, OAB, GN, PCS-AN, PCS-HN, PN, QN, QNC, RN, SN, TN) as standard. When a substitute character is ordered to displace a character in one of the standard arrangements, the substitute character assumes the card and bit codes of the character it replaces. Refer to the Type Catalog. If the International Print Support specify feature **#9351** is installed, the 3777 mdl 1 will support Print Train Arrangements corresponding to the 48-, 64-, and 94-character EBCDIC sets available for print belts for the 3776 Communication Terminal. Support is also provided for the QN, HN, AN, PN, RN and PCS-HN arrangements. The 3203 mdl 3 accepts continuous forms of up to 20 inches wide and 132 print positions. Character spacing is 10 per inch; line spacing is 6 or 8 per inch under operator control. Maximum print lines are 127 per page when attached to the 3777 mdl 1. Refer to M3203 pages for further description of the 3203 mdl 3 Printer. Refer to Type Catalog for further description of the 1416 print train arrangements supported and for print speeds. Refer to GA24-3488 for forms design considerations.

Buffers: Transfer data between the input and output devices and the communication line. The buffers also transfer data between input and output devices during offline operation. Buffers alternate in providing input and output services to permit overlapped operation. Dual 256-byte or 512-byte buffers are used for BSC or SDLC operation and are under operator control.

Printer Format Controls: Facilitate the formatting of printed data. Vertical and horizontal control characters in data initiate vertical or horizontal tabbing.

Compression/Expansion: Provides a means for improving the efficiency of data transmission. For BSC, the compression option can be invoked at the terminal for a job that reads non-transparent data from card and diskette. A two-byte sequence is substituted for each occurrence of three of more consecutive blank bytes (63 consecutive blanks is the upper limit). A second two-byte sequence is appended if more than 63 consecutive blank bytes are read. Incoming non-transparent data (destined for the printer) is monitored by the terminal which automatically expands this two-byte sequence to the correct number of blanks.

SDLC implementation provides a compression option at the terminal for a job that reads data from cards or diskette to the line. An identifying sequence is substituted for each occurrence of two or more consecutive duplicate characters. The terminal automatically expands the compression sequence to the correct number of blanks or duplicate characters for compressed transparent or non-transparent data received.

Decompaction: Provides the decompaction function associated with the receipt of a compacted data stream whereby a pair of consecutive alphameric characters is represented by a single transmission byte. Function is dependent upon transmission receipt, and subsequent 3777 mdl 1 storage, of a decompaction table corresponding to the compaction table used by host programming in creating the compacted job data stream. Decompaction function is available only under SDLC operation. Decompaction occurs only for data directed to the printer. Compaction by the 3777 mdl 1 of data inbound to the host is not provided.

Transmission Reversal: Data transmission from the host may be temporarily interrupted, via the keyboard, to permit data transmission from the terminal. When the terminal has completed its data transmission, the host automatically resumes its own transmission of data. This function is dependent upon associated host programming.

Record Compress: Using two special feature diskette storage devices permits offline compression of Basic Exchange diskette records onto a single 3777 mdl 1 diskette for subsequent batch transmission. The compressed records are written on the 3777 diskette in 3770 mode. Record Compress, using one diskette storage device, permits the compression of basic exchange diskette records into blocks of up to 256 or 512 bytes for transmission.

Dual Data Path: Provides for concurrent operation of a line-to-print primary job and a card reader-to-diskette or diskette-to-diskette secondary job. The line-to-printer job uses either the dual 256-byte or dual 512-byte alternating buffers to accept data from the line for printing. A single 256-byte or single 512-byte buffer is used for data buffering between card-and-diskette or diskette-and-diskette. The primary line-to-printer job will not normally be degraded during Dual Data Path operation. The secondary job will be degraded during periods of concurrent operation.

Automatic Card-to-Line Job: When an online job is completed and the 3777 goes into Standby Status, a reader-to-line job is automatically started. The Start-Job procedure is not required provided the terminal has a 2502 Card Reader and it is in Ready Status.

Remote Power Off: This feature can be used to conserve energy: The host CPU application program can initiate "power down" at the terminal by sending a controlled data sequence over communication special facilities. The terminal must also be equipped with the appropriate special communication features. This capability is in addition to the standard, manually operable "power down" switch.

Input/Output Form Definitions: Can be operator or terminal defined. Up to five operator defined forms settings can be read from diskette or card reader to facilitate rapid job set-up when the terminal is equipped with either of the special features, otherwise they can be entered from keyboard. Printer format controls can be part of the job definition. An appropriately configured 3777 mdl 1 will permit input/output job designation as follows:

3777 Communication Terminal Mdl 1 (cont'd)

	INPUT	OUTPUT
Offline Jobs	Diskette[1]	Printer or Diskette
	Card Reader[1]	Printer or Diskette
Online Batch Jobs	Diskette or Card Reader[1]	Line
	Line[1]	Printer or Diskette
Dual Data Path Jobs	Line[2]	Printer
	Card Reader[2]	Diskette
	Diskette[2]	Diskette

(1) One input device and one output device per job.
(2) Line-to-printer occurs concurrently with card reader-to-diskette or diskette-to-diskette.

Performance Considerations: Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression characteristics, characters read/printed, forms skipping, application processing, etc., must all be considered in determining actual throughput. See *IBM 3770 Data Communication System,* GA27-3097, for additional information.

Problem Determination Procedures

These are easily understood problem identification routines and procedures for use by the operator. See *IBM 3777-1 Operating Procedures Guide,* GA27-3124.

Customer Responsibilities

It will be a customer's responsibility to use and follow the Problem Determination Procedures and fill out the trouble report prior to calling IBM for service. Also refer to M2700 pages.

Communications

See "Special Features". Transmission speeds of up to 9600 bps and at 19.2K bps are allowed by selecting the appropriate modem and communication facility. Direct Local Attachment to 3705-II at 14.4K bps or a 3725 at 19.2K bps. Refer to M2700 pages for information on customer responsibilities, communication facilities, and other attachment information.

For 19.2K bps the 3777 mdl 1 may use either the EIA or the High-Speed Digital Interface to communicate through an appropriate modem and communication facility with a 3704/3705 Communication Controller Line Set Type 1G (#4717) at the central processing unit. This type of communication requires modems which are line compatible (suitable for interconnection) and which provide optional EIA or RS-232-C or High-Speed Digital Interface DTE interfaces. Also attaches via a Communications Adapter feature on the 4331 Processor ... see M4331 pages for details.

IBM Modems	Speed (bps)
3863	2400
3868 mdl 1	2400
3864	4800
3868 mdl 2	4800
3865	9600
3868 mdl 3,4	9600

Note: 4-wire Switched Network Backup is available on 3863, 3864 and 3865. For communications capability, product utilization and features, see M3863, 3864 and 3865 pages.

Bibliography: GC20-0001

SPECIFY

- Voltage (115V AC, 1-phase, 3-wire, 60 Hz): **#9880** for locking plug, or **#9881** for non-locking plug. See 3203 mdl 3 for 3-phase power requirements.
- Color Group: Blue is supplied as standard.
- International Print Support **(#9351)**: Provides support for modified AN, PN and SN Print Train Arrangements for the 1416 Interchangeable Train Cartridge corresponding to the 48-, 64-, and 94-character EBCDIC sets available for print belts for the 3776 Communication Terminal. Support is also provided for the QN, HN, AN, PN, RN, PCS-HN Print Train Arrangements. See "Type Catalog". **Note:** Not recommended for field installation. Replaces standard print support.
- Cabling: Fixed-length cables are supplied as standard. Refer to *Installation Manual-Physical Planning,* GA27-3006 and to Customer Site Preparation Planning Guide, GA27-3103.
- EIA RS-232-C 19.2K bps Line Speed: **#9481** ... provides support of 19.2K bps. Provides diagnostics

SPECIAL FEATURES

COMMUNICATION FEATURES

For Communication Capability, select one of the following Communication features (#1460, #1461 or #1470); a Communication Driver (#1481); and EIA Interface (#3701) or High-Speed Digital Interface (4501) BSC Multipoint (#1462) is required in addition to #1460 or #1461 for multipoint operation using BSC.

SDLC/BSC, Switch Control (#1460): Provides communication procedure using SDLC or BSC under operator switch control. SDLC allows point-to-point or multipoint operation. BSC operation is point-to-point without #1462, multipoint with 1462. **Limitations:** Cannot be installed with #1461 or #1470. See GA27-3097 for BSC compatibility considerations. **Maximum:** One. **Field Installation:** Yes.

BSC, Point-To-Point (#1461): Provides for point-to-point BSC operation over switched or nonswitched facilities. **Limitations:** Cannot be installed with #1460 or #1470. See GA27-3097 for BSC compatibility considerations. **Maximum:** One. **Field Installation:** Yes.

BSC Multipoint (#1462): Required for BSC multipoint operation over nonswitched facilities. **Limitations:** See GA27-3097 for BSC compatibility considerations. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1460 or #1461.

SDLC (#1470): Provides for switched and nonswitched SDLC procedures. Specify one of the following: **#9977** for DOS/VS VTAM, **#9988** for OS/VS1 VTAM, **#9989** for OS/VS2 VTAM, or **#9993** for all other combinations of operating systems and access methods. **Limitations:** Cannot be installed with #1460 or #1461. **Maximum:** One. **Field Installation:** Yes.

Communication Driver Without Business Machine Clocking (#1481): Provides communication driver without clocking. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Communication Feature (#1460, #1461 or #1470).

EIA Interface (#3701): Provides an EIA RS-232-C compatible interface and a cable for attachment to a modem. Speeds from 2400 bps to 9600 bps and at 19.2K bps are permitted. **Limitations:** Cannot be installed with #4501 or #4720.**Maximum:** One. **Prerequisites:** For 19.2K bps operation, **#9481** is required ... see item under "Specify".

High-Speed Digital Interface (#4501): Provides an interface and a cable for attachment to a modem which permits point-to-point synchronous operation at 19.2K bps on a Type 5703 or 8803 wideband channel. **Limitations:** Cannot be installed with #3701 . **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1481.

V35 Interface (#4720): Required for direct High-Speed Local Attachment to 3705-II at 14.4K bps with a maximum cable distance of 170 feet or to a 3725 at 19.2K bps with a maximum cable distance of 150m (491 ft). **Limitations:** Cannot be installed with a #3701, #4501. **Field Installation:** Yes. **Prerequisites:** #1481.

NON-COMMUNICATION FEATURES

ASCII Feature (#1201): A 48 data key keyboard (produces 94 ASCII graphics) is provided in place of the standard EBCDIC keyboard. This feature also provides for operation with diskette storage features (ASCII is written on the diskette) and with BSC features #1460, #1461 or #1462 or with SDLC features #1460 or #1470. A #1416 interchangeable Train Cartridge containing an ASCII GN print train is required for the 3203 Printer mdl 3 if 1201 is ordered for the 3777. **Maximum:** One. **Field Installation:** Not recommended.

Audible Alarm (#1390): Sounds an alarm that alerts the operator of conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. **Maximum:** One. **Field Installation:** Yes.

Door Keylock (#3401): Provides one keylock and two keys for the desk-console cabinet door. **Limitations:** The keys provided for this lock can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. **Maximum:** One. **Field Installation:** Yes.

Door Keylock, Dual (#3402): Provides two keylocks and four identical keys for both desk-console cabinet doors. **Limitations:** The keys provided with this lock can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4902.

Keylock (#4650): Provides a mechanical keylock to activate controls that disable all operator activity related to input, output or control of data at the terminal. Each machine will have its own unique key. Two identical key are supplied with the feature. See "Accessories" for information on additional or replacement keys. **Maximum:** One. **Field Installation:** Yes.

Diskette Storage, 1st (#4901): This storage device, with a customer-removable diskette, is placed in the left cabinet. Additional diskettes are available from IBM. Characteristics of the diskette storage device are: one movable read/write head; one read/write surface; 73 data tracks; 26 sectors per track and 128 bytes per sector. Up to 949 256-byte records, or 474 512-byte records can be stored on the diskette (one 256-byte data record is reserved for forms control information). Each 256-byte record is stored in two consecutive

3777 Communication Terminal Mdl 1 (cont'd)

numbered sectors in exchange mode, or in two non-consecutive sectors in 3770 mode. Each 512-byte record is stored in four consecutive numbered sectors in exchange mode, or four non-consecutive sectors in 3770 mode. Diskette data is code-insensitive in SDLC mode, non-transparent only in BSC mode. **Maximum:** One. **Field Installation:** Yes.

Diskette Storage, 2nd (#4902): Provides a second diskette storage device with the same characteristics as the first. It is placed in the right desk cabinet which is also supplied by this feature. The second diskette allows additional capabilities for: **Copy** - Data can be copied from diskette 1 to diskette 2 (single data set or all active data sets - 3770 mode only). **Concatenate (Pool)** - The ability to concatenate on a data set basis. **Continue** - Allows a read or write operation to automatically continue onto diskette 2 if it has been placed in "ready" condition. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4901.

Operator Identification Reader (#5450): Reads 40 characters (of which 37 are discretionary) from magnetic-stripe cards which are encoded in the ABA format. Each character contains four bits plus odd parity. Card size is 3-3/8 inches by 2-1/8 inches, and cards ranging in thicknesses of from 0.007 inches to 0.045 inches thick may be read. Contact IBM for magnetically striped and encoded identification cards. With BSC, a read operation can be initiated during a keyboard-to-line job only. Data read from the magnetic-stripe card cannot be printed. **Limitations:** (1) The operator must position and slide the card through the reader-slot at a steady rate of between 5 and 40 inches per second for a read operation. (2) BSC programming for 2770 and 3780 does not support this feature. **Maximum:** One. **Field Installation:** Yes.

Print Speed Enhancement (#5595): Provides support for 3203 Printer mdl 3 operating with 1200 lpm Speed Enhancement feature (#6360). **Maximum:** One. **Field Installation:** Yes.

2502 Card Reader Attachment (#8002): Provides for attachment of a 2502 Card Reader mdl A1, A2 or A3. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS

The following model upgrades are field installable: Model 1 to model 2 and model 2 to model 3. **Note:** Customer price quotations and customer order acknowledgement letters for purchase MESs must state: "Installation of this model change involves removal of parts which become the property of IBM."

ACCESSORIES

Locks and Keys: The Keylock **#4650** special feature is shipped with two identical keys. Additional or replacement keys may be obtained only from IBM (purchase only). A customer letter of authorization with key identification number must accompany each order. Allow seven weeks for shipment.

SUPPLIES

Ribbons: For 3203 mdl 3 ribbons, Contact IBM.

3777 COMMUNICATION TERMINAL MDL 2

PURPOSE

The 3777 model 2 is a high speed remote job entry terminal which operates as a S/360-20 Submodel 5 BSC MULTI-LEAVING Workstation. A keyboard is used for terminal control and may be used for operator communication with the host CPU. A 3203 model 3 Printer is used for output. The 3203 model 3 uses the 1416 Interchangeable Train Cartridge which can be interchanged by the operator. Special features provide for the attachment of one 1024-character console display, one diskette storage device for logging of console display messages, one diskette Storage Device for reading of card image Basic Exchange datasets (processed as 80-column card images), one card reader and one card punch. One of three 2502 Card Reader models can be selected for operation at 150, 300 or 400 cards per minute. The 3521 card punch operates at 50 cpm. A minimum configuration includes a 3777 model 2 Communication Terminal, a 3203 Printer model 3 and a 2502 Card Reader or a Diskette Input Device (#3201). If a Diskette Input Device is attached and a 2502 Card Reader is not present, a Console Display (#1601) is required. A console display is also required if the keyboard is to be used for operator console communication with the host processor.

Communications features permit operation at speeds of up to 9600 bps and at 19.2K using BSC transmission techniques and an appropriate modem. Direct Local Attachment to 3705-II at 14.4K bps or a 3725 at 19.2K bps via appropriate features.

MODELS

	Maximum Lines Per Minute	
Standard 3203-3	**Featured 3203-3**	**Character Set**
1000	1200	48 AN, PN
870	1020	60 PN

See Type Catalog for additional character sets and speeds. See M3203 pages for 1200 lpm Speed Enhancement feature information.

Limitations: The input/output capabilities outlined under "Highlights" are dependent on appropriate configurations of the terminal. Keyboard is standard on the 3777 mdl 2 while the 3203 Printer is a stand-alone unit. A minimum configuration includes a 3777 Communication Terminal mdl 2, a 3203 Printer mdl 3 and a 2502 Card Reader or a Diskette Input Device (#3201). If a Diskette Input Device is attached and a 2502 Card Reader is not present, a Console Display (#1601) is required.

Prerequisites: For BSC Communications with S/360 or 4300 Processor: The 3777 mdl 2 will interface to current host MULTI-LEAVING programming systems as a S/360-20 Submodel 5. BSC attachment can be made via a 3704/3705 Communications Controller, a 2701 Data Adapter Unit or a 2703 Transmission Control attached to a channel of any S/360, or S/370, supporting BSC MULTI-LEAVING Workstations. Also attaches via a Communications Adapter feature on the 4331 Processor.

HIGHLIGHTS

Keyboard: EBCDIC arrangement with 44 data keys (produces 88 characters). Space and Character Advance keys have typamatic action. Associated with the keyboard are: indicator lights, function keys, operating mode switches, and a 3-position numeric display. The keyboard, in conjunction with the optional console display, provides a console function for the 3777 mdl 2.

Printer: A stand-alone 3203 Printer mdl 3 cable attached to the 3777 mdl 2. The 3203 mdl 3 uses the 1416 Interchangeable Train Cartridge. The 3777 mdl 2 supports 15 Print Train Arrangements (AN, HN, OAA, ODA, ONA, OAB, GN, PCS-AN, PCS-HN, PN, QNC, QN, RN, SN, TN) as standard.

When a substitute character is ordered to displace a character in one of the standard arrangements, the substitute character assumes the card and bit codes of the character it replaces.

If the International Print Support specify feature is installed, the 3777 mdl 2 will support Print Train Arrangements corresponding to the 48-, 64- and 94-character EBCDIC sets available for print belts for the 3776 Communication Terminal. Support is also provided for the QN, HN, AN, PN, RN, PSC-HN arrangements. The 3203 Printer mdl 3 permits feeding continuous forms up to 20 inches wide and 132 print positions. Character spacing is 10 per inch, line spacing is 6 or 8 per inch under operator control. Maximum form length is 24 inches when attached to the 3777 mdl 2. Refer to the 3203 write up for further description of the 3203 mdl 3. Refer to Type Catalog for further description of the 1416 print train arrangements supported and for print speeds. Refer to GA24-3488 for forms design considerations.

Console Display: Contains up to 1024 characters of information formatted into 16 lines of 64 character positions each. Operator messages are displayed in the top 14 lines of the display. Operator originated keyboard data is displayed in the bottom two lines of the display and will be displayed as keyed.

Operator messages larger than 64 characters overflow to subsequent lines. Subsequent lines of the message are indented. The latest message displayed is identified with a special character. If the display becomes full, the oldest message is overlayed retaining the most recent messages on the display. The operator may defer subsequent messages in order to complete reference to a particular message.

Console Display Spooling: A diskette storage device may be attached to the 3777 mdl 2 by special feature to provide storage for operator console messages. Two options are available to the operator when the diskette becomes filled. First, automatic rewrite occurs. New messages are overlaid upon older messages commencing with the initial message written upon the diskette. Second, an end of diskette signal is provided to the operator and messages are suspended pending replacement of the used diskette by a new diskette. The diskette may also be used to IPL the 3777 in lieu of the 2502 once the workstation program has been written on the diskette from a card reader.

Operator access to the diskette is via the keyboard. The diskette may be paged backward a defined number of messages and displayed for reference. In addition, the diskette may be written to the printer.

Diskette Input Device: A diskette storage device may be attached to the 3777 mdl 2 by special feature for reading of card image Basic Exchange datasets. Basic Exchange datasets will be processed by the 3777 mdl 2 as 80-column card images. The datasets may be multivolume. Individual datasets or all active datasets may be read. Volume label and dataset labels may be printed. Initial Program Load of the workstation program may take place from the Diskette Input Device if the Console Spool Device is not present. Diskette IPL must take place from the Console Spool Device if both diskette devices are present. IPL is available from the 2502 Card Reader if that device is attached.

If the 3777 mdl 2 configuration includes both a 2502 Card Reader and the Diskette Input Device, diskette input may be alternated with cards; however, both devices will not operate simultaneously. If the 3777 mdl 2 configuration includes a Diskette Input Device instead of a 2502 Card Reader, and IPL is executed from the Diskette Input Device or the Console Spool Device, the IPL diskette containing the workstation program must have been written on a 3777 mdl 2 configuration containing a 2502 Card Reader and a diskette device.

Buffers: Transfer data between the input and output devices and the communication line. The buffers alternate in providing input and output services to permit overlapped operation. Storage is provided in the 3777 mdl 2 for dual buffers for each input and output device attached. The buffer size is variable, dependent upon the workstation program. The recommended buffer size is 512-bytes.

Communications Adapter: Integrated to provide and BSC point-to-point operation over switched or nonswitched facilities.

Printer Format Controls: Facilitate the formatting of printed data. Vertical forms definition provides forms set-up for the printer by means of the keyboard or card reader. The definition may be displayed on the console display, if present, or printed for verification.

Extended forms definition may be used in conjunction with the Diskette Input Device (#3201). Standard forms definition provide for the definition of five printer forms. Extended forms definition provides for greater than five printer forms. The Diskette Input Device (#3201) is a prerequisite to the use of extended forms definition.

Compression/Expansion: Provides a means for improving the efficiency of data transmission. Provides options of (dependent upon the workstation program) trailing blank truncation, blank or data compression/expansion.

Performance Considerations: The line-to-printer performance of the 3777 mdl 2 and attached 3203 Printer mdl 3 is up to 1,000 lpm (up to 1200 lpm with 3203 mdl 3 Speed Enhancement feature) with 48-character AN or HN set and up to 870 lpm (up to 1020 lpm with 3203 mdl 3 Speed Enhancement feature) with a 60 character PN set. The 3777 mdl 2 may operate, however, with concurrent input/output processing as a function of the MULTI-LEAVING capability. The card reader, punch and display console may have a degrading effect on printer performance while transferring data to and from the 3777 mdl 2 buffers and the host as communications line time is shared by all 3777 mdl 2 I/O units.

Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression characteristics, characters read/printed, forms skipping, application processing, etc., must all be considered in determining actual throughput. See *3770 Data Communication System,* GA27-3097, for additional information.

Problem Determination Procedures: Significant function has been designed into this unit to help provide greater availability to the customer. This has been done through the use of problem identification routines and procedures that are easily understood and used by the operator. See *IBM 3777-2 Operating Procedures Guide,* GA27-3129.

Customer Responsibilities: It will be a customer's responsibility to use and follow the Problem Determination Procedures and fill out the trouble report prior to calling IBM for service. Also refer to M2700 pages.

3777 Communication Terminal Mdl 2 (cont'd)

Communications: See "Special Features". Transmission speeds of up to 9600 bps and at 19.2K bps. Point-to-point transmission capability over switched or nonswitched facilities is allowed by selecting the appropriate modem and communication facility. Speeds above 4800 bps are on nonswitched facilities. Direct Local Attachment to 3705-II at 14.4K bps or a 3725 at 19.2K bps. EBCDIC is the only supported transmission code. Refer to M2700 pages for information on customer responsibilities, communication facilities, and other attachment information.

For 19.2K bps the 3777 mdl 2 may use either the EIA or the High Speed Digital Interface to communicate through an appropriate modem and communication facility with a 3704/3705 Communications Controller Line Set Type 1G (#4717) at the central processing unit. This type of communication requires modems which are line compatible (suitable for interconnection) and which provide optional EIA or RS-232-C or High Speed Digital Interface DTE interfaces. Also attaches via a Communications Adapter feature on the 4331 Processor ... see M4331 pages for details.

IBM Modems	Speed (bps)
3863	2400
3868 mdl 1	2400
3864	4800
3868 mdl 2	4800
3865	9600
3868 mdl 3,4	9600

Note: 4-Wire Switched Network Backup is available on 3863, 3864 and 3865. For communications capability, product utilization and features, see M3863, 3864, 3865 and 2700 pages.

Bibliography: GC20-0001

SPECIFY

- **Voltage (115V AC, 1-phase, 3-wire, 60 Hz): #9880** for locking plug, or **#9881** for non-locking plug. See M3203 mdl 3 pages for 3-phase power requirements.
- Color Group: Blue is supplied as standard.
- International Print Support **(#9351):** Provides support for modified AN, PN and SN Print Train Arrangements for the 1416 Interchangeable Train Cartridge corresponding to the 48-, 64-, and 94-character EBCDIC sets available for print belts for the 3776 Communication Terminal. Support is also provided for the QN, HN, AN, PN, RN, PCS-HN Print Train Arrangements. See "Type Catalog". **Note:** Not recommended for field installation. Replaces standard print support.
- Cabling: Fixed-length cables are supplied as standard. Refer to *Installation Manual-Physical Planning,* GA27-3006 , and to Customer Site Preparation Planning Guide, GA27-3103.
- EIA RS-232-C 19.2K bps Line Speed: **#9481** ... provides support of 19.2K bps. Provides diagnostics.

SPECIAL FEATURES

COMMUNICATION FEATURES

Communication Driver Without Business Machine Clocking (#1481): [Required] Provides communication driver without clocking. **Maximum:** One. **Field Installation:** Yes.

EIA Interface (#3701): Provides an EIA RS-232-C compatible interface and a cable for attachment to a modem. Speeds from 2400 bps to 9600 bps and at 19.2K bps are permitted. **Limitations:** Cannot be installed with High Speed Digital Interface (#4501) , DDS Adapter, Point-to-Point (#5650), DDS Adapter, Multipoint (#5651) or V.35 Interface (#4720). **Maximum:** One. **Prerequisites:** For 19.2K bps operation, **#9481** is required ... see item under "Specify".

High-Speed Digital Interface (#4501): Provides an interface and a cable for attachment to a modem which permits point-to-point synchronous operation at 19.2K bps on a Type 5703 or 8803 wideband channel. **Limitations:** Cannot be installed with #3701 or #2911. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1481.

V.35 Interface (#4720): Required for direct High Speed Local Attachment to 3705-II at 14.4K bps with maximum cable distance of 170 feet. **Limitations:** Cannot be installed with a #3701, #4501. **Field Installation:** Yes. **Prerequisites:** Communication Driver (#1481).

NON-COMMUNICATION FEATURES

Audible Alarm(#1390): Sounds an alarm that alerts the operator of conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. **Maximum:** One. **Field Installation:** Yes.

Console Display (#1601): Provides a 1024-character (16 lines of 64 characters each) console information display. **Maximum:** One. **Field Installation:** Yes.

Console Display Spooling (#1602): Diskette storage device for spooling of console display messages. One device with a customer removable diskette placed in the left cabinet. Additional diskettes are available from IBM. Contact IBM. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1601.

Diskette Input Device (#3201): Diskette storage device for reading of card image Basic Exchange Datasets. One device with a customer removable diskette placed in the right cabinet. Additional diskettes are available from IBM. Contact IBM. **Maximum:** One. **Field Installation:** Yes.

Door Keylock (#3401): Provides one keylock and two keys for the desk console cabinet door. **Limitations:** The keys provided for this lock can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. **Maximum:** One. **Field Installation:** Yes.

Door Keylock Dual (#3402): Provides two Keylocks and four Identical keys for both desk-console cabinet doors. **Limitations:** The keys provided with this lock can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3201.

Keylock (#4650): Provides a mechanical keylock to activate controls that disable all operator activity related to input, output, or control of data at the terminal. Each machine will have its own unique key. Two identical keys are supplied with the feature. Refer to M10000 pages for information on additional or replacement keys. **Maximum:** One. **Field Installation:** Yes.

Operator ID Reader (#5450): Provides for reading magnetic stripe cards encoded in the ABA format to permit reading of 40 characters of which 37 are discretionary. Each character contains four bits plus odd parity. Card size 3-3/8 inches x 2-1/8 inches ranging from 0.007 inches to 0.045 inches thick may be read. Contact IBM. for magnetically striped and encoded identification cards. A read operation can be initiated during an operator inquiry (SYSREQ function). Data read from the magnetic stripe card cannot be printed, displayed or written on the Console Display Spooling diskette. **Limitations:** (1) The operator must position and slide the card through the reader-slot at a steady rate between 5 and 40 inches per second for a read operation. (2) BSC programming does not support this feature. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1601.

Print Speed Enhancement (#5595): Provides support for 3203 mdl 3 Printer operating with 1200 lpm Speed Enhancement feature (#6360). **Maximum:** One. **Field Installation:** Yes.

2502 Card Reader Attachment (#8002): Provides for attachment of a 2502 Card Reader mdl A1, A2 or A3. **Maximum:** One. **Field Installation:** Yes.

3782/3521 Card Punch Attachment (#8150): To attach a 3782 Card Attachment Unit mdl 1 and a 3521 Card Punch. The 3521 can be equipped with special features for Card Read/Punch Check and/or Card Print. **Limitations:** The Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS

The following model upgrades are field installable:

Model 1 to model 2
Model 2 to model 3 **

** When upgrading a mdl 2 to a mdl 3, it is assumed that the mdl 2 has Special Features #1601 (Console Display) and #1602 (Console Display Spooling) installed. If they are not, an RPQ must be submitted.

Note: Customer price quotations and customer order acknowledgement letters for purchase MESs must state: "Installation of this mdl change involves removal of parts which become the property of IBM."

ACCESSORIES

The following item is available on a purchase-only basis. For shipment with machine, order the P/N indicated below.

Mercury Battery (P/N 1743456): Provides power to sustain the master key of the Encrypt/Decrypt feature (#3680) when normal power is not present. This accessory is a 4 volt non-rechargeable mercury battery. This battery has a shelf life of one year under normal conditions, and can be expected to provide 3.5 years of normal operation. **Note:** Discharged battery should be returned to IBM.

SUPPLIES

Ribbons: For 3203 mdl 3 ribbons, contact IBM.

3777 COMMUNICATION TERMINAL MDL 3

PURPOSE

The 3777 model 3 is a high-speed remote job entry terminal and is a member of the 3770 Data Communication System. The 3777 model 3 is an SNA Multiple Logical Unit (MLU) terminal. A keyboard and console display are used for terminal control and for operator communication with the host processor. Terminal operation may be controlled by the storage of operating procedures, terminal setups and local utility programs in terminal storage for use by the terminal operator. The 3777 is not designed as an interactive terminal. The printer is not integrated into the 3777 model 3 but is a stand-alone 3203 Printer model 3 which is cable-attached to the 3777 model 3. Special features permit one or two diskette storage devices, one magnetic tape unit, one card reader and one card punch. One of three card readers can be selected for operation at speeds of 150, 300 or 400 cards per minute. The card punch operates at 50 cpm. A minimum configuration includes a 3777 model 3 Communication Terminal and a 3203 model 3 Printer.

MODELS

Maximum Lines Per Minute		
Standard 3203-3	**Featured 3203-3**	**Character Set**
1000	1200	48 AN, PN
998	1195	52 RN
870	1020	60 PN

See "Type Catalog" for additional character sets and speeds. See M3203 for 1200 lpm Speed Enhancement feature information.

Limitations: The input/output capabilities outlined under "Highlights" are dependent upon appropriate configurations of the terminal. Keyboard, console display and terminal storage are standard. The 3203 and 3262 Printers are stand-alone units. A minimum configuration includes a 3777 mdl 3 Communication Terminal and a 3203 Printer mdl 3. For other configurations refer to "Special Features" below. The duplex data communications capability of the 3776-3, -4, 3777-3 is operational on nonswitched full duplex communications facilities only.

Prerequisites: For SDLC Communications with S/370 or a 4300 Processor - A 3704, 3705 or 3725 Communications Controller operating under Network Control Program (NCP/VS) and attached to any virtual storage S/370 Processor or 4300 Processor operating under VS1, MVS or DOS/VS using RES, JES2, JES3, POWER/VS and VTAM.

Note: 4300 MVS and JES2-3 support is limited to 4341 4361 or 4381 Processors.

An appropriately featured 3705 operating under the appropriate level of Network Control Program (ACF/NCP/VS) is required for duplex data stream operation.

HIGHLIGHTS

Communications: Transmission speeds from 2400 bps to 9600 bps and at 19.2K bps are provided using the appropriate modems and communications facilities. Duplex-- simultaneous inbound/outbound -- data transmission is provided on nonswitched full duplex communication facilities only when communicating with an appropriately equipped 3705 or 3725 Communication Controller with the supporting ACF/NCP/VS level. May also be locally attached in either a Duplex or Half-Duplex mode to a 3705 at 14.4K bps or a 3725 at 19.2K bps.

Keyboard: EBCDIC arrangement with 44 data keys. The keyboard in conjunction with a standard console display, indicator lights, function keys, operating mode switches and a 3-position numeric display provides operator control. Host application commands, System Services Control Point (SSCP) commands and local functions are entered from the keyboard. Data entered on the keyboard is displayed. If a keying error is made, Character Backspace and Character Advance may be used for editing. Character Backspace and Advance are non-destructive. Character Advance is typamatic. Reset returns to the position from which the Character Backspace began.

Console Display: Contains 16 lines of 64 characters each for a total of 1,024 characters. The 3777 mdl 3 reserves the bottom three lines of the display for operator keying, display of system information and prompting for information required for the execution of functions. The remaining 13 lines of the display are used to display messages between the terminal and the host application or the SSCP and to display information regarding terminal operations such as host input.

Lower case alphabetics are converted to upper case before displaying. When the cursor is beneath a character any new data keystroke will cause the new character to replace the old. Overstrikes are not permitted.

Each message is displayed as it is received except as described below. Each message is also written in terminal storage. At power on time the operator is prompted to specify date and time. As messages are received they are time-stamped prior to display and storage. Messages longer than a display line will wrap around to the next line with an indent to aid readability. The display fills from top to bottom. Subsequent new message lines replace the oldest message lines. The most recent message received is identified by the (>) in the first position. The following line is blanked to assist the operator with message identification.

Function keys on the keyboard allow the operator to control the display function. The display can be held while incoming messages are sent to terminal storage and not displayed. If messages arrive during the 'hold' state a message alert light notifies the operator. The operator may subsequently display the desired message group. A terminal utility program is available for listing or copying the message contents of terminal storage for external message retention and reference.

Printer: A standalone 3203 Printer mdl 3 cable attached to the 3777 mdl 3. The 3203 mdl 3 uses the 1416 Interchangeable Train Cartridge. The 3777 mdl 3 supports 15 Print Train Arrangements (AN, HN, OAA, ODA, ONA, OAB, GN, PCS-AN, PCS-HN, PN, QNC, QN, RN, SN, RN) as standard. When a substitute character is ordered to displace a character in one of the standard arrangements, the substitute character assumes the card and bit codes of the character it replaces. See "Type Catalog" pages. International Print Support is provided supporting Print Train Arrangements corresponding to the 48-, 64-, and 94-character EBCDIC sets available for print belts for the 3776 Communication Terminal. Support is also provided for the QN, HN, AN, PN, RN, and PCS-HN arrangements. The 3203 mdl 3 permits feeding continuous forms up to 20 inches wide and 132 print positions. Character spacing is 10 per inch, line spacing is 6 or 8 per inch under operator control. Maximum forms length is 24 inches when attached to the 3777 mdl 3. Refer to 3203 for further description of the 3203 mdl 3. Refer to "Type Catalog" for further description of the 1416 print train arrangements supported and for print speeds. Refer to GA24-3488 for forms design considerations.

Terminal Storage: Is standard for message spooling, terminal control, utility programs and user-generated procedures.

Diskette Storage: There are two diskette storage devices available as special features. While the devices are physically identical to those on the 3777 mdl 1, additional operational facilities such as data set concatenation enhance the use of the special feature diskette storage devices. Also, each special feature diskette storage device may be assigned individually to an independent host SNA session or used locally for input or output. Diskette operation is concurrent with other terminal functions.

Magnetic Tape: May be used as either an input or as an output device. One 3411 mdl 1 Magnetic Tape Unit and Control attachment is available as a special feature. The 3411 mdl 1 provides 9-track tape with recording densities of 1600 bpi Phase Encoded or 800 bpi NRZI. 7-Track tape operation is not provided. The 3411 mdl 1 may be assigned to an independent host SNA session or used locally for input or output. Labeled and unlabeled tapes are supported. Records are fixed- or variable-length and may be unblocked or blocked to a maximum block size of 4,000 bytes. Maximum record size is 255 bytes. A block size of up to 2,000 bytes automatically provides dual buffering. Magnetic tape operation is concurrent with other terminal functions. Refer to G232-0004 for detailed information on operation of the 3411 Magnetic Tape Unit and Control. Refer to M3411 pages for ordering information, #7003 is prerequisite for attachment.

Buffers: Transfer data between the input and output devices and the communication line. SDLC communications uses a customer defined Request/Response Unit (RU) of up to 512 bytes. The actual transmission is dependent on session pacing values, data length, buffer availability and data availability. The buffers also transfer data between input and output devices during local operation.

Printer Format Controls: Facilitate the formatting of printed data. Vertical and horizontal control characters in data initiate vertical or horizontal tabbing. Carriage control definition provides for specification of a variable number of line numbers per carriage stop with a maximum of 60 lines per carriage control definition. Carriage control definition may be defined at the terminal or may be sent dynamically by the host application. Extended Forms Definition is standard and utilizes terminal storage.

Compression/Expansion: Implementation provides a compression option at the terminal for a job that reads data from cards, magnetic tape, or diskette to the line. An identifying sequence is substituted for each occurrence of two or more consecutive duplicate characters. Trailing blank truncation is standard. The terminal automatically expands the compression sequences to the correct number of blanks or duplicate characters for compressed transparent or non-transparent data received. The option, when exercised, is unique to the individual associated session and output device.

Decompaction: Provides the decompaction function associated with the receipt of a compacted data stream whereby a pair of consecutive alphameric characters is represented by a single transmission byte. Function is dependent upon transmission by the host of a decompaction table corresponding to the compaction table used by host programming in creating the compacted job data stream. Decompaction occurs for data directed to the printer, card punch, magnetic tape and diskette (except 3770 format). Compaction by the terminal of data inbound to the host is not provided. The function is an option exercised and performed by the 3777 terminal and may be unique to each associated session and output device.

3777 Communication Terminal Mdl 3 (cont'd)

Automatic Card Reading: Capability is under the control of the operator. The "hot reader" function may be enabled/disabled at any appropriate operational time.

Job Control: Initiated by the operator, pertains to online jobs with the host and local utility jobs run concurrently with the online jobs. Online job submission may be initiated at any time there is an SNA session available for data transmission. The terminal may have up to six concurrent sessions that are controlled by the operator. Online job input may consist of card, diskette or magnetic tape data. Data from different devices or data sets may be concatenated into a single input data stream as one job execution. Online job output may consist of printer, card, diskette or magnetic tape data.

Local utility jobs may be defined by the operator and stored in terminal storage to provide the following functions:

Input	Output
Card	Printer, Magnetic Tape, Diskette, Card Punch
Magnetic Tape	Printer, Diskette, Card Punch
Diskette	Printer, Magnetic Tape, Diskette, Card Punch

Record Formats: Consist of card image, print image and 3770 format. Card image and print image, in addition to being applicable to card reader, card punch, printer and magnetic tape data sets, are also applicable to diskette as a function of Basic Exchange data sets (128 byte maximum).

Basic Exchange diskettes may be read by the terminal. Basic exchange diskettes may also be written by the terminal, thereby creating a diskette for further Basic Exchange mode processing.

3770 format is applicable to diskette data recording which is to be subsequently printed or punched. 3770 format recording results in more efficient diskette utilization than does card or print image. Basic Exchange (card or print image) or 3770 format is a user specification in job control.

Input record size from both magnetic tape and diskette may be limited to 80 or 128 bytes, because of host programming considerations. In addition, the ability to concatenate multiple data sets, with different record lengths, into a single input job stream requires host programming support of a CDS-FM Header type 1 (Continue Destination Select).

Remote Power Off: This feature can be used to conserve energy used by the terminal by providing the capability for the host CPU application program to initiate power down at the terminal by sending a controlled data sequence over communication facilities. The terminal must also be equipped with the appropriate communication special features. This capability is in addition to the standard power down switch which can be manually operated. **Note:** The 3262 Line Printer requires manual powering down.

Encrypt/Decrypt Feature: Available to provide secure data transmission in conjunction with ACF VTAM Encrypt/Decrypt Feature 5735-RC2, feature #6010 and Programmed Cryptographic Facility Program Product 5740-XY5.

Performance Considerations: The line-to-printer performance of the 3777 mdl 3 and attached 3203 mdl 3 is up to 1,000 lpm (up to 1,200 lpm with 3203 mdl 3 Speed Enhancement feature #6360) on the 3203 mdl 3 and Print Speed Enhancement (#5595) on the 3777 mdl 3 with 48-character AN or HN set, and up to 870 lpm (up to 1,020 lpm with 3203 mdl 3 Speed Enhancement feature) with a 60-character PN set. For other speeds, see the *3770 Data Communication System,* GA27-3097.

The 3777 mdl 3 MLU terminal will operate, however, with concurrent input-output processing in either a Duplex or Half-Duplex data communications mode as a function of the Multiple Logical Unit capability. The card reader, punch, diskette storage devices, magnetic tape unit and display console may have a degrading effect on printer performance during concurrent operations.

The degree of degradation which may occur will tend to be greater when Half-Duplex communications are employed as opposed to Duplex communications and System facilities in support of the concurrent inbound-outbound data stream capability of the terminal.

Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression characteristics, characters read/printed, forms skipping, application processing, SNA pacing, and cryptographic processing, must all be considered in determining actual throughput. See *3776 and 3777 Component Description Manual,* GA27-3145, for additional information.

In general, Duplex data communications operation will tend to provide greater terminal throughput under concurrent input/output functions than a Half-Duplex communications mode. The 3777 mdl 3 operating Duplex 19.2K bps on a terrestrial link may however present a variance of from greater to degraded overall terminal throughput when compared to comparable operation in Half-Duplex mode. Reference the *Component Description Manual for the IBM 3776/3777 Communication Terminals,* GA27-3145, for specific performance considerations.

Problem Determination Procedures: Function has been designed into this unit to help provide availability to the customer. This has been done through the use of problem identification routines and procedures that are easily understood and used by the operator. See *IBM 3770 Multiple Logical Unit Operator's Guide for the 3776-3, 3776-4, 3777-3,* GA27-3165.

Customer Responsibilities: It will be a customer's responsibility to use and follow the Problem Determination Procedures and fill out the trouble report prior to calling IBM for service. Also refer to M2700, 3203 and 3262 pages.

Communications: See "Special Features". Transmission speeds from 2400 bps to 9600 bps and at 19.2K bps. Point-to-point and multipoint transmission capability over switched or nonswitched facilities is allowed by selecting the appropriate modem and communication facility. Speeds above 4800 bps are nonswitched facilities. Direct Local Attachment to 3705-II at 14.4K bps or a 3725 at 19.2K bps. EBCDIC is the standard transmission code. ASCII is available as a special feature on the 3777 and by RPQ on the 3262. Refer to M2700 pages for information on customer responsibilities, communication facilities and other attachment information.

For 19.2K bps, the 3777 mdl 3 may use either the EIA Interface (#3701) or the High-Speed Digital Interface (#4501) to communicate through an appropriate modem and communication facility with a 3704/3705 Communication Controller Line Set Type 1G (#4717) at the central processing unit. This type of communication requires modems which are line compatible (suitable for interconnection and which provide optional EIA RS-232-C or High-Speed Digital Interface DTE interfaces. Also attaches via a Communications Adapter feature(#1601) on the 4331 Processor. The 4331 must be equipped with a Local Attachment Interface (#4801) and its prerequisites ... see "Special Features" in M4331 pages.

IBM Modems	Speed (bps)
3863	2400
3868 mdl 1	2400
3864	4800
3868 mdl 2	4800
3865	9600
3868 mdl 3,4	9600

Note: 4-Wire Switched Network Backup is available on 3863 mdl 1, 3864 mdl 1 or 3865 mdls 1 or 2. For communications capability, product utilization and features, see M3863, 3864 and 3865 pages.

Communications Adapter: An integrated communications adapter without business machine clocking is standard. It provides SDLC communications over switched or nonswitched facilities.

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SPECIFY

- Voltage (115V AC, 1-phase, 3-wire, 60 Hz): **#9880** for locking plug, or **#9881** for non-locking plug. See M3203, 3262 and 3411 for their power requirements.
- **Color Group:** Blue is supplied as standard (no specify required).
- Cables: Fixed-length cables except for the 3602 and the 3411 Magnetic Tape are supplied as standard. Refer to *Installation Manual-Physical Planning,* GA27-3006. 3411 cables must be separately ordered.
- EIA RS-232-C 19.2K bps Line Speed: **#9481** ... provides support of 19.2K bps. Provides diagnostics and used for record purposes.
- Alternate Address: **#9011** ... for record purposes only. Order this optional feature to specify that diskettes containing terminal control code updates are to be mailed to an alternate address supplied by CE using a Teleprocessing Control number (TPC). The alternate address selected is usually the central site location.

SPECIAL FEATURES

ASCII Feature (#1201): A 48-data key keyboard (produces 94 ASCII graphics) is provided in place of the standard EBCDIC keyboard. This feature also provides for operation with diskette storage features (ASCII is written on the diskette). Orders for #1201 must also specify one print belt, **#9493** for 48-character ASCII, **#9494** for 64-character ASCII, or **#9495** for 94-character ASCII. **Maximum** One. **Field Installation:** Not recommended. **Note:** ASCII on the 3262 requires an RPQ ... see M3262 pages.

Audible Alarm (#1390): Sounds an alarm that alerts the operator of conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. **Maximum:** One. **Field Installation:** Yes.

Door Keylock (#3401): Provides one keylock and two keys for the desk-console cabinet door. **Limitation:** The keys provided for this lock can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. **Maximum:** One. **Field Installation:** Yes.

3777 Communication Terminal Mdl 3 (cont'd)

Door Keylock, Dual (#3402): Provides two keylocks and four identical keys for both desk-console cabinet doors. **Limitation:** The keys provided with this lock can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4902.

Encrypt/Decrypt (#3680): Provides cryptographic data transmission in conjunction with program support in the host. Includes a security keylock. Each machine will have its own unique key. Two identical keys are supplied with the feature. **Maximum:** One. **Field Installation:** Yes. **Note:** A mercury battery, P/N 1743456 or equivalent, is required. A battery is shipped with this feature. See M10000 pages for additional or replacement battery. Replacement of the discharged battery is the customer's responsibility.

EIA Interface (#3701): Provides an EIA RS-232-C compatible interface and a cable for attachment to a modem. Speeds from 2400 bps to 9600 bps and at 19.2K bps are permitted. **Limitations:** Cannot be installed with High Speed Digital Interface (#4501), DDS Adapter, Point-to-Point (#5650), DDS Adapter, Multipoint (#5651) or V.35 Interface (#4720). **Maximum:** One. **Prerequisites:** For 19.2K bps operation, **#9481** is required ... see item under "Specify". .

High-Speed Digital Interface (#4501): Provides a cable and interface for attachment to a modem which permits point-to-point and multipoint synchronous operation at 19.2K bps on a Type 5703 or 8803 wideband channel. **Limitation:** Cannot be installed with EIA Interface (#3701), V.35 Interface (#4720) or DDS Adapter (#5650, #5651). **Maximum:** One. **Field Installation:** Yes.

Keylock (#4650): Provides a mechanical keylock to activate controls that disable all operator activity related to keyboard or control of data at the terminal. Each machine will have its own unique key. Two identical keys are supplied with the feature. Refer to M10000 pages for information on additional or replacement keys. **Maximum:** One. **Field Installation:** Yes.

V.35 Interface (#4720): Required for direct High-Speed Local Attachment to 3705-II at 14.4K bps with maximum cable distance of 170 feet or a 3725 at 19.2K bps with a maximum cable distance of 150 meters (491 feet). **Limitations:** Cannot be installed with a #3701, #4501. **Field Installation:** Yes. **Prerequisites:** #1481.

Diskette Storage, 1st (#4901): This storage device, with a customer-removable diskette, is placed in the left cabinet. Additional diskettes are available from IBM. Contact IBM. Characteristics of the diskette storage device are: one movable read/write head; one read/write surface; 73 data tracks; 26 sectors per track and 128 bytes per sector. Up to 1898 128-byte records. Data may be stored in either a Basic Exchange data set or in a 3770 format dataset. Diskette capabilities allow for:

Concatenate (pool) - the ability to concatenate on a data set basis.

Multi-Volume - allows a read or write operation to automatically continue to diskette 2 if it has been placed in ready condition or it may continue on the current drive.

Maximum: One. **Field Installation:** Yes.

Diskette Storage, 2nd (#4902): Provides a second diskette storage device with the same characteristics as the first. It is placed in the right desk cabinet which is also supplied by this feature. The second diskette allows additional capabilities for: **Copy** - Data can be copied from diskette 1 to diskette 2. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4901.

Operator Identification Reader (#5450): Reads 40 characters (of which 37 are discretionary) from magnetic-stripe cards which are encoded in the ABA format. Each character contains four bits plus odd parity. Card size is 3-3/8 inches by 2-1/8 inches ranging from 0.007 inches to 0.045 inches thick may be read. Data read from the magnetic stripe card cannot be printed or displayed. **Limitation:** The operator must position and slide the card through the reader-slot at a steady rate of between 5 and 40 inches per second for a read operation. **Maximum:** One. **Field Installation:** Yes.

Print Speed Enhancement (#5595): Provides support for 3203 Printer mdl 3 operating with 1,200 lpm Speed Enhancement feature (#6360). **Maximum:** One. **Field Installation:** Yes.

DDS Adapter (DDSA) (#5650, #5651): Provides adapter for SDLC data transmission at speeds of 2400, 4800 or 9600 bps over the AT&T nonswitched Dataphone® Digital Service network. The DDSA interfaces to a DDS channel service unit, the customer site termination of the DDS network. Available at three speeds; 2400, 4800 or 9600 bps. **Limitations:** Cannot be installed with #3701, #4501 or #4720. **Maximum:** One. **Specify #9822** for 2400 bps, **#9823** for 4800 bps or **#9825** for 9600 bps. For point-to-point (#5650); for multipoint tributary (#5651). **Note:** Cable length is 55 feet. **Maximum:** One. **Specify:** Record purposes only. **#9822** for 2400 bps, **#9823** for 4800 bps, or **#9825** for 9600 bps.

3411-1 Magnetic Tape Unit And Control Attachment (#7801): To attach one 3411-1 Magnetic Tape Unit and Control. **Maximum:** One. **Prerequisites:** #7003 or 3411 mdl 1. **Field Installation:** Yes.

2502 Card Reader Attachment (#8002): Provides for attachment of a 2502 Card Reader mdl A1, A2 or A3. **Limitation:** OMR is not supported. **Maximum:** One. **Field Installation:** Yes.

3782/3521 Card Punch Attachment (#8150): To attach a 3782 Card Attachment Unit mdl 1 and a 3521 Card Punch. The 3521 can be equipped with special features for Card Read/Punch Check and/or Card Print. **Limitation:** The Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. **Maximum:** One. **Field Installation:** Yes.

ACCESSORIES (None)

SUPPLIES

For 3203 mdl 3 ribbons, contact IBM.

3777 COMMUNICATION TERMINAL MDL 4

PURPOSE

The 3777 model 4 is a high-speed remote job entry terminal providing an SNA Multiple Logical Unit (MLU). A keyboard and console display are used for terminal control and for operator communication with the host processor. Terminal operation may be controlled by the storage of operating procedures, terminal setups and local utility programs in terminal storage for use by the terminal operator. The 3777 is not designed as an interactive terminal. The printer is not integrated into the 3777 model 4 but is a stand-alone IBM 3262 model 2 or 12 Printer which is cable attached to the 3777 model 4. Special features permit one or two diskette storage devices, one magnetic tape unit, one card reader, one card punch and an additional printer. One of three card readers can be selected for operation at speeds of 150, 300 or 400 cards per minute. The card punch operated at 50 cpm. A minimum configuration includes a 3777 model 4 Communication Terminal and a 3262 model 2 or 12 Printer.

MODELS

Model 1 001

3262 NOMINAL RATED SPEED (LINES PER MINUTE)

CHARACTER SET	MODEL 2	MODEL 12
48 Character (AN)	650	325
64 Character	467	230
96 Character	364	180
63 Optimized	625 (max)	310 (max)

Limitations: The input/output capabilities outlines under "Highlights" are dependent upon appropriate configurations of the terminal. Keyboard, console display and terminal storage are standard. The 3262 Printer is a standalone unit. A minimum configuration includes a 3777 mdl 4 Communication Terminal with the appropriate communications capabilities and a 3262 Printer. For other configurations refer to "Special Features" below. The duplex data communications capability of the 3777 mdl 4 is operational on nonswitched full duplex communications facilities only.

Prerequisites

For SDLC Communications With S/370 or a 4300 Processor: A 3704, 3705 or 3725 Communications Controller operating under Network Control Program (NCP/VS) and attached to any virtual storage S/370 Processor or 4300 Processor operating under VS1, MVS or DOS/VS using RES, JES2, JES3, Power/VS and VTAM.

Note: 4300 MVS and JES2-3 support is limited to 4341, 4361 or 4381 Processors.

An appropriately featured 3705 operating under the appropriate level of Network Control Program (ACF/NCP/VS) is required for Duplex data stream operation.

HIGHLIGHTS

Communications: Transmission speeds from 2400 bps to 9600 bps and at 19.2K bps are provided via an integrated communications adapter using the appropriate modems and communications facilities. Duplex-simultaneous inbound/outbound -- data transmission is provided on nonswitched full duplex communication facilities only when communicating with an appropriately equipped 3705 or 3725 Communication Controller with the supporting ACF/NCP/VS level.

Keyboard: EBCDIC arrangement with 44 data keys. The keyboard in conjunction with a standard console display, indicator lights, function keys, operating mode switches and a 3-position numeric display provides operator control. Host application commands, System Services Control Point (SSCP) commands and local functions are entered from the keyboard. Data entered on the keyboard is displayed. If a keying error is made, Character Backspace and Character Advance may be used for editing. Character Backspace and Character Advance are non-destructive. Character Advance is typamatic. Reset returns to the position from which the Character Backspace began.

Console Display: Contains 16 lines of 64 characters each for a total of 1024 characters. The 3777 mdl 4 reserves the bottom three lines of the display for operator keying, display of system information and prompting for information required for the execution of functions. The remaining 13 lines of the display are used to display messages between the terminal and the host application or the SSCP and to display information regarding terminal operations such as host input.

Lower case alphabetics are converted to upper case before displaying. When the cursor is beneath a character, any new data keystroke will cause the new character to replace the old. Overstrikes are not permitted.

Each message is displayed as it is received except as described below. Each message is also written in terminal storage. At power on time the operator is prompted to specify date and time. As messages are received they are time-stamped prior to display and storage. Messages longer than a display line will wrap around to the next line with an indent to aid readability. The display fills from top to bottom. Subsequent new message lines replace the oldest message lines. The most recent message received is identified by the Greater Than sign in the first position. The following line is blanked to assist the operator with message identification.

Function keys on the keyboard allow the operator to control the display function. The display can be held while incoming messages are sent to terminal storage and not displayed. If messages arrive during the 'hold' state a message alert light notifies the operator. The operator may subsequently display the desired message group. A terminal utility program is available for listing or copying the message contents of terminal storage for external message retention and reference.

Printer: The 3262 is a standalone unit providing 132 print positions. Horizontal spacing is 10 characters per inch (25.4 mm). Vertical spacing is limited to 6 or 8 lines per inch (25.4 mm). Forms skipping and spacing are program controlled within the 3262, and is optimized by the 3777 to provide the closest comparison possible with the other 3776/3777 MLU models and their associated programming interfaces.

There are character set variations forms control variations between the 3262 and the other printers associated with the IBM 3776/3777. The user should refer to the *3776/3777 Component Description Manual* (GA 27-3145) and the *Forms Design Reference Guide for Printers* (GA 24-3488) for the specific variations. Refer to M3262 for ordering information.

Second Printer Attachment: Adding a second printer to the 3777 mdl 4 will yield a higher output to the 3777. As an example:

	SECOND PRINTER		48 CHARACTER Nominal Rated
3262 Mdl 2	3262 Mdl 2	3262 Mdl 12	LPM
650			650
650		325	975
650	650		1300

Terminal Storage: Is standard for message spooling, terminal control, utility programs and user generated procedures.

Diskette Storage: There are two diskette storage devices available as special features. While the devices are physically identical to those on the 3777 mdl 1, additional operational facilities such as data set concatenation enhance the use of the special feature diskette storage devices. Also, each special feature diskette storage device may be assigned individually to an independent host SNA session or used logically for input or output. Diskette operation is concurrent with other terminal functions.

Magnetic Tape: May be used as either an input or as an output device. One 3411 Magnetic Tape Unit and Control attachment is available as a special feature. The 3411 mdl 1 provides 9-track tape with recording densities of 1600 bpi Phase Encoded or 800 bpi NRZI. Seven track tape operation is not provided. The 3411 mdl 1 may be assigned to an independent host SNA session or used locally for input or output. Labeled and unlabeled tapes are supported. Records are fixed or variable length and may be unblocked or blocked to a maximum block size of 4,000 bytes. Maximum record size is 255 bytes. A block size of up to 2,000 bytes automatically provides dual buffering. Magnetic tape operation is concurrent with other terminal functions. Refer to G232-0004 for detailed information on operation of the 3411 Magnetic Tape Unit and Control. Refer to M3411 for ordering information, #7003 is prerequisite on 3411 mdl 1 for attachment to 3777.

Buffers: Transfer data between the input and output devices and the communication line. SDLC communications uses a customer defined Request/ Response Unit (RU) of 256 or 512 byte buffers. The actual transmission is dependent on session pacing values, data length, buffer availability and data availability. The buffers are used for transferring data between input and output devices during local operation.

Printer Format Controls: Facilitate the formatting of printed data. Vertical control characters in data initiate vertical tabbing. Carriage control definition provides for specification of a variable number of line numbers per carriage stop with a maximum of 60 lines per carriage control definition. Carriage control definition may be defined at the terminal or may be sent dynamically by the host application. Extended Forms Definition is standard and utilizes terminal storage.

Compression/Expansion: Implemenation in the 3777 mdl 4 by providing a terminal option for a job that reads data from cards, magnetic tape, or diskette to the line. An identifying sequence is substituted for each occurrence of two or more consecutive duplicate characters. Trailing blank truncation is standard. The terminal automatically expands the compression sequences to the correct number of blanks or duplicate characters for compressed transparent or non-transparent data received. The option, when exercised, is unique to the individual associated session and output device.

Decompaction: Provides the decompaction function associated with the receipt of a compacted data stream whereby a pair of consecutive alphanumeric characters is represented by a single transmission byte. Function is dependent upon transmission by the host of a decompaction table corresponding to the compaction table used by host programming in creating the compacted job data stream. Decompaction occurs for data directed the printers, card punch, magnetic tape and diskette (except 3770 format). Compaction by the terminal of data

3777 Communication Terminal Model 4 (cont'd)

inbound to the host is not provided. The function is an option exercised and performed by the 3777 terminal and may be unique to each associated session and output device.

Automatic Card Reading: Capability is under the control of the operator. The "hot reader" function may be enabled/disabled at any appropriate operational time.

Job Control: Initiated by the operator, pertains to online jobs with the host and local utility jobs run concurrently with the online jobs. Online job submission may be initiated at any time there is an SNA session available for data transmission. The terminal may have up to six concurrent sessions that are controlled by the operator. Online job input may consist of card, diskette, or magnetic tape data. Data from different devices or data sets may be concatenated into a single input data stream as one job execution. Online job output may consist of printer, card, diskette or magnetic tape data.

Local Utility: Jobs may be defined by the operator and stored in terminal storage to provide the following functions:

Input	Output
Card	Printers, Magnetic Tape, Diskette, Card Punch
Magnetic Tape	Printers, Diskette, Card Punch
Diskette(s)	Printers, Magnetic Tape, Diskette, Card Punch

Record Formats: Consist of card image, print image and 3770 format. Card image and print image, in addition to being applicable to card reader, card punch, printer and magnetic tape datasets, are also applicable to diskette as a function of Basic Exchange datasets (128 byte maximum). Basic Exchange diskettes may be read by the terminal. Basic exchange diskettes may also be written by the terminal, thereby creating a diskette for further Basic Exchange mode processing.

3770 format is applicable to diskette data recording which is to be subsequently printed or punched. 3770 format recording results in more efficient diskette utilization than does card or print image. Basic Exchange (card or print image) or 3770 format is a user specification in job control.

Input record size from both magnetic tape and diskette may be limited to 80 or 128 bytes, because of host programming considerations. In addition, the ability to concatenate multiple data sets, with different record lengths, into a single input job stream requires host programming support of a CDS-FM Header type 1 (Continue Destination Select).

Remote Power Off: This function can be used to conserve energy via the capability of the user written host CPU application program to initiate power down at the terminal by sending a controlled data sequence over communication facilities. This capability is in addition to the standard power down switch which can be manually operated. Note: The 3262 Line Printer requires manual powering down.

Performance Considerations: The line to printer performance of the 3777 mdl 4 and attached 3262 mdl 2 is up to 650 lpm with 48 character set. For other speeds see M3262.

The 3777 mdl 4 MLU terminal will operate, however, with concurrent input-output processing in either a Duplex of Half Duplex data communications mode as a function of the Multiple Logical Unit capability. The card reader, punch, diskette storage devices, magnetic tape unit and display console may have a degrading effect on printer performance during concurrent operations.

The degree of degradation which may occur will tend to be greater when Half Duplex communications are employed as opposed to Duplex communications and System facilities in support of the concurrent inbound-outbound data stream capability of the terminal.

In general, Duplex data communications operation will tend to provide greater terminal throughput under concurrent input/output functions than a Half Duplex communications mode. The 3777 mdl 4 operating Duplex 19.2K bps on a terrestrial link may, however, present a variance of from greater to degraded overall terminal throughput when compared to comparable operation in Half Duplex mode. Reference the Component Description Manual for the IBM 3776/3777 Communication Terminals (GA 27-3145) for specific performance considerations.

Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression/compaction characteristics, characters read/printed, forms skipping, application processing, and SNA pacing, must all be considered in determining actual throughput. See *IBM Component Description 3776 & 3777 Manual* GA 27-3145 for additional information.

cProblem Determination Procedures:c Significant function has been designed into this unit to help provide greater availability to the customer. This has been done through the use of problem identification routines and procedures that are easily understood and used by the operator. See IBM 3777 mdl 4, *Communications Terminal Operator's Guide*, (GA27-3309).

Customer Responsibilities: It will be a customer's responsibility to use and follow the Problem Determination Procedures and fill out the trouble report prior to calling IBM for service. Also refer to M2700 and M3262 pages. The 3262 is designated as Customer Setup Unit (C.S.U.).

Communications: See Special Features. Transmission speeds from 2400 bps to 9600 bps and at 19.2K Point-to-point and multipoint transmission capability over switched or nonswitched facilities is allowed by selecting the appropriate modem and communication facility. Speeds above 9600 bps are nonswitched facilities. Refer to M2700 pages for information on customer responsibilities, communication facilities, and other attachment information.

For 19.2K bps the 3777 mdl 4 uses the EIA Interface to communicate through an appropriate modem and communication facility with a 3704/3705 Communication Controller Line Set Type 1G (#4717) at the central processing unit. This type of communication requires modems which are line compatible (suitable for interconnection) and which provide optional EIA RS-232-C DTE interface Also attaches via a Communications Adapter feature pn the 4331 Processor. See M4331 for details.

IBM Modems	Speed (bps)
3863	2400
3868 mdl 1	2400
3864	4800
3868 mdl 2	4800
3865	9600
3868 mdl 3,4	9600

Note: 4 Wire Switched Network Backup is available on 3863, 3864 and 3865. For Communications capability, product utilization and features, see M3863, M3864 and M3865 pages.

Bibliography: GC 20-0001

SPECIFY

- Voltage (115V AC, 1-phase, 3-wire, 60 Hz): **#9880** for locking plug or **#9881** for non-locking plug. See 3411-1 Magnetic Tape Unit voltage requirements. See M3262 power requirements.
- Color Group: Blue is supplied as standard (do not specify).
- Cabling: All cables are supplied with fixed lengths with 3777 shipment except the 3411 Magnetic Tape and the 3262 Printer. Refer to *Installation Manual-Physical Planning,* GA27-3006. 3411 cables must be separately ordered (see M3411). The 3262 provides a 1.8 meter (6 foot) standard or 4.3 meter (14 feet) optionally specified Signal Cable (#9405) which connects to the 3777 mdl 4. The 3262 Customer Set-Up (CSU) must be performed prior to installation of the 3777 mdl 4.
- EIA RS-232-C 19.2K bps Line Speed: **#9481** ... provides support of 19.2K bps. @SM@
- Alternate Address: (90ll ... For record purposes only. Order this optional feature to specify that diskettes containing terminal control code updates are to be mailed to an alternate address supplied by Field Engineering using a Teleprocessing Control number (TPC). The alternate address selected is usually the central site location.@SS@

SPECIAL FEATURES

ASCII Feature (#1201): A 48 data key keyboard (produces 94 ASCII graphics) is provided in place of the standard EBCDIC keyboard. This feature also provides for operation with diskette storage features (ASCII is written on the diskette). **Maximum:** One. **Field Installation:** Not Recommended.
NOTE: ASCII on 3262 requires an RPQ (see M3262).

Audible Alarm (#1390): Sounds an alarm that alerts the operator of conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. **Maximum:** One. **Field Installation:** Yes.

EIA Interface (#3701): Provides an EIA RS-232-C compatible interface and a cable for attachment to a modem. Speeds from 2400 bps to 9600 bps and at 19.2K bps are permitted. **Limitations:** Cannot be installed with DDS Adapter, Point-to-Point (#5650); DDS Adapter, Multipoint (#5651). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** For 19.2K bps operation, **#9481** is required ... see item under "Specify".

Keylock (#4650): Provides a mechanical keylock to activate controls that disable all operations related to keyboard or control of data at the terminal. Each machine will have its own unique key. Two identical keys are supplied with the feature. Refer to M10000 pages for information on additional or replacement keys. **Maximum:** One. **Field Installation:** Yes.

Diskette Storage, 1st (#4901): This storage device, with a customer-removable diskette, is placed in the left cabinet. Additional diskettes are available from IBM. Contact IBM. Characteristics of the diskette storage device are: one movable read/write head; one read/write surface; 73 data tracks; 26 sectors per track and 128 bytes per sector. Up to 1898 128-byte records. Data may be stored in either a Basic

3777 Communication Terminal Model 4 (cont'd)

Exchange dataset or in a 3770 format dataset. Diskette capabilities allow for:

Concatenate - the ability to concatenate on a data set basis.

Multi-Volume - allows a read or write operation to automatically continue to diskette 2 if it has been placed in ready condition or it may continue on the current drive.

Maximum: One. **Field Installation:** Yes.

Diskette Storage, 2nd (#4902): Provides a second diskette storage device with the same characteristics as the first. It is placed in the right desk cabinet which is also supplied by this feature. The second diskette allows additional capabilities for: Data can be copied from diskette 1 to diskette 2 or vice-versa. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Diskette Storage, 1st (#4901).

DDS Adapter (DDSA) (#5650, #5651): Provides adapter for SDLC data transmission at speeds of 2400, 4800 or 9600 bps over the AT&T nonswitched Dataphone® Digital Service network. The DDSA interfaces to a DDS channel service unit, the customer site termination of the DDS network. Available at three speeds; 2400, 4800 or 9600 bps. **Limitations:** Cannot be installed with #3701. **Maximum:** One. **Field Installation:** Yes. **Specify #9822** for 2400 bps, **#9823** for 4800 bps or **#9825** for 9600 bps. For point-to-point (#5650); for multi-point tributary (#5651). **Note:** Cable length is 55 feet.

Second Printer Attachment (#6302): Supports the attachment of a second 3262 Printer. Either a Mdl 2 or a Mdl 12 may be attached. **Maximum:** One.

3411-1 Magnetic Tape Unit And Control Attachment (#7801): To attach one 3411-1 Magnetic Tape Unit and Control. **Maximum:** One. **Field Installation:** Yes.

2502 Card Reader Attachment (#8002): Provides for attachment of a 2502 Card Reader Model A1, A2 or A3. **Limitations:** OMR is not supported. **Maximum:** One. **Field Installation:** Yes.

3782/3521 Card Punch Attachment (#8150): To attach a 3782 Card Attachment Unit Model 1 and a 3521 Card Punch. The 3521 can be equipped with special features for Card Read/Punch Check and/or Card Print. **Limitations:** The Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS

Field conversion is possible from Model 3 to Model 4.

ACCESSORIES (None)

SUPPLIES

For 3262 Belts and Ribbons, see M3262. For 3203 mdl 3 ribbons: Contact IBM.

3863 MODEM

PURPOSE

A 2400 bps modem used to provide communication products with a means for transmitting data over telecommunications channels (normally telephone lines). These advanced microprocessor-based modems significantly enhance communication network management and network problem determination. The modem diagnostic functions operate with Network Problem Determination Application (NPDA), providing probable cause of network errors ... alert messages on error threshold ... formatted modem test results.

MODELS

Model 001 Operates in half-duplex or duplex mode over 4-wire nonswitched duplex facilities. Operates in point-to-point, multipoint control, or multipoint tributary mode.

Model 002 Operates in half-duplex mode over 2-wire switched telecommunications networks. Operating mode is point-to-point.

Customer Setup: The 3863 is designated for Customer Setup (CSU). This provides the customer with early availability. This also allows relocation of the unit without requiring IBM service personnel assistance. Customer accessible setup switches are provided on the rear panel to enhance adaptability of the modem. For example, the mdl 1 modem may be configured for point-to-point, multipoint control or multipoint tributary operation with the setup switches. **Note:** Some changes of the setup switches may require SYSGEN changes in the program support.

HIGHLIGHTS

Sales Highlights:

- Volume purchase price reductions are available for quantity purchases..
- Modems ordered with no special features, or with only Extended Diagnostic feature (#7930), are considered standard configurations and are generally available in a short delivery time.
- Telecommunications cable adapters are available to connect the modem to an unusual circuit termination. See "Attachment to Facilities".
- A high density rack-mounted version of the 3863 mdl 1 is available for central teleprocessing installations. See section "Related Equipment" below and "M3868" pages.

Standard Features:

- Data Rate: 2400 bps with backup of 1200 bps.
- A microprocessor for signal processing.
- Auto Answer - Automatic answering of switched network calls - mdl 2 ... SNBU - mdl 1.
- Automatic Remote Speed Selection: The transmission speed of the remote modem follows the transmission speed (2400/1200 bps) of the local modem.
- Anti-Streaming: A multipoint tributary modem can automatically cut off transmission if a terminal holds "Request to Send" up longer than 40 seconds (an abnormal condition in IBM communication protocol). Customer switch option.
- Automatic and Adaptive Equalization: Equalization is automatically performed by the modem and continues to adapt in data mode.
- Line conditioning is not required.
- The protective circuitry required by the FCC (Federal Communications Commission) for direct attachment to the public switched network is contained in the modem.
- Operator Panel with operational status indicators and data quality (Good/Poor) indications.
- The modem diagnostic functions referred to as Link Problem Determination Aid (LPDA), operate with Systems Network Architecture (SNA) and associated program products . Under control of these programs, the modem accepts commands and initiates tests that help isolate problems to the line, local or remote modem, or elsewhere in the network and provide the network operator with the most probable cause of network problems. These program products are:
  1. Network Communication Control Facility (NCCF) Version 1 Release 2 (PP 5735-XX6).
  2. Network Problem Determination Application (NPDA) Version 2 (PP 5668-983). If either "Receive Signal Level Reporting" or "LPDA Functions on Tailed Links" is needed, Version 3 (PP 5668-920) is required.
  3. ACF/NCP Version 2 (PP 5735-XX1). **Note:** The functions "Receive Signal Level Reporting", and "LPDA Functions on Tailed Links" are not supported by this level.
- Modem provides its own clocking or will accept DTE (external) clocking.
- Extended Length Cable: The interconnecting cable between the business machine and the modem can be up to 100 meters (328 ft.) long when the modem is attached to an 3705, 3725, or 3726 Communications Controller or equivalent. See M3705, 3725, 3726 pages for details.

Optional Features:

See "Special Features" for detailed description.

- Extended Diagnostic Card: Enables NPDA to differentiate between modem failures, line failures and remote modem power loss.
- 4-Wire Switched Network Backup: Provides backup for nonswitched telecommunications facilities.
- Fan-Out: Provides for the attachment of up to three telecommunicating machines to one modem.
- LPDA Functions on Tailed Links: Allows tailed 3863 mdl 1 to respond to LPDA diagnostic commands.

Diagnostics: Built-in diagnostics: All modems will respond to diagnostic commands from the system that help provide status of any modem in the link, its attached terminal, and the quality of the received signal over the communication facility. Test requests and responses utilize the same data path and controls that are used by S/370 or 4300 processor or System/36 for data transmission. Thus diagnostic status/test requests can be interspersed with data requests without interrupting terminal sessions.

To report "Receive Signal Level", a 3863 mdl 1 must have serial number suffix code of **HD** or later. If the serial number suffix code is earlier, **RPQ 8Q0317** must be installed.

To respond to LPDA commands, a 3863 tailed to a 3865 with Data Multiplexer feature #3620 must have LPDA Function on Tailed Links feature #4791 installed.

The Network Problem Determination Application (NPDA) program product is an example of an IBM program product offering the capability to utilize the modem diagnostic functions for the collection, storage and retrieval of network error/management data. NPDA implemented under the Network Communication Control Facility (NCCF) program product has both summary and detailed level information for determining probable cause of network errors. Probable cause differentiates between errors in the communications controller, line, modem, modem interface or terminals.

NPDA will also utilize the new modem facilities to provide alert messages on error threshold and display formatted modem test results.

The System/36 Support Program (5727-SS1) includes an online problem determination facility that uses the 3863 built-in diagnostics. Using online problem determination, the system operator can invoke diagnostic tests from the System/36 operator console. These tests help the system operator locate the failing component (line, System/36, local modem, remote modem or remote workstation controller) when a remote workstation experiences data transmission problems.

In addition, tests can also be executed from the the modem operator panel. These manual tests include:

- Modem self-test -- this includes an extensive test of modem microcode, plus a data wrap with reduced thresholds for received data.
- Modem/line transmit and receive tests -- allow testing of modem and line for switched network.
- Local loop-back test -- provides a "wrap" or loop-back at the line interface to allow terminal wrap tests through the modem.
- Remote loop-back test -- provides a wrap or loop-back at the remote modem to allow a DTE wrap test back through the local modem for nonswitched modems. This test does not require remote operator assistance.
- Loop test -- allows an end-to-end test to any modem on the link without remote operator assistance. This test is only available when operating over 4-wire telecommunications facilities.
- Lamp test -- tests all indicator lights on the operator panel.

COMMUNICATIONS FACILITIES MDL 1

Common Carrier Facilities: Common carrier-provided voiceband private line (nonswitched) channel, type 3002 (or equivalent) as described in the Bell System Technical Reference PUB 41004, dated October 1973.

Privately-owned Communication Facilities: Equivalent to above.

3863 Modem (cont'd)

COMMUNICATIONS FACILITIES MDL 2 AND MDL 1 WITH SWITCHED NETWORK BACKUP (#7953)

Public Switched Network: 2-wire switched line with an exclusion key telephone. The customer must be informed that satisfactory transmission of data depends upon the characteristics of the particular switched network connection being used. Refer to the M2700 pages for further details.

International Facilities: Request IBMto contact IBM coordinators of the other countries involved to determine the availability of such facilities.

Transmission of data between the United States and Canada on nonswitched or switched facilities is supported. (For nonswitched operation, the channel in Canada must be schedule 4, type 4.

Attachment to Facilities: Attachment of a 3863 mdl 1 to a private line (nonswitched) channel is by a cable supplied with the 3863. The cable termination is a 4-prong plug (WE 283B or equivalent). The plug mates with a receptacle (WE 404B or 549A surface mount or 493A flush mount or equivalent) which is connected to the channel. The receptacle is a conventional item of communications equipment. Upon customer request at the time the channel is ordered it will ordinarily be furnished by the telecommunications service supplier.

In those situations where it is not possible to have the aforementioned receptacle installed by the telecommunications service supplier prior to the installation of the modem a cable termination adapter can be ordered. Two adapters, a 4-spade lug and a 50-pin connector (commonly used for telephone company modems), are available. See "Accessories" for description .

Attachment of a 3863 mdl 2 to the public switched network is by a cable, supplied with the 3863, which is terminated with a miniature 8-position keyed plug for connection to a data jack provided by the telecommunications service supplier. Two of these cables are supplied to attach a 3863 mdl 1 with 4-Wire Switched Network Backup (#7953) to the public switched network and two data jacks are required. The data jack must be a programmed data jack (USOC RJ45S or equivalent) or a universal data jack (USOC RJ41S or equivalent) set in the programmed mode of operation. The RJ45S data jack is recommended. The modem adjusts its output power in accordance with the programming resistor in the data jack to ensure that the transmit signal level is optimum. When the telecommunications service supplier installs a data jack, special design rules are applied to the characteristics of the local loop connection to the central exchange. The special design rules minimize those local loop line impairments that have the most adverse effect on data transmission.

The telecommunications service supplier will install a data jack only on a line specified as a data line. Only lines that terminate at a telephone company central exchange can be specified as data lines. Extensions from a customer-owned or a telecommunications company-owned PBX (Private Branch Exchange) or a KTS (Key Telephone System) are not data lines. The FCC (Federal Communications Commission) Rules and Regulations, Part 68, prohibit the installation of a data jack on such extensions and allow only voice jacks (also called "permissive" jacks when used for data transmission) behind a PBX or KTS.

When a customer decides to connect the modem to a voice, or permissive, jack, an adapter is required to convert the plug on the end of the modem cable to a plug compatible with the voice jack (USOC RJ11C or equivalent) and to limit the transmit signal to the permissive (-9 dBm) level. Adapters for this purpose (Armiger AA330B or AA330C or equivalent) are available from distributors of telecommunications products.

The satisfactory transmission of data through a voice jack is not as predictable as when using a data jack. The most practical method of determining the success of transmitting date through a particular voice jack is by actual usage. In those situations where the transmission of data using a voice jack is unsatisfactory, the customer can initiate action to resolve the impairments in the PBX/KTS and/or the telecommunications service local loop or have the telecommunications service supplier install a data line that bypasses the PBX or KTS.

The protective circuitry required by the FCC for direct connection to the public switched network is contained in the modem. The FCC registration numbers are:

3863 mdl 2	ANO9SA-67992-DP-N
3863 mdl 1, SNBU (#7953)	ANO9SA-67935-DP-N

For both mdls the REN (Ringer Equivalence Number) is 0.8B.

An exclusion key telephone set is required with switched facilities at locations where calls will be originated. Two telephone sets are required with 4-Wire Switched Network Backup (#7953). Answer only locations are not required to have a telephone set. However, for optimum problem determination capability, a telephone set is recommended.

Related Equipment: The 3863 Modem operates with IBM communication products capable of 2400 bps operation. See M2700 pages. The 3863 Modem must communicate with another appropriately configured 3863 Modem or with a 3868 mdl 1 Rack-Mounted Modem. The interconnecting cable between the business machine and the modem must be supplied by the business machine.

Customer Responsibilities: Customers must be informed of their responsibilities as detailed in the M2700 pages, and in the site preparation section of the *Introduction and Site Preparation Guide* (GA27-3200).

The customer is also responsible for:

(1) Arrangements for price quotations, installation, and all costs of common carrier equipment and services.

(2) Private line (nonswitched) channel -- arranging for the telecommunications service supplier to provide a voice-grade data channel. Also, arranging for the installation of the appropriate receptacle described in "Attachment to Facilities".

(3) Switched Telecommunications Network -- arranging for the telecommunications service supplier to install the appropriate communication service equipped with the required connecting device as described in "Attachment to Facilities" and for attaching the IBM-provided cable to the connecting device. When ordering the telecommunications service the customer must be prepared to identify the line to which the modem will be connected, the modem manufacturer, the modem type and mdl number, the type of data jack required, the FCC registration number and the REN of the modem. The customer must also inform the telecommunications service supplier that the rate of data transmission will be faster than 1200 bps.

(4) Ensuring the availability of the interconnecting cable between the business machine and the modem because it must be supplied by the business machine.

(5) Unpacking and placing of the 3863. Physical setup, and connection of cables at setup time. During the physical setup, the position of the two configuration switches located at the bottom of the rear panel must be reviewed to ensure compatibility with the actual application. (Example: Point-to-point primary or secondary; multipoint control or tributary.) Details are in the *IBM 3863/3864 Setup Instructions and User's Guide,* GA27-3216.

(6) Notifying IBM of intent to relocate the unit, and following IBM instructions for relocation.

(7) Disconnecting, packing and movement to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be supplied by IBM.

(8) All three of the following program products must be installed for LPDA to function:
NCCF ... NPDA ... and ACF/NCP. See section "Standard Features" above for required release levels.

Bibliography: See *KWIC Index,* G320-1621, or specific systems bibliography.

SPECIFY

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): 3.0 meter (10 ft.) power cable, non-locking plug (no specify code required). If a 1.8 meter (6 ft.) power cable is required, specify **#9986.**

- Telecommunications Cable (modem to telecommunications line connection): 7.5 meter (25 ft.) (no specify code required).

SPECIAL FEATURES

Fan-Out (#3901): This feature allows attachment of up to three telecommunicating machines to one modem. See M2700 pages for applicable machines. Only one of the attached machines may transmit at a time. This feature may be used at a tributary station in a centralized multipoint network. In this configuration, multipoint programming discipline will provide the selection/control of the specified terminals without any additional user involvement. This feature may also be used to allow up to three multiplexers, or communications controllers, at a central site to share the same 3863 Modem for backup purposes. In this case, although all of the machines attached to the 3863 will receive the incoming data simultaneously, the user switchover procedure must ensure that only one machine is sending. **Limitations:** Mdl 1 only. Cannot be used with DTE external clocking. Cannot be installed with LPDA Functions on Tailed Links (#4791) or with Tail Circuit Attachment accessory. **Field Installation:** Yes.

LPDA Functions on Tailed Links (#4791): This feature enables the 3863 mdl 1 that is attached by the Tailed Circuit Attachment accessory to a channel of a 3865 Modem with Data Multiplexer (#3260) and 3863 mdl 1 that are at the other end of the line to respond to LPDA commands. Required only on the 3863 attached to the 3865. **Limitations:** Mdl 1 only. Cannot be installed with Fan-Out feature (#3901). Operates only with data line procedures SDLC (NRZ or NRZI) and BSC (EBDIC or ASCII or Transparent). **Field Installation:** Yes.

3863 Modem (cont'd)

Prerequisites: Tail Circuit Attachment accessory. See Modem Diagnostic Functions in section "Standard Features" for required program products.

Extended Diagnostic Card (#7930): This feature enhances the diagnostic capabilities of nonswitched modems when it is installed in both the local and remote modem. It provides an additional test that enables NPDA to differentiate between modem failures, line failures and remote modem power loss. **Limitation:** This feature is for the mdl 1 only, and must be in both the local and remote modems. **Field Installation:** Yes. **Prerequisite:** See LPDA in "Highlights" for required program products on S/370 and 4300 processors.

4-Wire Switched Network Backup (4W-SNBU) (#7953): Available for all 3863 Modem mdl 1s (nonswitched line). Provides backup for the nonswitched telecommunications facility. Data rate in 4W-SNBU mode is the same as in normal nonswitched line mode. 4W-SNBU allows restoration of the 4-wire service between two point-to-point or multipoint 3863 Modems. For point-to-point configurations, except for the requirement to establish the switched connections, 4W-SNBU allows continuation of service with no operational or programming impact. For multipoint configurations, operational (and possibly programming) modifications are required. 4W-SNBU can be configured in two ways:

- The 4W-SNBU feature is installed on the normal multipoint control station modem and on any tributary modems that require backup. To establish a backup path to any tributary, the control station modem must go to SNBU mode. In doing so, communication is broken to all other tributaries.
- A spare control station modem equipped with the 4W-SNBU feature is installed on a spare port at the control station location. The spare control station can then establish a 4W-SNBU connection to any 3863 tributary modem equipped with the 4W-SNBU feature. This tributary is deactivated from its normal polling list and assigned to the spare port. The normal control station continues to provide service to other tributaries still reachable over the nonswitched line.

This feature requires two 2-wire "switched" telephone lines, and two telephones at the host site. Attachment to the switched lines is made as described in the "Attachment to Facilities" section. This feature is designed to automatically answer when a call is received. Calls must be placed manually. When one call is placed and the connection completed, a four minute timer is started. The second line must be established within the time-out, otherwise the first line is automatically dropped. **Limitation:** Not available on 3863 mdl 2. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES

These items are purchase-only and must be ordered separately from the modem.

Shelf Adapter (P/N 8547412): A shelf adapter that fastens inside a standard 19" EIA rack. The shelf, which fits racks that have an inside depth of 60cm (23.6 in.) to 76cm (30 in.) and an inside opening of 45cm (17.7 in.) will hold two modems side-by-side.

Tail Circuit Attachment (P/N 8547438): Allows the 3863 mdl 1 or 3864 mdl 1 to attach to a 3865 Modem mdl 1 equipped with Data Multiplexing (#3260). Permits an extension of a network via a separate set of modems and a separate communications channel. **Limitations:** To have the 3863's on a tailed circuit responding to LPDA commands, LPDA Functions on Tailed Links (#4791) must be installed on 3863 that is attached to the 3865. Cannot be used simultaneously with Fan-Out (#3901).

Telecommunications Cable Adapters: Convert the 4-prong plug (WE283B or equivalent) supplied on the telecommunications cable to a 4-spade lug or a 50-pin connector termination. For 4-spade lugs, order **P/N 7838805** ... for 50-pin connectors, order **P/N 1992900**. (The 50-pin connector is commonly used for telephone company modems.) See "Attachment to Facilities".

SUPPLIES (None)

3864 MODEM

PURPOSE

A 4800 bps modem used to provide communication products with a means for transmitting data over telecommunications channels (normally telephone lines). These advanced microprocessor-based modems significantly enhance communication network management and network problem determination. The modem diagnostic functions operate with Network Problem Determination Application (NPDA), providing probable cause of of network errors ... alert messages on error threshold ... formatted modem test results.

MODELS

Model 001 Operates in half-duplex or duplex mode over 4-wire nonswitched duplex facilities. Operates in point-to-point, multipoint control, or multipoint tributary mode.

Model002 Operates in half-duplex mode over 2-wire switched telecommunications networks. Operating mode is point-to-point.

Customer Setup: The 3864 is designated for Customer Setup (CSU). This provides the customer with early availability. This also allows relocation of the unit without requiring IBM service personnel assistance. Customer accessible setup switches are provided on the rear panel to enhance adaptability of the modem. For example, the mdl 1 modem may be configured for point-to-point, multipoint control or multipoint tributary operation with the setup switches. **Note:** Some changes of the setup switches may require SYSGEN changes in the program support.

HIGHLIGHTS

Sales Highlights:

- Volume purchase price reductions are available for quantity purchases.
- Modems ordered with no special features, or with only Extended Diagnostic feature (#7930), are considered standard configurations and are generally available in a short delivery time.
- Telecommunications cable adapters are available to connect the modem to an unusual circuit termination. See "Attachment to Facilities".
- A high density rack-mounted version of the 3864 mdl 1 is available for central teleprocessing installations. See section "Related Equipment" below and M3868 pages.

Standard Features:

- Data Rate: 4800 bps with backup of 2400 bps.
- A microprocessor for signal processing.
- Auto Answer - Automatic Answering of Switched Network calls - mdl 2 ... SNBU - mdl 1.
- Automatic Remote Speed Selection: The transmission speed of the remote modem follows the transmission speed (4800/2400 bps) of the local modem.
- Anti-Streaming: A multipoint tributary modem can automatically cut off transmission if a terminal holds "Request to Send" up longer than 40 seconds (an abnormal condition in IBM communication protocol). Customer switch option.
- Automatic and Adaptive Equalization: Equalization is automatically performed by the modem and continues to adapt in data mode.
- Operator Panel with operational status indicators and data quality (Good/Poor) indications.
- The modem diagnostic functions referred to as Link Problem Determination Aid (LPDA), operate with Systems Network Architecture (SNA) and associated program products. Under control of these programs, the modems accept commands and initiate tests that help isolate problems to the line, local or remote modem, or elsewhere in the network and provide the network operator with the most probable cause of network problems. These program products are:
  1. Network Communication Control Facility (NCCF) Version 1 Release 2 (PP 5735-XX6).
  2. Network Problem Determination Application (NPDA) Version 2 (PP 5668-983). If either "Receive Signal Level Reporting" or "LPDA Functions on Tailed Links" is needed, Version 3 (PP 5668-920) is required.
  3. ACF/NCP Version 2 (PP 5735-XX1). **Note:** The functions "Receive Signal Level Reporting", and "LPDA Functions on Tailed Links" are not supported by this level.
- Modem provides its own clocking or will accept DTE (external) clocking.
- Line conditioning is not required for the 3864.
- The protective circuitry required by the FCC (Federal Communications Commission) for direct attachment to the public switched network is contained in the modem.
- Extended Length Cable: The interconnecting cable between the business machine and the modem can be up to 100 meters (328 ft.) long when the modem is attached to an 3705, 3725, or 3726 Communications Controller or equivalent. See M3705, 3725, 3726 for details.

Optional Features:

See "Special Features" for detailed description.

- Extended Diagnostic Card: Enables NPDA to differentiate between modem failures, line failures and remote modem power loss.
- 4-wire Switched Network Backup: Provides backup for nonswitched telecommunications facilities.
- Fan-Out: Provides for the attachment of up to three telecommunicating machines to one modem.
- LPDA Functions on Tailed Links: Allows tailed 3864 mdl 1 to respond to LPDA diagnostic commands.

Diagnostics: Built in diagnostics: All modems will respond to diagnostic commands from the system that help provide status of any modem in the link, its attached terminal, and the quality of the received signal over the communication facility. Test requests and responses utilize the same data path and controls that are used by S/370 or 4300 processor or System/36 for data transmission. Thus diagnostic status/test requests can be interspersed with data requests without interrupting terminal sessions.

To report Receive Signal Level, a 3864 mdl 1 must have serial number suffix code of **GM** or later. If the serial number suffix code is earlier, **RPQ 8Q0318** must be installed.

To respond to LPDA commands, a 3864 tailed to a 3865 with Data Multiplexer (#3620) must have LPDA Function on Tailed Links (#4791) installed.

The Network Problem Determination Application (NPDA) program product is an example of an IBM program product offering the capability to utilize the modem diagnostic functions for the collection, storage and retrieval of network error/management data. NPDA implemented under the Network Communication Control Facility (NCCF) program product has both summary and detailed level information for determining probable cause of network errors. Probable cause differentiates between errors in the communications controller, line, modem, modem interface or terminals.

NPDA will also utilize the new modem facilities to provide alert messages on error threshold and display formatted modem test results.

The System/36 Support Program (5727-SS1) includes an online problem determination facility that uses the 3864 built-in diagnostics. Using online problem determination, the system operator can invoke diagnostic tests from the System/36 operator console. These tests help the system operator locate the failing component (line, System/36, local modem, remote modem or remote workstation controller) when a remote workstation experiences data transmission problems.

In addition, tests can also be executed from the the modem operator panel. These manual tests include:

- Modem self-test -- this includes an extensive test of modem microcode, plus a data wrap with reduced thresholds for received data.
- Modem/line transmit and receive tests -- allow testing of modem and line for a switched network.
- Local loop-back test -- provides a "wrap" or loop-back at the line interface to allow terminal wrap tests through the modem.
- Remote loop-back test -- provides a wrap or loop-back at the remote modem to allow a DTE wrap test back through the local modem for nonswitched modems. This test does not require remote operator assistance.
- Loop test -- allows an end-to-end test to any modem on the link without remote operator assistance. This test is only available when operating over 4-wire telecommunications facilities.
- Lamp test -- tests all indicator lights on the operator panel.

COMMUNICATIONS FACILITIES MDL 1

Common Carrier Facilities: Voiceband private line (nonswitched) channel, type 3002 (or equivalent) as described in the Bell System Technical Reference PUB 41004, dated October 1973.

Privately-owned Communication Facilities: Equivalent to above.

3864 Modem (cont'd)

COMMUNICATION FACILITIES MDL 2 AND MDL 1 WITH SWITCHED NETWORK BACKUP (#7953)

Public Switched Network: Two-wire switched line with an exclusion key telephone. The customer must be informed that satisfactory transmission of data depends upon the characteristics of the particular switched network connection being used. Refer to the M2700 pages for further details.

International Facilities: Request IBMto contact IBM coordinators of the other countries involved to determine the availability of such facilities.

Transmission of data between the United States and Canada on nonswitched or switched facilities is supported. (For nonswitched operation, the channel in Canada must be schedule 4, type 4.

Attachment to Facilities: Attachment of a 3864 mdl 1 to a private line (nonswitched) channel is by a cable supplied with the 3864. The cable termination is a 4-prong plug (WE 283B or equivalent). The plug mates with a receptacle (WE 404B or 549A surface mount or 493A flush mount or equivalent) which is connected to the channel. The receptacle is a conventional item of communications equipment. Upon customer request at the time the channel is ordered it will ordinarily be furnished by the telecommunications service supplier.

In those situations where it is not possible to have the aforementioned receptacle installed by the telecommunications service supplier prior to the installation of the modem a cable termination adapter can be ordered. Two adapters, a 4-spade lug and a 50-pin connector (commonly used for telephone company modems), are available. See "Accessories" for description.

Attachment of a 3864 mdl 2 to the public switched network is by a cable, supplied with the 3864, which is terminated with a miniature 8-position keyed plug for connection to a data jack provided by the telecommunications service supplier. Two of these cables are supplied to attach a 3864 mdl 1 with 4-Wire Switched Network Backup (#7953) to the public switched network and two data jacks are required. The data jack must be a programmed data jack (USOC RJ45S or equivalent) or a universal data jack (USOC RJ41S or equivalent) set in the programmed mode of operation. The RJ45S data jack is recommended. The modem adjusts its output power in accordance with the programming resistor in the data jack to ensure that the transmit signal level is optimum. When the telecommunications service supplier installs a data jack, special design rules are applied to the characteristics of the local loop connection to the central exchange. The special design rules minimize those local loop line impairments that have the most adverse effect on data transmission.

The telecommunications service supplier will install a data jack only on a line specified as a data line. Only lines that terminate at a telephone company central exchange can be specified as data lines. Extensions from a customer-owned or a telecommunications company-owned PBX (Private Branch Exchange) or a KTS (Key Telephone System) are not data lines. The FCC (Federal Communications Commission) Rules and Regulations, Part 68, prohibit the installation of a data jack on such extensions and allow only voice jacks (also called "permissive" jacks when used for data transmission) behind a PBX or KTS.

When a customer decides to connect the modem to a voice, or permissive, jack, an adapter is required to convert the plug on the end of the modem cable to a plug compatible with the voice jack (USOC RJ11C or equivalent) and to limit the transmit signal to the permissive (-9 dBm) level. Adapters for this purpose (Armiger AA330B or AA330C or equivalent) are available from distributors of telecommunications products.

The satisfactory transmission of data through a voice jack is not as predictable as when using a data jack. The most practical method of determining the success of transmitting date through a particular voice jack is by actual usage. In those situations where the transmission of data using a voice jack is unsatisfactory, the customer can initiate action to resolve the impairments in the PBX/KTS and/or the telecommunications service local loop or have the telecommunications service supplier install a data line that bypasses the PBX or KTS.

The protective circuitry required by the FCC for direct connection to the public switched network is contained in the modem. The FCC registration numbers are:

3864 mdl 2	ANO9SA-67992-DP-N
3864 mdl 1, SNBU (#7953)	ANO9SA-67935-DP-N

For both mdls the REN (Ringer Equivalence Number) is 0.8B.

An exclusion key telephone set is required with switched facilities at locations where calls will be originated. Two telephone sets are required with 4-wire Switched Network Backup (#7953). Answer-only locations are not required to have a telephone set. However, for optimum problem determination capability, a telephone set is recommended.

Related Equipment: The 3864 operates with IBM communication products capable of 4800 bps operation. See M2700 pages. The 3864 must communicate with another appropriately configured 3864 or with a 3868 mdl 2 Rack-Mounted Modem. The interconnecting cable between the business machine and the modem must be supplied by the business machine.

Customer Responsibilities: Customers must be informed of their responsibilities as detailed in the M2700 pages, and in the site preparation section of the *Introduction and Site Preparation Guide,* GA27-3200.

The customer is also responsible for:

(1) Arrangements for price quotations, installation, and all costs of common carrier equipment and services.

(2) Private line (nonswitched) channel -- arranging for the telecommunications service supplier to provide a voice-grade data channel. Also, arranging for the installation of the appropriate receptacle described in "Attachment to Facilities".

(3) Switched Telecommunications Network -- arranging for the telecommunications service supplier to install the appropriate communication service equipped with the required connecting device as described in "Attachment to Facilities" and for attaching the IBM-provided cable to the connecting device.

When ordering the telecommunications service the customer must be prepared to identify the line to which the modem will be connected, the modem manufacturer, the modem type and mdl number, the type of data jack required, the FCC registration number and the REN of the modem. The customer must also inform the telecommunications service supplier that the rate of data transmission will be faster than 1200 bps.

(4) Ensuring the availability of the interconnecting cable between the business machine and the modem because it must be supplied by the business machine.

(5) Unpacking and placing of the 3864. Physical setup, and connection of cables at setup time. During the physical setup, the position of the two configuration switches located at the bottom of the rear panel must be reviewed to ensure compatibility with the actual application. (Example: Point-to-point primary or secondary; multipoint control or tributary.) Details are in the *IBM 3863/3864 Setup Instructions and User's Guide,* GA27-3216.

(6) Notifying IBM of intent to relocate the unit, and following IBM instructions for relocation.

(7) Disconnecting, packing and movement to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be supplied by IBM.

(8) All three of the following program products must be installed for LPDA to function:

NCCF ... NPDA ... and ACF/NCP. See section "Standard Features" for required release levels.

Bibliography: See *KWIC Index,* G320-1621, or specific systems bibliography.

SPECIFY

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): 3.0 meter (10 ft.) power cable, non-locking plug (no specify code required). If a 1.8 meter (6 ft.) power cable is required, specify **#9986**

- Telecommunications Cable (modem to telecommunications line connection): 7.5 meter (25 ft.) (no specify code required).

SPECIAL FEATURES

Fan-Out (#3901): Mdl 1 only. This feature allows attachment of up to three telecommunicating machines to one modem. See M2700 pages for applicable machines. Only one of the attached machines may transmit at a time. This feature may be used at a tributary station in a centralized multipoint network. In this configuration, multipoint programming discipline will provide the selection/control of the specified terminals without any additional user involvement. This feature may also be used to allow up to three Multiplexers, or Communications Controllers, at a central site to share the same 3864 mdl 1 for backup purposes. In this case, although all of the machines attached to the 3864 will receive the incoming data simultaneously, the user switchover procedure must ensure that only one machine is sending. **Limitations:** Mdl 1 only. Cannot be used with DTE external clocking. Cannot be installed with LPDA Functions on Tailed Links (#4791) or with Tail Circuit Attachment accessory. **Field Installation:** Yes.

LPDA Functions on Tailed Links (#4791): This feature enables the 3864 mdl 1 that is attached by the Tailed Circuit Attachment accessory to a channel of a 3865 modem with Data Multiplexer (#3260) and 3864 mdl 1 that are at the other end of the line to respond to LPDA commands. Required only on the 3864 attached to the 3865. **Limitations:** Mdl 1 only. Cannot be installed with Fan-Out (#3901).

3864 Modem (cont'd)

Operates only with data line procedures SDLC (NRZ or NRZI) and BSC (EBDIC or ASCII or Transparent). **Field Installation:** Yes. **Prerequisites:** Tail Circuit Attachment accessory. See Modem Diagnostic Functions in section "Standard Features" for required program products.

Extended Diagnostic Card (#7930): Mdl 1 only. This feature enhances the diagnostic capabilities of nonswitched modems when it is installed in both the local and remote modem. It provides an additional test that enables NPDA to differentiate between modem failures, line failures and remote modem power loss. **Limitation:** This feature is for the mdl 1 only, and must be in both the local and remote modems. **Field Installation:** Yes. **Prerequisite:** See LPDA in "Highlights" for required program product support.

4-Wire Switched Network Backup (4W-SNBU) (#7953): Available for all 3864 mdl 1s (nonswitched line). Provides backup for the nonswitched telecommunications facility. Data rate in 4W-SNBU mode is the same as in normal nonswitched line mode. 4W-SNBU allows restoration of the 4-wire service between two point-to-point or multipoint 3864s. For point-to-point configurations, except for the requirement to establish the switched connections, 4W-SNBU allows continuation of service with no operational or programming impact. For multipoint configurations, operational (and possibly programming) modifications are required. 4W-SNBU can be configured in two ways:

- The 4W-SNBU feature is installed on the normal multipoint control station modem and on any tributary modems that require backup. To establish a backup path to any tributary, the control station modem must go to SNBU mode. In doing so, communication is broken to all other tributaries.
- A spare control station modem equipped with the 4W-SNBU feature is installed on a spare port at the control station location. The spare control station can then establish a 4W-SNBU connection to any 3864 tributary modem equipped with the 4W-SNBU feature. This tributary is deactivated from its normal polling list and assigned to the spare port. The normal control station continues to provide service to other tributaries still reachable over the non-switched line.

This feature requires two 2-wire "switched" telephone lines, and two telephones at the host site. Attachment to the switched lines is made as described in the "Attachment to Facilities". This feature is designed to automatically answer when a call is received. Calls must be placed manually. When one call is placed and the connection completed, a four minute timer is started. The second line must be established within the time-out, otherwise the first line is automatically dropped. **Limitation:** Not available on 3864 mdl 2. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES

These items are purchase-only and must be ordered separately from the modem.

Shelf Adapter (P/N 8547412): A shelf adapter that fastens inside a standard 19" EIA rack. The shelf, which fits racks that have an inside depth of 60cm (23.6 in.) to 76cm (30 in.) and an inside opening of 45cm (17.7 in.) will hold two modems side-by-side.

Tail Circuit Attachment (P/N 8547438): Allows the 3863 mdl 1 or 3864 mdl 1 to attach to a 3865 Modem mdl 1 equipped with Data Multiplexing (#3260). Permits an extension of a network via a separate set of modems and a separate communications channel. **Limitations:** To have the 3864's on a tailed circuit responding to LPDA commands, LPDA Functions on Tailed Links (#4791) must be installed on 3864 that is attached to the 3865. Cannot be used simultaneously with Fan-Out (#3901).

Telecommunications Cable Adapters: Convert the 4-prong plug (WE283B or equivalent) supplied on the telecommunications cable to a 4-spade lug or a 50-pin connector termination. For 4-spade lugs, order **P/N 7838805** ... for 50-pin connectors, order **P/N 1992900**. (The 50-pin connector is commonly used for telephone company modems.) See "Attachment to Facilities".

SUPPLIES (None)

3865 MODEM

PURPOSE

A 9600 bps modem used to provide communication products with a means for transmitting data over telecommunications channels (normally telephone lines). These advanced microprocessor-based modems significantly enhance communication network management and network problem determination. The modem diagnostic functions operate with Network Problem Determination Application (NPDA), providing probable cause of network errors ... alert messages on error threshold ... formatted modem test results.

MODELS

Model 001 Operatesin half-duplex or duplex mode over 4-wire nonswitched duplex facilities. Operates in point-to-point mode.

Model 002 Operatesin half-duplex or duplex mode over 4-wire nonswitched duplex facilities. Operates in multipoint mode and can be configured as a multipoint control or as a multipoint tributary station.

Limitations: The 3865 mdl 002 can be used only in a multipoint network. A multipoint network can be implemented with only one tributary. Additional stations can be added as the network expands. The 3865 mdl 002 cannot be used in a point-to-point mode, like a 3865 mdl 001. Neither can a 3865 mdl 001 be used in a multipoint network, like a 3865 mdl 002. Model conversion is not possible. See "Network Configuration" in *IBM 3863, 3864 and 3865 Modems Introduction and Site Preparation Guide,* GA27-3200.

Customer Setup: The 3865 is designated for Customer Setup (CSU). This provides the customer with early availability. This also allows relocation of the unit without requiring IBM service personnel assistance. Customer accessible setup switches are provided on the rear panel to enhance adaptability of the modem. For example, the mdl 002 modem may be configured for multipoint control or multipoint tributary operation with the setup switches. **Note:** Some changes of the setup switches may require SYSGEN changes in the program support.

HIGHLIGHTS

Sales Highlights:

- Volume purchase price reductions are available for quantity purchases. See Z125-3260 and Z120-3257 for details.
- Modems ordered with no special features, or with only Extended Diagnostic feature (#7930), are considered standard configurations and are generally available in a short delivery time. Refer to the Delivery Schedule and Availability Card or Advanced Administrative System (AAS) for current delivery schedules.
- Telecommunications cable adapters are available to connect the modem to an unusual circuit termination. See "Attachment to Facilities".
- A high density rack-mounted version of the 3865 mdl 001 and 002 is available for central teleprocessing installations. See section "Related Equipment" below and M3868 pages.

Standard Features:

- Data Rate: 9600 bps with backup of 4800 bps.
- Auto Answer: Automatic answering of switched network calls with Switched Network Backup.
- A microprocessor for signal processing.
- Automatic Remote Speed Selection: The transmission speed of the remote modem follows the transmission speed (9600/4800 bps) of the local modem (primary status). The network configuration of the remote modem must be secondary.
- Anti-Streaming: A multipoint tributary modem (mdl 002) can automatically cut off transmission if a terminal holds "Request to Send" up longer than 40 seconds (an abnormal condition in IBM communication protocol). Customer switch option.
- Automatic and Adaptive Equalization: Equalization is automatically performed by the modem and continues to adapt in data mode.
- Operator Panel with operational status indicators and data quality (Good/Poor) indications.
- The modem diagnostic functions referred to as Link Problem Determination Aid (LPDA), operate with Systems Network Architecture (SNA) and associated program products. Under control of these programs, the modems accept commands and initiate tests that help isolate problems to the line, local or remote modem, or elsewhere in the network and provide the network operator with the most probable cause of network problems. These program products are:
  1. Network Communication Control Facility (NCCF) Version 1 Release 2 (PP 5735-XX6).
  2. Network Problem Determination Application (NPDA) Version 2 (PP 5668-983). If either Receive Signal Level Reporting or LPDA Functions on multiplexed links is needed, Version 3 (PP 5668-920) is required.
  3. ACF/NCP Version 2 (PP 5735-XX1). **Note:** The functions Receive Signal Level Reporting, and LPDA Functions on multiplexed links" are not supported by this level.
- Modem provides its own clocking or will accept DTE (external) clocking.
- Fast RFS: 24 millisecond Ready for Sending (RFS) Delay available for 3865 multipoint tributary modems. Customer switch option (24ms or 60ms).
- Both point-to-point and multipoint can operate over 3002 Basic (unconditioned) channels.
- The protective circuitry required by the FCC (Federal Communications Commission) for direct attachment to the public switched network is contained in the 4-wire Switched Network Backup feature (#7953).
- Extended Length Cable: The interconnecting cable between the business machine and the modem can be up to 100 meters (328 ft.) long when the modem is attached to an 3705, 3725, or 3726 Communications Controller or equivalent. See M3705, 3725, 3726 pages for details.

Optional Features:

See "Special Features" for detailed description.

- Extended Diagnostic Card: Enables NPDA to differentiate between modem failures, line failures and remote modem power loss.
- 4-wire Switched Network Backup: Provides backup for non-switched telecommunications facilities.
- Fan-Out: Provides for the attachment of up to three telecommunicating machines to one modem.

Diagnostics: Built in diagnostics: All modems will respond to diagnostic commands from the system that help provide status of any modem in the link, its attached terminal, and the quality of the received signal over the communication facility. Test requests and responses utilize the same data path and controls that are used by S/370 or 4300 processor or System/36 for data transmission. Thus diagnostic status/test requests can be interspersed with data requests without interrupting terminal sessions.

To report Receive Signal Level, a 3865 must have serial number suffix code of **GM** or later. If the serial number suffix code is earlier, **RPQ 8Q0319** must be installed.

The Network Problem Determination Application (NPDA) program product is an example of an IBM program product offering the capability to utilize the modem diagnostic functions for the collection, storage and retrieval of network error/management data. NPDA implemented under the Network Communication Control Facility (NCCF) program product has both summary and detailed level information for determining probable cause of network errors. Probable cause differentiates between errors in the communications controller, line, modem, modem interface or terminals.

NPDA will also utilize the new modem facilities to provide alert messages on error threshold and display formatted modem test results.

The System/36 Support Program (5727-SS1) includes an online problem determination facility that uses the 3865 built-in diagnostics. Using online problem determination, the system operator can invoke diagnostic tests from the System/36 operator console. These tests help the system operator locate the failing component (line, System/36, local modem, remote modem or remote workstation controller) when a remote workstation experiences data transmission problems.

In addition, tests can also be executed from the the modem operator panel. These manual tests include:

- Modem self-test -- this includes an extensive test of modem microcode, plus a data wrap with reduced thresholds for received data.
- Modem/line transmit and receive tests -- allow testing of modem and line for switched network.
- Local loop-back test -- provides a "wrap" or loop-back at the line interface to allow terminal wrap tests through the modem.
- Remote loop-back test -- provides a wrap or loop-back at the remote modem to allow a DTE wrap test back through the local modem for nonswitched modems. This test does not require remote operator assistance.
- Loop test -- allows an end-to-end test to any modem on the link without remote operator assistance. This test is only available when operating over 4-wire telecommunications facilities.

3865 Modem (cont'd)

- Lamp test -- tests all indicator lights on the operator panel.

COMMUNICATIONS FACILITIES

Common Carrier Facilities: Voiceband private line (nonswitched) channel, type 3002 (or equivalent) as described in the Bell System Technical Reference PUB 41004, dated October 1973.

Mdl 001 (point-to-point), and mdl 002 (multipoint) use basic channels.

The 3865 operates on unconditioned lines. In some unusual situations, it may be beneficial to activate a longer (60ms) RFS delay (by a switch on the back panel) on tributary modems. Mdl 002 modems can operate on links with a mix of 24ms and 60ms RFS delay.

Privately-owned Communication Facilities: Equivalent to above.

MDL 001 OR MDL 002 WITH SWITCHED NETWORK BACKUP (#7953)

Public Switched Networks: 2-wire switched line with an exclusion key telephone set. The customer must be informed that satisfactory transmission of data depends upon the characteristics of the particular switched network connection being used. Refer to the M2700 pages for further details.

International Facilities: Request IBM to contact IBM coordinators of the other countries involved to determine the availability of such facilities.

Transmission of data between the United States and Canada on nonswitched or switched facilities is supported. (For nonswitched operation, the channel in Canada must be schedule 4, type 4.

Attachment to Facilities: Attachment of a 3865 to a private line (nonswitched) channel is by a cable supplied with the 3865. The cable termination is a 4-prong plug (WE 283B or equivalent). The plug mates with a receptacle (WE 404B or 549A surface mount or 493A flush mount or equivalent) which is connected to the channel. The receptacle is a conventional item of communications equipment. Upon customer request at the time the channel is ordered, it will ordinarily be furnished by the telecommunications service supplier.

In those situations where it is not possible to have the aforementioned receptacle installed by the telecommunications service supplier prior to the installation of the modem a cable termination adapter can be ordered. Two adapters. a 4-spade lug and a 50-pin connector (commonly used for telephone company modems), are available. See "Accessories" for description and ordering instructions.

Attachment of a 3865 with 4-wire Switched Network Backup (#7953) to the public switched network is by two cables, supplied with the feature, which are terminated with a miniature 8-position keyed plug for connection to the two data jacks provided by the telecommunications service supplier. The data jacks must be programmed data jacks (USOC RJ45S or equivalent) or universal data jacks (USOC RJ41S or equivalent) set in the programmed mode of operation. RJ45S data jacks are recommended. The modem adjusts its output power in accordance with the programming resistor in the data jack to ensure that the transmit signal level is optimum. When the telecommunications service supplier installs a data jack, special design rules are applied to the characteristics of the local loop connection to the central exchange. The special design rules minimize those local loop line impairments that have the most adverse effect on data transmission.

The telecommunications service supplier will install a data jack only on a line specified as a data line. Only lines that terminate at a telephone company central exchange can be specified as data lines. Extensions from a customer-owned or a telecommunications company-owned PBX (Private Branch Exchange) or a KTS (Key Telephone System) are not data lines. The FCC (Federal Communications Commission) Rules and Regulations, Part 68, prohibit the installation of a data jack on such extensions and allow only voice jacks (also called "permissive" jacks when used for data transmission) behind a PBX or KTS.

When a customer decides to connect the modem to a voice, or permissive, jack, an adapter is required to convert the plug on the end of the modem cable to a plug compatible with the voice jack (USOC RJ11C or equivalent) and to limit the transmit signal to the permissive (-9 dBm) level. Adapters for this purpose (Armiger AA330B or AA330C or equivalent) are available from distributors of telecommunications products.

The satisfactory transmission of data through a voice jack is not as predictable as when using a data jack. The most practical method of determining the success of transmitting data through a particular voice jack is by actual usage. In those situations where the transmission of data using a voice jack is unsatisfactory, the customer can initiate action to resolve the impairments in the PBX/KTS and/or the telecommunications service local loop or have the telecommunications service supplier install a data line that bypasses the PBX or KTS.

The protective circuitry required by the FCC for direct connection to the public switched network is contained in the 4-wire Switched Network Backup feature. The FCC registration number is ANO9SA-67935-DP-N. The REN (Ringer Equivalent Number) is 0.8B.

An exclusion key telephone set is required with switched facilities at locations where calls will be originated. (Two telephone sets are required with 4-wire Switched Network Backup (#7953).) Answer-only locations are not required to have a telephone set. However, for optimum problem determination capability, a telephone set is recommended.

Related Equipment: The 3865 operates with IBM communication products capable of 9600 bps operation. See M2700 pages. The 3865 must communicate with another appropriately configured 3865 or with a 3868 mdl 003 or 004 Rack-Mounted Modem unless multiplexing is used. The interconnecting cable between the business machine and the modem must be supplied by the business machine.

Customer Responsibilities: Customers must be informed of their responsibilities as detailed in the M2700 pages, and in the site preparation section of the *Introduction and Site Preparation Guide* (GA27-3200).

The customer is also responsible for:

(1) Arrangements for price quotations, installation, and all costs of common carrier equipment and services.

(2) Private line (nonswitched) channel -- arranging for the telecommunications service supplier to provide a voice-grade data channel. Also, arranging for the installation of the appropriate receptacle described in "Attachment to Facilities".

(3) Switched Telecommunications Network -- arranging for the telecommunications service supplier to install the appropriate communication service equipped with the required connecting device as described in "Attachment to Facilities" and for attaching the IBM-provided cable to the connecting device. When ordering the telecommunications service, the customer must be prepared to identify the line to which the modem will be connected, the modem manufacturer, the modem type and mdl number, the type of data jack required, the FCC registration number and the REN of the modem. The customer must also inform the telecommunications service supplier that the rate of data transmission will be faster than 1200 bps.

(4) Ensuring the availability of the interconnecting cable between the business machine and the modem because it must be supplied by the business machine.

(5) Unpacking and placing of the 3865. Physical setup, and connection of cables at setup time. During the physical setup, the position of the two configuration switches located at the bottom of the rear panel must be reviewed to ensure compatibility with the actual application. (Example: Point-to-point primary or secondary; multipoint control or tributary.) Details are in the *IBM 3865 Setup Instructions and User's Guide,* GA27-3218.

(6) Notifying IBM of intent to relocate the unit, and following IBM instructions for relocation.

(7) Disconnecting, packing and movement to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be supplied by IBM.

(8) All three of the following program products must be installed for LPDA to function.
NCCF ... NPDA ... and ACF/NCP. See section "Standard Features" above for required release levels.

Bibliography: See *KWIC Index,* G320-1621, or specific systems bibliography.

SPECIFY

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): 3.0 meter (10 ft.) power cable, non-locking plug (no specify code required). If a 1.8 meter (6 ft.) power cable is required, specify **#9986.**

- Telecommunications Cable (modem to telecommunications line connection): 7.5 meter (25 ft.) (no specify code required)

SPECIAL FEATURES

Data Multiplexer (#3260): This feature allows selection of a 4800 bps and 2400 bps subchannel. The modem multiplexes subchannel data into a single aggregate data stream ... this feature offers four channel configurations. When the 3865 is placed in half-speed mode, the aggregate data stream is transmitted at half speed and as a result the channel configurations will be automatically altered because of lower speed. Channel configurations are:

Channels				Half-Speed Operation			
A	B	C	D	A	B	C	D
9600	–	–	–	4800	–	–	–
4800	4800	–	–	4800	–	–	–
4800	2400	2400	–	4800	–	–	–
2400	2400	2400	2400	2400	2400	–	–

All data sources are connected to the 3865 mdl 001 by separate EIA/CCITT interfaces. Multiplexer channels will permit attachment to

3865 Modem (cont'd)

co-located terminals or tailed circuit extensions for network flexibility and cost savings. Tail circuit extensions allow co-located 3863 or 3864 modems equipped with the Tailed Circuit Attachment accessory to be attached to a 3865 channel. Modems so attached can extend the channel data path by its attached communications line and a second (remotely attached) modem. Each multiplexer channel is equipped with buffers to compensate for timing variations between tailed modems and the 3865 clocks. **Limitations:** Mdl 001 only. Cannot be installed with Fan-Out feature (#3901). Tailed 3863 or 3864 modems must be mdl 001 only, multipoint control mode only, set for external clocking. LPDA diagnostic commands to a Data Multiplexed Link are received only on Channel A of the 3865 with Data Multiplexer feature attached to the host DTE. In order for this 3865 to respond to LPDA commands, it must have serial number suffix code of **DG** or later. If the serial number suffix code is earlier, MES **#323406** must be installed.

Field Installation: Yes.

Fan-Out (#3901): This feature allows attachment of up to three telecommunicating machines to one modem. See M2700 pages for applicable machines. Only one of the attached machines may transmit at a time. This feature may be used as a tributary station in a centralized multipoint network. In this configuration, multipoint programming discipline will provide the selection/control of the specified terminals without any additional user involvement. this feature may also be used to allow up to three Multiplexers, or Communications Controllers, at a central site to share the same 3865 for backup purposes. In this case, although all of the machines attached to the 3865 will receive the incoming data simultaneously, the user switchover procedure must ensure that only one machine is sending. **Limitations:** Cannot be installed with DTE external) clock, or Data Multiplexer (#3260).

Field Installation: Yes.

Extended Diagnostic Card (#7930): This feature enhances the diagnostic capabilities of nonswitched modems when it is installed in both the local and remote modem. It provides an additional test that enables NPDA to differentiate between modem failures, line failures and remote modem power loss. **Limitation:** This feature must be in both the local and remote modems. **Field Installation:** Yes. **Prerequisite:** See LPDA in "Highlights" for required program product support.

4-Wire Switched Network Backup (4W-SNBU) (#7953): Provides backup for the nonswitched telecommunications facility. Data rate in 4W-SNBU mode is the same as in normal nonswitched line mode. 4W-SNBU allows restoration of the 4-wire service between two point-to-point or multipoint 3865s. For point-to-point configurations, except for the requirement to establish the switched connections, 4W-SNBU allows continuation of service with no operational or programming impact. For multipoint configurations, operational (and possibly programming) modifications are required. 4W-SNBU can be configured in two ways:

- The 4W-SNBU feature is installed on the normal multipoint control station modem and on any tributary modems that require backup. To establish a backup path to any tributary, the control station modem must go to SNBU mode. In doing so, communication is broken to all other tributaries.
- A spare control station modem equipped with the 4W-SNBU feature is installed on a spare port at the control station location. The spare control station can then establish a 4W-SNBU connection to any 3865 tributary modem equipped with the 4W-SNBU feature. This tributary is deactivated from its normal polling list and assigned to the spare port. The normal control station continues to provide service to other tributaries still reachable over the nonswitched line.

This feature requires two 2-wire switched telephone lines, and two telephones at the host site. Attachment to the switched lines is made as described in the "Attachment to Facilities" section. This feature is designed to automatically answer when a call is received. Calls must be placed manually. When one call is placed and the connection completed, a four minute timer is started. The second line must be established within the time-out; otherwise the first line is automatically dropped. **Limitations:** It may be necessary to re-dial or change to half speed to maintain acceptable performance in SNBU mode. See "Customer Responsibilities" in the M2700 pages for details. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES

These items are purchase-only and must be ordered separately from the modem.

Shelf Adapter (P/N 8547412): A shelf adapter that fastens inside a standard 19" EIA rack. The shelf, which fits racks that have an inside depth of 60cm (23.6 in.) to 76cm (30 in.) and an inside opening of 45cm (17.7 in.) will hold two modems side-by-side.

Telecommunications Cable Adapters: Convert the 4-prong plug (WE283B or equivalent) supplied on the telecommunications cable to a 4-spade lug or a 50-pin connector termination. For 4-spade lugs, order **P/N 7838805** ... for 50-pin connectors, order **P/N 1992900**. (The 50-pin connector is commonly used for telephone company modems.) See "Attachment to Facilities". Request price and order from IBM Direct, Dayton, NJ, using telephone number (800) 631-5582; in New Jersey use (800) 352-4960; in Hawaii or Alaska use (800) 526-2484. Specify P/N, quantity, ship date, bill-to name, bill-to address, ship-to name, and ship-to address.

SUPPLIES (None)

3866 MULTIMODEM ENCLOSURE

PURPOSE

The 3866 models 1 and 2 are multimodem enclosure. Model 1 can be mounted in a standard commerically available 19-inch rack cabinet and model 2 comes mounted in a mini cabinet for one enclosure only. These enclosures provide housing, cooling and power for the 3868 models 1 to 4 rack-mounted modems.

MODELS

Model 1	001	Multimodem Enclosure for installation in commercial standard 19-inch rack cabinet.
Model 2	002	Multimodem Enclosure with single enclosure cabinet.

HIGHLIGHTS

The 3866 mdl 1 and 2 are multimodem enclosures providing housing, powering and cooling for 3868 mdls 1 to 4 modem packs. Up to 12 single-width modem packs (3868 mdl 1) or up to six double-width modem packs (3868 mdl 2, 3 and 4) can be housed in an enclosure.

The 3866 mdl 1 multimodem enclosure must be installed in a standard 19-inch wide by 24-inch deep rack cabinet to be provided by the customer. Standard cabinets are available to accommodate several enclosures and mandatory fan units. Up to six enclosures and three mandatory fan units can be housed in a six foot high cabinet.

The 3866 mdl 2 multimodem enclosure is already mounted in an IBM provided mini cabinet.

For both mdls, a power unit and a fan unit must be ordered with each enclosure. In cabinet for multi enclosures only one fan unit is necessary per two enclosures (see "Special Features"). The customer may wish to replace a failing power unit with a spare and should be advised to order sufficient spare units.

Optional Features: See "Special Features" for detailed description.

Customer Set-Up (CSU): The 3866 multimodem enclosures and associated power and fan units are designated to be set up by the user thereby offering the customer availability and relocation flexibility.

Customer Responsibilities: The customer must be advised that these responsibilities include:

- Assuring that the use of the equipment complies with all Federal, State and local laws, regulations and ordinances.
- Adequate hardware ordering including Commercial Cabinet, where required, site preparation and setting up. For more information, refer to the *Planning and Site Preparation Guide* (GA33-2023).
- Receipt at the customer's receiving dock, unpacking and setting up the cabinet, enclosure, power and fan units.
- Performing 3866 check-out in accordance with supplied procedures for initial set up and relocation.
- Using customer problem determination procedures provided with the 3866 to determine the failing unit and filling out the appropriate 3866 problem report prior to taking action to get the failing unit exchanged . (See "Maintenance" below).
- Procuring any required spares.

Warranty Service: The warranty period is three years . Warranty service is provided under the terms and conditions of the Agreement for Purchase of IBM Machines and the Amendment for IBM Service/Exchange Center Services. The service offering during warranty is Customer On-Site Exchange (COE) as described below.

Customer On-Site Exchange (COE): It is the customer's responsibility to set up the equipment and to determine when maintenance is required. The customer may wish to replace a failing element with a spare element and should be advised to purchase sufficient spare elements.

It is the customer's responsibility to disconnect the element(s) and call a designated number to have a replacement element(s) delivered to the customer site where they will be exchanged (without testing) for the customer's defective unit(s). The defective elements become the property of IBM.

The 3866 will be eligible for IBM Maintenance Agreement coverage immediately following expiration of the warranty for an annual charge. The service offering after warranty will be Customer On-Site Exchange (COE).

Maintenance: The level of maintenance service on a rental (MRC) machine is Customer On-Site Exchange (COE). Maintenance service is provided under the Amendment for IBM Service/Exchange Center services.

On-Site Assistance: If the customer desires assistance to perform Customer Problem Analysis and Resolution (CPAR), he may call for assistance on a toll free number. IBM will respond to the customer site to aid the customer in performing CPAR procedures using the same documentation available to the customer. IBM assistance is billable at the application rates and terms.

RPQs: RPQs will not be accepted.

SPECIFY

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): Specify **#9891** for 3.0 meter (10 ft.) power cable, or **#9986** for 1.8 meter (6 ft.) power cable or **#9491** for 0.75 meter (2.5 ft.) special rack-installation power cable. If one of the above is not specified, **#9891** will be assigned.

SPECIAL FEATURES

Fan Unit (#3950): Provides cooling for modem enclosure. The Fan Unit is installed in the rack cabinet above the modem enclosures. **Minimum:** One Fan Unit is required for a single 3866 mdl 1 modem enclosure or for a 3866 mdl 2 modem enclosure. Only one Fan Unit is required for two 3866 mdl 1 modem enclosures installed one above the other. **Field Installation:** Yes.

Power Unit (#5210): Provides power for the modem packs installed in the modem enclosure. **Minimum:** One per modem enclosure 3866 mdl 1 or 3866 mdl 2. **Field Installation:** Yes.

Field Installation: Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3867 LINK DIAGNOSTIC UNIT

PURPOSE

The 3867 is a microprocessor-based Link Diagnostic Unit designed to complement the IBM family of microprocessor-based modems (3863, 3864 and 3865). The problem determination and diagnostic functions built into the microprocessor-based Link Diagnostic Unit provide the capability to offer the customer an integrated IBM system solution to network management for both digital and analog links.

MODELS

Model 001

Customer Setup: The 3867 is designed for Customer Setup (CSU). This provides the customer with early availability. This also allows relocation of the unit without requiring IBM service personnel assistance. Customer accessible "Setup Switches" are provided on the rear panel to allow reconfiguration of the unit where application needs change.

HIGHLIGHTS

The microprocessor-based diagnostic unit is designed to operate from 2400 to 9600 bps on nonswitched lines. It is designed to be used either with analog modems attaching to both DTE and carrier modem connections, or on digital/analog links, attaching to the DTE interface connections only, where interpositioning is prohibited.

The function of the Link Diagnostic Unit is to provide a level of the Link Problem Determination Aids (LPDA) problem determination facilities of the 3863, 3864 and 3865 for non-intelligent signal processors.

The 3867 operates in either point-to-point or multipoint mode.

Customer Responsibilities:

1. Arrangements for price quotations, installation, and all costs of common carrier equipment and services.
2. Completion of the site preparation requirements as stated in the *IBM 3867 Link Diagnostic Unit Site Preparation Guide,* GA27-3261. This includes modification of the attaching modem connection and the interface to the telecommunications facility for the 3867 that is installed as an interpositioned analog unit.
3. Unpacking of the 3867, placement, set up, connection of cables and operational checkout during installation.
4. Determine when remedial maintenance is required.
5. Disconnecting, packing and movement to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
6. Packing of the malfunctioning 3867 in the designated shipping container with a completed Repair Authorization form and shipping prepaid to the designated IBM Repair Center.
7. Retaining a supply of original shipping containers for use when packing for shipment to the IBM Repair Center.
8. Machines designated as "spares" should be unpacked and checked for proper operation prior to shelving.

Communication Facilities: Attachment to facilities:

Where interpositioning is permitted, attachment to a private line (nonswitched) channel is by a cable, supplied with the 3867, which is terminated with a 4-prong plug (WE 283B or equivalent). The plug mates with a receptacle (WE 404B or 549A surface mount or 493A flush mount or equivalent), which is connected to the channel. For those situations in which the 3867 Link Diagnostic Unit will be attached to a telecommunication receptacle that does not accept the 4-prong plug, adaptors for 4-spade lugs or a 50-pin connector should be ordered. See "Telecommunication Cable" under "Specify".

Maintenance

Spares: The customer may wish to replace a failing 3867 with a spare and must be advised to purchase spares for such use. The number of spare devices needed is dependent upon the number of devices the customer has installed, his application requirements and physical locations.

When a 3867 is removed for maintenance and not replaced with a spare device, a customer must re-cable his modem connections which may be an inconvenience. Unless the customer re-sysgens his NCP, he may obtain unpredictable results from LPDA tests or misleading probable cause indications from NPDA. For these reasons, it is highly recommended that the customer be informed of the value of purchasing spares.

IBM Service: Maintenance of the 3867 will be at a designated IBM Location. All maintenance, parts replacement, adjustments, and repair shall be performed at the designated IBM Location. It shall be the customer's responsibility to determine when remedial maintenance is required. When remedial maintenance is required, it shall be the customer's responsibility to determine the failing device, pack the device in the designated shipping container and ship it prepaid to the designated IBM Location. There is no regularly scheduled preventive maintenance recommended by IBM on these devices.

Purchased Machines under Warranty: All purchased new machines are covered by three months service and parts warranty. If a malfunction occurs within this 90-day period, the machine will be repaired at the designated IBM Repair Center at no cost to the customer other than normal shipping charges.

Purchased Machines - Post Warranty: At the completion of the 90-day warranty period, service is available under a *Maintenance Agreement with the IBM Repair Center Maintenance Supplement* (Z120-2240-5).

Customers may obtain IBM maintenance agreement service after expiration of the warranty period by:

- Shipping the machine to the designated IBM repair center for inspection.
  - If, on the basis of the inspection, the center concludes that a machine is not repairable, no further work will be performed and the machine will be returned to the customer without charge.
  - In all other cases, a minimum charge per machine to cover handling, inspection, cleaning, lubrication, adjustments and testing will be applied. In addition, all parts used will be billed at IBM's prevailing parts prices, and additional time required to make repairs will be billed at IBM's prevailing hourly service rates. The machine will then be qualified for maintenance agreement coverage.
- Having the machine inspected on the customer's site.
  - This inspection will be performed by a local customer engineer to verify that the machine is fully operational.
  - Machines which are not fully operational must be sent to the designated IBM repair center for an IBM inspection and repair and will be subject to the terms and conditions of repair center inspections as stated above.
  - This inspection service is available on a firm price basis under an IBM contract support service agreement or on an hourly service basis.
  - For machines with non-IBM alterations, IBM will furnish maintenance service on the unaltered portion of the IBM machine under the applicable IBM agreement and in accordance with the maintenance plan described in the IBM Multiple Supplier Systems Bulletin.

All customer inquiries regarding IBM maintenance agreement acceptability inspections for purchased repair center machines are to be handled by the branch office. Customers should be advised that if they have non-operational machines for which they desire IBM repair center maintenance agreement service, these machines should be inspected at the repair center rather than on the customer's site.

Leased Machines: The cost of Repair Center maintenance other than the customer-prepaid shipping charges is included in the lease price.

Publications: *IBM 3867 Link Diagnostic Unit Setup Instructions and Users Guide* (GA27-3260) ... *IBM 3867 Link Diagnostic Unit Site Preparation Guide* (GA27-3261)

SPECIFY

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): Specify **#9891** for non-locking plug or **#9890** for locking plug. If standard 4.5 meter (15 foot) power cable is not required, specify **#9986** for 1.8 meter (6 foot) cable.
- Telecommunication Cable (Link Diagnostic Unit to telecommunication line): Specify only when interpositioning between modem and telecommunication line is permissible. For 4.5 meters (15 feet), specify **#9711**; 18 meters (60 feet), specify **#9712**.

  Cable Termination: See "Attachment to Facilities". For 4-spade lugs, specify **#5332**; 50-pin connector, specify **#5333**.
- 3867 Link Diagnostic Unit to Modem Cable: For 4.5 meters (15 feet), specify **#9940**; 13.5 meters (45 feet), specify **#9941**.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3868 RACK-MOUNTED MODEM

PURPOSE

The 3868 modem packs are rack-mounted versions of the 3863, 3864 and 3865 modem family to be inserted in a 3866 multimodem enclosure. Offering in a minimum volume, the maximum density of modems housing facility, they enhance the user capability for easy installation, maintenance and expansion of a user telecommunication network.

MODELS

Model 1	001	2400 bps modem pack operating in half- or full-duplex data mode over 4-wire, nonswitched duplex telecommunication facility at speeds of 2400/1200 bps. It operates in point-to-point or multipoint mode.
Model 2	002	4800 bps modem pack operating in half- or full-duplex data mode over 4-wire nonswitched duplex telecommunication facility at speeds of 4800/2400 bps. It operates in point-to-point or multipoint mode.
Model 3	003	9600 bps modem pack operating in half- or full-duplex data mode over 4-wire nonswitched duplex telecommunication facility at speeds of 9600/4800 bps. It operates in point-to-point mode.
Model 4	004	9600 bps modem pack operating in half- or full-duplex data mode over 4-wire nonswitched duplex telecommunication facility at speeds of 9600/4800 bps. It operates in multipoint mode and can be configured as a multipoint control or as a multipoint tributary station.

Prerequisites: A 3866 model 1 or 2 with available modem pack slots.

HIGHLIGHTS

The 3868 modem packs have the same functional characteristics as the equivalent 3863, 3864 and 3865 stand-alone modems. The following table gives the list of modem packs and equivalent stand-alone modems:

Modem Pack	Description	Equivalent Stand-alone Modem
3868-1	2400 bps leased	3863-1 with extended diagnostic feature
3868-2	4800 bps leased	3864-1 with extended diagnostic feature
3868-3	9600 bps pt-to-pt	3865-1 with extended diagnostic feature
3868-4	9600 bps multipt	3865-2 with extended diagnostic feature

The following list of functions already available with the 3863, 3864 and 3865 stand-alone modems are included in the 3868 mdls 1 to 4 modem packs:

- Data rate:
  - 2400 bps with back-up of 1200 bps on mdl 1
  - 4800 bps with back-up of 2400 bps on mdl 2
  - 9600 bps with back-up of 4800 bps on mdls 3 and 4
- Operation on 4-wire nonswitched duplex communication facility.
- A microprocessor for signal processing.
- Automatic Remote Speed Selection: The transmission speed of the remote modem follows the transmission speed of the local modem (primary status). The network configuration of the remote modem must be secondary.
- Anti-Streaming: A multipoint tributary modem can automatically cut off transmission if a terminal holds "Request to Send" up longer than 40 seconds (an abnormal condition in IBM communication protocol). Customer switch option.
- Automatic and Adaptive Equalization: Equalization is automatically performed by the modem and continues to adapt in data mode.
- Operator Panel with operational status indicators and data quality (Good/Poor) indications.
- The modem diagnostic function referred to as Link Problem Determination Aid (LPDA), operates with Systems Network Architecture (SNA) and associated program products . Under control of these programs, the modem accepts commands and initiates status retrieval and tests that help isolate problems to the line, local or remote modem, or elsewhere in the network and provide the network operator with the most probable cause of a network problem. These program products are:

  Network Communication Control Facility (NCCF) Version 1 Release 2 (PP 5735-XX6).

  Network Problem Determination Application (NPDA) Version 2 (PP 5668-983) or Version 3 (PP 5668-920 MVS/370, MVS/VA) (PP 5666-925 DOS/VSE, SSX/VSE).

  ACF/NCP Version 1 Release 2.1 or Release 3 (PP 5735-XX1) or ACF/NCP Version 2 (PP 5735-XX9). Receive Signal Level Reporting is not supported by these versions.
- Modem pack provides its own clocking or will accept DTE (external) clocking.
- Fast (RFS) Ready for sending delay available for multipoint tributary modem (customer switch option).
- Both point-to-point or multipoint can operate over 3002 Basic (unconditioned) channels.

Note: If a function is not listed herein, it is not available on the 3868 modem packs.

Diagnostics:

Built-in diagnostics: All modems will respond to diagnostic commands from the system. Test requests and responses utilize the same data path and controls that are used by the S/370, System/36, S/8100, (DPPX/SP) or 4300 processor for data transmission. Thus, diagnostic status/test requests can be interspersed with data requests without interrupting terminal sessions.

NPDA implemented under the Network Communication Control Facility (NCCF) program product has both summary and detailed level information for determining probable cause of network errors. Probable cause differentiates between errors in the communications controller, line, modem, modem interfaces or terminals.

NPDA will also utilize the new modem facilities to provide alert messages on error threshold and display formatted modem test results and status data including receive signal level.

In addition, tests can also be executed from the modem operator panel. These manual tests include:

- Modem self-test -- this includes an extensive test of modem microcode, plus a data wrap with reduced thresholds for received data.
- Local loop-back test -- provides a "wrap" or loop-back at the line interface to allow terminal wrap tests through the modem.
- Remote loop-back test -- provides a "wrap" or loop-back at the remote modem to allow a DTE wrap test back through the local modem for nonswitched modems. This test does not require remote operator assistance.
- Loop test -- allows an end-to-end test to any modem on the link without remote operator assistance.
- Lamp test -- tests all indicator lights on the operator panel.

Customer Set Up (CSU): The 3868 Rack-Mounted modems are designated to be set up by the user thereby offering the customer availability and relocation flexibility.

Customer Responsibilities: The customer must be advised that these responsibilities include:

- Assuring that the use of the equipment complies with all Federal, State and local laws, regulations and ordinances.
- Adequate hardware ordering including Commercial Cabinet, Site preparation and setting up. For more information, refer to the *Planning and Site Preparation Guide* (GA33-2023).
- Arrangements for the price quotations, installation, and all costs of common carrier equipment and service.
- Private line (nonswitched) channel -- arranging for the telecommunications service supplier to provide a voice-grade data channel.
- Ensuring the availability of the interconnecting cable between the business machine and the modem because it is not supplied by the modem.
- Receipt at the customer's receiving dock, unpacking and setting up the packs.
- Performing 3868 check-out in accordance with supplied procedures for initial set up and relocation.
- Using customer problem determination procedures provided with the 3866 to determine the failing unit and filling out the appropriate 3868 problem report prior to taking action to get the failing unit repaired or exchanged. (See "Maintenance" below.)
- Procuring any required spare packs. The customer may wish to replace a failing 3868 with a spare and must be informed to retain sufficient spare units for such use. The number of spare units recommended is dependent upon the number units the customer has installed, the operational requirements, physical locations, and layouts. However, the minimum number of spare units recommended is shown in the following table:

3868 Rack-Mounted Modem (cont'd)

Number of 3868s Installed	Minimum Number of Spares Recommended
001-100	3
101-200	4
201-300	6
301-500	8
501-1000	14
1001-1500	19
1500-2000	24

- Notifying IBM of intent to relocate the unit, and following IBM instructions for relocation.
- Disconnecting, packing and movement to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be supplied by IBM.
- All three of the following program products must be installed for LPDA to function:
  - NCCF Version 1 Release 2 (PP 5735-XX6)
  - NPDA Version 2 (PP 5668-983) or Version 3 (PP 5668-920, PP 5666-925)
  - ACF/NCP Version 1 Release 2.1 or Release 3 (PP 5735-XX1) or ACF/NCP Version 2 (PP 5735-XX9)

Warranty Service: The warranty period is three years . Warranty Service is provided under the terms and conditions of the Agreement for Purchase of IBM Machines and the Amendment for IBM Service/Exchange Center Services. The service offering during warranty is Customer On-Site Exchange (COE) as described below.

Customer On-Site Exchange (COE): It is the customer's responsibility to set up the equipment and to determine when maintenance is required. The customer may wish to replace a failing element with a spare element and should be advised to purchase sufficient spare elements.

It is the customer's responsibility to disconnect the element(s) and call a designated number to have a replacement element(s) delivered to the customer site where they will be exchanged (without testing) for the customer's defective unit(s). The defective elements become the property of IBM.

The 3868 will be eligible for IBM Maintenance Agreement coverage immediately following expiration of the warranty for an annual charge. The maintenance offering will be Customer On-Site Exchange (COE).

Maintenance: The level of maintenance service on rental (MRC) machines is Customer On-Site Exchange (COE). Maintenance service is provided under the Amendment for IBM Service/Exchange Center services.

On-Site Assistance: If the customer desires assistance to perform Customer Problem Analysis and Resolution (CPAR), he may call for assistance on a toll free number. IBM will respond to the customer site to aid the customer in performing CPAR procedures using the same documentation available to the customer. IBM assistance is billable at the application rates and terms.

Communications Facilities - Mdls 1 and 2

Common Carrier Facilities: Common carrier-provided voiceband private line (nonswitched) channel, type 3002 (or equivalent) as described in the *Bell System Technical Reference,* PUB 41004, dated October 1973.

Privately-owned Communication Facilities: Equivalent to above.

Communications Facilities - Mdls 3 and 4

Common Carrier Facilities: Voiceband private line (nonswitched) channel, type 3002 (or equivalent) as described in the *Bell System Technical Reference,* PUB 41004, dated October 1973.

Mdl 3 (point-to-point), and mdl 4 (multipoint) use basic channels.

Privately-owned Communication Facilities: Equivalent to above.

Extended Diagnostic Functions: Provided with 3868 mdls 1 to 4, these functions enhance the diagnostic capabilities of non-switched modems when it is installed in both the local and remote modems. It provides and additional test that enables NPDA to differentiate between modem failure, line failure and remote modem power loss.

Related Equipment: The 3868 operates with IBM communication products capable of 2400 bps operation for mdl 1, 4800 bps operation for mdl 2 and mdl 2 and 9600 bps operation for mdls 3 and 4. See M2700 pages. The 3868 communicates with another appropriately configured 3868 or 3863/3864/3865 stand-alone modem. The interconnecting cable between the business machine and the modem must be supplied by the business machine.

Bibliography: See specific systems bibliography.

RPQs: RPQs will not be accepted.

SPECIFY

- Telecommunication cable (modem to telecommunications line connection):

  7.5m (25 ft.) **#9713**
  0.7m (2.5 ft.) **#9719**

  If one of the above is not specified, **#9713** will be assigned.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Telecommunications Cable Adapters (P/N 7838805, P/N 1992900): Convert the 4-prong plug (WE238B or equivalent) supplied on the telecommunications cable to a 4-spade lug or a 50-pin connector termination. For 4-spade lugs, order P/N **7838805** ... for 50-pin connectors, order P/N **1992900.** (The 50-pin connector is commonly used for telephone company modems.) See "Attachment Facilities" in the M3863, 3864 or 3865 pages.

SUPPLIES (None)

3872 MODEM

PURPOSE

A 2400 bps modem, with half-speed capability, used to provide communications products with the means for transmitting data over common carrier-provided voice band private line (nonswitched) channels, equivalent privately-owned channels or switched telecommunications networks.

MODELS

Model 1 001

Prerequisites: See "Teleprocessing Systems" in GI section.

HIGHLIGHTS

Modem operation is possible in half-duplex mode over 2- or 4-wire half-duplex facilities, half-duplex or duplex mode over 4-wire duplex facilities, or half-duplex mode over switched telecommunication networks.

Data Rates: 2400 bps with backup half-speed.

Equalization: Manually adjustable by operator on private line (nonswitched) channels and automatic on switched networks .

Operation: Switched network or multipoint control, multipoint tributary, point-to-point on a private line (nonswitched) channel. See "Special Features".

Built-In Diagnostics: Included in each modem are the following diagnostic features accessible to the operator: (1) The modem may be *wrap tested* independently of the using machine and telecommunication channel ... (2) It may be *line tested* with a remote modem and telecommunication channel, independently of the attached business machine. The test may be one-way or remotely wrapped to the local modem.

Communication Facilities

Communication common carrier-provided voice band private line (nonswitched) channel, type 3002 (or equivalent) as described in the *Bell System Technical Reference PUB 41004,* dated October, 1973. **Note:** Machines with a serial number prior to 13100 and a suffix prior to HZ with Multipoint Tributary (#5101, #5102) or Point-to-point (#6101, #6102) feature require the installation of an RPQ to operate on a basic (not conditioned) 3002 channel. Machines shipped from the plant after June 1, 1976, do not require the RPQ. Conditioned lines may be used but are not required. Contact IBM for RPQ ordering information.

Privately Owned Communications Facilities: Equivalent to above.

Public Switched Networks: The customer must be advised that satisfactory data transmission depends upon the characteristics of the particular switched network connection being used. Refer to M2700 pages for further details.

International Facilities: Transmission of data between the U.S. and Canada on nonswitched or switched facilities is supported. (For nonswitched operation, the channel in Canada must be a schedule 4, type 4.)

Attachment to Facilities: Attachment to a private line (nonswitched) channel is by a cable, supplied with the 3872, which is terminated with a 4-prong plug (WE 283B or equivalent). The plug mates with a receptacle (WE 404B or 549A surface mount or 493A flush mount, or equivalent) which is connected to the channel. (The receptacle is a conventional item of communications equipment and is, upon customer request, ordinarily furnished by the telecommunication service supplier.)

If the 3872 is equipped with Switched Network Backup (#7951), another cable is supplied with the feature. This cable is also terminated with a 4-prong plug and requires the aforementioned type of receptacle which is connected to the FCC registered protective circuitry of the CDT type (or equivalent) provided by the user.

If the 3872 is equipped with Switched Network (#7941, #7942) or Switched Network Backup with Automatic Answer (#7952) a cable is supplied with the feature which is terminated with spade lugs for connection to FCC registered protective circuitry of the CBS type (or equivalent) provided by the user.

Related Equipment: The 3872 operates with IBM communications products capable of 2400 bps operation ... see "Related Equipment" under "Specify". Modem clocking must be used. The 3872 Modem must communicate with another appropriately equipped 3872, or with an appropriately equipped IBM 2400 bps Integrated Modem. The interconnecting cable between the business machine and the modem must be supplied by the business machine. If the 3872 is equipped with the Automatic Call Originate (#1091) feature, the interconnecting Auto-Call cable between the business machine and the modem must be supplied by the business machine.

Customer Responsibilities: The customer must be informed of his responsibilities as detailed in the M2700 pages and in the Installation Planning section of the *3872 User's Guide,* GA27-3058. The customer is responsible for:

1. Private line (nonswitched) channel -- arranging for the telecommunication service supplier to provide a type 3002 voice grade data channel (or equivalent) as described under "Communications Channel Specifications" in the *3872 User's Guide.* Also arranging for the installation of the appropriate receptacle described in "Attachment to Facilities".
2. Switched Telecommunication Network -- arranging for the telecommunication service supplier to install the appropriate communication service.

   Also arranging for the FCC registered protective circuitry as described in "Attachment to Facilities" and for attaching the IBM-provided cable to the protective circuitry.

   Also inform the telecommunication service supplier that the speed of data transmission will be 2400 bps and that appropriate conditioning of the local loop is required. The customer must be made aware that the use of local loops not properly conditioned for the speed of data transmission or the use of special switched facilities may result in unsatisfactory data transmission.
3. Providing voice communication between modems to coordinate tests or re-equalization. The voice facility can be provided by the 3872 Alternate Voice feature. Information concerning the handset for the Alternate Voice feature is described in the *3872 Modem User's Guide.* The voice facility must be located such that an operator can use it while operating the controls on the front of the modem.
4. If the 3872 is to be attached to a non-IBM product, the interconnecting cable between the business machine and the modem must be supplied by the business machine.
5. If the 3872 is equipped with the Automatic Call Originate feature (#1091), the interconnecting Auto-Call cable between the business machine and the modem must be supplied by the business machine.

Publications: See *KWIC Index,* G320-1621, or specific system bibliography ... *IBM 3872 User's Guide,* GA27-3058

SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60 Hz): Locking plug -- **#9880** for 115V, **#9884** for 208V, **#9886** for 230V ... non-locking plug -- **#9881** for 115V, **#9885** for 208V, **#9887** for 230V.
- Telecommunication Cord (modem to telecommunication facility): Specify one of the following for each telecommunication channel or network connection:

  #9750 -- Telecommunication cord to connect a basic (control station) 3872 Modem or one equipped with Multipoint Tributary (#5101), or Point-to-Point (#6101) feature, to a private line (nonswitched) channel.

  #9751 -- Telecommunication cord to connect a basic (control station) 3872 Second Modem (#6302) or second modem equipped with Multipoint Tributary (#5102), or Point-to-Point (#6102) feature, to a private line (nonswitched) channel.

  #9752 -- Telecommunication cord to connect a 3872 Modem equipped with Switched Network (#7941) to a switched telecommunication network.

  #9753 -- Telecommunication cord to connect a 3872 Second Modem (#6302) equipped with Switched Network (#7942) to a switched telecommunication network.

  #9754 -- Telecommunication cord to connect a 3872 Modem equipped with Switched Network Backup (#7951) or Switched Network Backup with Automatic Answer (#7952) to a switched telecommunication network.

  A 10-foot cable will be supplied. If a longer cable is required, indicate 15, 20 or 25 feet as the quantity of the feature number specified. **Note:** MES orders to add the Switched Network Backup feature(s) (#7951 or #7952), to convert a private line (nonswitched) channel modem to Switched Network, or to convert a Switched Network modem to private line (nonswitched) channel must include the telecommunication cord specify number(s) compatible with the resultant modem configuration.
- Related Equipment: For record purposes, one 3872 Attachment Feature Code from the table below must be specified for each 3872, depending upon the unit to which it is attached.

The Following Table Has Been Revised:

3872 Modem (cont'd)

Machine	3872 Attach #	Machine	3872 Attach #
2701	#9505	4952	#9573
3115	#9527	4953	#9573
3125	#9525	4954	#9573
3135	#9512	4955	#9573
3135-3	#9525	4987	#9574
3138	#9550	5010	#9531
3232-1	#9585	5110	#9564
3271	#9513	5231	#9547
3274	#9558	5251	#9565
3275	#9514	5265	#9566
3276	#9557	5285	#9604
3601	#9532	5288	#9605
3602	#9532	5320	#9545
3614	#9532	5340	#9559
3624	#9578	5381	#9570
3631	#9560	5404	#9549
3632	#9561	5406	#9518
3651	#9534	5408	#9538
3684	#9572	5410	#9519
3694	#9581	5412	#9546
3704	#9516	5415	#9533
3705	#9515	5525	#9606
3707	#9548	6240	#9562
3725	#9515	6640	#9556
3735	#9517	6670	#9563
3741	#9526	8101	#9569
3747	#9526	8130	#9567
3767	#9537	8140	#9568
3771	#9540	6/420	#9575
3774	#9542	6/430	#9552
3775	#9543	6/440	#9553
3776	#9544	6/442	#9576
3777	#9528	6/450	#9554
3780	#9521	6/452	#9577
3791	#9535	MC II	#9555
3845	#9579	RPQ	#9524
3846	#9579	Non-IBM	#9520

SPECIAL FEATURES

The basic 3872 Modem, with no additional features required, is used at the control station in a centralized multipoint network. Additional capabilities/configurations are provided by the following features:

Alternate Voice (#1051, #1052): Provides signalling capability and a socket on the operator panel into which a customer-provided handset may be plugged, permitting voice communications with the distant 3872 Modem(s). Data cannot be simultaneously transmitted with voice. A handset is not provided. See *3872 User's Guide* for description of handset. #1051 -- for basic modem ... #1052 -- for Second Modem (#6302). **Limitations:** #1051 cannot be installed with Switched Network (#7941) ... #1052 cannot be installed with Switched Network (#7942). **Maximum:** One of each. **Field Installation:** Yes. **Prerequisites:** #1052 requires #6302.

Automatic Call Originate (#1091): Permits automatic origination of a call by the using machine equipped with an IBM autocall feature. Provides control to FCC registered protective circuitry of the CBS type (or equivalent) provided by the user to dial telephone numbers and to provide on-hook/off-hook control. **Note:** Can only be used with Rotary Dial System. **Limitations:** Cannot be installed with Second Modem (#6302) or Switched Network Backup (#7951, #7952). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #7941 on 3872 and an IBM Auto Call feature on the using machine.

Fan-Out (#3901): This feature allows attachment, to the 3872, of up to three IBM Teleprocessing machines at one location ... see "Related Equipment" under "Specify" for applicable machines. Only one of the attached machines may transmit at a time. This feature may be used at a tributary station in a centralized multipoint network. In this configuration, multipoint programming discipline will provide the selection/control of the specified IBM terminals without any additional user involvement. This feature may also be used to allow up to three of the specified IBM multiplexers, communications controllers, integrated communications adapters or communications adapters on 4331, at a central site, to share the same 3872 Modem for backup purposes. In this case, although all of the machines attached to the 3872 will receive the incoming data simultaneously, the user switchover procedure must ensure that only one machine is sending. **Limitations:** Cannot be installed with Second Modem (#6302) or Switched Network (#7941) . **Maximum:** One. **Field Installation:** Yes.

Multipoint Tributary (#5101, #5102): Used on each modem attached to tributary stations in a centralized multipoint network to compensate for line distortion between the control and tributary station. Operator adjustment on front panel. #5101 -- for basic modem ... #5102 -- for Second Modem (#6302). **Limitations:** #5101 cannot be installed with Point-to-Point (#6101) or Switched Network (#7941) ... #5102 cannot be installed with Point-to-Point (#6102) or Switched Network (#7942). **Maximum:** One of each. **Field Installation:** Yes. **Prerequisites:** #5102 requires #6302. **Specify:** Telecommunication cord **#9750** for feature #5101 ... Telecommunication cord **#9751** for feature #5102.

Point-to-Point (#6101, #6102): Used on modems at each end of a point-to-point private line (nonswitched) channel to compensate for line distortion. #6101 -- for basic modem ... #6102 -- for Second Modem (#6302). **Limitations:** #6101 cannot be installed with Multipoint Tributary (#5101) or Switched Network (#7941) ... #6102 cannot be installed with Multipoint Tributary (#5102) or Switched Network (#7942). **Maximum:** One of each. **Field Installation:** Yes. **Prerequisites:** #6102 requires #6302. **Specify:** Telecommunication cord **#9750** for feature #6101 ... Telecommunication cord **#9751** for feature #6102.

Second Modem (#6302): Permits two modems, each to operate on a separate line, to be housed in the same stand-alone cabinet. The two modems share the same power supply. **Limitations:** Only the following features are allowed on either or both modems -- Alternate Voice (#1051, #1052), Point-to-Point (#6101, #6102), Multipoint Tributary (#5101, #5102), or Switched Network (#7941, #7942). **Maximum:** One. **Field Installation:** No.

Switched Network (#7941, #7942): Used for operation over the public switched network via the FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. Automatic answering of incoming calls will be performed by the modem. Automatic equalization is effected at the beginning of each call. #7941 -- for basic modem ... #7942 -- for Second Modem (#6302). Conditioning of the telecommunication service local loop for transmission of data faster than 300 bps is required. It can communicate with another 3872 equipped with Switched Network (#7941 or #7942), with Switched Network Backup (#7951) or with Switched Network Backup with Automatic Answer (#7952). **Limitations:** #7941 cannot be installed with Alternate Voice (#1051), Fan-Out (#3901), Multipoint Tributary (#5101) or Point-to-Point (#6101) ... #7942 cannot be installed with Alternate Voice (#1052), Multipoint Tributary (#5102) or Point-to-Point (#6102). **Maximum:** One of each. **Field Installation:** Yes. **Prerequisites:** #7942 requires #6302. **Specify:** Telecommunication cord **#9752** for feature #7941 ... telecommunication cord **#9753** for feature #7942.

Switched Network Backup (#7951): Provides the capability of attaching the 3872 to the public switched network as a backup to the private line (nonswitched) channel. It can communicate with another 3872 equipped with Switched Network (#7941 or #7942), with Switched Network Backup (#7951) or with Switched Network Backup with Automatic Answer (#7952). A fixed compromise equalizer is provided for the backup operation. A front panel switch permits operator selection of either the prime or the backup facility. Both facilities cannot be used simultaneously. Attachment to the switched network is made via the FCC registered protective circuitry of the CDT type (or equivalent) provided by the user. Calls must be established and answered manually. **Note:** To use this feature, operator intervention at the modem is required. Operator intervention, program modification, or both may be required on the using system/terminal. This feature can be used with BTAM programs for DOS, DOS/VS, OS, OS/VS1 and OS/VS2 in certain configurations. Programming support for the 2020, 5231, 5285, 5288, 5320, 5340, 5381, 5404, 5406, 5408, 5410, 5412, and 5415 is still applicable when these devices are used as remote terminals. Additional customer program routines will be required, in existing BTAM programming, to fully utilize the capabilities of the Switched Network Backup feature. For additional information, see the *3872 User's Guide.* Conditioning of the telecommunication service local loop for transmission of data faster than 300 bps is required. **Limitations:** Cannot be installed with Second Modem (#6302), or Switched Network features (#7941, #7942 or #7952). **Maximum:** One. **Field Installation:** Yes. **Specify:** Telecommunication cord **#9754.**

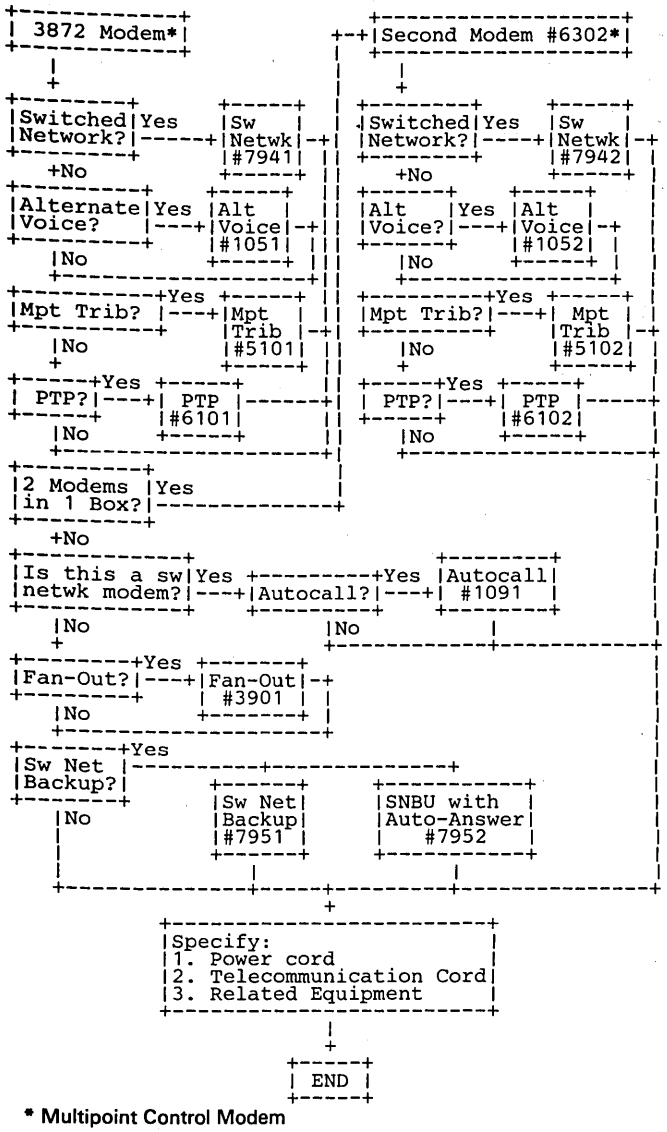
Switched Network Backup with Automatic Answer (#7952): Same as Switched Network Backup (#7951) plus the added capability of automatically answering incoming calls when attached to FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. **Note:** To use this feature, operator intervention at the modem is required. Operator intervention, program modification, or both may be required on the using system/terminal. This feature can be used with BTAM programs for DOS, DOS/VS, OS, OS/VS1 and OS/VS2 in certain configurations. Programming support for the 2020, 5231, 5285, 5288, 5320, 5340, 5381, 5404, 5406, 5408, 5410, 5412, and 5415 is still applicable when these devices are used as remote terminals. Additional customer program routines will be required, in existing BTAM programming, to fully utilize the capabilities of the Switched Network Backup feature. Conditioning of the telecommunication service local loop for the transmission of data faster than 300 bps is required. For additional information, see the *3872 User's Guide.* **Limitations:** Cannot be installed with Second Modem (#6302) or Switched Network features (#7941, #7942 or #7951). **Maximum:** One. **Field Installation:** Yes. **Specify:** Telecommunication cord **#9754.**

3872 Modem (cont'd)

CONFIGURATOR

The HONE Configurator, CFMODEM, is available for assistance in configuring the 3872 Modem.

Feature Code Configuration Flowchart



* Multipoint Control Modem

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3880 STORAGE CONTROL MDLS 1,2,3

PURPOSE

Provides two independent control unit paths, called storage directors, for 3330/3333, 3340/3344, 3350, 3370, 3375 and 3380 direct access storage.

MODELS

Model 1 001 — Each of the two storage directors provides for attachment of either up to four 3340 model A2s, or up to four 3370 model A1s and/or A2s in any combination, or up to four 3375 model A1s and/or D1s, or up to four 3333s (any model) and 3350 A2/A2Fs and C2/C2Fs in any combination (see DASD Attachment Configuration under "Specify" and M3330, 3333, 3340, 3344, 3350, 3370, and 3375 pages).

Model 2 002 — One of the two storage directors provides for DASD attachment as described for both storage directors of the model 1 above. The other storage director provides for attachment of either up to two 3380 model A4s or two 3380 model AA4s (see M3380 pages).

Model 3 003 — Each of the two storage directors provides for attachment of either up to two 3380 model A4s or up to two 3380 model AA4s (see M3380 pages).

Limitations:

1) See M3330, 3333, 3340, 3344, 3350, 3370, 3375, 3380 pages for system support limitations.
2) 3350 DASD attached to the 3880 must be in Native Mode format; 3330 mdls 1 and 11 Compatibility Mode are not supported.
3) In S/370 Mdl 135, 135-3, 138, when a 3880 is attached to a block multiplexer channel, only 16 logical devices will operate in this mode, even if more than 16 logical devices are attached.
4) Mdls of 3380 DASD with dynamic path selection (mdl AA4) may not be attached to the same storage director as mdls of 3380 without dynamic path selection (mdl A4).

Maximum: For configurations attaching 3340/3344 DASD, the storage director uses 64 contiguous addresses irrespective of the number of drives attached. The 3340 mdl A2s on the first and third strings may attach up to three 3340 mdl B1s/B2s and/or 3344s in any combination. The 3340 mdl A2 on the second string may attach up to three 3340 mdl B1s/B2s. The 3340 mdl A2 in the fourth string may attach one 3340 mdl B1/B2.

For a storage director attaching 3370 DASD, a maximum of four 3370 mdls A1 and A2 in any combination, each with up to three 3370 mdl B1s may be attached.

For a storage director attaching 3330/3333/3350 DASD, a maximum of four 3333 mdl 1s, 3333 mdl 11s, and/or 3350 mdls A2s/A2Fs in any combinations. Each string with a 3333 mdl 1 or 11 may attach up to three 3330 mdls 1s/2s or 11s. Each string with a 3350 mdl A2/A2F may attach up to three 3350 mdls B2s/B2Fs or up to two 3350 mdls B2s/B2Fs and a 3350 mdl C2/C2F.

For a storage director attaching 3380 DASD, a maximum of either two 3380 mdl A4s or two AA4s. Each string with a 3380 mdl A4/AA4 may attach up to three 3380 mdl B4s.

For a storage director attaching 3375 DASD, a maximum of four 3375 model A1s and/or D1s.

Prerequisites: An available control unit position for each storage director on a block multiplexer channel. One unshared subchannel for each logical address attached to a block multiplexer channel.

On 3880 mdls 2 and/or 3, storage directors attaching 3380 DASD must be attached to either a 3.0MB/sec. block multiplexer channel which can operate in data streaming mode or must have the Speed Matching Buffer for 3380 feature (#6550). On 3880 Models 1 and/or 2, storage director attaching 3375 DASD must be attached to either a block multiplexer channel which can operate at 1.859MB/sec. or more or must have the Speed Matching Buffer for 3375 feature (#6560). Attachment of either the 3380 without use of the Speed Matching Buffer for 3380 feature or the 3375 without use of the Speed Matching Buffer for 3375 feature, through the 3880 to 3031, 3032, 3033 or 3042 mdl 2 requires the Data Streaming feature (#4850) installed on the processor. Attaches to a 3081, 3083, or 3084 Processor via any block multiplexer channel.

On a 4341 Processor, storage directors on 3880 mdls 2 or 3 attaching 3380 DASD must either be attached to a 3.0MB/sec. block multiplexer channel or have the Speed Matching Buffer feature (#6550) and be attached to a 2.0 or 3.0MB/sec. block multiplexer channel. On a 4381 Processor, storage directors on a 3880 mdl 2 or 3 attaching 3380 DASD must be attached to a 3.0MB/sec. block multiplexer channel. Attachment of the 3380 to 4381 Processors in shared DASD environments via speed matching buffer (#6550) is supported only on 4381 3.0MB/sec. channels. Storage directors on 3880 Models 1 and 2 attaching 3350, 3370 or 3375 DASD must be attached to a 2.0 or 3.0MB/sec. block multiplexer channel; storage directors on 3880 Models 1 or 2 attaching 3330/3333 or 3340/3344 DASD may be attached to either a 1.0 (Mdl Group 1), 2.0 or 3.0MB/sec. block multiplexer channel.

On a 4331 Mdl Group 2, or 4361, a 3880 mdl 1 or 2 is supported only on the optional High-Speed Block Multiplexer Channel (#1431).

On a 4361, the 3880 must be attached to optional High-Speed Block Multiplexer Channels (HS BMPX) (#143X). Storage directors attaching 3380 must be attached to HS BMPX 1 or 2 (#1413, #1432).

On a S/370 mdl 165-II and 168, attachment is to the 2880 Block Multiplexer Channel. On S/370 mdl 158, 158-3, 168 and 168-3, the S/370 Extended feature (#7730) is required in order to attach 3380 or 3375 through a 3880 mdl 2 or 3 when the programming support used is one of the MVS/System Program Products.

HIGHLIGHTS

File organization and format are under program control, allowing random or sequential processing of files. Two independent storage directors allow orderly conversion to newer 3370, 3375 or 3380 DAS. Multiple requesting allows multiple overlapped operations on DAS drives attached to each storage director. Data Integrity is provided through extensive error detection and correction capabilities. Advanced logic and improved fault detection capability provide high availability.

System Attachments: Each storage director attaches to a processor channel. The second of the two storage directors can attach to either the same channel as the first, or a different channel on the same processor, or a channel on a different processor. The following DASD and processor attachments are supported:

Processor(s)	DASD
4341/4361/4381	3330, 3333, 3340, 3344, 3350, 3370, 3375, 3380
4331 mdl Group 2	3330, 3333, 3340, 3344, 3350, 3370, 3375
S/370 mdls 135, 135-3, 138, 145, 145-3, 148, 155-II, 165-II, 3330, 3333, 3344, 3340, 3350, 3375	3330, 3333, 3340, 3344, 3350
S/370 mdls 158, 158-3, 168, 168-3	3330, 3333, 3340, 3344, 3350, 3375, 3380
3031, 3032, 3033, 3081, 3083, 3084	3330, 3333, 3340, 3344, 3350, 3375, 3380

Bibliography: GA26-1661.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9915** for 240V.
- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray.
- DASD Attachment Configuration: Two of the following must be specified; one for each storage director. The same attachment specify code may be specified twice:

Attachment	Specify
3330/3333/3350	**#9192**
3340/3344	**#9190**
3370	**#9191**
3380 without (#6550)	**#9193**
3380 with (#6550)	**#9194**
3375 without (#6560)	**#9195**
3375 with #6560	**#9198**

Note 1: Diskette-only specify feature. A fee for purchased machines when DASD Attachment Configuration features are changed via MES.

Note 2: On MES orders where one of the two DASD Attachment Configuration specify codes is changed, you must also specify removal and addition of the other code, even though the code does not change. This will assure that the latest EC level of code is shipped for both storage directors.

3880 Storage Control Mdls 1,2,3 (cont'd)

SPECIAL FEATURES

Remote Switch Attachment (#6148): Removes the enable/disable switches from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. This feature allows relocation of up to four switches, accommodating the single channel connection to each storage director, or two channel connections to each storage director (using #8170). **Maximum:** One. **Field Installation:** Yes.

Remote Switch Attachment, Add'l (#6149): Removes the four additional enable/disable switches provided by the Two Channel Switch Pair, Additional (#8171) from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #8170, #8171, #6148.

Remote Switch Attachment For Eight-Channel Switch (#6150): Removes the eight additional enable/disable switches provided by the Eight-Channel Switch (#8172) from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #8170, #8171, #8172, #6148, #6149.

Speed Matching Buffer For 3380 (#6550): Supports attachment of 3380 DASD to 1.5MB/sec. block multiplexer channels on S/370 mdls 158, 158-3, 168 and 168-3, 3031, 3032, 3033 and 3042 mdl 2, and 2.0MB/sec. block multiplexer channels on the 4341 Processor. Also supports attachment of 3380 to 3.0MB/sec. block multiplexer channels on 3031, 3032, 3033 and 3042 mdl 2 that have the Data Streaming feature (#4850) with data transfer at 3.0MB/sec., or a 3.0MB/sec. block multiplexer channel on a 4341 or 4381 Processor. The feature is for a storage director that attaches 3380. **Limitations:** On a 3031, 3032, 3033 or 3042 mdl 2 channel group with Data Streaming (#4850), first three block multiplexer channels of the group can attach 3880 storage directors with this feature installed. When both paths of the 3380 with the dynamic path selection function are attached to a single processor, both storage directors must have the Speed Matching Buffer feature or neither may have it.

On 3031, 3032, 3033 or 3042 mdl 2 channel group without Data Streaming, first two block multiplexer channels of the group can attach 3880 storage directors with this feature installed. See the publication *IBM 3031, 3032, 3033 Processor Complex Channel Configuration Guidelines,* GC22-9020, for more information.

On a S/370 mdl 158 or 158-3, two block multiplexer channels can attach 3880 storage directors with this feature installed. See the publication *Guide to the System/370 Model 158,* GG20-1754, for more information.

On a S/370 mdl 168 or 168-3, six block multiplexer channels can attach 3880 storage directors with this feature installed. See the publication *System/370 Model 168 Functional Characteristics,* GA22-7010, for more information. **Maximum:** One on a 3880 mdl 2; two on a 3880 mdl 3. **Field Installation:** Not available on machines with serial numbers of 10444 and below. Not recommended on machines with serial numbers between 10445 and 20119. Field installable on machines with serial numbers of 20200 and above. **Prerequisites: #9194** ... 3380 with #6550.

Speed Matching Buffer For 3775 (#6560): Supports attachment of 3375 DASD to 1.5MB/sec. block multiplexer channels on S/370 Models 145, 148, 155-II, 158, 158-3, 165-II, 168, 168-3, 3031, 3032, 3033, and 3042 Model 2 Processors. Also supports attachment of 3375 to 3.0MB/sec. block multiplexer channels on 3031, 3032, 3033 and 3042 Model 2 that have the Data Streaming Feature (#4850) with data transfer at 3.0MB/sec. per second, or a 2.0 or 3.0MB/sec. block multiplexer channel on a 4341 or 4381 Processor, or the 3.0MB/sec. block multiplexer channel on the 3081 Processor, or the optional High-Speed Channel on the 4331 Model Group 2. If channels of speeds different from 1.859 megabytes per second are switched to a storage director with Speed Matching Buffer Feature, the 3.0 and 2.0MB/sec. block multiplexer channels are supported at the 3375 data rate (1.859MB/sec) and the 1.5MB/sec. block multiplexer channels are supported at the channel data rate (1.5MB/sec). The feature is for a storage director that attaches 3375. **Limitations:** On a 3031, 3032, 3033 or 3042 Mdl 2 channel group with Data Streaming (#4850), first three block multiplexer channels of the group can attach 3880 storage directors with this feature installed.

On 3031, 3032, 3033 or 3042 Model 2 channel group without Data Streaming, the first two block multiplexer channels of the group can attach 3880 storage directors with this feature installed.

On a S/370 Model 155-II, the first or second block multiplexer channel can attach 3880 Storage Directors with this feature installed. On a S/370 Model 158 or 158-3, the first two block multiplexer channels can attach 3880 Storage Directors with this feature installed.

On a S/370 Model 165-II, four block multiplexer channels can attach 3880 Storage Directors with this feature installed. On a S/370 Model 168, 168-3, six block multiplexer channels can attach 3880 Storage Directors with this feature installed.

On a S/370 Model 145 or 148, the first block multiplexer, only, can attach 3880 Storage Directors with this feature installed. Word Buffer Feature (#8810) is required on S/370 Model 145. **Maximum:** Two on a 3880 Model 1; one on a 3880 Model 2. **Field Installation:** Field installable on 3880 Model 1 or 2 machines with serial numbers 20200 through 29999, 30200 through 39999, and 40200 through 99999. RPQ MM2865 is required for machines with serial number 10445 through 20000 . Not available for any other machines.

Two-Channel Switch Pair (#8170): To attach each storage director to a second channel. Four unique channels may be switched, two to each storage director or the same two channels may be switched to both storage directors. The channels to be switched may be on the same or on different processors. An available control unit position is required on each channel ... see "Prerequisites". Switching is under program control. Each storage director can be dedicated to a single channel by means of an enable/disable switch. **Maximum:** One. **Field Installation:** Yes.

Two-Channel Switch Pair, Add'l (#8171): Adds switching for two additional channels per storage director on a 3880 with the Two-Channel Switch Pair (#8170) feature, providing four channel switch capability for both storage directors. Up to eight unique channels may be switched, four to each storage director. Each storage director can be dedicated to a subset of the four attached channels by means of an enable/disable switch. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #8170.

Eight-Channel Switch (#8172): For 3330/3333/3350 and/or 3380 DASD, adds switching for four additional channels per storage director on a 3880 with the Two-Channel Switch Pair and Two-Channel Switch Pair, Add'l features (#8170, #8171), providing eight channel switch capability for both storage directors. The same eight channels must be switched to both storage directors. Each storage director can be dedicated to a subset of the eight attached channels by means of an enable/disable switch. **Maximum:** One. **Field Installation:** Available at time of manufacture only. **Prerequisites:** #8170, #8171. Only supported for 3330/3333/3350 (**#9192**) and/or 3380 (**#9193** or **#9194**).

MODEL CONVERSIONS

Model upgrades are field installable. MES orders for model upgrades must include removal of old DASD Attachment Configuration specify codes and addition of new specify codes.

ACCESSORIES (None)

SUPPLIES (None)

3880 STORAGE CONTROL MDL 4

PURPOSE

Provides a single control unit path, called a Storage Director, for 3370 and 3375 Direct Access Storage. The model 4 contains one Storage Director that provides for attachment of up to four 3370 models A1 and A2 in any combination, or up to four 3375 model A1s. See DASD Attachment Configuration under "Specify" and M3370 and 3375 pages.

MODELS

Model 4 004

Prerequisites: An available control unit position on a block multiplexer channel for the storage director. One unshared subchannel is required for each logical address attached to a block multiplexer channel.

On the 4331-2 or 4361, the Storage Director must be attached to a High-Speed Block Multiplexer Channel (#143X).

On the 4341, the Storage Director must be attached to a 2.0MB/sec. Block Multiplex Channel.

On the 4381, the Storage Director must be attached to either a 3.0MB/sec. Block Multiplexer channel or to a 2.0MB/sec. Block Multiplexer Channel.

Maximum: A maximum of four 3370 mdls A1 and A2 in any combination, or four 3375 mdl A1s can be attached ... See M3370 and 3375 pages.

Limitations:

1. See M3370 and 3375 pages for system limitations.
2. 3370s & 3375s cannot both be attached to the storage director at the same time.
3. No RPQs will be accepted.

HIGHLIGHTS

File organization and format are under program control, allowing random or sequential processing of files; data integrity is provided through extensive error detection and correction capabilities; advanced logic and improved fault detection capability provide high availability.

Systems attachment: The single storage director attaches to a processor channel. The following DASD and processor attachment is supported:

Processor	DASD
4331-2	3370, 3375
4341	3370, 3375
4361	3370, 3375
4381	3370, 3375

Bibliography: GC20-0001

SPECIFY

- Voltage: (AC, 3-Phase, 4-wire, 60 Hz): **#9903** for 208V, or **#9915** for 240V **Note:** 240V AC is compatible with 230V AC systems.
- DASD Attachment Configuration: Only one of the following may be specified:

Attachment	Specify
3370	**#9201**
3375	**#9202**

  Diskette-only specify feature. No fee when ordered at time of manufacture. A fee on purchased machines when attachment specify features are changed via MES.

- Color: **#9060** for willow green **#9061** for garnet rose, **9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, or **#9065** for pebble gray.

SPECIAL FEATURES

Two-Channel Switch (#8160): To attach the storage director to a second channel. The channels to be switched may be on the same or different processors. An available control unit position is required on each channel ... see "Prerequisites" above. Switching is under program control. The storage director can be dedicated to a single channel by means of an enable/disable switch. **Maximum:** One. **Field Installation** Yes. **Available:** December 30, 1983.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

3880 STORAGE CONTROL MDL 11

PURPOSE

The 3880 Storage Control mdl 11 modifies the first Storage Director, called the Paging Storage Director, to manage dynamically an 8MB solid-state storage unit, for page and swap data. The storage unit is divided into a directory and a cache. Up to eight actuators of 3350 disk storage provide backing storage for the cache. The second Storage Director operates in a conventional manner, as a 3880 Model 1 Storage Director, for 3330/3333 and 3350 direct access storage only.

MODELS

Model 11 D11 — Provides 8,388,608 bytes of Subsystem Storage.

Prerequisites: An available control unit position on a block multiplexer channel for each Storage Director. Four unshared subchannels are required for each 3350 device attached to the Paging Storage Director. One unshared subchannel is required for each 3350 or 3333/3330 device attached to the other Storage Director. The channel must be able to provide either a 1.5 or 3.0MB/sec. capability.

Attaches to a 3081 or 3083 Processor Unit via a block multiplexer channel.

Attaches to a 303X or 3042 Attached Processor mdl 2 via either a 1.5 or 3.0MB/sec. channel. In order to operate at 3.0MB/sec., the Data Streaming Feature (#4850) is required.

On a S/370 mdl 168 or 168-3, attachment is to a 2880 Block Multiplexer Channel capable of 1.5MB/sec.

On a S/370 mdl 158 or 158-3, attachment is to any block multiplexer channel capable of 1.5MB/sec.

On a 4341 and 4381, Storage Directors attaching 3350 DASD must be attached to a 2.0 or 3.0 MB/sec. block multiplexer channel. Data rate will be up to 1.5 or 3.0 MB/sec. respectively for the Paging Storage Director. See M4341 and 4381 pages for information.

Maximum: The Paging Storage Director is limited to attaching one 3350 mdl A2/A2F and three mdl B2/B2Fs, or one 3350 mdl A2/A2F, two mdl B2/B2Fs and one C2/C2F.

The other Storage Director attaches 3330/3333/3350 DASD; a maximum of four 3333 mdl 1s, 3333 mdl 11s, and/or 3350 mdl A2s/A2Fs in any combination. Each string with a 3333 mdl 1 or 11 may attach up to three 3330 mdl 1/2s or 11s. Each string with a 3350 mdl A2/A2F may attach up to three 3350 mdl B2/B2Fs or up to two 3350 mdl B2/B2Fs and a 3350 mdl C2/C2F.

Limitations:

1. The 3350 mdl A2/A2F or C2/C2F attached to the Paging Storage Director may not be actively string switched to another Storage Director (i.e., String Switch Special Feature (#8150) on the 3350 is not supported). The switch may be installed but it is recommended that the switch should be manually positioned to the Paging Storage Director.

2. See M3330, 3333, 3350 for system support limitations.

3. 3350 DASD attached to either 3880 mdl 11 Storage Director must be in native mode format; 3330 mdls 1 and 11 Compatibility Mode are not supported.

4. All 3880 mdl 11 conversions require a 3880 mdl 1 as the converted-from machine.

US manufactured 60 Hz machines: Eligible 3880 machines that can be field model converted are 3880 models with serial numbers between 20200 and 29999, 30200 and 39999, and 40200 and 99999.

5. While the Paging Storage Director may be attached to more than one host system for backup reasons, true dynamic sharing of the paging devices is not supported.

6. The 3880 special feature Eight Channel Switch (#8172) is not supported.

HIGHLIGHTS

- Access to page and swap data in the cache at electronic speeds and transfer at channel speeds of up to 1.5 or 3.0 MB/sec. Up to 3.0MB/sec. data rates are provided on data streaming channels only.
- Attaches to 1.5, 2.0 or 3.0MB/sec. channels (Data rate on a 2.0MB/sec. channel is up to 1.5MB/sec).
- Multiple exposures for 3350s attached to the Paging Storage Director in a similar manner to that provided by the 2305 Fixed Head Storage.
- Easy migration.
- Dynamically managed cache.
- Subsystem Storage size of 8MB.
- The 3880 mdl 11 will attach to a 1.5, 2.0 or 3.0MB/sec. block multiplexer channel on S/370 mdls 158 or 168, 303X, 3042 Attached Processor mdl 2, 4341, 4381, 3081, 3083, or 3084 Processors. On a 303X or 3042 Attached Processor mdl 2, the Data Streaming Feature (#4850) is required for operation in data steaming mode at 3.0MB/sec.
- MVS/SP Release 3 and MVS DFDS Support.
- VM/SP High-Performance Option Release 3 Support.

System Attachments: Each Storage Director attaches to a processor block multiplexer channel whose speed may be 1.5, 2.0 or 3.0MB/sec. (Data rate on a 2.0MB/sec. channel is up to 1.5MB/sec.) The second of the two Storage Directors can attach to either the same channel as the first, or a different channel on the same processor, or a channel of a different processor. These channels need not be the same speed. Only the following DASD and Processor attachments are supported (note the Paging Storage Director attaches to 3350 devices only):

Processor(s)	DASD
4341 mdl Groups 1 and 2	3330, 3333, 3350
4381	3330, 3333, 3350
S/370 mdls 158, 158-3, 168, 168-3	3330, 3333, 3350
3031, 3032, 3033, 3042 mdl 2, 3081, 3083, 3084	3330, 3333, 3350

Bibliography: GC20-0001

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9915** for 240V.
  Note: 240V AC is compatible with 230V AC systems.
- DASD Attachment Configuration: Specify one each of the following;
  one for each Storage Director:

Attachment	Specify
3330/3333/3350	**#9192** *
3350/Paging	**#9196** *

* Diskette-only specify feature. No fee when ordered at time of manufacture. A fee on purchased machines when attachment specify features are changed via MES. **Note:** The specify features must be changed when field model conversions of 3880 mdl 1 to mdl 11 occur. See "Model Conversions".

- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble grey.

SPECIAL FEATURES

Remote Switch Attachment (#6148): Removes the enable/disable switches from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. This feature allows relocation of up to four switches, accommodating the single channel connection to each Storage Director, or two channel connections to each Storage Director when using the Two-Channel Switch - Pair (#8170). **Maximum:** One. **Field Installation:** Yes.

Remote Switch Attachment, Additional (#6149): Removes the four additional enable/disable switches provided by the Two-Channel Switch - Pair, Add'l (#8171) from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. **Prerequisites:** #8170, #8171 and #6148. **Maximum:** One. **Field Installation:** Yes.

Two-Channel Switch - Pair (#8170): To attach each Storage Director to a second channel. Four unique channels may be switched, two to each Storage Director or the same two channels may be switched to both Storage Directors. The channels to be switched may be on the same or different processors. An available control unit position is required on each channel (see "Prerequisites" above). Switching is under program control. Each Storage Director can be dedicated to a single channel by means of an enable/disable switch. **Maximum:** One. **Field Installation:** Yes.

Two-Channel Switch - Pair, Additional (#8171): Adds switching for two additional channels per Storage Director on a 3880 equipped with a Two-channel Switch - Pair (#8170), providing four-channel switch capability for both Storage Directors. Up to eight unique channels may be switched, four to each Storage Director. Each Storage Director can be dedicated to a subset of the four attached channels by means of an enable/disable switch. **Maximum:** One. **Prerequisites:** #8170. **Field Installation:** Yes.

4331 PROCESSOR

The 4331 Mdl Group 1 is no longer available, replaced by 4331 Mdl Group 11.

PURPOSE

Provides the power, control, logic and storage circuitry necessary for the arithmetic, logic and processor storage functions of the 4331 Processor models.

MODELS

Group–Model		Processor Storage (bytes)	Buffer Storage (bytes)
4331-MG 1			
Model I1	I01	524,288	None
Model J1	J01	1,048,576	None
4331-MG 2			
Model J2	J02	1,048,576	8,192
Model K2	K02	2,097,152	8,192
Model KJ2	KJ2	3,145,728	8,192
Model L2	L02	4,194,304	8,192
4331-MG 11			
Model J11	J11	1,048,576	4,096
Model K11	K11	2,097,152	4,096
Model L11	L11	4,194,304	4,096

For clarity of description, separate machine pages are provided for Mdl Group 11. Tables of supported communications equipment included in this page set are common for all 4331 mdls.

Maximum Configuration: The maximum number of DASD/8809 Adapters and Byte and/or Block Multiplexer Channels which are available are shown below:

4331 Mdl Group 1	**Maximum**
DASD Adapter	1
8809 Adapter	1
Byte Multiplexer Channel	1
Block Multiplexer Channel	1

4331 Mdl Group 2	**Options (select one column)**		
DASD Adapter	1	1	1
DASD Adapter, Add'l	1	1	–
8809 Adapter	1	–	–
Byte Multiplexer Channel	1	1	1
Block Multiplexer Channel	1	1	1
Block Multiplexer Channel, Add'l	–	1	1
High-Speed Block Multiplexer Channel	–	–	1

The channel load of the attached I/O devices has to be checked against the load limitations of the processor. Refer to *IBM 4331 Processor Channel Characteristics,* GA33-1527 (Mdl Group 1) or GA33-1535 (Mdl Group 2) which contains comprehensive tables of pre-analyzed configurations.

Prerequisites: Each system requires an operator's display, keyboard and control panel to allow Initial Microcode Load (IML) and interaction with the hardware/software system. A 3278 Display Console mdl 2A or a 3279 Color Display Console mdl 2C with keyboard is required for this purpose.

HIGHLIGHTS

Depending on the mdl, the processor can contain up to 4,194,304 bytes of monolithic processor storage. Storage is high density single bit cell design. Data flow is four bytes parallel. Processor storage cycles are mdl dependent. The 4331 Mdl Group 1 storage fetch cycle is 900 nanoseconds for four bytes and the store cycle is 1,300 nanoseconds for four bytes. The 4331 Mdl Group 2 fetch and store cycles for the buffer are each 200 nanoseconds for four bytes. Buffer storage is automatically replenished from processor storage in 64 byte units at a time. The 64 byte fetch cycle requires 2.6 microseconds, the store cycle requires 3.1 microseconds. The processor is microcode controlled.

Note: The microcode which controls system operations resides in both Processor Storage and Reloadable Control Storage, reducing the Processor Storage available for user programming. For 4331 Mdl Group 1 without the optional Control Storage Expansion feature installed, Processor Storage available for the user is reduced from that installed by at least 53,248 bytes. For 4331 Mdl Group 1 with the optional Control Storage Expansion feature installed or 4331 Mdl Group 2, Processor Storage is reduced from that installed by at least 16,348 bytes (4331 Mdl Group 2 includes 131,072 bytes of Control Storage). Table 1 below lists the storage requirements for system microcode.

Standard Functions:

- For 4331 Mdl Group 1 -- 524,288 bytes or 1,048,576 bytes of processor storage. For 4331 Mdl Group 2 -- 1,048,576 bytes to 4,194,304 bytes of processor storage. 4331 Processor configurations require a portion of processor storage to be allocated for system microcode use. See Table 1 for details.
- ECPS:VSE mode or S/370 mode. In S/370 mode, both Extended Control (EC) and Basic Control (BC) are available. The 4331 Processor operates in either S/370 mode or in Extended Control Program Support:VSE mode. The system mode is selectable at Initial Program Load (IPL) time and determines the base operating characteristics of the machine: S/370 mode allows operation of certain releases of OS/VS1, VM/370, DOS/VSE, DOS/VS and DOS. (See Programming Note below for details.) ECPS:VSE mode supports operation of DOS/VSE and SSX/VSE, offering enhanced systems performance.
- Display/Printer Adapter allows attachment of:
  - 3178 Display Station
  - 3262 Line Printer mdl 1 (650 lpm system printer)
  - 3262 Line Printer mdl 11 (325 lpm system printer)
  - 3268 Printer mdl 2 and 2C (340 cps)*
  - 3230 Terminal Printer mdl 2 (350/450 cps burst speed)*
  - 3289 Line Printer mdl 4 (400 lpm system printer)
  - 3278 Display Station mdl 2, and keyboards
  - 3270 Personal Computer - Control unit terminal mode only. **
  - 3279 Color Display Station mdl 2A, S2A or 02X and keyboards
  - 3278 Display Console mdl 2A, keyboard and control panel
  - 3279 Color Display Console mdl 2C, keyboard and control panel.
  - 3287 Printer mdls 1, 2, 1C and 2C.
  - 4250 Printer
  - 6580 Displaywriter System, mdl A04, A06, A08, A10 (25-line display)

  * Specify **#9841** in 4331 must be ordered for attachment of 3268 or 3230 mdl 2 to the 4331 Mdl Group 1. Provides microcode and/or maintenance documentation if machine is below EC 366585 (microcode for 4331 Mdl Group 1) or below EC 366586 (microcode for 4331 Mdl Group 2, 11) and/or below EC 366584 (maintenance document) for all mdls.

  ** Specify **#9843** on 4321 and 4331 must be ordered for attachment of the 3270 Personal Computer.
- The 6580 Displaywriter System prerequisites for attachment include the 3270 Attached Workstation licensed program (5608-SR9) and the 3274/3276 Attached Workstation adapter (**#8332**) and Specify **#9842** in 4331 must be ordered for attachment of Displaywriter.
- The System Diskette Facility is the microcode loading system for the 4331 Processor. The diskette facility reads and writes from removable magnetic diskettes that provide all of the microcode for the 4331 Processor. The diskettes shipped with the 4331 Processor will supply the required microcode for diagnostics, standard functions, and the special features ordered. The System Diskette Facility also allows storage of failure data from 4331 Processor errors which can subsequently be analyzed by the CE for maintenance purposes.
- Reloadable Control Storage is provided in addition to processor storage. This provides storage space for a portion of system microcode in support of standard functions and special features of the 4331 Processor. The Reloadable Control Storage is not available to the user. Tables 1 and 2 list the Reloadable Control Storage requirements for system microcode.
  - 4331 Mdl Group 1 includes 65,536 bytes of Reloadable Control Storage. An additional 65,536 bytes is available as an optional feature.
  - 4331 Mdl Group 2 includes 131,072 bytes of Reloadable Control Storage.

  In addition to Reloadable Control Storage, 4331 Mdl Group 2 contains 12,288 bytes of Read-Only Control Storage.
- Remote Support Facility (RSF) is an IBM CE tool permitting IBM Field Technical Support Center

  specialists to remotely monitor and/or perform problem diagnosis on the 4331 Processor. This includes remotely-initiated execution of diagnostic programs, remote examination of all or selected logout records from the System Diskette Facility, and (with proper customer authorization), remote exercise of the Customer Manual Operations.
- Remote Operator Console Facility (ROCF) provides the ability to IML, IPL and execute other 4331 manual control functions for a remote 4331 via a 3275 (real or emulated) terminal at a host location.
- One level addressing facility for improved virtual storage control by DOS/VSE and SSX/VSE (ECPS:VSE mode)
- Channels with virtual storage addressing (ECPS:VSE mode)
- Channel Indirect Data Addressing (in S/370 mode)

4331 Processor (cont'd)

- Data Streaming Mode can operate on the High-Speed Block Multiplexer channel (not available on mdl Group 1). The 3380 is not supported on the 4331.
- S/370 Universal Instruction Set
- Extended Precision Floating Point
- Conditional Swapping
- CE maintenance support functions
- Storage Protection (Store and Fetch)
- Byte Oriented Operands
- Clock Comparator and CPU timer
- Time-of-Day Clock
- Interval Timer
- PSW Key Handling
- Control Registers
- Machine Check Handling
- Program Event Recording
- Monitoring
- Clear I/O
- Move inverse instruction (not used by IBM programs)
- 8,192 bytes of high-speed buffer storage (4331 Mdl Group 2 only)

Programming Note: The ECPS:VSE mode may be invoked at IPL time and supports operation of an appropriately generated DOS/VSE Control Program with VSE/Advanced Functions Release 1 and 2, or the Small Systems Executive/VSE.

In S/370 mode, operation of DOS/VSE with VSE/Advanced Functions Release 1 and 2 (generated for use in S/370 mode), VM/370 Release 6 with or without VM/System Product or VM/BSE Release 2 or VM/SE Release 2, and OS/VS1 Release 7 with or without VS1/BPE are supported. Although not supported, DOS Release 26 and DOS/VS Release 34 will operate on the 4331 Processor when in S/370 mode.

Console Function: An operator's display, keyboard and control panel is a prerequisite for use of the system by the customer ... a 3278 Display Console mdl 2A or a 3279 Color Display Console mdl 2C is required for this purpose ... the display and keyboard function as an operator's I/O console to communicate with the operating system ... the Operator Control Panel allows additional operator communication with the system. Depending on the mode of console operation, a maximum of 20 of the 25 lines on the display may be used for system communication, four are reserved for messages from the 4331 Processor hardware system, and one displays messages unique to the 3278 Display Console mdl 2A or a 3279 Color Display Console mdl 2C. The console address is selected at system installation time from the range 009 through 01F.

The console functions in one of two modes: "Display Mode" or the "Printer-Keyboard Mode". In the "Printer-Keyboard Mode", the Display Console uses the keyboard for input and the display and a 3287 Printer mdl 1 or 2, 3230 Printer mdl 2 and 3268 Printer mdl 2 for output. The CRT, keyboard and printer appear to the system as a 1052 Printer/Keyboard and operate compatibly with S/360 console operations or as a 3210/3215 Console Printer-Keyboard and operate compatibly with S/370 Console operations. The operation of the 3287/3230/3268 printer in this mode is optional, but recommended.

In "Display Mode" the keyboard is used for input and the CRT with 20 lines by 80 characters/line is used for output. The 3287 mdls 1, 2, 1C or 2C, 3230 mdl 2 and 3268 mdl 2 or 2C if attached, has its own address and must be supported by either the 3277 Console Support of DOS/VS Release 34, the 3277 Console Support of DOS/VSE and SSX/VSE, the Multiple Console Support of OS/VS1, the local-attached 3286/3287/3230/3268 Printer support of VM/370, or the equivalent of any of these.

Another function of the console is the Remote Operator Console Facility (ROCF) which provides the ability to IML, IPL and execute other 4331 manual control functions for a remote 4331 via a real or emulated 3275 terminal at a host location. ROCF is an extension of Remote Support Facility (RSF).

Byte Multiplexer Channel (Optional): Functionally equivalent to the byte multiplexer channel on S/360 and S/370 and provides eight control unit positions. When certain control units/devices are to be connected, the optional Power Interface (**#5531, #5532**) for power control must be installed on the processor. See special features and Table 3 below for details. The channel permits simultaneous operations of low speed devices. Operates at up to 18K bytes per second (Mdl Group 1) or at up to 36K bytes per second Mdl (Group 2) in single byte mode. Up to 500K bytes per second in burst mode. See *IBM 4331 Channel Characteristics* GA33-1527 for 4331 Mdl Group 1 or GA33-1535 for 4331 Mdl Group 2 for devices which may attach and the data rates achievable for certain configurations. The Byte Multiplexer Channel is always addressed as channel 0.

Subchannels: The 4331 Mdl Group 1 Byte Multiplexer Channel (**#5248**) provides up to 31 subchannels, 4 of which are shared subchannels with up to 16 devices each. The maximum number of subchannels is reduced from 31 with the addition of certain special features:

Feature	Subchannels Unavailable
DASD Adapter (**#3201**)	2
8809 Magnetic Tape Unit Adapter (**#4910**)	2
Block Multiplexer Channel (**#1421**)	1
Communications Adapter (**#1601**)	1
Each telecommunication line on the Communications Adapter (**#1601**)	1

The 4331 Mdl Group 2 byte Multiplexer Channel (#5248) provides up to 36 subchannels, 4 of which are shared subchannels with up to 16 devices each. The maximum number of 36 subchannels is reduced by one if the Communications Adapter (#1601) is installed, and one for each telecommunication line on the Communications Adapter.

Block Multiplexer Channel (Optional): Each provides eight control unit positions. When certain control units/devices are to be connected, the optional Power Interface (**#5531, #5532**) for power control must be installed on the processor. See Special Features and Table 3 below for details. The Block Multiplexer Channel permits simultaneous operation of high-speed devices. Ability to "Block Multiplex" and facility for multiple requesting allows several I/O units to operate concurrently with greater channel efficiency. Devices attached to these channels which cannot utilize block multiplexing will function as if attached to selector channels. 33XX devices (and the 3830 or 3880 storage control units) do not attach.

- 4331 Mdl Group 1: One channel is optional. Data rate is up to .5 million bytes per second ... see *IBM 4331 Mdl Group 1 Channel Characteristics,* GA33-1527, for details. Standard channel address is 1, a different address may be selected at installation time from the range of 1 to 6.
- 4331 Mdl Group 2: Two channels are optional. Data rate is up to 1.25 million bytes per second ... see *IBM 4331 Mdl Group 2 Channel Characteristics,* GA33-1535, for details. If installed together with High-Speed Block Multiplexer Channel, the data rate of the Block Multiplexer Channel, Add'l (**#1422**) is up to .6 million bytes per second. Channel addresses may be selected at installation time from the range of 1 to 6.

Subchannels: The following subchannel combinations can be configured at installation time:

– up to 128 non shared subchannels
and
– up to 16 shared subchannels, each with devices in multiples of 8, up to a total of 128 devices

High-Speed Block Multiplexer Channel (Optional): One channel is optional on 4331 Mdl Group 2 only. High data rate (up to 1.86MB/sec) allows attachment of high-speed I/O devices including 2311/2314/2319, 3330/3333/3340/3344, 3350, 3370 via control units. Ability to "Block Multiplex" and facility for Multiple Requesting allows several I/O units to operate concurrently with greater channel efficiency. Can operate in Data Streaming Mode, which allows increased interface cable length and allows attachment of a control unit, e.g., a 3880, operating in Data Streaming Mode. The 3380 is not supported on the 4331. Devices attached which cannot utilize block multiplexing will function as if attached to a Selector Channel. Eight control unit positions are available. When certain control units/devices are to be connected, the optional Power Interface (**#5531, #5532**) for power control must be installed on the processor. See "Special Features" and Table 3 for details. The channel address is selected at installation time from the range of 1 to 6.

Subchannels: Same as the Block Multiplexer Channel.

Native I/O Adapters: The following I/O adapters control the designated I/O devices:

DASD Adapter
5424 Adapter
Loop Adapter
8809 Magnetic Tape Unit Adapter
Display/Printer Adapter
Communications Adapter

Note: All data passing through the system for any I/O device interfaces with the data flow for other devices, producing I/O limitations. The limitations take two forms:

(1) Hardware exclusivities listed in the sales manual.

(2) I/O attachments which individually or in combination can produce frequent overruns. Considerations in this category are:

- The aggregate data rate on the Block Multiplexer Channel and the DASD Adapter.

4331 Processor (cont'd)

- The number and speed of lines attached to the Communications Adapter.
- The number and class of overrunnable devices on the Byte Multiplexer Channel.
- The number and traffic on 3178, 3278 mdl 2 or 3279 mdl 2A, S2A or 02X attached to the Display/Printer Adapter.

It is necessary to consult the *IBM 4331 Channel Characteristics Manual,* GA33-1527, for 4331 Mdl Group 1 or GA33-1535, for 4331 Mdl Group 2 to properly configure a 4331 with an I/O configuration that has not previously been analyzed.

DASD Adapter (Optional): One DASD Adapter is optional on the 4331 Mdl Group 1, one or two are available on the 4331 Mdl Group 2. Attaches 3310, 3370 A1 and/or 3340/3344 Direct Access Storage Devices without the necessity of a control unit. The 3310 and the 3370 normally operate in fixed block mode where optimum DASD and system performance is achieved.

As a transition aid and to allow the use of operating systems and programs which require Count-Key-Data (CKD) direct access storage, the 3340/3344 Direct Attachment and Direct Access Storage (DAS) Compatibility for emulation of 231X on 3310 or 3370 and 3330/3340 on 3370 are available. Operation with DAS Compatibility or the 3340/3344 Direct Attachment features in general will not achieve the same performance as the equivalent devices when attached to S/370 or 4300 processor channels. See performance notes included with the feature descriptions.

The String Switch Capability allows sharing of 3340/3344 or 3370 DASD with another IBM processor or control unit that supports the DASD and string switching. String switch support for the 3340/3344 is limited to the static assignment of a shared string to one processor at a time.

3340/3344 devices attaching to the DASD Adapter have logical unit/device addresses as follows:

X00	**01**	**02**	**03**	**04**	**05**	**06**	**07**
		2A	2B	2C	2D	2E	2F
		4A	4B	4C	4D	4E	4F
		6A	6B	6C	6D	6E	6F

and

X10	**11**	**12**	**13**	**14**	**15**	**16**	**17**
		3A	3B	3C	3D	3E	3F
		5A	5B	5C	5D	5E	5F
		7A	7B	7C	7D	7E	7F

With a directly attached 3340 the DASD Adapter can read data from a 3348 Data Module which was recorded on a 3340 attached to a S/3 mdl 12 or 15 ... this is a read-only mode and is available as a conversion aid for users converting to the 4331 Processors from a System/3.

The Direct Access Storage Compatibility feature provides emulation of 231X, 3330 (100MB/volume) or 3340 data formats on the 3370 mdl A1 and B1 Direct Access Storage and the emulation of 231X data formats on the 3310 Direct Access Storage. For address assignment of emulated volumes refer to *IBM 4331 Processor Compatibility Features,* GA33-1528.

Addresses for up to four strings of 3310 and 3370 can be configured at installation time in the range from X0X to X7X. The channel address may be from 1 to 6.

Display/Printer Adapter (Standard): This adapter allows for attachment of the prerequisite 3278 Display Console mdl 2A or a 3279 Color Display Console mdl 2C and up to seven (or fifteen with optional feature, see below) additional devices chosen from the list below:

3178 Display Station
3262 Line Printer mdl 1 and 11 (650 and 325 lpm)
3268 Printer mdl 2 and 2C (340 cps)*
3230 Terminal Printer mdl 2 (350/450 cps burst speed)*
3278 Display Station mdl 2
3270 Personal Computer - Control unit terminal mode only. **
3279 Color Display Station mdl 2A, S2A or 02X
3287 Printer mdls 1, 2, 1C and 2C (80 and 120 cps)
3289 Printer mdl 4 (400 lpm)
4250 Printer
6580 Displaywriter System, mdl A04, A06, A08, A10, (25-line display)

* Specify **#9841** in 4331 must be ordered for attachment of 3268 or 3230 mdl 2 to the 4331 Mdl Group 1. Provides microcode and/or the maintenance documentation if machine is below EC 366585 (microcode for 4331 Mdl Group 1) or below EC 366586 (microcode for 4331 Mdl Group 2, 11) and/or below EC 366584 (maintenance document) for all mdls.

** Specify **#9843** on 4321 and 4331 must be ordered for attachment of the 3270 Personal Computer.

These machines may be installed in any combination, provided that [1] only seven (or fifteen with optional feature) devices are installed and [2] no more than two system printers (3262 and/or 3289) are included. Due to the processing power of the 4250, it is not practical to attach more than two on mdl 1 or more than four on mdl 2, see Specify. The 6580 Displaywriter System can connect to 1 or 2 device ports (display station, or display station and printer).

The 3262 or the 3289 Line Printer may be used as system printers dependent upon control program or program product support. One 3287/3230/3268 Printer may be used as a console hardcopy device; one or more 3178, 3287/3230/3268 Printers may be used as hardcopy workstation devices. The 3178, 3278 Display Station mdl 2 , 3270 Personal Computer - Control Unit Terminal Mode only (**), or 3279 Color Display Station mdl 2A , S2A or 02X may be used as additional operator's consoles with the presence of OS/VS1 Multiple Console Support or equivalent, or as workstations for user-written applications. The 6580 Displaywriter System emulates a 3278-2 Display Station, and, optionally, a 3287-1/2 Printer. The 6580 may be used as a workstation for user-written applications and for hard copy, as a 3278-2 and 3287-1/2. Display/Printer Adapter support includes all standard functions of the 3274 mdl X1B or 3178 with the 3278 mdl 2 , 3270 Personal Computer - Control Unit Terminal Mode only (**), or 3279 mdl 2A, S2A or 02X attached. In addition, the following 3278 mdl 2 or 3279 mdl 2A, S2A or 02X special features are supported: (standard on the 3178) Keyboard Numeric Lock, (standard on the 3178) Audible Alarm, (standard on the 3178 or 3279), Security Keylock and Switched Control Unit. Other 3278 mdl 2 or 3279 mdl 2A, S2A or 02X special features are not supported. When used as workstations, 3278 or 3279 Display Station keyboard feature codes **#4621**, **#4622**, **#4623**, **#4627** ,**#4624**, **#4628** may be selected. If two different keyboards are required for a workstation, one must be **#4621**. Addresses for these devices are selected at installation time from the range 009 through 01F.

** Specify **#9843** on 4321 and 4331 must be ordered for attachment of the 3270 Personal Computer.

The 6580 Displaywriter System prerequisites for attachment include the 3270 Attached Workstation licensed program (5608-SR9) and the 3274/3276 Attached Workstation adapter (**#8332**) and specify **#9842** in 4331 must be ordered for attachment of Displaywriter.

Display/Printer Adapter Expansion (Optional): Expands the capability of the standard Display/Printer Adapter to permit the 3278 Display Console mdl 2A or a 3279 Color Display Console mdl 2C and up to 15 displays and/or printers to directly attach to the 4331 Processor. All other capabilities and limitations are listed under Display/Printer Adapter (Standard) above.

Diskette Drive (Optional): A single drive diskette reader/recorder providing the ability to read or write Diskettes Type I on the 4331 Processor. This diskette has a data capacity of 242,944 bytes organized in 1,898 sectors of 128 bytes each (for use in exchanging data with the several products listed below) or a data capacity of 246,272 bytes organized in 1,924 sectors of 128 bytes each (for use in exchanging data with another 4331 Processor). Each Diskette Drive is supported by the control program as a 3540 Diskette Input/Output Unit. When used with DOS/VSE or DOS/VS POWER refer to VSE/POWER documentation. Data recorded on a Diskette Type I can be interchanged with IBM devices and systems which have a diskette drive. Examples are the 3740, 3770, 3790, 5230 and 8100 and Series/1 and Systems/3, 32, 34, and 38. One diskette is shipped with the feature. Device address is selected at installation time from the range 009 through 01F.

5424 Adapter (Optional): Provides native attachment of 5424 Multi-Function Card Unit mdls A1 or A2 for 96-column card operations ... Device address is 04C.

Loop Adapter (Optional): The Loop Adapter on the 4331 Mdl Groups 1 and 2 is a native attachment method for the 3640 Plant Data Communications Terminals ... 3104 Display Terminal mdls B1, B2 ... 8775 Display Terminal mdls 1 and 2 ... 3232 Keyboard Printer ... 3287 Printer ... 3274 Control Unit mdl 51C, 61C ... 3276 Control Unit Display Station with their associated terminals ... 7426 Terminal Interface Unit mdl 1 with its associated terminals. Communications is based on SDLC loop protocols. The Loop Adapter provides the user with a native interface to these terminals and increased configuration flexibility.

A maximum of two direct attached loops and two data link adapters are supported. Each of the direct attached loops consists of two lobes (loop cables), for a total of four lobes on the system. Both lobes must operate at the same bit rate. Each lobe is functionally a loop however, all data on one lobe passes serially through the second lobe and can be as long as the loop, and a fault in one lobe will not affect the terminals on the second lobe, when the disrupted lobe is bypassed at the system. Therefore lobes can cover a greater distance and improve availability.

Each of the data link adapters can attach one 3843 Loop Control Unit as point-to-point or up to 4 Loop Control Units as multipoint configuration. Details on programming information are provided in the *IBM 4331 Loop Adapter Programming Guide,* SC31-0500-0.

4331 Processor (cont'd)

User-written programs for loop-attached terminals reside in the 4331 Processor storage and are controlled by VSE and ACF/VTAME or ACF/VTAM and CICS/DOS/VS. The 3644 Automatic Data Unit and 8775 Display Terminal with Downstream Loadable Functions are supported by ACF/VTAME and DSLU with VSE. In order to personalize the 3644, the GEN3644 program product is required in addition to DSLU.

In addition IBM offers a PRPQ to CICS/VS . This PRPQ Loop Adapter CICS/VS Extension for 3640 terminals is a series of programs and exit routines that enhance the support of the 3641, 3642, 3644, 3646 and 3647 when attached to the 4331 Processor by Loop Adapter Feature. The following four functions are addressed by this PRPQ:

- Terminal initialization
- Terminal re-initialization
- 3642 encode check handling
- Transaction selection

Communications network management problem determination support for 4331 loop-attached 3104 Display Terminals, 8775 Display Terminals, 3232 Keyboard Printer mdl 11, 3276 Display Control Stations and 3274 mdl 51C, 61C Display Controllers and their/associated terminals, is provided via NCCF/NPDA.

The following terminals/controllers are supported: 3641 Reporting Terminal mdls 1, 2 ... 3642 Encoder Printer mdls 1, 2 ... 3643 Keyboard Display mdl 2, 3, 4 including 4920 Badge and Document Encoder ... 3644 Automatic Data Unit ... 3645 Printer ... 3646 Scanner Control Unit ... 3647 Time and Attendance Terminal ... 3104 Display Terminal mdls B1, B2 ... 8775 Display Terminal mdls 1,2 ... 3232 Keyboard Printer mdl 11 ... 3287 Printer mdls 11, 12 ... 3274 Control Unit mdl 51C, 61C ... 3276 Control Unit Display Station mdls 11-14 with their associated terminals ... 3843 Loop Control Unit ... 7426 Terminal Interface Unit mdl 1 with its associated terminals. Device addresses are 040 through 07E.

8809 Magnetic Tape Unit Adapter (Optional): Provides native attachment of 8809 mdl 1A and up to five additional 8809 tape units (consisting of a mix of 8809 mdl 2s and 3s) ... allows the 8809 Magnetic Tape Unit to operate in streaming mode (data rate is up to 160K bytes per second) for loading or offloading DASD devices or in start/stop mode (data rate is up to 20K bytes per second) for other data processing operations. Although physical Read Backward commands are not supported, the Read Backward operation is simulated in the Logical IOCS (MTMOD) of DOS/VSE. Standard channel address is 3. Channel and device addresses may be assigned at system installation time from the range of X00 to X7F, where X is 1 to 6.

Communications Adapter (Optional): The 4331 Communications Adapter can serve up to eight communication lines. Synchronous Data Link Control (SDLC), Binary Synchronous Communications (BSC) and Start/Stop (asynchronous) transmission modes are provided (Start/Stop and BSC operate in 2703 compatibility mode). The Communications Adapter can handle a variety of terminals (Data Terminal Equipments, DTEs), at different speeds.

The Communications Adapter has the following overall structure: The Communications Adapter Base contains common circuits and control. Each of the up to eight telecommunication lines attachable requires one Line Attachment Base (two different types) and one line attachment feature. Another feature serves for autocall unit interface and two may be installed.

The interface with the external communication facilities is through a modem (also called signal converter or Data Circuit-terminating Equipment). It may be a stand-alone unit or a 1200 bps integrated modem. For further details, refer to "Special Features".

IBM Stand-Alone Modems

Switched

3863	2400 bps
3864	4800 bps
3872	1200/2400 bps
3874	2400/4800 bps

Nonswitched

The following modems, except the 3868, are supported with the Switched Network Backup feature ... see M3863, 3864, 3865, 3872, 3874, 3875 pages for details:

3863	2400 bps
3868 mdl 1	2400 bps
3864	4800 bps
3868 mdl 2	4800 bps
3865	9600 bps
3868 mdl 3/4	9600 bps
3872	1200/2400 bps
3874	2400/4800 bps
3875	3600/7200 bps

IBM Integrated Modem (V.23, 1200 bps): The following integrated modem configurations are available:

- Switched network with auto answer
- Nonswitched line, 2- or 4-wire.
- Nonswitched line with switched network backup and auto answer.
- Nonswitched line with switched network backup with manual answer.

OEM Modems: OEM modems that comply with EIA RS-232-C, CCITT V.24/V.28, or CCITT V.35 recommendations may be connected to the Communications Adapter. Attachment is under the provisions of the Multiple Supplier Systems Policy.

Digital Data Service Adapter: The Digital Data Service Adapter allows attachment to the AT & T Private Line Dataphone* Digital Service Network by way of an internal Digital Data Service (DDS*) adapter.

* Dataphone and DDS are registered trademarks of the American Telephone and Telegraph Company. Other usage of Dataphone and DDS in this text also refers to the registered trademarks of American Telephone and Telegraph.

X.21 Adapter for Nonswitched Networks: The X.21 interface allows attachment to the X.21 facilities by way of an internal X.21 adapter.

Automatic Calling Equipment: The following Automatic Calling Equipment, maximum two, can be attached to the Communications Adapter:

- 3872 with Automatic Call Originate feature
- 3874 with Automatic Call Originate feature
- Other Automatic Calling Equipment which complies with EIA RS-366 or CCITT V.25 may be connected to the Autocall Unit Interface **(#1020)** under the provisions of the IBM Multiple Supplier Systems Bulletin.

SPECIFY

Unless otherwise indicated, these specify features are only available at time of manufacture.

- Voltage (1-phase, 3 wire, 60 Hz): **#9902** for 208V, **#9914** for 240V.
- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray.
- Specify **#9260** for 4250 attachment and **#9841** for 3268 or 3230 Mdl 2 attachment.
- Remote Support Facility: The Remote Support Facility (RSF) is a customer option. It is recommended to enhance the hardware maintenance of the 4331 Processor. It provides service personnel the capability of remotely controlling the 4331 from any RETAIN terminal and allows the CE to access the RETAIN Data Bank for the latest service aids and information from the customer site. When RSF is selected, the customer must provide the telephone lines required for the RSF modem. The customer must also arrange for the connection of the telephone interface cable provided by IBM to the telephone network. For details on customer responsibilities, see *IBM 4300 Processors Installation Manual-Physical Planning,* GA24-3667.

  RSF is available in two versions:

  Specify **#9510** for integrated modem, 1200 bps, switched network, manual answer. A telephone with FCC registered Data Access Arrangement (DAA) compatible with CDT Coupler Series 1000A interface and operation, with a 4-prong jack, is required.

  Specify **#9511** for EIA RS-232-C Interface, 1200 bps, switched network, manual answer. An FCC registered external cable modem compatible with the WE 202S modem, interface and operation, or equivalent, is required.
- Remote Operator Console Facility (ROCF): This feature is an extension of RSF. It provides to an operator at a host location the ability to IML, IPL and execute other 4331 manual control functions for a remote 4331 via a real* or emulated 3275 terminal (Remote Console). After IML and IPL is complete the Remote Operator console should be disconnected and the remote 4331 should be operated in stand-alone mode or control should be turned over to existing networking facilities. ROCF is not designed to be used for interactive applications because operation of all devices attached to the Display/Printer Adapter of the 4331 are suppressed when ROCF is in use.

  * 3275 mdl 2 can only be obtained on an as available basis.

  Specify ROCF feature **#9511.** The requisite customer supplied non-clocked external modem attached to feature **#9511** must include auto answer. Line discipline is BSC, 600 or 1200 bps.
- Loop Attached Terminals: The following specify codes must be selected one time when 3640 and/or 8775 and/or 3287 Terminals and/or 3274-51C, 61C and/or 3276 Control Units are attached to

4331 Processor (cont'd)

the system via Loop Adapter 1 and/or 2 (**#4830, #4831**) and/or Data Link Adapters (**#4840**).

Specify	Selected Terminals
#9251	3641 Reporting Terminal/3647 Time and Attendance Terminal
#9252	3642 Encoder Printer
#9253	3643 Keyboard Display
#9254	3644 Automatic Data Unit (ADU)
#9256	3646 Scanner Control Unit
#9257	8775 Display Terminal 3287/3645 Printer 3274-51C, 61C and 3276 Control Unit and 3104 Display Terminal
#9258	3643 Keyboard Display with #4920

- Keyboard/Character Set Language: When a 3178 Display Station, 3278 Display Station mdl 2 and/or 3268 or 3287 Printers are attached to the Display/Printer Adapter, specify on the 4331 Processor:

  #9441: For ASCII Keyboard/Character Set Language (**#4624, #4628**, on 3278 mdl 2 or 3279 mdl 2A or S2A and/or 3287 with **#9084**), when used as a workstation, or

  #9442: For EBCDIC Data Entry Keyboards, 3178 mdl 1C, 3278 mdl 2 or 3279 mdl 2A or S2A with **#4622, #4623**. In addition, specify on the 4331 Processor either **#9301** for Data Entry Keyboard or **#9302** for Data Entry Keyboard, keypunch layout.

  No specify codes on the 4331 are required for EBCDIC Typewriter Keyboards 3178 mdl C2, 3270 Personal Computer - Control Unit Terminal Mode only (**), or (**#4621, #4627** on 3278 mdl 2 or 3279 mdl 2A S2A). The 6580 Displaywriter System supports the EBCDIC Typewriter Keyboard.

  ** Specify **#9843** on 4321 and 4331 must be ordered for attachment of the 3270 Personal Computer.

  Note: The keyboard/character set language selected must correspond with the mdl of 3178 or the specifications on the 3278 mdl 2 or 3279 mdl 2A or S2A and 3287s. ASCII keyboards are supported as indicated, but the internal binary codes are EBCDIC.

- Console Table: A console table is available ... see **#1550** or Accessories section for details. Book Rack and Cable Holder ... see **#1480** or Accessories section.

- See 3278 Display Console mdl 2A or 3279 Color Display Console mdl 2C for console cabling.

  #9842 - For attachment of 6580 Displaywriter System to the Display/Printer Adapter (ordered on the 4331 only, not on the Displaywriter).

- System Environment: For record purposes specify one of the following codes (reference only, no parts required):

  #9701 - This processor is planned to be host/peer connected to a system within the same branch office territory (at installation or at a future time).

  #9702 - This processor is planned to be host/peer connected to a system in a different branch office territory (at installation or at a future time).

  #9703 - This processor is planned to be stand-alone (no host/peer connect).

SPECIAL FEATURES

Notes:

%z System Diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchase machines to include any number of diskette-only changes ordered on the same diskette.

%x Feature supplies diskette for System Diskette facility.

%y System Diskette-only special feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchase machines to include any number of diskette-only changes ordered on the same diskette.

Adapter Power Prerequisite (#1001): Provides power and control circuitry necessary for the Communications Adapter (**#1601**), (when more than three line features are attached), and the Adapter Logic. **Maximum:** One. **Field Installation:** Yes. **Prerequisite: #1002** or for the Loop Adapter (**#4830**) and/or **#1601** with more than three line attachments **#4695** and/or **#4696**.

Adapter Logic Prerequisite (#1002): Provides logic and control function necessary for the 5424 Adapter (#3901). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1001.

Block Multiplexer Channel (#1421), Add'l [Mdl Group 2] (#1422): Each provides means of attaching I/O devices. Up to 8 control units may attach to each channel. Disconnect during command chaining allows multiple I/O devices to operate concurrently. The 3830 and 3880 Control Units with associated DASD do not attach. See DASD Adapter (**#3201, #3202**) for attachment of 3340/3344/3310/3370 devices.

4331 Mdl Group 1: Data transfer rates up to 0.5 million bytes per second.

4331 Mdl Group 2: Data transfer rates up to 1.25 million bytes per second each.

If High-Speed Block Multiplexer Channel is installed, the data rate is up to 0.6 million bytes per second for the Block Multiplexer Channel, Add'l (#1422). See Input/Output Attachment section above for details on subchannels. **Limitations:** [1] 231X can only be installed on Block Multiplexer Channel **#1421**, not on **#1422**. [2] 231X devices cannot operate with any telecommunication line feature on the Communications Adapter which operates at a speed greater than 9600 bps (**#4720**) , or **#5650** with **#9444** On 4331 Mdl Group 1 only: [3] Block Multiplexer Channel, Add'l (**#1422**) is not available. [4] 231X devices may not be installed with any of the following: 3370s on the DASD Adapter (**#3201, #3202**), 3340/3344 Direct Attachment (#7851), 8809 Magnetic Tape Unit Adapter (**#4910**), Magnetic Tape Units attached to the Byte Multiplexer Channel (**#5248**). On 4331 Mdl Group 2: [5] Block Multiplexer Channel, Add'l (**#1422**) not be installed with 8809 Magnetic Tape Unit Adapter (**#4910**). [6] 231X devices cannot be installed on the Block Multiplexer Channel (#1421) if High-Speed Block Multiplexer Channel (**#1431**) is installed. **Maximum: #1421** one, **#1422** one (Mdl Group 2). **Field Installation:** Yes. **Prerequisites: #1422** requires **#1421**. For certain control units/devices the processor requires Power Interface feature (**#5531, #5532**). See Table 3 above.

High-Speed Block Multiplexer Channel (#1431): [Mdl Group 2] Provides attachment of high-speed I/O devices including 3330/3333, 3340/3344, 3350, 3370 A1 via control units including 3830 mdl 2 and 3880. The control unit can operate in Data Stream Mode. Up to eight control units may attach. Data transfer rate up to 1.86 million bytes per second. (See Input/Output Attachment section above for specifics). **Limitations:** [1] Not available on 4331 Mdl Group 1. [2] For data rate and attachment limitations for other devices and communications lines refer to *IBM 4331 Processor Channel Characteristics,* GA33-1535 (Mdl Group 2), which contains tables of pre-analyzed configurations. [3] Cannot be installed with 8809 Magnetic Tape Unit Adapter (**#4910**). [4] 231X devices must be attached to the High-Speed Block Multiplexer Channel and cannot be used on the Block Multiplexer Channel (**#1421**). [5] Is mutually exclusive with DASD Adapter, Add'l (**#3202**). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** For certain control units/devices, the processor requires Power Interface feature (**#5531, #5532**). See Table 3 above.

Control Storage Expansion (#1901): [Mdl Group 1] Increases the Control Storage capacity of the Mdl Group 1 from 65,536 to 131,072 bytes, providing additional storage area for special features and the basic functions of the 4331 Processor. See Tables 1 and 2 to determine the requirement for this feature. **Limitations:** Not available on 4331 Mdl Group 2 (expanded control storage is standard). If installed on Mdl Group 1, this feature should be deleted with the order entry for conversion to Mdl Group 2. **Maximum:** One. **Field Installation:** Yes.

Note: This is for order entry only. The feature is not physically removed when upgrading to a Mdl Group 2.

Microcode Storage Requirements: The System microcode resides in the Reloadable Control Storage and Processor Storage, and is loaded from the standard System Diskette facility at IML-time. None of the Reloadable Control Storage is available for user programming and the systems configuration selected will determine the Processor Storage available for user programming and operating system residence.

To calculate the amount of Processor Storage which is available for customer purposes and operating system residence, and to determine when Control Storage Expansion (#1901) is required, use the following procedure.

Note: An interactive HONE aid is available dependent on the control program or program product device support to facilitate this procedure.

1) Consulting Table 1, determine the microcode groups required to support the features and I/O to be installed.

2) On the Table 2, place a checkmark in the appropriate rows. Note that each microcode group is required only once, even if it supports multiple functions of the 4331 Processor. The only exception to this is microcode group 2 where 2,048 bytes of Processor Storage are required per megabyte of virtual storage defined in the notes.

3) Find the sum of each of the three columns for the required microcode groups.

4) The total from Column A and B must pass three tests.

4331 Processor (cont'd)

- When the total from Column A exceeds 65,536 bytes, Control Storage Expansion **(#1901)** is required (4331 Mdl Group 1).
- When the total from Column A exceeds 131,072 bytes for a Mdl Group 1 or 143,360 bytes for a Mdl Group 2, an invalid configuration has been selected (see Note).
- When the total from Column A plus the total from Column B exceeds 262,144 bytes, an invalid configuration has been selected (see Note).

5) Subtract the total from Column A from either:
   - 131,072 if **#1901** is required (4331 Mdl Group 1), or
   - 65,536 if **#1901** is not required (4331 Mdl Group 1).
   - 143,360 if 4331 Mdl Group 2 is being configured.

6) Subtract the results of Step 5 from the total of Column B.

7) Add the results of Step 6 to the total from Column C and round up to the next multiple of 4,096.

The results of Step 7 determine the amount of Processor Storage occupied by microcode and should be subtracted from the Processor Storage size ordered to determine the amount available for the user. The storage for Group 9 (DAS Compatibility **#7901**) is only occupied if the feature is activated at IPL time.

Note: Too many features/options have been selected. Inspect table 1 and 2 and determine which feature(s) of lower priority should be deleted from the configuration.

TABLE 1

Function/Feature Installed	Microcode Group
4331 Processor	1
Processor Storage	2
3310 attached **(#3201** and **#9202)**	3,4,5,6
3370 attached **(#3201** and **#9201)**	3,4,6,17
3340/3344 Direct Attach **(#3201** and **#7851)**	3,6,8,15
Direct Access Storage Compatibility **(#7901)**	9,15
8809 Magnetic Tape Unit attached **(#4910)**	3,4,6,7
Communications Adapter Base **(#1601)**	6,10
BSC lines installed **(#9671-#9678)**	11
S/S lines installed **(#9681-#9688)**	12
SDLC lines installed **(#9691-#9698)**	13
ECPS:VM/370 **(#8701)**	16
1401/1440/1460 Compatibility **(#3950)**	14
High-Speed BMPX Channel **(#1431)**	21

TABLE 2

Micro-code Group	– A – Control Storage (only)	– B – Control Storage – or – Processor Storage	– C – Processor Storage (only)	Notes
1	33792	66816	24576	
2	–	–	2048 or 32768	For each 1 MB of processor storage in S/370 mode or for each 1 MB of virtual storage in ECPS:VSE mode, in steps of 2, 4, 8, 16 MB. For Mdl Group 2 when High-Speed BMPX or ECPS:VM/370 is installed.
3	6144	24320	7168	
4	5120	12288	–	
5	–	4608	11250	
6	–	–	10250	
7	6144	9728	3060	Excl. with Group 14
8	9216	13312	11600 8800 1800	Plus Per 3340 buffer. For a second string of 3340s attached to the DASD adapter.
9	–	27648	1300 4096 7680 13312 8704	Plus Per 2311 buffer. Per 2314 buffer. Per 3330 buffer. Per 3340 buffer.
10	8192	9216	2150	
11	6144	–	–	
12	5120	–	–	
13	12288	–	1024	
14	14336	–	1800	Excl. with Group 7 and 16
15	–	5760	200	
16	6656	–	–	Excl. with Group 14
17	–	9316	10000	
21	8448	2880	400	(Mdl Group 2 only)
TOTAL				

Display/Printer Adapter Expansion (#2001): Expands the capability of the standard Display/Printer Adapter to allow the 3278 mdl 2A or the 3279 mdl 2C and up to 15 displays and/or printers to directly attach to the 4331 Processor. The devices attachable are:

Up to 15 3178 Display Stations

Up to 15 3270-PC's may be attached
Up to 15 3278 Display Station mdl 2s
Up to 15 3279 Color Display Station mdl 2A, S2A or 02X
Up to 15 3230 and 3268 Printers mdl 2
Up to 15 3287 Printer mdls 1, 2, 1C and 2C
Up to 2 3289 Line Printer mdl 4s
Up to 2 3262 Line Printer mdl 1s and 11s.
Up to 2 4250 Printers mdl 1 or four mdl 2.
6580 Displaywriter System mdl A04, A06, A08, A10 (25-line display). Can connect to 1 or 2 device ports (display station or display station and printer).

Other details are the same as given under the description of the Standard Function: Display/Printer Adapter, above. **Limitations:** Only the 3278 mdl 2A or the 3279 mdl 2C and 15 devices (listed above) may attach to the Display/Printer Adapter and the Display/Printer Adapter Expansion. **Maximum:** One. **Cable Order:** See Accessories section for ordering information for the required coaxial cable. **Field Installation:** Yes. **Specify:** See "Specify" for character code/keyboard combinations available. **Prerequisites:** The 6580 Displaywriter System prerequisites for attachment include the 3270 Attached Workstation licensed program (5608-SR9) and the

4331 Processor (cont'd)

3274/3276 Attached Workstation adapter **(#8332)** and Specify **#9842** in 4331 must be ordered for attachment of Displaywriter.

DASD Adapter (#3201%x), ADD'L (4331 Mdl Group 2) (#3202%x): Each allows attachment of the 3310, 3370 A1 and 3340/3344 DASD to the 4331 Processor. Up to four strings of devices may be attached to each adapter. The attachable device types may be intermixed on each adapter but not within a string. The maximum number of strings of each type of device on each DASD Adapter is:

a) Up to four 3310 mdl A1s or A2s with 3310 mdl B units attached, up to a maximum of 4 drives per string.

b) Up to four 3370 mdl A1s with 3370 mdl B1 units attached, up to a maximum of 4 devices (8 actuators) per string.

c) Up to two 3340 mdl A2s with 3340/3344 mdl B units attached, up to a maximum of eight drives per string - (3340/3344 Direct Attach feature **#7851** is required). Attachment of 3340/3344 is limited to two strings on the system.

String Switch Capability allows sharing of 3340 mdl A2 and/or 3370 mdl A1 and associated drives with another IBM processor or control unit that supports the DASD and string switching. It provides the ability for strings of 3340/3344 or 3370 to be accessed from DASD adapters or control units on the same or two different processors. The 3340 mdl A2 or 3370 mdl A1 must have the String Switch feature **#8150** installed. String switch support for 3340/3344 is limited to the static assignment of a shared string to one processor at a time. **Limitations:** [1] DASD Adapter, Add'l **(#3202)** is not available for Mdl Group 1. [2] DASD Adapter, Add'l **(#3202)** is mutually exclusive with High-Speed Block Multiplexer Channel **(#1431)**. [3] 3310 and 3370 are not supported by VS1 in fixed block mode. [4] For data rate and attachment limitations for other devices and communications lines refer to *IBM 4331 Processor Channel Characteristics,* GA33-1527 (Mdl Group 1) or GA33-1535 (Mdl Group 2), which contains tables of pre-analyzed configurations. [5] On 4331 Mdl Group 1 only: 3340 or 3370 may not be attached to the DASD Adapter if 231X DASD is attached to the Block Multiplexer Channel **(#1421)**. **Maximum:** One **#3201** and one **#3202** (on 4331 Mdl Group 2). **Field Installation:** Yes. **Prerequisites:** 3340/3344 requires #7851 ... see Table 1 for microcode storage requirements and possible requirement for **#1901** on Mdl Group 1 ... **#3202** requires **#3201**. **Specify: #9202**%z if 3310 and/or **#9201**%z if 3370 attaches to the DASD Adapter. **#9316** if String Switch Capability is required with 3370.

Diskette Drive (#3401): A single drive diskette reader/recorder providing the ability to read or write IBM Diskettes Type 1. The Diskette Drive is supported by the control program as a 3540 Diskette Input/Output unit. **Limitations:** Not supported by VM/370. **Maximum:** One. **Field Installation:** Yes.

External Signals (#3898): Provides six distinct external interrupt lines to request and identify an external interrupt response from the processing unit. **Maximum:** One. **Cable Order:** Required. **Field Installation:** Yes. **Prerequisites:** External Devices must meet the interface specifications outlined in *S/360 Direct Control Feature OEMI,* GA22-6845.

5424 Adapter (#3901%x): Allows attachment of one 5424 Multi-Function Card Unit mdl A1 or A2. **Limitations:** The 5424 is supported by DOS/VSE only. The 5424 must be physically attached, otherwise the system is inoperative. Cannot be installed with the Loop Adapter **(#4830)**. **Maximum:** One. **Field Installation:** Yes. **Prerequisites: #1001** and **#1002**.

1401/1440/1460 Compatibility (#3950%y): A feature which, in conjunction with special software, permits execution of 1401/1440/1460 instructions. Feature may be used with S/370 mode or with ECPS:VSE mode. See "Software" for details concerning prerequisites. **Limitations:** May not be installed with 8809 Magnetic Tape Unit Adapter **(#4910)**. May not be installed with ECPS:VM/370 **(#8701)** and does not operate under VM/370. Support is available under DOS/VSE/Advanced Function, DOS/VS Release 34 and DOS Release 26. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** IBM Systems 1401/1440/1460 Emulator Program Product. See Programming pages for details. See Table 1 for microcode storage requirements and possible requirement for #1901.

8809 Magnetic Tape Unit Adapter (#4910%x): Provides for attachment of the 8809 Magnetic Tape Unit. One 8809 mdl 1A may attach. Up to five 8809 mdl 2s and 3s may attach to the mdl 1A for a total of six 8809 Magnetic Tape Unit drives. **Limitations:** [1] May not be installed with 1401/1440/1460 Compatibility **(#3950)**. [2] May not be installed with Block Multiplexer Channel, Add'l **(#1422)** on 4331 Mdl Group 2. [3] May not be installed on 4331 Mdl Group 1 if 231X devices are attached to the Block Multiplexer Channel **(#1421)**. [4] May not be installed with High-Speed Block Multiplexer Channel **(#1431)** on 4331 Mdl Group 2. [5] The 8809 is not supported by VS1. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See Table 1 for microcode storage requirements and possible requirement for #1901 on Mdl Group 1.

Byte Multiplexer Channel (#5248): The byte multiplexer channel attaches S/370 byte multiplex devices. The data rate of the channel is up to 18K bytes per second for Mdl Group 1 or up to 36K bytes per second for Mdl Group 2 in single byte interleaved mode and up to 500K bytes per second in burst mode. For data rates achievable for specific configurations, see *IBM 4331 Channel Characteristics,* GA33-1527 for Mdl Group 1 or GA33-1535 for Mdl Group 2. Up to eight control units may be attached. See Input/Output Attachments section above for details on subchannels. **Limitations:** [4331 Mdl Group 1] Magnetic tape devices may not be attached to the Byte Multiplexer Channel whenever 231X devices are attached to the Block Multiplexer Channel **(#1421)**. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** For certain control units/devices, the processor requires Power Interface **(#5531, #5532)**. See Table 3.

Power Interface (#5531), ADD'L (#5532): Provides power control to the 4331 Processor for control units attaching to the 4331 Byte Multiplexer Channel and Block Multiplexer Channel. Table 3 below lists the control units/devices for which this feature must be installed in the 4331 Processor ... Power Interface **(#5531)** allows attachment of up to eight of these control units; Power Interface, Add'l **(#5532)** allows attachment of eight additional control units for a maximum of 16 per processor. **Maximum:** One of **#5531**; one of **#5532**. **Field Installation:** Yes. **Prerequisites: #5532** requires **#5531**.

Table 3

Control Units/Devices Requiring Power Interface Features

1 - Mandatory:
- 1255 Magnetic Character Reader
- 1287 Optical Reader
- 1288 Optical Reader
- 1419 Magnetic Character Reader
- 1442 Card Read Punch mdl N1
- 1442 Card Punch mdl N2
- 1443 Printer mdl N1
- 2314 Storage Control* mdl A1 and B1
- 2314 Direct Access Storage Facility* mdl 1
- 2415 Magnetic Tape Unit and Control
- 2501 Card Reader mdl B1 and B2
- 2520 Card Read Punch mdl B1, B2 and B3
- 2701 Data Adapter Unit
- 2702 Transmission Control*
- 2703 Transmission Control*
- 2803 Tape Control
- 2821 Control Unit mdls 1, 2, 3, 5 and 6
- 2822 Paper Tape Reader Control*
- 2840 Display Control*
- 2841 Storage Control
- 3272 Control Unit
- 3411 Magnetic Tape Unit and Control
- 3430 Magnetic Tape Unit and Control
- 3505 Card Reader
- 3540 Diskette Input/Output Unit
- 3704 Communications Controller
- 3705 Communications Controller
- 3725 Communication Controller
- 3791 Controller
- 3800 Printing Subsystem
- 3803 Tape Control
- 3811 Printer Control Unit
- 3881 Optical Mark Reader mdl 1
- 3886 Optical Character Reader mdl 1
- 3890 Document Processor
- 3895 Document Reader/Inscriber

2 - Not Mandatory, but can utilize Power Interface features:
- 3274 Control Unit
- 3340 Direct Access Storage Facility
- 3370 Direct Access Storage
- 3203 Printer mdl 5

* No longer available

3340/3344 Direct Attachment (#7851%y): A feature allowing 3340 mdl A2s to attach to a DASD Adapter **(#3201, #3202)**. Up to two 3340 mdl A2s per system may attach to either adapter. Up to three 3340/3344 mdl B units may attach to each 3340 mdl A2. **S/3 Data Import:** With the VSE/IBM System/3-3340 Data Import utility program (5746-AM3), 3348 Data Modules which have been written on a 3340 attached to a System/3 can be read on any directly attached 3340 drive. The String Switch Capability allows sharing of 3340 mdl A2 drives (with **#8150** installed) and associated drives, with another IBM processor or control unit that supports the DASD and string switching. String switch support is limited to the static assignment of a shared string to one processor at a time. **Limitations:** [1] May not be installed if 231X devices attach to the Block Multiplexer Channel **(#1421)**. [2] Attachment of 3340/3344 and/or use of the DAS Compatibility is limited to two strings on the system. [3] If one string of 3340/3344s is attached to a DASD Adapter **(#3201)**, only one string of 3310/3370s can perform DASD emulation. If two strings of 3340/3344s are attached, no 3310/3370s can perform DASD emulation. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:**

4331 Processor (cont'd)

#3201 ... 3340 mdl A2. See Table 1 for microcode storage requirements and possible requirement for **#1901. Specify: #9315** if String Switch Capability for 3340 required, **#9317** if 3344 is installed.

Note: Use of this feature introduces additional processor and channel demands, and can have a significant effect on system performance, particularly in batch environments with heavy I/O load and/or if multi-track operations are used. Performance considerations should be carefully reviewed before proposing use of the 3340/3344.

Direct Access Storage Compatibility (#7901%y): Designed to be used primarily as a conversion aid, this feature provides emulation of 2311/2314 data formats on 3310 or 3370 Direct Access Storage and emulation of 3330 (100MB/volume) or 3340 data formats on 3370 Direct Access Storage. This allows programs written for use of 2311/2314, 3330 or 3340/3344 DASD to be executed with only Job Control modifications using the 3310 or 3370 Direct Access Storage.

DAS Compatibility can be used on 3310 or 3370 devices which are installed on one DASD adapter on up to two consecutively addressed strings. The DAS Compatibility feature includes all of the compatibility types available for 3310 and 3370. Any one type can be activated at IPL time. Operates in S/370 mode under DOS, DOS/VS, OS/VS1 or VM/370, in ECPS:VSE mode under DOS/VSE. Under DOS/VSE data sets in fixed block format and in emulated format can coreside on the same 3310/3370 volume. With DOS/VSE a variable number of full or partial CKD volumes can be stored on the 3310 or 3370 up to the capacity of the host device. Each emulated volume regardless of whether stored with full or partial capacity, begins on a predefined full-volume boundary. With OS/VS1 or VM/370 partial emulated volumes are not supported.

Mapping of emulated volumes onto 3310/3370 volumes is as follows:

Compatibility Type	Max number of emulated full volumes		
	Per Host Volume	Per String	Per System
2311 on 3310	7	28	56
2314 on 3310	2	8	16
2311 on 3370	34	68	68
2314 on 3370	9	63	63
3330 on 3370	2	16	28
3340 on 3370	3	24	42

For device address assignment refer to *IBM 4331 Compatibility Features,* GA33-1528.

Performance Note: Use of DAS Compatibility introduces additional processor and channel demands and can have a significant effect on system performance, particularly in environments with high I/O load using emulated DASD. Batch job execution elapsed times may increase by a factor of more than two. The results of measurements on a typical commercial jobstream show an increase in elapsed time by a factor of 1.7, compared to execution with the 3370 in fixed block mode. The performance impact is less severe when DASD is used in mixed fixed block and emulation mode, which is possible in operation with DOS/VSE or VM/370 but not with OS/VS1. Also less critical are online workloads with generally lighter I/O loads. Exclusive use of DASD emulation for batch operation is not recommended in any SCP environment.

Limitations: [1] Operates on up to two strings of 3310 or 3370 attached to the DASD adapter. [2] Operation of emulation and directly attached 3340/3344 is limited to two strings on the system. [3] One type of emulation can be activated at IPL time. [4] 3330 mdl 11 cannot be emulated. [5] Emulation cannot be used on 3370 drives which are shared via a string switch. [6] VM/370 supports 3310 or 3370 volumes containing emulated data which are dedicated to a guest operating system, other than VM/370 or CMS. Emulated 2311 is not supported by VM/370. [7] OS/VS1 does not support 2311, native or emulated. **Program Order:** The required utility programs 3310 for initialization and surface analysis of the 3370 DASD as well as the formatting of the emulator extent are included in the DOS/VSE SCP, 5745-030 or combined with VSE/Advanced Functions, 5746-XE9. OS/VS1 (5741-VS1) and VM/370 (5749-010) contain the Device Support Facilities for initialization and surface analysis of CKD DASD. In addition, for the required formatting of the emulator extent, order 5747-SA1. The stand-alone Device Support Facilities are also separately orderable with program order number 5747-DS1. **Maximum:** One. **Field Installation:** Yes. **Prerequisites: #3201** with 3370 (**#9201**) and/or 3310 (**#9202**) specification. See Tables 1 and 2 for microcode storage requirements.

ECPS:VM/370 (#8701%y): The 4331 Processor provides ECPS:VM/370 support at Level 19. This support is compatible with VM/370 Release 6 and VM/System Product or VM/BSE Release 2 or VM/SE Release 2. corresponding levels of the System Extension Program Products. The functional areas assisted include: Virtual Machine I/O, SVC Handler, Privileged Instruction Emulation and Virtual Interval Timer. **Limitations:** May only operate when S/370 mode has been invoked by IPL. May not be installed with 1401/1440/1460 Compatibility (#3950). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See Table 1 for microcode storage requirements and possible requirement for Control Storage Expansion (#1901).

Communications and Loops

Communications Adapter: Provides the basic control and common circuits for the direct attachment of up to eight synchronous (BSC), asynchronous (Start/Stop) or Synchronous Data Link Control (SDLC) communication lines in any combination, provided that the aggregate data rate capability of up to 64,000 bps is not exceeded. For data rates achievable, see GA33-1527 for Mdl Group 1 or GA33-1535 for Mdl Group 2. The maximum speed of each of the eight lines is 9600 bps except that line position one may be a synchronous high-speed line (BSC or SDLC) up to 56,000 bps and may operate concurrently with other lines provided that its data rate does not exceed 50,000 bps and the data rate limitation is not exceeded. SDLC is supported only by ACF/VTAME operating under DOS/VSE or SSX/VSE, native or as a guest under VM/370.

Base Characteristics are:

- Auto Answer
- Autopoll operation
- Multipoint central station functions
- Multipoint tributary station functions for BSC only
- EBCDIC transparent mode for BSC only
- EBCDIC and ASCII code for BSC only

The Communications Adapter attaches up to eight lines via the following optional features:

- Up to eight line features without business clock for attachment to X.21 Nonswitched Data Network.
- Up to 8 line features without internal clock for attachment to external modems (Data Circuit-Terminating Equipment, DCE) with clock.
- Up to 8 line features with internal clock for attachment to external modems (Data Circuit-Terminating Equipment, DCE) without clock.
- Up to 1 synchronous high-speed line feature.
- Up to 8 line features with integrated modems.
- Up to 8 line features with local attachments.
- Up to eight line features with Digital Data Service Adapters.
- Autocall Unit interfaces for up to two of the installed lines.

From the Operator's Console-Keyboard the user may specify some configuration parameters for each separate telecommunications line for each individual connection:

- Select stand-by.
- Half speed operation for synchronous lines only (for both clocked and nonclocked modems which have this capability).
- NRZI mode in SDLC mode.
- Write interrupt (S/S only).
- Read interrupt (S/S only).
- Unit exception suppression (S/S only).
- Error index byte mode (BSC only).
- ASCII code instead of EBCDIC (BSC only).
- Tributary station addresses (BSC only).

Other configuration parameters can be selected at installation time and set by the customer engineer:

- Duplex instead of half-duplex connection (two-way alternate data flow transmission).
- Switched network facility instead of nonswitched lines (for external modems).
- New sync (for BSC or SDLC in multipoint primary station function only).
- High speed operation for one line (BSC or SDLC only).
- Connect Data Set to Line or Data Terminal Ready procedure.
- Selection of WE 202 or V.23 answer tone frequencies for 1200 bps integrated modems with automatic answering.

Customer Responsibilities: See M2700 pages for customer responsibilities regarding communications facilities and services.

Communication Facilities: See M2700 pages for communications facility requirements with this feature.

4331 Processor (cont'd)

Terminals Supported

The Data Communications Equipment and remotely attachable Data Terminal Equipment (abbreviated "terminals") supported by the Communications Adapter are shown in the table below:

SDLC Terminals Supported:

Type	Speed in K bps								
	+1.2/.6	+2.4	+2.4/1.2	+4.8	+4.8/2.4	+7.2	+7.2/3.6	+9.6	+19.2-56
Terminals:									
3271-11,-12 (3)	X	X	X	X	X	X	X	X	
3274-1 X1C (8)		X	X	X	X	X	X	X	X
3276-1-4 (7)	X	X	X	X	X	X	X	X	
3275-12 (3)	X	X	X	X	X	X	X	X	
3276-11-14	X	X	X	X	X	X	X	X	
3601	X	X	X	X	X	X	X	X	
3602	X	X	X	X	X	X	X	X	
3614	X	X	X	X	X				
3624	X	X	X	X	X				
3631	X	X	X	X	X	X	X	X	
3632	X	X	X	X	X	X	X	X	
3651-25,-75		X	X	X	X				
3651-A50,-B50		X	X	X	X				
3651-A60,-B60		X							
3661				X					
3684	X	X	X	X	X				
3694	X	X	X	X	X	X	X	X	
3767-1-3	X	X	X						
3771-1-3	X	X	X	X	X				
3773-1-3	X	X	X	X	X				
3773-P1-P3	X	X	X	X	X				
3774-1,-2	X	X	X	X	X				
3774-P1,-P2	X	X	X	X	X				
3775-1,-P1	X	X	X	X	X				
3776-1,-2		X	X	X	X				
3776-3,-4		X	X	X	X	X	X	X	X
3777-1,-3		X	X	X	X	X	X	X	X
3791	X	X	X	X	X	X	X	X	
3791/3730	X	X	X	X	X	X	X	X	
3791/3760	X	X	X	X	X	X	X	X	
4701-1	X	X	X	X	X	X	X	X	
4730	X	X	X	X	X	X	X	X	
6670		X	X	X	X	X	X	X	
7426-1 (10)	X	X	X	X	X	X	X	X	
8775-11, -12 (10)	X	X	X	X	X	X	X	X	
8815		X	X	X	X	X	X	X	
Controllers:									
3705 (1)(3)	X	X	X	X	X	X	X	X	X
3725	X	X	X	X	X	X	X	X	X
Systems:									
4331 (2)	X	X	X	X	X	X	X	X	X
5285 (9)	X	X	X	X	X				
5288 (9)	X	X	X	X	X				
5320 (5)	X	X	X	X	X	X	X		
5340 (6)(9)	X	X	X	X	X	X	X	X	X
5360 (6)(9)	X	X	X	X	X	X	X	X	X
5380 (5)	X	X	X	X	X	X	X	X	X
8100	X	X	X	X	X	X	X	X	X

Notes:

(1) 3705 or 3725 supported as a primary station in a network using ACF/VTAM Release 1 or ACF/VTAM Release 2.
(2) Participant as a primary or a secondary station in a network using ACF/VTAME.
(3) Not supported by ACF/VTAME.
(5) Supported as a 3770.
(6) Supported as a 3770 or 3791.
(7) With SDLC/BSC Switch in SDLC mode.
(8) The maximum speed supported is 56K bps.
(9) Supported as a 3274 mdl 1C or 3770
(10) DSLU (5668-006) is required for 7426 or 8775-11, -12 with downstream loadable functions.

BSC Terminals Supported

Type	Speed in K bps								
	+1.2/.6	+2.4	+2.4/1.2	+4.8	+4.8/2.4	+7.2	+7.2/3.6	+9.6 (6)	+19.2-56
Terminals:									
2715-2		X	X	X	X				
3271-1,-2	X	X	X	X	X	X	X	X	
3274-X1C		X	X	X	X	X	X	X	
3275-2 (1)	X	X	X	X	X	X	X	X	
3276-1-4	X	X	X	X	X	X	X		
3631 (7)	X	X	X	X	X	X	X	X	
3632 (7)	X	X	X	X	X	X	X	X	
3651-25,-75		X	X	X	X				
3651-A50,-B50		X	X	X	X				
3651-A60,-B60		X							
3661		X							
3684-1,-2	X	X	X	X	X				
3741-2,-4	X	X							
3747	X	X							
3771 (2)	X	X	X	X	X				
3773-1-3 (2)	X	X	X	X	X				
3773-P1,-P3 (2)		X	X	X					
3774,3775 (2)	X	X	X	X	X				
3776-1,-2 (3)		X	X	X	X				
3777-1,-2 (3)		X	X	X	X	X	X	X	X
3780	X	X	X	X	X	X	X		
4701-1	X	X	X	X	X				
5110 (12)	X	X	X	X	X	X	X		
5231-2 (9)	X	X	X	X	X				
5275 (10)	X	X	X	X	X	X	X		
5285	X	X	X	X	X				
5288 (13)	X	X	X	X	X				
5937 (11)	X	X	X	X	X	X	X		
6670		X	X	X	X	X	X		
Controllers:									
2701 (w 360/370)	X	X	X	X	X	X	X		
3704	X	X	X	X	X	X	X	X	
3705	X	X	X	X	X	X	X	X	X
Systems: (5)									
3115	X	X	X	X	X	X	X	X(1)	
3125	X	X	X	X	X	X	X	X(1)	
3135	X	X	X	X	X	X	X		
3138	X	X	X	X	X	X	X		
4331	X	X	X	X	X	X	X	X	X
5010 (8)	X	X	X	X	X	X	X		
5285 (14)	X	X	X	X	X				
5288 (14)	X	X	X	X	X				
5320 (8)	X	X	X	X	X	X			
5340 (14)	X	X	X	X	X	X	X	X	X
5360 (14)	X	X	X	X	X	X	X	X	X
5380 (8)	X	X	X	X	X	X	X	X	
5404	X	X	X	X	X	X	X	X	
5406	X	X	X	X	X	X	X	X	
5408	X	X	X	X	X	X	X	X	
5410	X	X	X	X	X	X	X	X	
5412	X	X	X	X	X	X	X	X	
5415	X	X	X	X	X	X	X	X	
8100 (4)	X	X	X	X	X	X	X	X	
Series/1 (8)	X	X	X	X	X	X	X	X	X

Notes:

(1) By RPQ.
(2) Equivalent to 2770/2772.
(3) Equivalent to 2770/3780.
(4) Supported as a 3276 mdl 1, 2, 3, 4, nonswitched connection only.
(5) With Communications Adapter.
(6) 19,200 - 56,000 bps in line position 1.
(7) See M3631 and/or 3632 pages for 3631/3632 features required and software requirements for host connection.
(8) Equivalent to 54XX (S/3).
(9) Equivalent to 3741 mdl 2, 4.
(10) Equivalent to 3275 mdl 1, 2.
(11) Equivalent to 3271 mdl 1, 2.
(12) Supported as a 2772.
(13) Supported as 3280
(14) Supported as a 3271 mdl 2.

Start/Stop Terminals Supported

Only terminals using IBM Terminal Control - Type 1 are supported.

Type	IBM I Line Control Speed in bps				
	75	134.5	300	600	1200
2740-1		X			
2740-2	X	X		X	
2741		X			
3232-51 (3)			X	X	X
3767-1 (1)		X	X	X	X
3767-2 (1)		X	X	X	X
3767-3 (1)		X	X	X	X
5100 (2)		X	X		
5110		X	X		
6733 (3)			X		X
CMCST (1)		X	X		

(1) Equivalent to 2740 and/or 2741: Speed 134.5 bps needs 3767 RPQ 853129.

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(2) Equivalent to 2741.

(3) Supported as a CPT-TWX 33/35

Autocall Unit Interface (#1020%x): Provides an interface to customer-supplied Automatic Calling Equipment allowing data links with remote stations to be automatically established on the switched telephone network. Automatic Calling Equipment complying with EIA RS-366 or CCITT V.25 procedures may be attached. For the appropriate Automatic Calling Equipment, refer to M2700 pages. **Limitations:** Does not operate with High-Speed Modem Adapter **(#4720)**, any features with 1200 bps Integrated Modem or with any nonswitched lines. **Maximum:** Two. **Cable Order:** Required, for attachment to external equipment. **Field Installation:** Yes. **Prerequisites: #1601** and **#3701** (in switched operation) for each Autocall Unit Interface installed. **Specify:** Line position, see Table 4 below.

Communications Adapter, Base (#1601%x): Allows attachment of up to eight lines (with up to two transmission modes) plus Autocall Unit Interfaces (#1020) for up to two of the lines. The aggregate data rate capability of the Communications Adapter is 64,000 bps. **Limitations:** [1] SDLC is supported only by ACF/VTAME operating under DOS/VSE or SSX/VSE, or ACF/VTAME operating under VM/370 Release 6 with DOS/VSE running as a guest. [2] Each line attached reduces the number of available subchannels on the Byte Multiplexer Channel. See "System Subchannels" above for details. [3] The aggregate data rate of lines in operation on the Communications Adapter is 64,000 bps. With the exception of a synchronous line installed in position one capable of higher speed, the line speed is limited to 9600 bps. For data rate and attachment limitations for other devices and communications lines refer to *IBM 4331 Processor Channel Characteristics* GA33-1527 (Mdl Group 1) or GA33-1535 (Mdl Group 1) which contains tables of pre-analyzed configurations. **Maximum:** One. **Field Installation:** Yes. **Prerequisites: #1001** is required when more than three telecommunications line features are attached. See Table 1 for microcode storage requirements and possible requirement for **#1901** (4331 Mdl Group 1). **Specify:** See Table 4, "Communications Adapter Configuration Features and Position Codes", for required specify codes for each line feature attached.

EIA/CCITT Interface (#3701%x): This feature may be intermixed with other line features. Each feature provides for the attachment of one external modem having EIA RS-232-C, CCITT V.24/V.28 or X.21bis interface for attachment to one switched or one nonswitched line.

When this feature is installed in conjunction with Line Attachment Base for Clocked Modem **(#4695)**, a BSC or SDLC line is supported. Nonswitched lines with switched network backup may be used where maximum line speed on nonswitched lines is 9600 bps, the maximum line speed on switched network backup or switched networks is 4800 bps.

When this feature is installed in conjunction with Line Attachment Base for Nonclocked Modems **(#4696)**, then a BSC, Start/Stop or SDLC line is supported. Transmission speeds supported are listed with feature **#4696** below. **Maximum:** Eight. **Cable Order:** Required, for attachment to external equipment. **Field Installation:** Yes. **Prerequisites: #1601.** One **#4695** or **#4696** is required for each feature **#3701** installed. **Specify:** Start/Stop, SDLC and/or BSC operations are possible. See Table 4 for Line Position Code and Transmission Mode Codes.

Loop Adapter: Provides the capability to attach directly or via a data link the 3640 Plant Data Communication Terminals and/or General Purpose Terminals 3104 mdls B1, B2 and 8775 mdls 1, 2 , 3232 Keyboard Printer mdl 11 and 3287 mdls 11, 12, 3230 and 3268 Printers mdl 2 and/or Control Units 3274 mdl 51C, 61C7426 Terminal Interface Unit mdl 1 with its associated terminals and 3276 mdls 11-14 with the associated terminals to the 4331 Processors. Loop Adapter 1 and 2 **(#4830, #4831)** provide for direct attachment. A maximum of two Data Link Adapters **(#4840)** provide for remote attachment capabilities for 3843 Loop Control Units. Each Data Link Adapter **(#4840)** can be used as point-to-point or multipoint connection to attach up to four 3843 Loop Control Units.

Devices that can be attached to direct attached loops at 9600 bps or data link attached loops at 2400, 4800 or 9600 bps are the following:

Device Attachments

3104 Display Terminal mdls B1, B2
3232 Keyboard Printer mdl 11
3641 Reporting Terminal mdls 1,2
3642 Encoder Printer mdls 1,2
3643 Keyboard Display mdls 2, 3,4
including #4920 Badge and Document Encoder
3644 Automatic Data Unit
3645 Printer
3646 Scanner Control Unit
3647 Time and Attendance Terminal
8775 Display Terminal mdls 1,2
3287 Printer mdls 11,12
3274 Control Unit mdl 51C, 61C with the associated terminals
3276 Control Unit Display Station mdl 11-14 with the associated terminals

Control Units and Associated Terminals

3274 Control Unit Mdl 51C, 61C
3178 Display Station
3278 Display Station

3270 Personal Computer - Control unit terminal mode only. **

3279 Color Display Station
3262 Line Printer
3268 Printer mdl 2 and 2C
3287 Printer
3289 Line Printer
6580 Displaywriter System, mdl A04, A06, A08, A10 (25-line display)
6580 Displaywriter System, mdl B04, B06, B08, B10 (66-line display)

3276 Control Unit Display Station Mdl 11-14
3178 Display Station
3278 Display Station
3279 Color Display Station
3262 Line Printer
3268 Printer Mdl 2 and 2C
3287 Printer
3289 Line Printer
with its associated terminals
6580 Displaywriter System, mdl A04, A06, A08, A10 (25-line display)
6580 Displaywriter System, mdl B04, B06, B08, B10 (66-line display)
7426 Terminal Interface Unit mdl 1

In addition the following devices can be attached at 38,400 bps:

3104 Display Terminal mdls B1, B2
8775 Display Terminal mdls 1,2
3232 Keyboard Printer mdl 11
3287 Printer mdls 11, 12
3274 Control Unit mdl 51C with the associated terminals
7426 Terminal Interface Unit mdl 1 with its associated terminals

** Specify **#9843** on 4321 and 4331 must be ordered for attachment of the 3270 Personal Computer.

For the attachment of 3640 terminals it is recommended to use a 3643 Keyboard Display or a 3641 Reporting Terminal on each Loop Control Unit for diagnostics and testing. These units do not need to be dedicated to this purpose.

Cable length for direct attached loops can be up to 2,000m (1.25 miles) when operating at 38,400 bps, or 3,200m (2 miles) when operating at up to 9600 bps.

For data link attached loops see 3843 Loop Control Unit. For details refer to GA23-0038, *IBM Multiuse Communications Loop Planning Guide.*

Loop Installation: For the required information to plan and install the Loop Adapter feature, the loop cables and accessories see the *IBM Multiuse Communications Loop Planning Guide,* GA23-0038, and *Installation Guide,* GA23-0039. The loop cables and accessories should be installed and checked out prior to attaching processors or devices.

The customer is responsible to enter the loop configuration and terminal addresses into the system using the loop adapter configuration tool invocable via a manual operation. Refer to *IBM 4331 Processor Loop Adapter Feature, Operating Procedures,* GA33-1538, and *Problem Determination Procedures,* GA33-1540.

Note: (1) Loop Accessories are required to properly install the customer-owned loop. The customer is responsible to provide (purchase, install, test and maintain, problem determination) the loop cable and accessories for terminal attachment. See Accessories section for details and ordering information.

(2) An unused lobe has to be terminated by a Loop Station Connector (wrap-type), P/N1657320.

Communications Facilities: See M2700 pages for communications facility requirements.

Loop Adapter 1 (#4830): Provides for direct attachment of a Loop with one or two Lobes (The lobe is the actual physical Loop cable). Transmission speed can be 9.6K bps for 3640 and/or 3104 and/or 8775 and/or 3232 Keyboard Printer mdl 11 and/or 3287 terminals and/or 3274-51C, 61C and/or 3276 Control Units or 38.4K bps for 3104 and/or 7426 Terminal Interface Unit mdl 1 with its associated terminals 8775 and/or 3232 Keyboard Printer mdl 11 and/or 3287 terminals and/or 3274-51C, 61C Control Unit. Cable length for each lobe can be maximum of 3,200m (2 miles) for up to 9.6K bps, or

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maximum of 2,000m (1.25 miles) for 38.4K bps transmission speed. **Limitations:** Can not be installed with 5424 adapter **(#3901)**. **Maximum:** One. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites: #1001.**

Loop Adapter 2 (#4831): Provides for direct attachment of a Loop with one or two Lobes (A lobe is the actual physical Loop cable). Transmission speed can be 9.6K bps for 3640 and/or 3104 and/or 3104 and/or 8775 and/or 7426 Terminal Interface Unit mdl 1 with its associated terminals and/or 3232 Keyboard Printer mdl 11 and/or 3287 terminals, and/or 3274-51C, 61C and/or 3276 Control Units, or 38.4K bps for 3104 and/or 8775 and/or 3232 Keyboard Printer mdl 11 and/or 3287 terminals and/or 3274-51C, 61C control unit. Cable length for each lobe can be maximum of 3,200m (2 miles) for up to 9.6K bps, or maximum of 2,000m (1.25 miles) for 38.4K bps transmission speed. **Limitations:** Can not be installed with 5424 adapter **(#3901)**. **Maximum:** One. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites: #4830.**

Data Link Adapter (#4840): Allows connection of one or more 3843 loop control units to the 4331 processor. The feature provides for the attachment of one external modem complying with EIA/CCITT recommendations. EIA RS-232, RS-334 support will be provided for nonswitched lines only . Transmission speed can be 2400, 4800, or 9600 bps, with half speed option dependent on the attached modem. The modem can be connected to either a point-to-point or multipoint telecommunications line for connection of up to four 3843 loop control units which directly control the data link attached loops. Support will be provided for the same terminals as on the direct attached loop. **Limitations:** Can not be installed with 5424 adapter (#3901). **Maximum:** Two. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** Loop Adapter 1 **(#4830).**

Loop Adapter Logic Storage Requirements: The microcode storage required for attaching terminals to the Loop Adapter 1 and 2 **(#4830, #4831)** or Data Link Adapters **(#4840)** has to be calculated from the table shown below. If Total 1 exceeds 65,536, an invalid configuration has been selected. If the sum of Total 1 plus Total 2 exceeds 98,304 an invalid configuration has been selected.

	Microcode Program Space Bytes	System Control Space Bytes
Microcode Base	42836	7880
One or multiple 3641 and/or 3647	7800	1060
One or multiple 3642	5900	580
One or multiple 3643 w/o #4920	8800	3450
One or multiple 3643 w/#4920	9400	3450
One or multiple 3644	4900	-
One or multiple 3646	2900	256
One or multiple 3104 and/or 8775 and/or 3287, 3274, 3276, 3645, 7426	2600	-
		Terminal* Control Space
Each 3641, 3647	-	156
Each 3642	-	194
Each 3643	-	156
Each 3644	-	228
Each 3646	-	72
Each port on 3646	-	84
Each 3274, 3276, 3287, 3645, 3104, 8775	-	186
Each 3843	-	68
Each Loop Adapter (#4830, #4831)	-	1272
Each Data Link Adapter (#4840)	-	1204
	Total 1	Total 2

*For additional information on buffer space refer to the *IBM 4331 Loop Adapter Characteristics*, GA33-1534.

The storage requirements need to be validated by DP because the number of devices of each type attached by the customer is not known to manufacturing. Manufacturing can only validate storage requirements with respect to device types but not with respect to the number of devices of each type.

System Diskette Space Requirements: When attaching the Loop Adapter feature with 364X terminals to the IBM 4331 the diskette space requirements must be verified. See the following table for the space calculation. If the total number of records exceeds 3876, an invalid configuration has been selected. A trade-off between features must be considered.

4331 Processor Feature/Facility	System Diskette Records
4331 Basic	2061
DASD Adapter **(#3201, #3202)**	251
3310 or 3370 Common **(#9202, #9201)**	71
3310 Att. **(#9202)**	63
3370 Att. **(#9201)**	61
3340/3344 Direct Att. **(#7851)**	73
3340 Att. or DAS Compatibility **(#7851 or #7901)**	24
DAS Compatibility **(#7901)**	190
8809 Tape Adapter **(#4910)**	87
Communications Adapter **(#1601)**	272
Start/Stop Transmission Mode **(#968x)**	15
BSC Transmission Mode **(#967x)**	18
SDLC Transmission Mode **(#969x)**	52
Inline (System RAS Test Functions, req'd. by CE)	40
1400/1440/1460 Compatibility **(#3950)**	60
ECPS:VM/370 (#8701)	26
High-Speed BMPX Channel **(#1431)**	50
Loop Adapter Common **(#4830, #4831, #4840)**	448
3640 Terminal Att. **(#9251, #9252, #9253, #9254, #9256)**	252

The maximum number of system diskette records may not exceed 3876.

Maximum Number of Terminal Attachment Via Loop Adapters/Data Link Adapter: The maximum number of terminals that can be attached to the 4331 processor via Loop Adapters/Data Link Adapters is 80, of which 62 can be any mix of 3644, 3645, 3287, 3104, 8775 , 3232 mdl 11 terminals or 3274-51C, 61C or 3276 Control Units.

Multiple terminals on a 3274 or 3276 control unit count as a single terminal in determining the maximum number of terminals.

A maximum of 64 terminals out of the total of 80 terminals may be attached to either Loop Adapter 1 or 2, or to one of the Data Link Adapters. For details see *IBM Multiuse Communications Loop Planning Guide*, GA23-0038.

Line Attachment Base For Clocked Modems (#4695%x): This feature is a prerequisite for all line adapters which attach to modems (Data Circuit-terminating Equipment) which provide clocking and comply with EIA RS-232-C CCITT V.35, X.21 or X.21bis recommendations and it is a prerequisite for attachment to X.21 nonswitched data network . See the various line features below to determine when it is required. **Limitations:** A maximum of eight Line Attachment Bases may be installed on 4331 Communications Adapter. Each feature **#4695** installed reduces by one the number of feature **#4696** allowable. **Maximum:** Eight, one per line installed. **Field Installation:** Yes. **Prerequisites: #1601** ... **#1001** is required if more than three line attachments **#4695** and/or **#4696** are installed.

Line Attachment Base For Nonclocked Modems (#4696%x): This feature is a prerequisite for all line adapters which attach to modems (Data Circuit-terminating Equipment) which do not provide clocking. See the various features below to determine when it is required.

The clock speed internal to the feature is wired by default to 134.5 bps for Start/Stop operation and 1200 bps for BSC and SDLC operation. Otherwise, the clock speed can be wired at installation to one of the following:

- Start/Stop: 75, 300, 600 or 1200 bps.
- BSC: 600 bps.
- SDLC: 600 bps.

For BSC or SDLC operations, if 1200 bps is wired, then full speed operation (1200 bps) or half-speed operation (600 bps) may be selected from the operator console keyboard. **Limitations:** A maximum of eight Line Attachment Bases may be installed on 4331 Communications Adapter. Each feature **#4696** installed reduces by one the number of feature **#4695s** allowable. **Maximum:** Eight, one per line installed. **Field Installation:** Yes. **Prerequisites: #1601.** Feature **#1001** is required if more than three line attachments **#4695** and/or **#4696** are installed.

High-Speed Modem Adapter (#4720%x): Provides for the attachment of an external modem with clock having a CCITT V.35 or X.21bis interface. One nonswitched point-to-point BSC or SDLC line may be operated with speeds from 19,200 to 56,000 bps. **Limitations:** For speed limitations refer to the Communication Adapter Base feature description. For channel rates achievable, see *IBM 4331 Channel Characteristics,* GA33-1527 (Mdl Group 1) or GA33-1535 (Mdl Group 2). Cannot be installed with 231X DASD attached to the Block Multiplexer Channel **(#1421)**. Cannot be installed with X.21 Adapter for Nonswitched Networks **(#5655)** if its speed is 48,000 bps **#9831.** Cannot be installed with Digital Data Service Adapter **(#5650)** if the Digital Data Service Adapter operates at 56,000 bps **(#9444).** **Maximum:** One. **Cable Order:** Required for attachment to the external modem. **Field Installation:** Yes. **Prerequisites:** #1601 and #4695. **Specify:** BSC and/or SDLC operations are possible ... see Table 4 for Line Position Code and Transmission Mode Codes.

1200 bps Integrated Modem, Nonswitched (#4781%X): This feature may be intermixed with other line features. Each feature provides for the attachment of one nonswitched BSC, Start/Stop or SDLC line via an integrated 1200 bps modem. The transmission speed can be strapped by the CE for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps. Selection of 2- or 4-wire operation is made at installation time. **Cable Orders:** Required for

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attachment to external equipment. **Maximum:** Eight. **Field Installation:** Yes. **Prerequisites:** #1601 and #4696. **Specify:** SDLC and/or BSC and/or Start/Stop operations are possible, see Table 4.

1200 bps Integrated Modem, Switched With Auto Answer (#4782%x): This feature may be intermixed with other line features. Each feature provides for the attachment of one switched network Start/Stop line via an integrated modem at speeds up to 300 bps and for BSC and SDLC at 600 and 1200 bps. Attachment to the switched network is via an IBM-provided cable to FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. **Maximum:** Eight. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** **#1601** and **#4696**. **Specify:** SDLC and/or BSC and/or Start/Stop operations are possible, see Table 4.

1200 bps Integrated Modem, Nonswitched With Switched Network Backup And Manual Answer (#4787%x): This feature may be intermixed with other line features. Each feature provides for the attachment of one nonswitched line with Switched Network Backup (SNBU) and manual answer, allowing BSC, Start/Stop or SDLC operations via an integrated 1200 bps modem. The transmission speed can be strapped by the CE for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps.

Attachment to the nonswitched line is via an IBM-provided cable. Selection of 2- or 4-wire line operation is made at installation time. The cable group which is ordered also provides for attachment to a Data Access Arrangement type CDT or FCC registered equivalent for manual answer. **Maximum:** Eight. **Cable Order:** Required for one cable group which connects to nonswitched line and to the switched network. **Field Installation:** Yes. **Prerequisites:** **#1601** and **#4696**. **Specify:** SDLC and/or BSC and/or Start/Stop operations are possible, see Table 4.

1200 bps Integrated Modem, Nonswitched With Switched Network Backup And Auto Answer (#4788%x): This feature may be intermixed with other line features. Each feature provides for the attachment of one nonswitched line with Switched Network Backup (SNBU) and auto answer, allowing BSC, Start/Stop or SDLC operations via an integrated 1200 bps modem. The transmission speed can be strapped by the CE for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps.

Attachment to the nonswitched line is via an IBM-provided cable. The same cable group provides for attachment to the switched network to a Data Access Arrangement type CBS or FCC registered equivalent for auto answer. **Maximum:** Eight. **Cable Order:** Required for one cable group which connects to the nonswitched line and to the switched network. **Field Installation:** Yes. **Prerequisites:** **#1601** and **#4696**. **Specify:** SDLC and/or BSC and/or Start/Stop operations are possible, see Table 4.

Local Attachment Interface (#4801%x): Provides circuits and controls for the local attachment of one BSC or SDLC remote station to the Communications Adapter without the use of modems at either device. Transmission speed can be strapped at installation time by the CE at 1200, 2400, 4800 and 9600 bps. The feature provides clocking for both the Communications Adapter and the terminal. The attached terminal must be equipped with an EIA RS-232-C or CCITT V.24/V.28 interface, have no Business Machine Clocking and have an external modem cable. The distance to the terminal may be extended via a customer-provided cable to allow a maximum distance between Communications Adapter and terminal of:

800 meters at 1200 bps
400 meters at 2400 bps
200 meters at 4800 bps
100 meters at 9600 bps

The feature includes cables to attach the Communications Adapter to a customer-supplied terminal plate and from the terminal plate to the DTE external modem cable. **Cable Order:** Required for attachment to terminal plate. Customer supplied cable for in-door use. **Maximum:** Eight. **Field Installation:** Yes. **Prerequisites:** **#1601** and **#4695**. **Specify:** SDLC and/or BSC operations are possible, see Table 4.

Digital Data Service Adapter (#5650%x): Provides circuits and controls for attachment of one BSC or SDLC line and includes an internal Dataphone Digital Service Adapter. The adapter allows interface to American Telephone and Private Line DDS Network via the American Telephone and Telegraph Channel Service Unit. The Digital Data Service Adapter will operate at synchronous speeds of 2400, 4800, 9600 and 56,000 bps. The speed must be set to the speed specified in the customer's order for service to the common carrier at installation time. These line features can be associated with each line position if the line speed does not exceed 9600 bps. **Limitations:** If feature **#5650** is installed with a speed of 56,000 bps (**#9444**), then: [1] High-Speed Modem Adapter **(#4720)** cannot be installed. [2] 231X DASD attached to the Block Multiplexer Channel **(#1421)** cannot be installed. [3] For speed limitations refer to the Communications Adapter Base feature description. **Maximum:** Eight. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** **#1601** and **#4695**. **Specify:** **#9444**%z for operation at 56,000 bps ... See Table 4 for Line Position Code, Transmission Mode Code, and line speed selection codes.

X.21 Adapter For Nonswitched Networks (#5655): Provides controls and circuits for attachment of one X.21 Point-to-point or multipoint nonswitched communication line via a DCE complying with CCITT recommendation X.21. Transmission may be at speeds of 2400, 4800, 9600 or 48,000 bps for point-to-point operations and 2400, 4800 and 9600 for multipoint operations. **Limitations:** If feature **#5655** operates at 48,000 bps (specify **#9831**), then the following limitations apply: [1] High-Speed Modem Adapter (#4720) cannot be installed ... [2] 231X DASD attached to the Block Multiplexer Channel (#1321) cannot be installed ... [3] For speed limitations, refer to the Communications Adapter Base feature description. **Maximum:** Up to eight may be installed, subject to the overall data rate limitations of the Communications Adapter. **Field Installation:** Yes. **Prerequisites:** **#1601** ... one **#4695** is required for each **#5655** installed. **Specify:** SDLC operation must be specified for this feature ... see Table 4 for line position, transmission mode and transmission speed codes. **Note:** **#9831**%x is required for 48,000 bps operation. **Cable Order:** Required for attachment to external equipment.

Table 4
Communications Adapter Configuration Feature And Position Codes

	Feat Number %x	Req'd Line Att Base %x	Line Pos. with Line Pos. Codes 1 %z	2 %z	3 %z	4 %z	5 %z	6 %z	7 %z	8 %z
EIA/CCITT Interface (for Clocked Modems)	3701	4695	9531	9532	9533	9534	9535	9536	9537	9538
EIA/CCITT Interface (for Non-clocked Modems)	3701	4696	9521	9522	9523	9524	9525	9526	9527	9528
High-Speed Modem Adapter (7)	4720	4695	9501							
1200 bps Integrated Modems:										
Nonswitched with Switched Network Backup and Auto Answer	4788	4696	9641	9642	9643	9644	9645	9646	9647	9648
Nonswitched with Switched Network Backup and Manual Answer	4787	4696	9631	9632	9633	9634	9635	9636	9637	9638
Switched with Auto Answer	4782	4696	9651	9652	9653	9654	9655	9656	9657	9658
Nonswitched	4781	4696	9661	9662	9663	9664	9665	9666	9667	9668
Digital Data Service Adapter for 2400, 4800 and 9600 bps	5650	4695	9471	9472	9473	9474	9475	9476	9477	9478
56,000 bps (7) (8)			9444							
X.21 Adapter for Nonswitched Networks for 2400-9600 bps	4695	5655	9711	9712	9713	9714	9715	9716	9717	9718
for 48,000 bps			9831							
Local Attachment Interface	4801	4695	9451	9452	9453	9454	9455	9456	9457	9458
Autocall Unit Interface (3) First	1020		9541	9542	9543	9544	9545	9546	9547	9548

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Second	9551	9552 9553	9554 9555	9556 9557	9558
Transmission Mode (5)					
BSC (1)	9671	9672 9673	9674 9675	9676 9677	9678
Start/Stop (2)	9681	9682 9683	9684 9685	9686 9687	9688
SDLC (1)	9691	9692 9693	9694 9695	9696 9697	9698

Notes:

(1) BSC or SCLC transmission mode with any line attachment feature.

(2) Start/Stop transmission mode only with EIA/CCITT Interface (for nonclocked modem, **#3701** and prerequisite **#4696**) or with any other features offering 1200 bps Integrated Modems (with prerequisite **#4696**).

(3) Must be associated with EIA/CCITT Interface (**#3701** and prerequisite **#4695** or **#4696**). Maximum of two **#1020s** may be installed.

(5) The aggregate data rate of the Communications Adapter is 64,000 bps ... Line Features exceeding this aggregate may be installed, but not operated concurrently. To allow the aggregate of 64,000 bps to be achieved, the highest speed line must be installed in line position one, the next highest in line position two, etc. Each transmission mode installed has different requirements for microcode storage ... see Table 1 for microcode storage requirements and possible requirement for Control Storage Expansion (**#1901**).

(7) May not be installed when 231X DASD is attached to the Block Multiplexer Channel (**#1421**).

(8) When changing **#9444** to/from **#9471**, no new hardware or diskette is required.

%z System Diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchase machines to include any number of diskette-only changes ordered on the same diskette.

%x Feature supplies diskette for System Diskette facility.

%y System Diskette-only special feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchase machines to include any number of diskette-only changes ordered on the same diskette.

MODEL CONVERSIONS

For model upgrade from the 4331 to a 4361 processor, refer to the M4361 pages.

Model Conversions within Model Group: Can be made in the field.

Model Group Conversions: Customer price quotation and customer order acknowledgement letters for purchase model upgrades must State: "Installations of this model upgrade involves the removal of parts which become the property of IBM."

Field upgrade from 4331 Model Group 1 to 4331 Model Group 11 is possible ... refer to M4331-11 pages.

Field upgrade from 4331 Model Group 1 to 4331 Model Group 2 is possible ... see below.

Field downgrade from 4331 Model Group 2 to 4321 or 4331 Model Group 1 is not recommended. Field downgrade from 4331 Model Group 11 to 4331 Model Group 1 is not recommended.

For upgrade from 4321 to 4331 Mdl Group 2, refer to 4321 pages.

Field upgrade from 4331 Model Group 1 to Model Group 2: For upgrade of a purchase 4331 Mdl Group 1 processor to Mdl Group 2, conversion RPQ number 7B0697 is required in addition to the mdl upgrade MES if Control Storage Expansion (**#1901**) is not installed or on order for installation prior to the mdl upgrade installation.

ACCESSORIES

CONSOLE TABLE

An operator workstation with modesty skirt has capabilities for two operators with two 3278 mdl 2A/3279 mdl 2C and room for reference material. Attachable book racks may be ordered for manual storage and also serves as a cable control device for the 3278 mdl 2A/3279 mdl 2C, telephones, etc. Table dimensions are 1590mm x 815mm and is equipped with gliders. For field installation, order feature via MES specify on the 4300:

4300 Processors Console Table Accessory, **#1550**
4300 Processors Bookrack and Cable Holder, **#1480**

Console table will be supplied in the same color as the basic machine. It is available only on a purchase basis.

LOOP - ACCESSORIES

A group of accessory products are offered to permit plant electricians or contract personnel to install the loops. Refer to *IBM Multiuse Communications Loop Planning and Installation Guide,* GA23-3341, for information necessary to plan the layout and for selection of the loop hardware, for Installation and Testing information.

Loop Splice Plate (LSP): The LSP splices together two segments of indoor cable or provides a connecting point for future expansion of the loop. The LSP consists of a single connector strip, to which the incoming loop cable and the outgoing loop cable can be attached; it is installed in a standard outlet box for business office environments, or weatherproof outlet box for industrial environments.

Loop Station Connector (LSC): The LSC is available as two unique types: Wrap and radial. The wrap LSC attaches an I/O unit or controller directly to the main loop cable; the radial LSC attaches an I/O unit only through an LWC to the loop. The wrap LSC attaches an incoming and outgoing loop cable; the radial LSC attaches at the end of one loop cable from the LWC.

The wrap LSC also offers the isolation feature of wrapping, which allows the customer to wrap the loop away from a loop wiring failure or to reconfigure the loop during alterations. Both wrap and radial LSCs contain bypass relays that bypass the I/O unit when the I/O unit is powered-off or disconnected. These accessories are installed in a standard or weatherproof outlet box.

2 X 4 Adapter Plate (2AP): The 2" X 4" Adapter Plate is used with the Loop Station Connector and accommodates the use of standard outlet boxes that have dimensions smaller than the outlet boxes defined in the Loop Installation and Planning Guide. It is not to be used with the environmental boxes.

Loop Wiring Concentrator (LWC): The LWC provides the facility to attach a cluster of I/O units without a large number of drops on the loop cable. It attaches up to eight radial LSCs at the end of loop cables called *radials.* The point where a radial line terminates at the LWC is called an LWC *port.* Not all ports have to be used; unused ports can be reserved for future expansion.

The LWC has the same wrapping capability as the wrap LSC. In addition, the LWC allows the customer to bypass one or more of the radials by setting a corresponding switch located inside the LWC.

The LWC has its own enclosure or can be mounted in a NEMA-4X environmental equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in.).

Loop Surge Suppressor (LSS): The LSS allows the loop to be run across an outdoor space to another building. It attaches two outdoor cables and two indoor cables, allowing the proper termination and grounding for each type of cable. In addition, the LSS contains four surge protectors, one for each twisted pair in the two outdoor cables, to protect from voltage surges caused by near strikes of lightning. There is no protection in the LSS from a direct lightning strike.

The LSS has its own enclosure or can be mounted in an electrical equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in).

Continuity And Relay Tester: The Continuity and Relay Tester is used with a customer supplied volt-ohm meter, capable of reading 0.5 ohms and rated at least 5000 ohms/volt, to verify the loop installation, including loop cabling and accessories, after completion. By plugging the tester into any loop station connector and connecting the volt-ohm meter to the tester, the condition of the wire segment being tested can be determined as to conductor and shield continuity (opens or shorts), wrap switch operation, and total lobe resistance.

The loop station connector relays are also activated and their operation verified with this tester.

System Loop Accessories	Part Number
Loop Splice Plate (LSP) (indoor)	**1657300**
Loop Station Connector (Radial LSC)	**1657310**
Loop Station Connector (Wrap LSC)	**1657320**
Loop Station Connector Gasket	**1657260**
Loop Wiring Concentrator (LWC)	**1657330**
LWC Circuit Board Assy (order instead of LWC-1657330) *	**1657332**
Loop Surge Suppressor (LSS)	**1657350**
LSS Circuit Board Assy (order instead of LSS-1657350) *	**1657354**
Continuity and Relay Tester	**1657420**
Wrap Switch Access Cover	**1657325**
Loop Accessory Keys (10 spares) **	**1657379**
2 X 4 Adapter Plate (2AP)	**7838771**
Conventional Box (indoor) 5 x 10cm - (2 x 4 inches)	**2102151**
Clamp (for cable to indoor box)	**2100264**
ElectricalBox (outdoor) 7 x 11.5cm - (2.75 x 4.5 inches) (For industrial use)	**1657280**
Clamp - small (for indoor	

4331 Processor (cont'd)

cable to environmental box)	**2114285**
Clamp - large (for outdoor cable to environmental box)	**1657377**

* For use with NEMA-4X enclosure and associated parts (used when installing in harsh environments) or as a replacement part for the LWC or LSS.

** 1 package (10 keys) shipped with each 43XX with Loop Adapter 1 (#4830), 1 key shipped with each LWC and wrap LSC.

Order via MSORDER (Order Category = Supplies/ Accessories; Group Code = DP Supply Order). When ordering, use Machine type 43XX with Loop Adapter 1 (#4830). Allow lead time of 120 days.

Warranty: All loop accessories are warranted free from defects of workmanship and materials for 90 days.

Customer Responsibilities: The customer is responsible to provide (purchase, install, test, and maintain) the loop cables and accessories for terminal attachments.

The customer is also responsible for procuring and stocking spare cable and spare parts for loop accessories.

See *IBM Multiuse Communications Loop Planning and Installation Guide,* (GA27-3341) for a suggested schedule to allow the customer to plan, install, and test the loop cable and accessories prior to delivery of the system.

It is recommended that the customer order additional loop components for spares with the initial order, as spares will not be stocked in the Branch Office.

To enable a customer to test his installed loops it is recommended that the customer order a Continuity and Relay Tester. Testing the loop wiring will require the tester or its equivalent.

LOOP - CABLES

Loop Cables may be purchased from IBM or a customer selected source. See *IBM Multiuse Communication Loop Planning and Installation Guide,* GA27-3341, for part numbers, specifications and usage which is necessary for preplanning and ordering.

- **Indoor Cable P/N 1657265:** UL approved (style 2919) for interconnection of low voltage electronic equipment. Maximum allowable cable temperature range is -34°C to +80°C.
- **Indoor Cable P/N 7838694:** UL approved for cable tray installation (NEC Art. 725-40b3). Maximum allowable cable temperature range is -34°C to +90°C.
- **Indoor Cable P/N 7838695:** UL approved for duct and plenum installation (NEC Art. 725-2b). Maximum allowable cable temperature range is -34°C to +105°C.
- **Outdoor Cable P/N 1657267:** For above ground installation. Maximum allowable cable temperature range is -34°C to +80°C.
- **Outdoor Cable P/N 1657268:** For below ground installation. Maximum allowable cable temperature range is -34°C to +80°C.

Ordering Instructions: Interior cable (**P/N 1657265**, **7838694** and **7838695**) should be ordered in lengths of 304.8m to 609.6m (1000 to 2,000 feet). Additional lengths up to 609.6m (2,000 ft.) can be ordered by specifying the length wanted. Indoor cable splices can be accomplished via **P/N 1657300**. A minimum order quantity is 304.8M (1,000 feet).

Exterior cable (**P/N's 1657267** and **1657268**) should be ordered in one continuous length, up to a maximum of 914.4m (3,000 feet), by specifying the length wanted.) Outdoor splices with aerial and burial cable should be avoided. Order via MSORDER (Category = Bulk Cable). Specify cable part number and number of feet desired.

Warranty: Loop cable is warranted free from defects of workmanship and materials for 90 days.

SUPPLIES (None)

4331 PROCESSOR MODEL GROUP 11

PURPOSE

Provides the power, control, logic and memory circuitry necessary for the arithmetic, logic and processor storage functions of the 4331 Processor models, including I/O channels and integrated adapters.

MODELS

Group-Model	Processor Storage (bytes)	Buffer Storage (bytes)
Model J11	1,048,576	4,096
Model K11	2,097,152	4,096
Model L11	4,194,304	4,096

Prerequisites: Each system requires an operator's display, keyboard and control panel to allow Initial Microcode Load (IML) and interaction with the hardware/software system. A 3278 Display Console mdl 2A or a 3279 Color Display Console mdl 2C with keyboard and control panel is required for this purpose.

Maximum Configuration: The channel load of the attached I/O devices has to be checked against the load limitations of the processor. Refer to *IBM 4331 Processor Channel Characteristics,* GA33-1550 or use the HONE aid ANCHLOAD.

HIGHLIGHTS

The 4331 Mdl Group 11 is a featured processor with up to four megabytes of processor storage and contains the following standard hardware features:

	Feature Number on Mdl Group 1 and 2
One block multiplexer channel	#1421
Communications Adapter Base	#1601
128K bytes of control storage	#1901*
Display/Printer Adapter Expansion (16 ports)	#2001
One DASD adapter (3310, 3370 A1 attachment)	#3201
One 8809 adapter	#4910
One byte multiplexer channel	#5248
Power Interface	#5531
3340/3344 Direct Attachment	#7851
ECPS: VM/370 (VM assist microcode)	#8701

* Mdl Group 1

These features are not ordered separately. The processor can contain up to 4,194,304 bytes of monolithic processor storage. Data flow is four bytes parallel. Processor fetch and store cycles for the buffer are each 200 nanoseconds for four bytes. Buffer storage is automatically replenished from processor storage in 64 byte units at a time. The 64 byte fetch cycle requires 2.6 microseconds, the store cycle requires 3.1 microseconds. The processor is microcode controlled.

> **Note:** The microcode which controls system operations resides in Processor Storage, Reloadable Control Storage and Read-Only Storage. 4331 Mdl Group 11 includes 131,072 bytes of Control Storage plus 12,288 bytes of Read-only Storage. In addition to the microcode contained in this storage approximately 200,000 bytes of Processor Storage are occupied by microcode, RAS workspace and system data.

Standard Functions:

- Processor storage: 1,048,576, 2,097,152 or 4,194,304 bytes for Model Group 11. Approximately 200,000 bytes of processor storage are allocated for system/microcode use. The 4331 Mdl Group11 configurations require a portion of processor storage to be allocated for system microcode use. See Table 1 for details.
- ECPS:VSE Mode or S/370 Mode: In S/370 mode, both Extended Control (EC) and Basic Control (BC) are available. The 4331 Processor operates in either S/370 Mode or in Extended Control Program Support:VSE Mode. The system mode is selectable at Initial Program Load (IPL) time: S/370 Mode allows operation of VM/370, VSE, DOS/VS and DOS. (See "Programming Note" below for details.) ECPS:VSE mode supports operation of an appropriately generated VSE system, with enhanced systems performance.
- Display/Printer Adapter allows attachment of:
  - 3178 Display Station
  - 3262 Line Printer mdl 1 (650 lpm system printer)
  - 3262 Line Printer mdl 11 (325 lpm system printer)
  - 3268 Printer mdl 2 and 2C (340 cps)
  - 3230 Printer mdl 2 (350/450 cps burst speed)
  - 3289 Line Printer mdl 4 (400 lpm system printer)
  - 3278 Display Station mdl 2, and keyboards
  - 3270 Personal Computer - Control Unit Terminal Mode only (**)
  - 3279 Color Display Station mdl 2A and keyboards
  - 3278 Display Console mdl 2A, keyboard and control panel
  - 3279 Color Display Console mdl 2C, keyboard and control panel
  - 3287 Printer mdls 1,2, 1X and 2C.
  - 4250 Printer
  - 6580 Displaywriter System mdl A4, A6, A8, A10 (25 line display)

  ** Specify **#9843** on 4321 and 4331 must be ordered for attachment of the 3270 Personal Computer.
- The System Diskette Facility is the microcode loading system for the 4331 Processor. The diskettes shipped with the 4331 Processor will supply the required microcode for diagnostics, Standard Functions, and the special features ordered. The System Diskette Facility also allows storage of failure data from 4331 Processor errors which can subsequently be analyzed by the CE for maintenance purposes.
- Reloadable and Read-Only Control Storage is provided in addition to processor storage. This provides storage space for a portion of system microcode in support of standard functions and special features of the 4331 Processor. The Reloadable Control Storage is not available to the user. 4331 Mdl Group 11 includes 131,072 bytes of Reloadable Control Storage plus 12,288 bytes of ROS.
- Remote Support Facility (RSF) is an IBM CE tool permitting IBM Field Technical Support Center specialists to remotely monitor and/or perform problem diagnosis on the 4331 Processor. This includes remotely-initiated execution of diagnostic programs, remote examination of all or selected logout records from the System Diskette Facility, and (with proper customer authorization) remote exercise of the Customer Manual Operations.
- Remote Operator Console Facility (ROCF) provides the ability to IML/IPL and execute manual control functions on a remote 4331 via a 3275 (real or emulated) terminal at a host location.

Other Standard Functions are:

- Virtual Storage capability by Dynamic Address Translation
- One level addressing facility for improved virtual storage control by VSE (ECPS:VSE mode)
- Channels with virtual storage addressing (ECPS:VSE mode)
- Channel Indirect Data Addressing (in S/370 Mode)
- S/370 Universal Instruction Set
- Extended Precision Floating Point
- Conditional Swapping
- CE maintenance support functions
- Storage Protection (Store and Fetch)
- Byte-Oriented Operands
- Clock Comparator and CPU timer
- Time-of-Day Clock
- Interval Timer
- PSW Key Handling
- Control Registers
- Machine Check Handling
- Program Event Recording
- Monitoring
- Clear I/O
- Move inverse instruction (not used by IBM programs)
- 4,096 bytes of high-speed storage.

Programming Note: The ECPS:VSE mode may be invoked at IPL time and supports operation of an appropriately generated VSE Control Program with VSE/Advanced Functions and the SSX/VSE control program.

In S/370 Mode, operation of VSE with VSE/Advanced Functions (generated for use in S/370 Mode), VM/370 Release 6 with or without VM/System Product or VM/BSE Release 2 or VM/SE Release 2 are supported. Although not supported, DOS Release 26 and DOS/VS Release 34 will operate on the 4331 Processor when in S/370 Mode.

Console Function: An operator's display, keyboard and control panel is a prerequisite for use of the system by the customer. A 3278 Display Console mdl 2A or a 3279 color Display Console mdl 2C is required for this purpose. The Operator Control Panel allows additional operator communication with the system. Depending on the mode of console operation, a maximum of 20 of the 25 lines on the display may be used for system communication, four are reserved for messages from the 4331 Processor hardware system, and one displays messages unique to the 3278 Display Console mdl 2A or the 3279 Color Display Console

4331 Processor Mdl Group 11 (cont'd)

mdl 2C. The console address is selected at system installation time from the range 009 through 01F.

The console functions in one of two modes: "Display Mode" or the "Printer-Keyboard Mode". In the "Printer-Keyboard Mode", the Display Console uses the keyboard for input and the display and a 3287 Printer mdl 1, 2, 1C and 2C or 3268 mdl 2 or 2C for output. The CRT, keyboard and printer appear to the system as a 1052 Printer/Keyboard and operate compatibly with S/360 console operations or as a 3210/3215 Console Printer-Keyboard and operate compatibly with S/370 Console operations. The operation of the 3287 or 3268 mdl 2 or 2C in this mode is optional, but recommended. The "Printer-Keyboard Mode" and the 4250 attachment are mutually exclusive.

In "Display Mode" the keyboard is used for input and the CRT with 20 lines by 80 characters/line is used for output. The 3287 mdls 1, 2, 1C or 2C or 3268 mdl 2 or 2C if attached, has its own address and must be supported by either the 3277 Console Support of DOS/VS Release 34, the 3277 Console Support of VSE, the local-attached 3286/3287 Printer support of VM/370, or the equivalent of any of these.

Another function of the console is the Remote Operator Console Facility (ROCF) which provides the ability to IPL and execute manual control functions on a remote 4331 via a real or emulated 3275 terminal at a host location. ROCF is an extension of Remote Support Facility (RSF).

ECPS:VM/370: The 4331 Processor provides ECPS:VM/370 support at Level 19. This support is compatible with VM/370 Release 6 and VM/System Product or VM/BSE Release 2 or VM/SE Release 2 corresponding levels of the System Extension Program Products. The functional areas assisted include: Virtual Machine I/O, SVC Handler, Privileged Instruction emulation and Virtual Interval Time. **Limitations:** May only operate when S/370 Mode has been invoked by IPL.

Byte Multiplexer Channel (Standard): Functionally equivalent to the byte multiplexer channel on S/360 and S/370 and provides eight control unit positions. The channel permits simultaneous operations of low-speed devices. Operates at up to 36K bytes per second in single byte mode. Up to 500K bytes per second in burst mode. See *IBM 4331 Channel Characteristics*, GA33-1550, for devices which may be attached and the data rates achievable for certain configurations. The Byte Multiplexer Channel is always addressed as channel 0. **Limitation:** Magnetic tape devices may not be attached to the byte MPX channel when 231X devices are attached to the block multiplexer channel.

Subchannels: The 4331 mdl Group 11 byte Multiplexer Channel provides up to 36 subchannels, 4 of which are shared subchannels with up to 16 devices each. The maximum number of 36 subchannels is reduced by one for the Communications Adapter and one for each telecommunication line on the Communications Adapter.

Block Multiplexer Channel (Standard): Provides eight control unit positions. The Block Multiplexer Channel permits simultaneous operation of high-speed devices. Ability to "Block Multiplex" and facility for multiple requesting allows several I/O units to operate concurrently with greater channel efficiency. Devices attached to these channels which cannot utilize block multiplexing will function as if attached to selector channels. 33XX devices (and the 3830 or 3880 storage control units) do not attach.

Data rate is up to 1.25 million bytes per second ... see *IBM 4331 Channel Characteristics,* GA33-1550, for details. Channel addresses may be selected at installation time from the range of 1 to 6.

Subchannels: The following subchannel combinations can be configured at installation time:

– up to 256 non-shared or shared subchannels each with devices in multiples of 8, up to a total of 256 devices.

Integrated I/O Adapters: The following I/O adapters control the designated I/O devices:

DASD Adapter (Standard)
8809 Magnetic Tape Unit Adapter (Standard)
Display/Printer Adapter (16 Ports, Standard)
Communications Adapter Base (Standard)
5424 Adapter
Loop Adapter

Note: All data passing through the system for any I/O device interferes with the data flow for other devices, producing I/O limitations. The limitations take two forms:

(1) Hardware exclusivities listed in the feature descriptions.

(2) I/O attachments which individually or in combination can produce frequent overruns. Considerations in this category are:
- The aggregate data rate on the Block Multiplexer Channel and the DASD Adapter.
- The number and speed of lines attached to the Communications Adapter.
- The number and class of overrunable devices on the Byte Multiplexer Channel.

It is necessary to consult the *IBM 4331 Channel Characteristics Manual,* GA33-1550, to properly configure a 4331 with an I/O configuration that has not previously been analyzed.

DASD Adapter (Standard): One DASD Adapter provides direct attachment of 3310, 3370 A1 and/or 3340/3344 Direct Access Storage Devices without the necessity of a control unit. The 3310 and the 3370 operate in fixed block mode. The 3340/3344 operates in Count-Key-Data (CKD) mode. When using 3340/3344 exclusively system throughput can be degraded by a factor of more than two compared with use of fixed block mode devices.

Up to four strings of devices may be attached to the adapter. The attachable device types may be intermixed on the adapter but not within a string. The maximum number of strings of each type of device on the DASD Adapter is:

a) Up to four 3310 mdl A1s or A2s with 3310 mdl B units attached, up to a maximum of 4 drives per string.

b) Up to four 3370 mdl A1s with 3370 mdl B1 units attached, up to a maximum of 4 devices (8 actuators) per string.

c) Up to two 3340 mdl A2s with 3340/3344 mdl B units attached, up to a maximum of eight drives per string. Attachment of 3340/3344 is limited to two strings on the system.

The String Switch Capability allows sharing of 3340/3344 or 3370 DASD with another IBM processor or control unit that supports the DASD and string switching. String switch support for the 3340/3344 is limited to the static assignment of a shared string to one processor at a time. The 3340-A2 or the 3370-A1 must have the string switch feature #8150 installed.

With a directly attached 3340 the DASD Adapter can read data from a 3348 Data Module which was recorded on a 3340 attached to a System/3 mdl 12 or 15. This function is available as a conversion aid for users converting to the 4331 Processors from a System/3.

3340/3344 devices attaching to the DASD Adapter have logical unit/device addresses as follows:

X00	**01**	**02**	**03**	**04**	**05**	**06**	**07**
		2A	2B	2C	2D	2E	2F
		4A	4B	4C	4D	4E	4F
		6A	6B	6C	6D	6E	6F
				and			
X10	**11**	**12**	**13**	**14**	**15**	**16**	**17**
		3A	3B	3C	3D	3E	3F
		5A	5B	5C	5D	5E	5F
		7A	7B	7C	7D	7E	7F

Addresses for up to four strings of 3310 and 3370 can be configured at installation time in the range from X0X to X7X. The channel address may be from 1 to 6.

Display/Printer Adapter (Standard): This adapter allows for attachment of the prerequisite 3278 Display Console mdl 2A or a 3279 Color Display Console mdl 2C and up to fifteen additional devices chosen from the list below:

3178 Display Station
3230 Printer mdl 2 (350/450 cps burst speed)
3262 Line Printer mdl 1 and 11 (650 and 325 lpm)
3268 Printer mdl 2 and 2C (340 cps)
3278 Display Station mdl 2
3270 Personal Computer - Control Unit Terminal Mode only. (**)
3279 Color Display Station mdl 2A
3287 Printer mdls 1, 2, 1C and 2C (80 and 120 cps)
3289 Printer mdl 4 (400 lpm)
4250 Printer
6580 Displaywriter System mdl A4, A6, A8, A10 (25 line display)

** Specify **#9843** on 4321 and 4331 must be ordered for attachment of the 3270 Personal Computer.

These machines may be installed in any combination, provided that (1) only fifteen devices are installed and (2) no more than two System Printers (3262 and/or 3289) are included. Due to the processing power requirements, it is not practical to attach more than four 4250 printers. The 6580 Displaywriter System can connect to 1 or 2 device ports (display station, or display station and printer).

4331 Processor Mdl Group 11 (cont'd)

The 3262 or the 3289 Line Printer may be used as system printers dependent upon control program or program product support. One 3287 Printer may be used as a console hardcopy device; one or more 3287 Printers may be used as hardcopy workstation devices. The 3178 Display Station, 3278 Display Station mdl 2 , 3270 Personal Computer - Control Unit Terminal Mode only (**), or 3279 Color Display Station mdl 2A may be used as workstations for user-written applications. The 6580 Displaywriter System emulates a 3278 mdl 2 Display Station, and, optionally, a 3278 mdl 1, 2 Printer. The 6580 may be used as a workstation for user-written applications and for hard copy, as a 3278 mdl 2 and 3287 mdl 1, 2. Display/Printer Adapter support includes all standard functions of the 3274 mdl X1B with the 3178, 3278 mdl 2 or 3270 Personal Computer - Control Unit Terminal Mode only (**),or 3279 mdl 2A attached. In addition, the following 3278 mdl 2 or 3279 mdl 2A special features are supported: Keyboard Numeric Lock (standard on the 3178), Audible Alarm (standard on the 3178 or 3279), Security Keylock (standard on the 3178) and Switched Control Unit. Other 3278 mdl 2 or 3279 mdl 2A special features are not supported. When used as workstations, 3278 or 3279 Display Station keyboard feature codes #4621, #4622, #4623, #4627 , #4624, #4628 or 3178 mdl C1 or C2 may be selected. If two different keyboards are required for a workstation, one must be #4621. Addresses for these devices are selected at installation time from the range 009 through 01F.

** Specify **#9843** on 4321 and 4331 must be ordered for attachment of the 3270 Personal Computer.

The 6580 Displaywriter System prerequisities for attachment include the 3270 Attached Work Station licensed program (5608-SR9) and the 3274/3276 Attached Work Station adapter (#8332) and specify **#9842** in the 4331 must be ordered for attachment of Displaywriter.

Diskette Drive (Optional): A single drive diskette reader/recorder providing the ability to read or write Diskettes Type I on the 4331 Processor. This diskette has a data capacity of 242,944 bytes organized in 1,898 sectors of 128 bytes each (for use in exchanging data with the several products listed below). The Diskette Drive is supported by the control program as a 3540 Diskette Input/Output Unit. When used with VSE, refer to VSE/POWER documentation. Data recorded on a Diskette Type I can be interchanged with IBM devices and systems which have a diskette drive. Examples are the 3740, 3770, 3790, 5230 and 8100 and Series/1 and Systems/3, 32, 34, and 38. One diskette is shipped with the feature. Additional diskettes are available from IBM Information Records Division (SSD). Device address is selected at installation time from the range 009 through 01F. **Limitation:** Support by VM/370 via IUP only.

8809 Magnetic Tape Unit Adapter (Standard): Provides direct attachment of 8809 mdl 1A and up to five additional 8809 tape units (consisting of a mix of 8809 mdl 2s and 3s) ... allows the 8809 Magnetic Tape Unit to operate in streaming mode (date rate is up to 160K bytes per second) for loading or offloading DASD devices or in start/stop mode (data rates is up to 20K bytes per second) for other data processing operations. Although physical Read-Backward commands are not supported, the Read-Backward operation is simulated in the Logical IOCS (MTMOD) of VSE. Channel and device addresses may be assigned at system installation time from the range of X00 to X7F, where X is 1 to 6.

5424 Adapter (Optional): Provides native attachment of 5424 Multi Function Card Unit mdls A1 or A2 for 96-column card operations, device address is 04C.

Loop Adapter (Optional): The Loop Adapter on the 4331 is a native attachment method for the 3640 Plant Data Communications Terminals ... 3104 Display Terminals mdls B1, B2 ... 8775 Display Terminal mdls 1 and 2. 3232 Keyboard Printer ... 3287 Printer ... 3274 Control Unit mdl 51C, 61C ... 3276 Control Unit Display Station with their associated terminals. Communications is based on SDLC loop protocols. The Loop Adapter provides the user with a native interface to these terminals and increased configuration flexiblity.

A maximum of two direct attached loops and two data link adapters are supported. Each of the direct attached loops consists of two lobes (loop cables), for a total of four lobes on the system. Both lobes must operate at the same bit rate. Each lobe is functionally a loop however, all data on one lobe passes serially through the second lobe and can be as long as the loop, and a fault in one lobe will not affect the terminals on the second lobe, when the disrupted lobe is bypassed at the system. Therefore lobes can cover a greater distance and improve availability.

Each of the data link adapters can attach one IBM 3843 Loop Control Unit as point-to-point or up to 4 Loop Control Units as multipoint configuration. Details on programming information are provided in the *IBM 4331 Loop Adapter Programming Guide*, SC31-0500-0.

User-written programs for loop-attached terminals reside in the 4331 Processor storage and are controlled by VSE and ACF/VTAME or ACF/VTAM and CICS/DOS/VS. The 3644 Automatic Data Unit and 8775 Display Terminal with Downstream Loadable Functions are supported by ACF/VTAME and DSLU with VSE. In order to personalize the 3644, the GEN3644 program product is required in addition to DSLU.

In addition IBM offers a PRPQ to CICS/VS announced December 23, 1980 with P80-282. This PRPQ Loop Adapter CICS/VS Extension for 3640 terminals is a series of programs and exit routines that enhance the support of the 3641, 3642, 3644, 3646 and 3647 when attached to the 4331 Processor by Loop Adapter Feature. The following four functions are addressed by this PRPQ:

- Terminal initialization
- Terminal re-initialization
- 3642 encode check handling
- Transaction selection

Communications network management problem determination support for 4331 loop-attached 3104 Display Terminals, 8775 Display Terminals, 3232 Keyboard Printer mdl 11, 3276 Display Control Stations and 3274 mdl 51C, 61C Display Controllers and their/associated terminals, is provided via NCCF/NPDA.

The following terminals/controllers are supported: 3641 Reporting Terminal mdls 1, 2 ... 3642 Encoder Printer mdls 1, 2 ... 3643 Keyboard Display mdl 2, 3, 4 including #4920 Badge and Document Encoder ... 3644 Automatic Data Unit ... 3645 Printer ... 3646 Scanner Control Unit ... 3647 Time and Attendance Terminal ... 3104 Display Terminal mdls B1, B2 ... 8775 Display Terminal mdls 1,2 ... 3232 Keyboard Printer mdl 11 ... 3287 Printer mdls 11, 12 ... 3274 Control Unit mdl 51C, 61C ... 3276 Control Unit Display Station mdls 11-14 with their associated terminals ... 3843 Loop Control Unit. Device addresses are 040 through 07E.

Communications Adapter Base (Standard): The 4331 Communications Adapter can serve up to eight communication lines. Synchronous Data Link Control (SDLC), Binary Synchronous Communications (BSC) and Start/Stop (asynchronous) transmission modes are provided (Start/Stop and BSC operate in 2703 compatibility mode). The Communications Adapter can handle a variety of terminals (Data Terminal Equipments, DTEs), at different speeds.

The Communications Adapter has the following overall structure: The Communications Adapter Base contains common circuits and control. Each of the up to eight telecommunication lines attachable requires one Line Attachment Base (two different types) and one line attachment feature. Another feature serves for autocall unit interface and two may be installed.

The interface with the external communication facilities is through a modem (also called signal converter or Data Circuit Terminating Equipment). It may be a stand-alone unit or a 1200 bps integrated modem. For Communications Adapter Base details, see section "Communications and Loops" below.

IBM Stand- Alone Modems

Switched

3863	2400 bps
3864	4800 bps
3872	1200/2400 bps
3874	2400/4800 bps

Nonswitched

The following modems, except the 3868, are supported with the Switched Network Backup feature ... see M3863, 3864, 3865, 3872, 3874, 3875 pages for details:

3863	2400 bps
3868 mdl 1	2400 bps
3864	4800 bps
3868 mdl 2	4800 bps
3865	9600 bps
3868 mdl 3/4	9600 bps
3872	1200/2400 bps
3874	2400/4800 bps
3875	3600/7200 bps

IBM Integrated Modem (V.23, 1200 bps): The following integrated modem configurations are available:

- Switched network with auto answer
- Nonswitched line, 2- or 4-wire.
- Nonswitched line with switched network backup and auto answer.
- Nonswitched line with switched network backup with manual answer.

OEM Modems: OEM modems that comply with EIA RS-232-C, CCITT V.24/V.28, or CCITT V.35 recommendations may be connected to the Communications Adapter. Attachment is under the provisions of the Multiple Supplier Systems Policy.

Digital Data Service Adapter: The Digital Data Service Adapter allows attachment to the AT&T Private Line Dataphone* Digital Service Network by way of an internal Digital Data Service (DDS*) adapter.

* Dataphone and DDS are registered trademarks of the AT & T Company. Other usage of Dataphone and DDS in this text also refers to the registered trademarks of AT & .

X.21 Adapter for Nonswitched Networks: The X.21 interface allows attachment to the X.21 facilities by way of an internal X.21 adapter.

4331 Processor Mdl Group 11 (cont'd)

Automatic Calling Equipment: The following Automatic Calling Equipment, maximum two, can be attached to the Communications Adapter:

- 3872 with Automatic Call Originate feature
- 3874 with Automatic Call Originate feature
- Other Automatic Calling Equipment which complies with EIA RS-366 or CCITT V.25 may be connected to the Autocall Unit Interface (#1020) under the provisions of the IBM Multiple Supplier Systems Bulletin.

SPECIFY

Unless otherwise indicated, these specify features are only available at time of manufacture.

- Voltage (1-phase, 3 wire, 60 Hz): **#9902** for 208V, **#9914** for 240V.
- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray.
- Specify **#9841** in 4331 must be ordered for attachment of 3230 or 3268 to 4331. Provides microcode and/or maintenance documentation if machine is below EC 366586 (microcode for 4331) and/or below EC 366584 (maintenance document) for all mdls.
- 4250 Printer Attachment: Specify **(#9260)** for 4250 Printer attachment to display adapter.
- 6580 Displaywriter System Attachment: Specify **(#9842)** for 6580 attachment to the Display/Printer Adapter.
- Remote Support Facility: The Remote Support Facility (RSF) is a customer option. It is recommended to enhance the hardware maintenance of the 4331 Processor. It provides service personnel the capability of remotely controlling the 4331 from any RETAIN terminal and allows the CE to access the RETAIN Data Bank for the latest service aids and information from the customer site. When RSF is selected, the customer must provide the telephone lines required for the RSF modem. The customer must also arrange for the connection of the telephone interface cable provided by IBM to the telephone network. For details on customer responsibilities, see *IBM 4300 Processors Installation Manual-Physical Planning,* GA24-3667.

  RSF is available in two versions:

  Specify **#9510** for integrated modem, 1200 bps, switched network, manual answer. A telephone with FCC registered Data Access Arrangement (DAA) compatible with CDT Coupler Series 1000A interface and operation, with a 4-prong jack, is required.

  Specify **#9511** for EIA RS-232-C Interface, 1200 bps, switched network, manual answer. An FCC registered external cable modem compatible with the WE 202S modem, interface and operation, or equivalent, is required.
- Remote Operator Console Facility (ROCF): This feature is an extension of RSF. It provides to an operator at a host location the ability to IML, IPL and execute other 4331 manual control functions for a remote 4331 via a real* or emulated 3275 terminal (Remote Console). After IML and IPL is complete the Remote Operator console should be disconnected and the remote 4331 should be operated in stand-alone mode or control should be turned over to existing networking facilities. ROCF is not designed to be used for interactive applications because operation of all devices attached to the Display/Printer Adapter of the 4331 are suppressed when ROCF is in use. **Field Installation:** Yes.

  * 3275 mdl 2 can only be obtained on an "as available" basis.

  Specify ROCF feature **#9511**. The requisite customer supplied non-clocked external modem attached to feature **#9511** must include auto answer. Line discipline is BSC, 600 or 1200 bps/sec.
- Loop-Attached Terminals: The following specify codes must be selected one time when 3640 and/or 8775 and/or 3287 Terminals and/or 3274-51C, 61C and/or 3276 Control Units are attached to the system via Loop Adapter 1 and/or 2 (#4830, #4831) and/or Data Link Adapters (#4840).

Specify	Selected Terminals
#9251	3641 Reporting Terminal/3647 Time and Attendance Terminal
#9252	3642 Encoder Printer
#9253	3643 Keyboard Display
#9254	3644 Automatic Data Unit (ADU)
#9256	3646 Scanner Control Unit
#9257	8775 Display Terminal 3287/3645 Printer 3274-51C, 61C and 3276 Control Unit and 3104 Display Terminal
#9258	3643 Keyboard Display with #4920

- Keyboard/Character Set Language: When 3178 Display Station, 3278 Display Stations mdl 2 and/or 3287 Printers and/or 3268 Printer mdl 2 are attached to the Display/Printer Adapter, specify on the 4331 Processor:

  #9441: For ASCII Keyboard/Character Set Language (#4624, #4628, on 3278 mdl 2 or 3279 mdl 2A or S2A and/or 3287 with **#9084**), when used as a workstation, or

  #9442: For EBCDIC Data Entry Keyboards (3178 mdl C1, 3278 mdl 2 or 3279 mdl 2A or S2A with #4622, #4623). In addition, specify on the 4331 Processor either **#9301** for Data Entry Keyboard or **#9302** for Data Entry Keyboard, keypunch layout.

  No specify codes on the 4331 are required for EBCDIC Typewriter Keyboards (3178 mdl C2 or #4621, #4627 on 3278 mdl 2 or 3279 mdl 2A S2A or 3270 Personal Computer - Control Unit Terminal Mode only (**) or). The 6580 Displaywriter System supports the EBCDIC typewriter keyboard.

  Note: The keyboard/character set language selected must correspond with the mdl of 3178 or the specifications on the 3278 mdl 2 or 3279 mdl 2A or S2A and 3287s. ASCII keyboards are supported as indicated, but the internal binary codes are EBCDIC.

** Specify **#9843** on 4331 must be ordered for attachment of the 3270 Personal Computer.

- Console Table: A console table is available ... see #1550 or M4331-1 "Accessories" section. Book Rack and Cable Holder ... see #1480 or M4331-1 "Accessories" section.
- See 3278 Display Console mdl 2A or 3279 Color Display Console mdl 2C for console cabling.
- System Environment: For record purposes specify one of the following codes (reference only, no parts required):

  #9701 - This processor is planned to be host/peer connected to a system within the same branch office territory (at installation or at a future time).

  #9702 - This processor is planned to be host/peer connected to a system in a different branch office territory (at installation or at a future time).

  #9703 - This processor is planned to be stand-alone (no host/peer connect).

SPECIAL FEATURES

Notes:

%z System Diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchase machines to include any number of diskette-only changes ordered on the same diskette.

%x Feature supplies diskette for System Diskette facility.

%y System Diskette-only special feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchase machines to include any number of diskette-only changes ordered on the same diskette.

Adapter Power Prerequisite (#1001): Provides power and control circuitry necessary for the Communications Adapter, (when more than three line features are attached), and the Adapter Logic. **Maximum:** One. **Field Installation:** Yes. **Prerequisite:** #1002 or for the Loop Adapter (#4830) and/or Communications Adapter Base with more than three line attachments #4695 and/or #4696.

Adapter Logic Prerequisite (#1002): Provides logic and control function necessary for the 5424 Adapter (#3901). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1001.

Microcode Storage Requirements: The System microcode resides in the Reloadable Control Storage and Processor Storage, and is loaded from the standard System Diskette facility at IML-time. None of the Reloadable Control Storage is available for user programming and the systems configuration selected will determine the Processor Storage available for user programming and operating system residence.

To calculate the amount of Processor Storage which is available for customer purposes and operating system residence, use the following procedure.

Note: An interactive HONE aid (ANCHLOAD) is available dependent on the control program or program product device support to facilitate this procedure.

1) Consulting Table 2, determine the microcode groups required to support the features and I/O to be installed.
2) On the Table 3, place a check mark in the appropriate rows.
3) Find the sum of Table 3 for the required microcode groups.
4) Subtract the control storage of 143,360 bytes from the total of Table 3 and round up to the next multiple of 4,096.

4331 Processor Mdl Group 11 (cont'd)

The result of step 4 determines the amount of processor storage occupied by microcode and should be subtracted from the processor storage size ordered to determine the amount available for the user. The storage for group 3 specified in Table 2 (DAS Compatibility #7901) is only occupied if the feature is activated at IPL time.

Table 2

Function/Feature Installed	Microcode Group
4331 Mdl Group 11 Processor	1
Direct Access Storage Compatibility (#7901)	2
BSC lines installed (#9671-#9678)	3
S/S lines installed (#9681-#9688)	4
SDLC lines installed (#9691-#9698)	5

Note: The Microcode Group 1 contains 4331 Mdl Group 11 standard hardware features, see M4331-11.1 page.

Table 3

Micro-code Group	Control Storage – or – Processor Storage	Notes
1	331776 8800 1800	Plus Per 3340 buffer. For a second string of 3340s attached to the DASD adapter.
2	28948 4096 7680 13312 8704	Plus Per 2311 buffer. Per 2314 buffer. Per 3330 buffer. Per 3340 buffer.
3	6144	
4	5120	
5	10240	

Diskette Drive (#3401): A single drive diskette reader/recorder providing the ability to read or write IBM Diskettes Type 1. The Diskette Drive is supported by the control program as a 3540 Diskette Input/Output unit. **Limitations:** Not supported by VM/370. **Maximum:** One. **Field Installation:** Yes.

External Signals (#3898): Provides six distinct external interrupt lines to request and identify an external interrupt response from the processing unit. **Maximum:** One. **Cable Order:** Required. **Field Installation:** Yes. **Prerequisites:** External Devices must meet the interface specifications outlined in *S/360 Direct Control Feature OEMI,* GA22-6845.

5424 Adapter (#3901%x): Allows attachment of one 5424 Multi-Function Card Unit mdl A1 or A2. **Limitations:** The 5424 is supported by DOS/VSE only. The 5424 must be physically attached, otherwise the system is inoperative. Cannot be installed with the Loop Adapter (#4830). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1001 and #1002.

Power Interface, Add'L (#5532): Provides power control to the 4331 Processor for control units attaching to the 4331 Byte Multiplexer Channel and Block Multiplexer Channel. Table 4 below lists the control units/devices for which this feature must be installed in the 4331 Processor. Standard Power Interface allows attachment of up to eight of these control units; Power Interface, Add'l (#5532) allows attachment of eight additional control units for a maximum of 16 per processor. **Maximum:** One. **Field Installation:** Yes.

Table 4

Control Units/Devices Requiring Power Interface Features

1 - Mandatory:
- 1255 Magnetic Character Reader
- 1287 Optical Reader
- 1288 Optical Reader
- 1419 Magnetic Character Reader
- 1442 Card Read Punch mdl N1
- 1442 Card Punch mdl N2
- 1443 Printer mdl N1
- 2314 Storage Control* mdl A1 and B1
- 2314 Direct Access Storage Facility* mdl 1
- 2415 Magnetic Tape Unit and Control
- 2501 Card Reader mdl B1 and B2
- 2520 Card Read Punch mdl B1, B2 and B3
- 2701 Data Adapter Unit
- 2702 Transmission Control*
- 2703 Transmission Control*
- 2803 Tape Control
- 2821 Control Unit mdls 1, 2, 3, 5 and 6
- 2822 Paper Tape Reader Control*
- 2840 Display Control*
- 2841 Storage Control
- 3272 Control Unit
- 3411 Magnetic Tape Unit and Control
- 3505 Card Reader
- 3540 Diskette Input/Output Unit
- 3704 Communications Controller
- 3705 Communications Controller
- 3791 Controller
- 3800 Printing Subsystem
- 3803 Tape Control
- 3811 Printer Control Unit
- 3881 Optical Mark Reader mdl 1
- 3886 Optical Character Reader mdl 1
- 3890 Document Processor
- 3895 Document Reader/Inscriber

2 - Not Mandatory, but can utilize Power Interface features:
- 3274 Control Unit
- 3340 Direct Access Storage Facility
- 3370 Direct Access Storage
- 3203 Printer mdl 5

* No longer available

Direct Access Storage Compatibility (#7901%y): Designed to be used primarily as a conversion aid, this feature provides emulation of 2311/2314 data formats on 3310 or 3370 Direct Access Storage and emulation of 3330 (100MB/volume) or 3340 data formats on 3370 Direct Access Storage. This allows programs written for use of 2311/2314, 3330 or 3340/3344 DASD to be executed with only Job Control modifications using the 3310 or 3370 Direct Access Storage.

DAS Compatibility can be used on 3310 or 3370 devices which are installed on one DASD adapter on up to two consecutively addressed strings. The DAS Compatibility feature includes all of the compatibility types available for 3310 and 3370. Any one type can be activated at IPL time. Operates in S/370 Mode under DOS, DOS/VS, or VM/370, in ECPS:VSE Mode under DOS/VSE. Under DOS/VSE, data sets in fixed block format and in emulated format can coreside on the same 3310/3370 volume. With DOS/VSE a variable number of full or partial CKD volumes can be stored the 3310 or 3370 up to the capacity of the host device. Each emulated volume regardless of whether stored with full or partial capacity, begins on a predefined full-volume boundary. With VM/370 partial emulated volumes are not supported.

Mapping of emulated volumes onto 3310/3370 volumes is as follows:

Compatibility Type	Max Number of Emulated Full Volumes		
	Per Host Volume	Per String	Per System
2311 on 3310	7	28	56
2314 on 3310	2	8	16
2311 on 3370	34	68	68
2314 on 3370	9	63	63
3330 on 3370	2	16	28
3340 on 3370	3	24	42

For device address assignment refer to *IBM 4331 Compatibility Features,* GA33-1528.

Performance Note: Use of DAS Compatibility introduces additional processor and channel demands and can have a significant effect on system performance, particularly in environments with high I/O load using emulated DASD. Batch job execution elapsed times may increase by a factor of more than two. The results of measurements on a typical commercial jobstream show an increase in elapsed time by a factor of 1.7, compared to execution with the 3370 in fixed block mode. The performance impact is less severe when DASD is used in mixed fixed block and emulation mode, which is possible in operation with DOS/VSE or VM/370. Also less critical are online workloads with generally lighter I/O loads. Exclusive use of DASD emulation for batch operation is not recommended in any SCP environment.

Limitations: [1] Operates on up to two strings of 3310 or 3370 attached to the DASD adapter. [2] Operation of emulation and directly attached 3340/3344 is limited to two strings on the system. [3] One type of emulation can be activated at IPL time. [4] 3330 mdl 11 cannot be emulated. [5] Emulation cannot be used on 3370 drives which are shared via a string switch. [6] VM/370 supports 3310 or 3370 volumes containing emulated data which are dedicated to a guest operating system, other than VM/370 or CMS. Emulated 2311 is not supported by VM/370.

Program Order: The required utility programs 3310 for initialization and surface analysis of the 3370 DASD as well as the formatting of the emulator extent are included in the DOS/VSE SCP, (5745-030) or combined with VSE/Advanced Functions, and VM/370 (5749-010) contain the Device Support Facilities for initialization and surface

4331 Processor Mdl Group 11 (cont'd)

analysis of CKD DASD. In addition, for the required formatting of the emulator extent, order 5747-SA1. The stand-alone Device Support Facilities are also separately orderable with program order number 5747-DS1. **Maximum:** One. **Field Installation:** Yes. See Tables 2 and 3 for microcode storage requirements.

Communications And Loops

Communications Adapter Base (Standard): Provides the basic control and common circuits for the direct attachment of up to eight synchronous (BSC), asynchronous (Start/Stop) or Synchronous Data Link Control (SDLC) communication lines in any combination, provided that the aggregate data rate capability of up to 64,000 bps is not exceeded. For data rates achievable, see GA33-1535. The maximum speed of each of the eight lines is 9600 bps except that line position one may be a synchronous high-speed line (BSC or SDLC) up to 56,000 bps and may operate concurrently with other lines provided the data rate limitation is not exceeded. SDLC is supported only by ACF/VTAME operating under DOS/VSE or SSX/VSE, native or as a guest under VM/370.

Base Characteristics are:

- Auto Answer
- Autopoll operation
- Multipoint central station functions
- Multipoint tributary station functions for BSC only
- EBCDIC transparent mode for BSC only
- EBCDIC and ASCII code for BSC only

The Communications Adapter attaches up to eight lines via the following optional features:

- Up to eight line features without business clock for attachment to X.21 Nonswitched Data Network.
- Up to 8 line features without internal clock for attachment to external modems (Data Circuit Terminating Equipment, DCE) with clock.
- Up to 8 line features with internal clock for attachment to external modems (Data Circuit Terminating Equipment, DCE) without clock.
- Up to 1 synchronous high-speed line feature.
- Up to 8 line features with integrated modems.
- Up to 8 line features with local attachments.
- Up to eight line features with Digital Data Service Adapters.
- Autocall Unit interfaces for up to two of the installed lines.

From the Operator's Console-Keyboard the user may specify some configuration parameters for each separate telecommunications line for each individual connection:

- Select stand-by.
- Half speed operation for synchronous lines only (for both clocked and non-clocked modems which have this capability).
- NRZI mode in SDLC mode.
- Write interrupt (S/S only).
- Read interrupt (S/S only).
- Unit exception suppression (S/S only).
- Error index byte mode (BSC only).
- ASCII code instead of EBCDIC (BSC only).
- Tributary station addresses (BSC only).

Other configuration parameters can be selected at installation time and set by the CE:

- Duplex instead of half-duplex connection (two-way alternate data flow transmission).
- Switched network facility instead of nonswitched lines (for external modems).
- New sync (for BSC or SDLC in multipoint primary station function only).
- High speed operation for oneline (BSC or SDLC only).
- Connect Data Set to Line or Data Terminal Ready procedure.
- Selection of WE 202 or V.23 answer tone frequencies for 1200 bps integrated modems with automatic answering.

Limitations: (1) SDLC is supported only by ACF/VTAME operating under DOS/VSE or SSX/VSE, or ACF/VTAME operating under VM/370 Release 6 with DOS/VSE running as a guest. (2) Each line attached reduces the number of available subchannels on the Byte Multiplexer Channel. See "System Subchannels" above for details. (3) The aggregate data rate of lines in operation on the Communications Adapter is 64,000 bps. With the exception of a synchronous line installed in position one capable of higher speed, the line speed is limited to 9600 bps. For data rate and attachment limitations for other devices and communications lines, refer to *IBM 4331 Processor Channel Characteristics,* GA33-1535, which contains tables of pre-analyzed configurations. **Prerequisites:** #1001 is required when more than three telecommunications line features are attached. See Table 2 for microcode storage requirements.

Customer Responsibilities: See M2700 pages for customer responsibilities regarding communications facilities and services.

Communication Facilities: See M2700 pages for communications facility requirements with this feature.

Terminals Supported: For supported terminals refer to tables in the communications adapter feature description of 4331 pages for Mdl Group 1 and 2 or for more details to the M2700 pages.

Autocall Unit Interface (#1020%x): Provides an interface to customer-supplied Automatic Calling Equipment allowing data links with remote stations to be automatically established on the switched telephone network. Automatic Calling Equipment complying with EIA RS-366 or CCITT V.25 procedures may be attached. For the appropriate Automatic Calling Equipment, refer to M2700 pages. **Limitations:** Does not operate with High-Speed Modem Adapter (#4720), any features with 1200 bps Integrated Modem or with any nonswitched lines. **Maximum:** Two. **Cable Order:** Required, for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** #3701 (in switched operation) for each Autocall Unit Interface installed. **Specify:** Line position, see Table 5 below.

EIA/CCITT Interface (#3701%x): This feature may be intermixed with other line features. Each feature provides for the attachment of one external modem having EIA RS-232-C, CCITT V.24/V.28 or X.21bis interface for attachment to one switched or one nonswitched line.

When this feature is installed in conjunction with Line Attachment Base for Clocked Modem (#4695), a BSC or SDLC line is supported. Nonswitched lines with switched network backup may be used where maximum line speed on nonswitched lines is 9600 bps, the maximum line speed on switched network backup or switched networks is 4800 bps.

When this feature is installed in conjunction with Line Attachment Base for Nonclocked Modems (#4696), then a BSC, Start/Stop or SDLC line is supported. Transmission speeds supported are listed with feature #4696 below. **Maximum:** Eight. **Cable Order:** Required, for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** One #4695 or #4696 is required for each feature #3701 installed. **Specify:** Start/Stop, SDLC and/or BSC operations are possible. See Table 5 for Line Position Code and Transmission Mode Codes.

Loop Adapter: Provides the capability to attach directly or via a data link the 3640 Plant Data Communication Terminals and/or General Purpose Terminals 3104 mdls B1, B2 and 8775 mdls 1, 2 , 3232 Keyboard Printer mdl 11 and 3287 mdls 11, 12 and/or Control Units 3274 mdl 51C, , 61C and 3276 mdls 11-14 with the associated terminals to the 4331 Processors. Loop Adapter 1 and 2 (#4830, #4831) provide for direct attachment. A maximum of two Data Link Adapters (#4840) provide for remote attachment capabilities for 3843 Loop Control Units. Each Data Link Adapter (#4840) can be used as point-to-point or multipoint connection to attach up to four 3843 Loop Control Units.

Devices that can be attached to direct attached loops at 9600 bps or data link attached loops at 2400, 4800 or 9600 bps are the following:

Device Attachments

3104 Display Terminal mdls B1, B2
3232 Keyboard Printer mdl 11
3641 Reporting Terminal mdls 1, 2
3642 Encoder Printer mdls 1, 2
3643 Keyboard Display mdls 2, 3, 4
  including #4920 Badge and Document Encoder
3644 Automatic Data Unit
3645 Printer
3646 Scanner Control Unit
3647 Time and Attendance Terminal
8775 Display Terminal mdls 1, 2
3287 Printer mdls 11, 12
3274 Control Unit mdl 51C, 61C with the
  associated terminals
3276 Control Unit Display Station mdl 11-14
  with the associated terminals

Control Units and Associated Terminals

3274 Control Unit Mdl 51C, 61C
  3178 Display Station
  3278 Display Station
  3270 Personal Computer - Control Unit Terminal
    Mode only (**)
  3279 Color Display Station
  3262 Line Printer
  3268 Printer mdl 2
  3287 Printer
  3289 Line Printer
6580 Displaywriter System, mdl A4, A6, A8,
  A10 (25-line display)
6580 Displaywriter System mdl B4, B6, B8,
  B10 (66-line display)

3276 Control Unit Display Station Mdl 11-14
  3178 Display Station
  3278 Display Station
  3279 Color Display Station
  3262 Line Printer
  3268 Printer Mdl 2

4331 Processor Mdl Group 11 (cont'd)

3287 Printer
3289 Line Printer
6580 Displaywriter System, mdl A4, A6, A8, A10 (25-line display)
6580 Displaywriter System, mdl B4, B6, B8, B10 (66-line display)

** Specify **#9843** on 4321 and 4331 must be ordered for attachment of the 3270 Personal Computer.

In addition the following devices can be attached at 38,400 bps:

3104 Display Terminal mdls B1, B2
8775 Display Terminal mdls 1,2
3232 Keyboard Printer mdl 11
3287 Printer mdls 11, 12
3274 Control Unit mdl 51C , 61C with the associated terminals

For the attachment of 3640 terminals it is recommended to use a 3643 Keyboard Display or a 3641 Reporting Terminal on each Loop Control Unit for diagnostics and testing. These units do not need to be dedicated to this purpose.

Cable length for direct attached loops can be up to 2,000m (1.25 miles) when operating at 38,400 bps, or 3,200m (2 miles) when operating at up to 9600 bps.

For data link attached loops see 3843 Loop Control Unit. For details refer to GA23-0038, *IBM Multiuse Communications Loop Planning Guide.*

Loop Installation: For the required information to plan and install the Loop Adapter feature, the loop cables and accessories see the *IBM Multiuse Communications Loop Planning Guide*, GA23-0038, and *Installation Guide*, GA23-0039. The loop cables and accessories should be installed and checked out prior to attaching processors or devices.

The customer is responsible to enter the loop configuration and terminal addresses into the system using the loop adapter configuration tool invocable via a manual operation. Refer to *IBM 4331 Processor Loop Adapter Feature, Operating Procedures*, GA33-1538, and *Problem Determination Procedures*, GA33-1540.

Note: (1) Loop "Accessories" are required to properly install the customer-owned loop. The customer is responsible to provide (purchase, install, test and maintain, problem determination) the loop cable and accessories for terminal attachment. See 4331-1 "Accessories" section for details and ordering information.

(2) An unused lobe has to be terminated by a Loop Station Connector (wrap-type), P/N 1657320. **Communications Facilities:** See M2700 pages for communications facility requirements.

Loop Adapter 1 (#4830): Provides for direct attachment of a Loop with one or two Lobes (a lobe is the actual physical Loop cable). Transmission speed can be 9.6K bps for 3640 and/or 3104 and/or 8775 and/or 3232 Keyboard Printer mdl 11 and/or 3287 terminals and/or 3274-51C , 61C and/or 3276 Control Units or 38.4K bps for 3104 and/or 8775 and/or 3232 Keyboard Printer mdl 11 and/or 3287 terminals and/or 3274-51C , 61C Control Unit. Cable length for each lobe can be maximum of 3,200m (2 miles) for up to 9.6K bps, or maximum of 2,000m (1.25 miles) for 38.4K bps transmission speed. **Limitations:** Can not be installed with 5424 adapter (#3901). **Maximum:** One. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** Adapter power prerequisite (#1001).

Loop Adapter 2 (#4831): Provides for direct attachment of a Loop with one or two Lobes (A lobe is the actual physical Loop cable). Transmission speed can be 9.6K bps for 3640 and/or 3104 and or 3104 and/or 8775 and/or 3232 Keyboard Printer mdl 11 and/or 3287 terminals, and/or 3274-51C, 61C and/or 3276 Control Units, or 38.4K bps for 8775 and/or 3232 Keyboard Printer mdl 11 and/or 3287 terminals and/or 3274-51C , 61C control unit. Cable length for each lobe can be maximum of 3,200m (2 miles) for up to 9.6K bps, or maximum of 2,000m (1.25 miles) for 38.4K bps transmission speed. **Limitations:** Can not be installed with 5424 adapter (#3901). **Maximum:** One. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** Loop Adapter 1 (#4830).

Data Link Adapter (#4840): Allows connection of one or more 3843 loop control units to the 4331 processor. The feature provides for the attachment of one external modem complying with EIA/CCITT recommendations. EIA RS-232, RS-334 support will be provided for nonswitched lines only . Transmission speed can be 2400, 4800, or 9600 bps, with half-speed option dependent on the attached modem. The modem can be connected to either a point-to-point or multipoint telecommunications line for connection of up to four 3843 loop control units which directly control the data link attached loops. Support will be provided for the same terminals as on the direct attached loop. **Limitations:** Can not be installed with 5424 adapter (#3901). **Maximum:** Two. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** Loop Adapter 1 (#4830).

Loop Adapter Logic Storage Requirements: The microcode storage required for attaching terminals to the Loop Adapter 1 and 2 (#4830, #4831) or Data Link Adapters (#4840) has to be calculated from the table shown below. If Total 1 exceeds 65,536, an invalid configuration has been selected. If the sum of Total 1 plus Total 2 exceeds 98,304 an invalid configuration has been selected.

	Microcode Program Space Bytes	System Control Space Bytes
Microcode Base	42836	7880
One or multiple 3641 and/or 3647	7800	1060
One or multiple 3642	5900	580
One or multiple 3643 w/o #4920	8800	3450
One or multiple 3643 w/#4920	9400	3450
One or multiple 3644	4900	-
One or multiple 3646	2900	256
One or multiple 3104 and/or 8775 and/or 3287, 3274, 3276, 3645	2600	-
		Terminal* Control Space
Each 3641, 3647	-	156
Each 3642	-	194
Each 3643	-	156
Each 3644	-	228
Each 3646	-	72
Each port on 3646	-	84
Each 3274, 3276, 3287, 3645, 3104, 8775	-	186
Each 3843	-	68
Each Loop Adapter (#4830, #4831)	-	1272
Each Data Link Adapter (#4840)	-	1204
	Total 1	Total 2

*For additional information on buffer space refer to the *IBM 4331 Loop Adapter Characteristics*, GA33-1534.

The storage requirements need to be validated because the number of devices of each type attached by the customer is not known to manufacturing. Manufacturing can only validate storage requirements with respect to device types but not with respect to the number of devices of each type.

System Diskette Space Requirements: When attaching the Loop Adapter feature with 364X terminals to the 4331 the diskette space requirements must be verified. See the following table for the space calculation. If the total number of records exceeds 3876, an invalid configuration has been selected. A trade-off between features must be considered.

4331 Mdl Group 11 Processor Feature Facility	System Diskette Records
4331 Basic	3133
DAS Compatibility #7901	170
Start/Stop Transmission Mode **#968X**	20
BSC Transmission Mode **#967X**	24
SDLC Transmission Mode **#969X**	52
364X Terminal Att. **#9251, #9252, #9253, #9254, #9256**	665

The maximum number of system diskette records may not exceed 3876.

Maximum Number of Terminal Attachment Via Loop Adapters/Data Link Adapter: The maximum number of terminals that can be attached to the 4331 processor via Loop Adapters/Data Link Adapters is 80, of which 62 can be any mix of 3644, 3645, 3287, 3104, 8775 , 3232 mdl 11 terminals or 3274-51C , 61C or 3276 Control Units.

Multiple terminals on a 3274 or 3276 control unit count as a single terminal in determining the maximum number of terminals.

A maximum of 64 terminals out of the total of 80 terminals may be attached to either Loop Adapter 1 or 2, or to one of the Data Link Adapters. For details see *IBM Multiuse Communications Loop Planning Guide*, GA23-0038.

Line Attachment Base For Clocked Modems (#4695%x): This feature is a prerequisite for all line adapters which attach to modems (Data Circuit-terminating Equipment) which provide clocking and comply with EIA RS-232-C CCITT V.35, X.21 or X.21bis recommendations and it is a prerequisite for attachment to X.21 nonswitched data network . See the various line features below to determine when it is required. **Limitations:** A maximum of eight Line Attachment Bases may be installed on 4331 Communications Adapter. Each feature #4695 installed reduces by one the number of feature #4696 allowable. **Maximum:** Eight, one per line installed. **Field Installation:** Yes. **Prerequisites:** #1001 is required if more than three line attachments #4695 and/or #4696 are installed.

4331 Processor Mdl Group 11 (cont'd)

Line Attachment Base For Nonclocked Modems (#4696%x): This feature is a prerequisite for all line adapters which attach to modems (Data Circuit Terminating Equipment) which do not provide clocking. See the various features below to determine when it is required.

The clock speed internal to the feature is wired by default to 134.5 bps for Start/Stop operation and 1200 bps for BSC and SDLC operation. Otherwise, the clock speed can be wired at installation to one of the following:

- Start/Stop: 75, 300, 600 or 1200 bps.
- BSC: 600 bps.
- SDLC: 600 bps.

For BSC or SDLC operations, if 1200 bps is wired, then full-speed operation (1200 bps) or half-speed operation (600 bps) may be selected from the operator console keyboard. **Limitations:** A maximum of eight Line Attachment Bases may be installed on 4331 Communications Adapter. Each feature #4696 installed reduces by one the number of feature #4695s allowable. **Maximum:** Eight, one per line installed. **Field Installation:** Yes. **Prerequisites:** #1001 is required if more than three line attachments #4695 and/or #4696 are installed.

High-Speed Modem Adapter (#4720%x): Provides for the attachment of an external modem with clock having a CCITT V.35 or X.21bis interface. One nonswitched point-to-point BSC or SDLC line may be operated with speeds from 19,200 to 56,000 bps. **Limitations:** For speed limitations refer to the Communication Adapter Base feature description. For channel rates achievable, see *IBM 4331 Channel Characteristics*, GA33-1535. Cannot be installed with 231X DASD attached to the Block Multiplexer Channel. Cannot be installed with X.21 Adapter for Nonswitched Networks (#5655) if its speed is 48,000 bps **#9831**. Cannot be installed with Digital Data Service Adapter (#5650) if the Digital Data Service Adapter operates at 56,000 bps (**#9444**). **Maximum:** One. **Cable Order:** Required for attachment to the external modem. **Field Installation:** Yes. **Prerequisites:** #4695. **Specify:** BSC and/or SDLC operations are possible ... see Table 5 for Line Position Code and Transmission Mode Codes.

1200 bps Integrated Modem, Nonswitched (#4781%X): This feature may be intermixed with other line features. Each feature provides for the attachment of one nonswitched BSC, Start/Stop or SDLC line via an integrated 1200 bps modem. The transmission speed can be strapped by the CE for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps. Selection of 2- or 4-wire operation is made at installation time. **Cable Orders:** Required for attachment to external equipment. **Maximum:** Eight. **Field Installation:** Yes. **Prerequisites:** #4696. **Specify:** SDLC and/or BSC and/or Start/Stop operations are possible, see Table 5.

1200 bps Integrated Modem, Switched With Auto Answer (#4782%x): This feature may be intermixed with other line features. Each feature provides for the attachment of one switched network Start/Stop line via an integrated modem at speeds up to 300 bps and for BSC and SDLC at 600 and 1200 bps. Attachment to the switched network is via an IBM-provided cable to FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. **Maximum:** Eight. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** #4696. **Specify:** SDLC and/or BSC and/or Start/Stop operations are possible, see Table 5.

1200 bps Integrated Modem, Nonswitched With Switched Network Backup And Manual Answer (#4787%x): This feature may be intermixed with other line features. Each feature provides for the attachment of one nonswitched line with Switched Network Backup (SNBU) and manual answer, allowing BSC, Start/Stop or SDLC operations via an integrated 1200 bps modem. The transmission speed can be strapped by the CE for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps.

Attachment to the nonswitched line is via an IBM-provided cable. Selection of 2- or 4-wire line operation is made at installation time. The cable group which is ordered also provides for attachment to a Data Access Arrangement type CDT or FCC registered equivalent for manual answer. **Maximum:** Eight. **Cable Order:** Required for one cable group which connects to nonswitched line and to the switched network. **Field Installation:** Yes. **Prerequisites:** #4696. **Specify:** SDLC and/or BSC and/or Start/Stop operations are possible, see Table 5.

1200 bps Integrated Modem, Nonswitched With Switched Network Backup And Auto Answer (#4788%x): This feature may be intermixed with other line features. Each feature provides for the attachment of one nonswitched line with Switched Network Backup (SNBU) and auto answer, allowing BSC, Start/Stop or SDLC operations via an integrated 1200 bps modem. The transmission speed can be strapped by the CE for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps.

Attachment to the nonswitched line is via an IBM-provided cable. The same cable group provides for attachment to the switched network to a Data Access Arrangement type CBS or FCC registered equivalent for auto answer. **Maximum:** Eight. **Cable Order:** Required for one cable group which connects to the nonswitched line and to the switched network. **Field Installation:** Yes. **Prerequisites:** #4696. **Specify:** SDLC and/or BSC and/or Start/Stop operations are possible, see Table 5.

Local Attachment Interface (#4801%x): Provides circuits and controls for the local attachment of one BSC or SDLC remote station to the Communications Adapter without the use of modems at either device. Transmission speed can be strapped at installation time by the CE at 1200, 2400, 4800 and 9600 bps. The feature provides clocking for both the Communications Adapter and the terminal. The attached terminal must be equipped with an EIA RS-232-C or CCITT V.24/V.28 interface, have no Business Machine Clocking and have an external modem cable. The distance to the terminal may be extended via a customer-provided cable to allow a maximum distance between Communications Adapter and terminal of:

800 meters at 1200 bps
400 meters at 2400 bps
200 meters at 4800 bps
100 meters at 9600 bps

The feature includes cables to attach the Communications Adapter to a customer-supplied terminal plate and from the terminal plate to the DTE external modem cable. **Cable Order:** Required for attachment to terminal plate. Customer supplied cable for in door use. **Maximum:** Eight. **Field Installation:** Yes. **Prerequisites:** #4695. **Specify:** SDLC and/or BSC operations are possible, see Table 5.

Digital Data Service Adapter (#5650%x): Provides circuits and controls for attachment of one BSC or SDLC line and includes an internal Dataphone Digital Service Adapter. The adapter allows interface to American Telephone and Private Line DDS Network via the AT&T Channel Service Unit. The Digital Data Service Adapter will operate at synchronous speeds of 2400, 4800, 9600 and 56,000 bps. The speed must be set to the speed specified in the customer's order for service to the common carrier at installation time. These line features can be associated with each line position if the line speed does not exceed 9600 bps. **Limitations:** If feature #5650 is installed with a speed of 56,000 bps (**#9444**), then: [1] High-Speed Modem Adapter (#4720) cannot be installed. [2] 231X DASD attached to the Block Multiplexer Channel cannot be installed. [3] For speed limitations refer to the Communications Adapter Base feature description. **Maximum:** Eight. **Cable Order:** Required for attachment to external equipment. **Field Installation:** Yes. **Prerequisites:** #4695. **Specify:** **#9444**%z for operation at 56,000 bps ... See Table 5 for Line Position Code, Transmission Mode Code, and line speed selection codes.

X.21 Adapter For Nonswitched Networks (#5655): Provides controls and circuits for attachment of one X.21 Point-to-point or multipoint nonswitched communication line via a DCE complying with CCITT recommendation X.21. Transmission may be at speeds of 2400, 4800, 9600 or 48,000 bps for point-to-point operations and 2400, 4800 and 9600 for multipoint operations. **Limitations:** If feature #5655 operates at 48,000 bps (specify **#9831**), then the following limitations apply: [1] High-Speed Modem Adapter (#4720) cannot be installed ... [2] 231X DASD attached to the Block Multiplexer Channel (#1321) cannot be installed ... [3] For speed limitations, refer to the Communications Adapter Base feature description. **Maximum:** Up to eight may be installed, subject to the overall data rate limitations of the Communications Adapter. **Field Installation:** Yes. **Prerequisites:** One #4695 is required for each #5655 installed. **Specify:** SDLC operation must be specified for this feature ... see Table 5 for line position, transmission mode and transmission speed codes. **Note:** **#9831**%x is required for 48,000 bps operation. **Cable Order:** Required for attachment to external equipment.

Table 5

Communications Adapter Configuration Feature And Position Codes

	Feature Number %x	Req'd Line Attachment Base %x	Line Pos. with Line Pos. Codes 1 %z	2 %z	3 %z	4 %z	5 %z	6 %z	7 %z	8 %z
EIA/CCITT Interface (for Clocked Modems)	3701	4695	9531	9532	9533	9534	9535	9536	9537	9538
EIA/CCITT Interface (for Non-clocked Modems)	3701	4696	9521	9522	9523	9524	9525	9526	9527	9528
High-Speed Modem Adapter (7)	4720	4695	9501							
1200 bps Integrated Modems:										
Nonswitched with Switched Network Backup and Auto Answer	4788	4696	9641	9642	9643	9644	9645	9646	9647	9648
Nonswitched with Switched Network	4787	4696	9631	9632	9633	9634	9635	9636	9637	9638

4331 Processor Mdl Group 11 (cont'd)

Backup and Manual Answer								
Switched with Auto Answer	4782	4696	9651	9652	9653	9654	9655	9656	9657	9658
Nonswitched	4781	4696	9661	9662	9663	9664	9665	9666	9667	9668
Digital Data Service Adapter for 2400, 4800 and 9600 bps	5650	4695	9471	9472	9473	9474	9475	9476	9477	9478
56,000 bps (7) (8)			9444							
X.21 Adapter for Nonswitched Networks for 2400-9600 bps	5655	4695	9711	9712	9713	9714	9715	9716	9717	9718
for 48,000 bps			9831							
Local Attachment Interface	4801	4695	9451	9452	9453	9454	9455	9456	9457	9458
Autocall Unit Interface (3)	1020									
First			9541	9542	9543	9544	9545	9546	9547	9548
Second			9551	9552	9553	9554	9555	9556	9557	9558
Transmission Mode (5)										
BSC (1)			9671	9672	9673	9674	9675	9676	9677	9678
Start/Stop (2)			9681	9682	9683	9684	9685	9686	9687	9688
SDLC (1)			9691	9692	9693	9694	9695	9696	9697	9698

Notes:

(1) BSC or SCLC transmission mode with any line attachment feature.

(2) Start/Stop transmission mode only with EIA/CCITT Interface (for non-clocked modem, #3701 and prerequisite #4696) or with any other features offering 1200 bps Integrated Modems (with prerequisite #4696).

(3) Must be associated with EIA/CCITT Interface (#3701 and prerequisite #4695 or #4696). Maximum of two #1020s may be installed.

(5) The aggregate data rate of the Communications Adapter is 64,000 bps ... Line Features exceeding this aggregate may be installed, but not operated concurrently. To allow the aggregate of 64,000 bps to be achieved, the highest speed line must be installed in line position one, the next highest in line position two, etc. Each transmission mode installed has different requirements for microcode storage ... see Table 2 for microcode storage requirements.

(7) May not be installed when 231X DASD is attached to the block multiplexer channel.

(8) When changing **#9444** to/from **#9471**, no new hardware or diskette is required.

%z System Diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchase machines to include any number of diskette-only changes ordered on the same diskette.

%x Feature supplies diskette for System Diskette facility.

%y System Diskette-only special feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchase machines to include any number of diskette-only changes ordered on the same diskette.

MODEL CONVERSIONS

Model Changes within Model Group: Can be made in the field. Customer price quotations and customer order acknowledgement letters for purchase model conversions must state, "Installation of this model upgrade involves the removal of parts which become the property of IBM".

Field upgrade from 4331 Mdl Group 1 or 4321 to 4331 Mdl Group 11 is possible. The 4331 Mdl Group 11 can be field upgraded to 4331 Mdl Group 2.

Downgrades from 4331 Mdl Group 2 to 4331 Mdl Group 11 and from 4331 Mdl Group 11 to 4331 Mdl Group 1 or to the 4321are not recommended for field installation.

Field Upgrade from 4331 Mdl Group 1 to 4331 Mdl Group 2, refer to machine pages for 4331 Mdl Group 1 and 2.

Field Upgrade from 4331 Mdl Group 1 to 4331 Mdl Group 11: When a leased 4331 Mdl Group 1 is upgraded to the 4331 Mdl Group 11, features and specifications installed on the 4331 Mdl Group 1 which are not available on the 4331 Mdl Group 11 should be deleted with the upgrade MES order. Features installed on the 4331 Mdl Group 1 which are standard on the 4331 Mdl Group 11 should be deleted, i.e, changed to standard, for record purposes. Features which are standard on 4331 Mdl Group 11, but are not installed on a leased 4331 Mdl Group 1 being upgraded, are automatically added to the configuration.

For upgrade of a purchased 4331 Mdl Group 1 to 4331 Mdl Group 11 features installed on the 4331 Mdl Group 1 which are not available on the 4331 Mdl Group 11 have to be removed. An RPQ has to be submitted listing each feature to be removed. There will be a charge for this RPQ. The features removed are the customer's property.

Standard features of the 4331 Mdl Group 11 not installed on the 4331 Mdl Group 1 are added to the configurations The 4331 Mdl Group 1 prices of these features are added to the model upgrade prices.

Standard features of the 4331 Mdl Group 11 already installed on a purchased 4331 Mdl Group 1 should be deleted, i.e., changed to standard, for record purposes.

Field Upgrade from 4331 Mdl Group 11 to 4331 Mdl Group 2: Standard features of the 4331 Mdl Group 11 which are to be retained on the 4331 Mdl Group 2 have to be included in the MES order using the individual feature and specify codes of the 4331 Mdl Group 2.

Order for the 4331 Mdl Group 2 Processor:

Block Multiplexer Channel	#1421
Communication Adapter Base	#1601
Display/Printer Add'l Expansion	#2001
DASD Adapter	#3201
8809 Adapter	#4910
Byte Multiplexer Channel	#5248
Power Interface	#5531
3340/3344 Direct Attachment (If required)	#7851
ECPS:VM/370 (VM assist) (if required)	#8701

Other features or specifies on the 4331 Mdl Group 11 are retained unchanged on the 4331 Mdl Group 2.

ACCESSORIES

See M4331-1 "Accessories" for additional information and field installation of Console Table (#1550), Book Rack and Cable Holder (#1480) and "Loop Accessories" and "Loop Cables".

SUPPLIES (None)

4341 PROCESSOR

PURPOSE

Provides power, control, logic and memory circuitry for the arithmetic, logic and processor storage functions of the 4341 Processor.

MODELS

Mdl Grp 9	Mdl Grp 10	Mdl Grp 1	Mdl Grp 11	Mdl Grp 2	Mdl Grp 12	Bytes of Processor Storage
J9						1,048,576
K9	K10	K1	K11	K2	K12	2,097,152
L9	L10	L1	L11	L2	L12	4,194,304
			M11	M2	M12	8,388,808
				N2	N12	12,582,912
				P2	P12	16,777,216

Note: The microcode which controls system operations resides in Reloadable Control Storage and keeps dynamic tables in Processor Storage, thus reducing the amount of Processor Storage available for user programming. See "Microcode Storage Requirements" below for details.

Prerequisites: Each 4341 Processor requires one 3278 Display Console mdl 2A or 3279 Color Display Console mdl 2C and Operator Console Keyboard with an operator control panel.

HIGHLIGHTS

From 2,097,152 to 16,777,216 bytes of monolithic processor storage depending upon the mdl ... see "Models" above.

Processor base cycle time in nanoseconds:

Mdl Groups					
Grp 9	**Grp 10**	**Grp 1**	**Grp 11**	**Grp 2**	**Grp 12**
150-300	150-300	150-300	120-240	120-240	115-230

8-byte parallel data flow within the processor as well as an 8-byte wide data flow between the processor, storage and channels.

Processor High-Speed Buffer storage in bytes:

Mdl Groups					
Grp 9	**Grp 10**	**Grp 1**	**Grp 11**	**Grp 2**	**Grp 12**
2,048	4,096	8,192	8,192	16,384	16,384

Buffer storage is transparent to the program and significantly reduces the effective access time of storage. Buffer storage does not increase the amount of addressable storage. Extensive data checking, error recording by the hardware itself and remote maintenance are coupled with increased availability and serviceability.

Standard Features Include: Virtual Storage Capability by Dynamic Address Translation ... Byte and Block Multiplexer Channels ... Data Streaming Mode ... One-Level Addressing Facility for Improved Virtual Storage Control by DOS/VSE (ECPS:VSE Mode) ... Channels with Virtual Storage Addressing (ECPS:VSE Mode) ... 128-1024 UCWs ... Channel Indirect Addressing in S/370 Mode ... Channel Command Retry ... EC and BC Modes ... Byte Oriented Operands ... Clock Comparator and CPU Timer ... Control Registers ... Error Checking and Correction in Processor Storage ... Extended Control-Program Support for DOS/VSE, VS1, VM/370 and MVS ... Extended Precision Floating Point ... Interval Timer ... Machine Check Handling ... Support Processor ... Instruction Retry ... Program Event Recording ... Reloadable Control Storage ... Storage Protection (Store and Fetch) ... S/370 Universal Instruction Set ... System Diskette Drive ... Time-of-Day Clock ... PSW Key Handling ... Compare and Swap and Compare Double and Swap ... Clear I/O ... External Signal ... Unit Power Off ... Move Inverse Instruction (not software supported) ... Engineering Scientific Assist (Multiply Add facility) on Mdl Group 9, Mdl Group 10, Mdl Group 11, Mdl Group 2 and Mdl Group 12 Processors ... Fast Release for the Start I/O Fast Release Instruction for the Mdl Group 12.

Modes of Operation: Two modes of operation are available. The mode is selected from a common diskette at Initial Microcode Load (IML) time.

- ECPS:VSE Mode – allows operation of an appropriately generated DOS/VSE system, offering potential for enhanced systems performance.
- S/370 Mode – allows operation of any program written for S/370 and S/360 that does not violate the exceptions noted under "Compatibility" below. **Note:** DOS/VSE in S/370 Mode will not operate on 12MB and 16MB models, except under VM/370. See the Programming Support Section for those SCPs which contain 4341 support. In this mode, two performance options and an MVS support option are available. These options are selected at IML time and are mutually exclusive on Mdl Group 9, Mdl Group 10, Mdl Group 1 and Mdl Group 11 processors. On Mdl Group 2 and Mdl Group 12 processors with ECPS Expansion Feature (#1601), ECPS:VM/370 and ECPS:MVS can operate concurrently.
  - ECPS:VS1 – hardware assist that reduces the processor time needed to execute certain frequently used supervisor functions in OS/VS1, Release 7. The functional areas include:

    IOS
    SVC FLIH
    System Trace
    Page Management

    Note: OS/VS1 Release 7 with or without OS/VS1 Basic Programming Extension will operate on 12MB and 16MB mdls, but the SCP will only access up to 8MB. However, when OS/VS1 runs as a guest SCP under VM/370 and the VM Handshaking feature is specified, an OS/VS1 system can utilize up to 16MB.
  - ECPS:MVS – hardware facility that provides 14 privileged instructions necessary to allow the 4341 processor to be supported by the MVS System Product – JES2, 5740-XYS, and MVS/System Product – JES3, 5740-XYN. The instructions involve the following MVS functional areas:

    SVC Interrupt Handling
    Integrity
    Tracing
    Lock Management
    Real Storage Management

    On Mdl Group 2 and Mdl Group 12 processors, the ECPS:MVS hardware facility is extended to include the dual address space facility a function supported by MVS/System Product-JES2 Release 3 and MVS/System Product-JES3 Release 3 and defined in *IBM System/370 Principles of Operation,* GA22-7000-7. This extension facilitates communication among address spaces in an MVS/SP environment. In addition, the extensions include the ADD FRR instruction and the Page Fault Assist function, defined in *IBM System/370 Assists for MVS,* GA22-7079-1.
  - ECPS:VM/370 – hardware assist that reduces the processor time needed to execute certain frequently used supervisor functions in VM/370 Release 6. The functional areas include:

    Virtual Machine I/O
    Storage Management
    SVC Handler
    Privileged Instruction Emulation
    Dispatching
    Virtual Interval Timer

    On Mdl Group 2 and Mdl Group 12 processors, whenever ECPS:VM/370 and ECPS:MVS are both selected at IML time, ECPS:VM/370 is enhanced to include the functions of the Shadow-Table Bypass Assist defined in *Virtual Machine Assist and Shadow-Table-Bypass Assist,* GA22-7074. These functions are defined to enhance the performance of MVS running under VM/370 in a V=R environment with VM System Extensions Release 2 or VM/System Product. (#1601, ECPS Expansion Feature is required.)

The Engineering/Scientific Assist can be used in both modes of operation.

Control Storage Requirements: [Mdl Group 2 and 12] ECPS Expansion Feature (#1601) is required to support concurrent operation of ECPS:VM/370 and ECPS:MVS.

System Diskette Drive: This is the basic microcode loading device for the system. The several removable diskettes that will be supplied with the system will contain all of the required microcode for CE diagnostics, basic systems features, plus the optional features ordered for the system. The System Diskette File also allows recording of system failure data for later CE diagnostics.

In addition, the system diskette file provides automated Problem Analysis for use by console operators and system programmers. Basic data are collected and analyzed. Messages are displayed which describe system problems or status and suggest corrective actions. Options are included for sending service information to IBM via RSF and for running an additional processing unit analysis test when required.

Console Function: A 3278 Display Console mdl 2A or 3279 Color Display Console mdl 2C and Operator Console Keyboard with an operator control panel is required. It is the principal device provided for the operator to communicate with the system. The operator may use the keyboard and the display to control the system operation as well as to display the status of the system. The primary Operator Console Keyboard includes the operator control panel. The 3278 mdl 2A and 3279 mdl 2C has a screen size of 1,920 characters, 24 lines at 80 characters per line. The bottom four lines (lines 21-24) are reserved for system status information and are not accessible to the user. 3278/3279 features other than those basic to the primary console display/keyboard are not supported. Up to three optional (for a total of four) 3278 Operator Display Consoles mdl 2A or 3279 Color Operator Display Console mdl 2C or 3268 Printer mdls 2 and 2C or 3287 Printers

4341 Processor (cont'd)

mdl 1, 2, 1C or 2C for hard copy output are also available in any combination.

Two console modes are available -- "Display Mode" and "Printer-Keyboard Mode". In "Display Mode", the keyboard is used for input, the display with 20 lines of 80 characters/line for output, and DOS/VSE, OS/VS1 Release 7 to VM/370 Release 6 or MVS Release 3.8 with the MVS/System Product-JES2 or MVS/System Product-JES3 support is required. The optional 3268 Printer mdls 2 and 2C or 3287 Printer mdl 1 or 2 has a separate address. In "Printer-Keyboard Mode", the 3278 mdl 2A Display Console or 3279 mdl 2C Color Display Console uses the keyboard for input and the display and a recommended 3268 Printer mdls 2 and 2C or 3287 Printer mdl 1 or 2 or 3287 Color Printer mdl 1C or 2C for output. The display/keyboard and 3268 Printer mdls 2 and 2C or 3287 Printer mdl 1 or 2 or 3287 Color Printer mdl 1C or 2C appear to the system as a Console Printer-Keyboard. This allows the 4341 Processor user to run an operating system which has been generated for use on a S/360 with a 1052 typewriter keyboard console or a S/370 with a 3210 or 3215 console.

Channels Mdl Group 9, Mdl Group 10 and Mdl Group 1: Six channels in two groups are available. Group 1 (standard) consists of 1 byte multiplexer channel and 2 block multiplexer channels. Group 2 (optional) consists of 3 block multiplexer channels. One of the 2.0 million byte per second block multiplexer channels in the second group (channel 4) can be optionally selected as an additional byte multiplexer channel.

The following table shows the Block Multiplexer speed in million bytes per second for the following Mdl Groups:

Mdl Group 1, 9, 10

Channel	Group 1			Group 2			Total
	0	1	2	3	4	5	
Option 1	byte	3	3	-	-	-	6
Option 2	byte	3	3	2	2	1	11
Option 3	byte	3	3	2	byte	1	9

Channels Mdl Group 11, Mdl Group 2 and Mdl Group 12: Six channels are standard, consisting of one byte multiplexer channel and five block multiplexer channels. One of the block multiplexer channels can be optionally selected as an additional byte multiplexer channel.

The following table shows the Block Multiplexor speed in million bytes per second for the following Mdl Groups:

Mdl Group 2, 11

Channel	Group 1			Group 2			Total
	0	1	2	3	4	5	
Option 1	byte	3	3	2	2	2	12
Option 2	byte	3	3	2	byte	2	10

Mdl Group 12

Channel	Group 1			Group 2			Total
	0	1	2	3	4	5	
Option 1	byte	3	3	2	3	2	13
Option 2	byte	3	3	2	3	byte	11
Option 3	byte	3	3	2	byte	2	10

Data Streaming Mode can operate on any 4341 block multiplexer channel up to the maximum data rates specified above.

The capability for the attachment and automatic I/O power sequencing of up to 24 separate control units is standard. Optionally, 48 control units can be attached. An optional Channel to Channel Adapter is also available.

Compatibility: Any program written for S/370 will operate on the 4341 Processor in S/370 Mode, provided that it (1) is not time-dependent, (2) does not depend on system facilities (storage size, I/O equipment, optional features, etc.) being present when the facilities are not included in the configuration, (3) does not depend on system facilities (such as operation codes) being absent when the facilities are included in the 4341 Processor, and (4) does not depend on results or functions which are defined in the *Principles of Operation* to be unpredictable or model-dependent.

Any program written for S/360 will operate on the 4341 Processor in S/370 Mode, provided that it follows the above rules and does not depend on functions that differ between S/360 and S/370.

Any program written for the 4331 Processor in ECPS:VSE Mode or S/370 Mode will operate on the 4341 Processor, provided it follows the above rules. **Note:** DOS/VSE and prior DOS releases in S/370 Mode will not operate on the 4341 12MB and 16MB models, except under VM/370.

For more details, see *S/370 Principles of Operation,* GA22-7000, or *4300 Processors Principles of Operations for ECPS:VSE Mode,* GA22-7070.

Microcode Storage Requirements: The microcode which controls system operations resides in Reloadable Control Storage and keeps dynamic tables in Processor Storage, thus reducing the amount of Processor Storage available for user programming. The amount required is the sum of Processor Storage required by two user selectable options: [1] the number of Unit Control Words (UCWs) selected, and [2] the mode of operation.

1. Number of UCWs:

   128 UCWs are basic on the 4341 and require 8,192 bytes of Processor Storage. Additional UCWs are allocated as required in groups of 32, each group requiring an additional 2,048 bytes of Processor Storage. The maximum number of UCWs on 4341 is 1,024.

   UCW assignment is user-dependent. It is the customer's responsibility to designate desired I/O addresses and configurations to service personnel. Channel configurations should be reviewed during pre-installation planning for new systems and when additional I/O devices are attached or existing equipment is reconfigured.

   For specific device requirements, see the appropriate machine pages.

2. Depending on which mode of operation is selected at IML time, processor storage will be required as follows:

	.... Mode of Operation	
	ECPS:VSE Mode	S/370 Mode
4341 J9 K1 K2 K9 K10 K11 K12	49,152 bytes	10,240 bytes
4341 L1 L2 L9 L10 L11 L12	51,200 bytes	10,240 bytes
4341 M2 M11 M12	55,296 bytes	10,240 bytes
4341 N2 N12	59,392 bytes	10,240 bytes
4341 P2 P12	63,488 bytes	10,240 bytes

Bibliography: GC20-0001

4341 Processor (cont'd)

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, **#9915** for 240V.
- Cabling: For the primary console with Operator Control Panel (OCP) signal and control cables are shipped with the processor. 7.6m (25 feet) is standard. Cables longer than 7.6m (25 feet), up to a maximum length of 45.6m (150 feet) may be obtained by RPQ. Each additional console device (without OCP) requires a cable order. For cable order information, refer to the *4300 Processor Installation Manual - Physical Planning,* #GA24-3667.
- Color: **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, **#9065** for pebble gray. **Note: #9061, #9062, #9063** are slightly different colors from those available on previous machines.
- Dimensions: The normal dimensions of the larger of two 4341 Processor frames are 62-3/4" x 32" x 39-1/2". Dimensions can be reduced to 60" x 29-1/2" x 38-1/2", if required, by local field engineering. No materials need to be ordered.
- Remote Support Facility: The Remote Support Facility utilization (RSF) is a customer option. It is recommended to enhance the hardware maintenance of the 4341 Processor. It provides service personnel the capability of remotely controlling the 4341 from any RETAIN terminal and allows the IBM CE to access the RETAIN Data Bank for the latest service aids and information from the customer site. When RSF is selected, the customer must provide the telephone lines required for the RSF Modem. The customer must also arrange for the connection of the telephone interface cable provided by IBM to the telephone network. For details on customer responsibilities, see *4300 Processors Installation Manual - Physical Planning,* GA24-3667.

  RSF is available in two versions for Mdl Group 1 and three versions for the other mdls:

  Specify **#9510** for integrated modem, 1200 bps, switched network, manual answer. A telephone set with exclusion Key and with FCC registered Data Access Arrangement (DAA), compatible with CDT Type Coupler Series 1000A interface and operation is required.

  Specify **#9511** for EIA-Interface, 1200 bps, switched network, manual answer. An FCC registered external modem compatible with the WE202S modem, interface and operation, or equivalent is required.

  For Mdl Group 2, Mdl Group 9, Mdl Group 10, Mdl Group 11 and Mdl Group 12, specify **#9512** for integrated modem with integrated protective circuits, 1200 bps, switched network, manual answer. (An external protective coupler is not required.) A telephone set with exclusion key and an RJ41S or RJ45S type data jack are required. Protective couplers are FCC registered. The FCC Registration number is AN09SA-67992-DP-N and Ringer Equivalence Number (REN) 0.8B.

  If Remote Support Facility is not desired, no specify code is required.
- Remote Operator Console Facility: The Remote Operator Console Facility (ROCF) is an extension of RSF. It gives personnel at a host site the ability to dial-up and control a remote 4341 by means of a 3275 mdl 2 Display Station or by means of host site programming support.

  Specify RSF feature **#9511**. The customer-supplied external modem attached to feature **#9511** must include auto answer.

SPECIAL FEATURES

ECPS Expansion (#1601): [Mdl Group 2 or 12] Adds 16,384 bytes of control storage. See "Control Storage Requirements" under "Highlights" for details. **Maximum:** One. **Field Installation:** Yes. Field installation of #1601 involves the removal of parts which become the property of IBM. **Prerequisites:** A 4341 Mdl Group 2 or Mdl Group 12 Processor.

Channel-To-Channel Adapter (#1850): One channel to channel feature is optionally available to interconnect two channels (4300 Processor, S/360, S/370) ... one of the processors requires this feature ... requires one control unit position on each of the connected channels. (If a 4381 Processor is one of the machines connected via a channel-to-channel adapter, three control unit positions are required on each processor.) **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** [1] #4631 must be specified on the primary 3278 Display Console mdl 2A or 3279 Color Display Console mdl 2C. [2] One control unit position on a block multiplexer channel. (Three positions required on the 4381 and each processor connected to it.)

Block Multiplexer Channels Add'l (#1870): [Mdl Group 9, 10, 1] An optional group of three block multiplexer channels permits simultaneous operation of high speed devices at a data rate of 2.0MB/second for two channels and 1.0MB/second for one channel. One of the 2.0 million byte per second block multiplexer channels in the second group (Channel 4) can be optionally selected as an additional byte multiplexer channel at installation time. **Limitations:** Not available on 4341 Mdl Group 2, 11, or 12 since five block multiplexer channels are standard. If installed on a 4341 Mdl Group 1, 9, or 10, this feature designation should be deleted with the order entry for conversion to a 4341 Mdl Group 2, 11, or 12. This is for order entry purposes only. The channels are not physically removed when upgrading. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** A 4341 Mdl Group 1, 9, or 10 Processor.

Channel Control Unit Positions, Add'l (#1890): This feature is required for the automatic I/O power sequencing of more than 24 control units from the 4341 Processor. Standard on the 4341 is the capability to attach up to 24 control units, not to exceed eight per channel. With this feature, 25 to 48 Control Units may be attached and automatically powered up, not to exceed eight per channel. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1870 on Mdl Group 9, Mdl Group 10 or Group 1 Processor.

MODEL CONVERSIONS

There are no additional installation charges for allowable upgrades of a purchased 4341 processor. Select the appropriate upgrade MES from the table below. Since six channels are standard on the Model Group 11 and Model Group 2, MES upgrade prices for upgrades to these two models from Model Group 10 or Model Group 1 without Add'l Block Multiplexer Channels #1870 installed will include the price for (#1870). Customer price quotations and customer order acknowledgment letters for purchase MESs must state: "Installation of a model upgrade and special feature additions involves the removal of parts which become the property of IBM." Other mdl changes and storage downgrades are not recommended for field installation.

4341 Model Group 9

From Model	To Model				
	J9	K9	L9	K10	L10
J9	-	MES	MES	MES	MES
K9	**	-	MES	MES	MES
L9	**	**	-	MES	MES

4341 Model Group 10

From Model w #1870	To Model via MES				
	K10	L10	K11	L11	M11
K10	-	MES	MES	MES	MES
L10	**	-	**	MES	MES
	K12	L12	M12	N12	P12
K10	MES	MES	MES	MES	MES
L10	**	MES	MES	MES	MES
w/o #1870					
	K10	L10	K11	L11	M11
K10	-	MES	MES	MES	MES
L10	**	-	**	MES	MES
	K12	L12	M12	N12	P12
K10	MES	MES	MES	MES	MES
L10	**	MES	MES	MES	MES

4341 Processor (cont'd)

4341 Model Group 1

From Model w #1870	To Model via MES				
	K1	L1	K11	L11	M11
K1	-	MES	MES	MES	MES
L1	**	-	**	MES	MES
	K2	L2	M2	N2	P2
K1	MES	MES	MES	MES	MES
L1	**	MES	**	MES	MES
	K12	L12	M12	N12	P12
K1	MES	MES	MES	MES	MES
L1	**	MES	MES	MES	MES
w/o #1870					
	K1	L1	K11	L11	M11
K1	-	MES	MES	MES	MES
L1	**	-	**	MES	MES
	K2	L2	M2	N2	P2
K1	MES	MES	MES	MES	MES
L1	**	MES	**	MES	MES
	K12	L12	M12	N12	P12
K1	MES	MES	MES	MES	MES
L1	**	MES	MES	MES	MES

4341 Model Group 11

From Model	To Model via MES							
	K11	L11	M11	K12	L12	M12	N12	P12
K11	-	MES	MES	MES	MES	MES	MES	MES
L11	**	-	MES	**	MES	MES	MES	MES
M11	**	**	-	**	**	MES	MES	MES

4341 Model Group 2

From Model	To Model via MES				
	K2	L2	M2	N2	P2
K2	-	MES	MES	MES	MES
L2	**	-	MES	MES	MES
M2	**	**	-	MES	MES
N2	**	**	**	-	MES
	K12	L12	M12	N12	P12
K2	MES	MES	MES	MES	MES
L2	**	MES	MES	MES	MES
M2	**	**	MES	MES	MES
N2	**	**	**	MES	MES
P2	**	**	**	**	MES

4341 Model Group 12

From Model	To Model via MES				
	K12	L12	M12	N12	P12
K12	-	MES	MES	MES	MES
L12	**	-	MES	MES	MES
M12	**	**	-	MES	MES
N12	**	**	**	-	MES

**Not recommended for field installation.

ACCESSORIES

The following items are available on a purchase-only basis. For shipment with machine, order the P/N indicated below.

Bookrack and Cable Holder (#1480): Provides a storage rack for use with Console Table (#1550) only. Up to four racks can be mounted on one table.

Console Table, 4300 Processors (#1550): Provides a convenient workstation table to support one or two 3278 mdl 2As/3279 mdl 2Cs.

SUPPLIES (None)

4990 COMMUNICATIONS CONSOLE

PURPOSE

The 4990 provides a debug and problem determination tool for the 4987 Programmable Communication Subsystem.

MODELS

Model 1 001

HIGHLIGHTS

The 4990 provides a portable function keyboard and set of displays for debugging programs and for problem determination in the feature and interfaces of the 4987. When the 4987 is equipped with two scanners, the console may be interchanged between them. A single console may be used on multiple 4987 subsystems by plugging into the appropriate unit. Power is supplied by the 4987.

Publications: *4987 Programmable Subsystem and Attachments and 4990-1 Communications Console Description* (GA34-0049).

SPECIFY (None)

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

4993 CHANNEL TERMINATION ENCLOSURE

PURPOSE

The 4993 provides physical support, mechanical connection, and electrical termination for IBM S/370 channel interface cables. It is used in conjunction with the Series/1-IBM S/370 Channel Attachment (#1200) for connection to IBM S/370 (models 135-168), 3031, 3032, 3033, 4300.

MODELS

Model 1 001

Limitations: One 4993 per 4997 rack. On a 4997, this unit will be mounted at the bottom of the rack. It may not be installed with 4962 on 4997 mdl 1, or with two 4962s on 4997 mdl 2. Field installation may require Series/1 system reconfiguration.

Prerequisites: #1200 on a processor unit, 4959, or 4965.

HIGHLIGHTS

The 4993 is designed for mounting on a 4997 or an EIA standard 19-inch rack enclosure. It is a full-width unit 5.25 inches high.

The 4993 contains channel drive and receive terminators, power source, power on/off control, control unit enable/disable control, disable indicator lamp, and mechanical assembly. It provides capability for select-out bypass. The function occupies one control unit position on the S/370 channel interface, requiring 32 channel addresses. Up to eight Series/1s with 4993s may be connected to an S/370 system channel.

Publications: *System/370 Channel Attachment Feature and 4993 Termination Enclosure Description* (GA34-0057).

SPECIFY

Specify codes **#9XXX** may not be ordered independently.

- Voltage (AC, 60 Hz, 1-phase): Specify **#9901** for 115V, **#9902** for 208V, or **#9904** for 230V.
- Power Cord: 1.8 meter (6 foot) cord, no specify required.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Cables: S/370 channel cables are not provided with the 4993. These cables (cable group 1806) should be identified and ordered when the S/370, 303X, or 43XX installation planning associated with the Series/1 is accomplished. See *IBM Series/1 Customer Site Preparation Manual* (GA34-0050) for details. Contact IBM for assistance.

SUPPLIES (None)

4994 ASCII DEVICE CONTROL UNIT

PURPOSE

Provides an ASCII Device Control Unit that can accommodate a variety of ASCII terminals including the 3101 model 1.

MODELS

Model A00 16 RS-232-C Ports, 1 meter Rack

Model B00 32 RS-232-C Ports, 1 meter Rack

Model C00 48 RS-232-C Ports, 1 meter Rack

Limitations: The 4994 is not featureable.

Prerequisites: 4331, 4341, 4361, or 4381. S/370 Block Multiplexer Channel.

HIGHLIGHTS

The 4994 provides the ability to attach ASCII devices to host processors. The display terminals that can be attached are defined in Terminal Definition Tables which are down-loaded from the host to the controller. In order to be supported, the devices at a minimum must perform the following functions upon receipt of appropriate character sequences from the communication line:

- Clear-screen or clear to end-of-screen
- Absolute cursor positioning
- A character written to a screen position should replace (not over-strike) the previous character in that position.

The communication interface for the 4994 is an asynchronous EIA RS-232-C/CCITT V.24. In addition each line has a jumper-selectable 20mA Current Loop connection. Data rates for asynchronous operation are program-selectable in two jumper-selectable ranges (37.5 to 1200 and 300 to 19,200 bps).

Programming Support: Program support for the 4994 is the Host Loaded Yale ASCII Communications System (5798-RRJ). This program offering provides a down-stream load capability for the 4994 control unit program. This program support runs under VM/SP Rel. 2.1 or 3.0 (5664-167) in the host.

Environmental Restriction: Certain atmospheric contaminants can destroy miniaturized electronic circuitry. These contaminants may be found in certain industrial and general urban environments. This machine should be protected from hostile, ambient conditions. See *IBM 4994 ASCII Device Control Unit General Information Manual* (GA34-0282), for details.

Publications: *IBM Series/1 Customer Site Preparation Manual* (GA34-0050), *IBM 4994 ASCII Device Control Unit General Information Manual* (GA34-0282).

SPECIFY

- Voltage (AC, 1-phase, 60 Hz):

  200V **#2732** 208V **#9902**
  220V **#2803** 240V **#9914**

- Power Cord: Standard power cord is 4.3 meters (14 feet), no specify required. Specify **#9986** for special 1.8 meter (6 foot) cord when required by local jurisdiction.
- Machine Nomenclature: English US only.
- Color Selection:

Willow Green	**#9060**	Classic Blue	**#9063**
Garnet Rose	**#9061**	Charcoal Brown	**#9064**
Sunrise Yellow	**#9062**	Pebble Gray	**#9065**

- Type of Distribution Channel: (Specify Only One)

  #9001 Sales to Third Party Participants (TPPs): Sales to Value Added Remarketers, systems integrators, programming houses, other equipment manufacturers (OEMs), who, in turn, resell to end-users. Includes sales to business concerns who resell to their independent franchises or distributors.

  #9002 End-User Sales: Sales directly to the business concern which will use the system for the intended application.

- Primary Application: (Specify only one)

  - Industry Terminal Systems

  #9010 Plant Floor System: Collection or dissemination of data using plant floor terminals requiring human intervention. Time and attendance, job reporting, etc.

  #9011 Banking: System with banking terminal(s) attached.

  #9012 Point of Sale: System with point of sale terminal(s) attached.

  #9019 Other Industry Terminal System: Hospital systems or any other industry terminal systems.

  Industrial Automation

  #9020 Electrical Test and Inspection: Monitoring or control of equipment that measures material or products to ensure conformance with specifications.

  #9021 Process Control: Monitoring and control of production operations, primarily in the fluid and non-fluid process industries.

  #9022 Laboratory Automation Systems: Includes instrument automation, experiment monitoring, and general laboratory automation.

  #9023 Power Management - FC/PM: Power Management Systems which will use the Facilities Control/Power Management (FC/PM) licensed program.

  #9024 Power Management - Non-FC/PM: Power Management Systems which will not use the FC/PM licensed program.

  #9025 Facilities Management and Security: All other facilities management and security systems [except Controlled Access System (CAS)].

  #9029 Other Industrial Automation: Controlled Access System (CAS), production monitoring, testing, and inspection (other than electronic test), discrete piece manufacturing, numeric control tape control, materials handling, environmental monitoring, maritime, railroad, auto traffic control, air traffic control, simulators.

  - Communications

  #9030 Concentrators/Multiplexers: Consolidation of input from terminals for transmission over high-speed lines to a remote computer.

  #9031 Front End Processors: For large systems.

  #9032 Front End Processors: For small and medium sized systems.

  #9033 Message Switching: Message routing and dispatching in a data communications network.

  #9034 Telephone Switching: Switching (PABX Control), call routing, and central office switching.

  #9035 Audio Store and Forward.

  #9039 Other Communications Applications: All other communications applications.

  - Scientific Computation

  #9050 Problem Solving: Engineering/Scientific Calculations. May be timesharing.

  #9051 Instructional: Stand-alone or timeshared systems for computer-assisted instruction and related functions.

  - Business Data Processing

  #9070 Remote Job Entry: RJE or Remote Batch Terminal.

  #9071 Distributed Host Support - Data Entry: Single or clustered workstation terminal controller with limited peripherals and batch communication to a host. Primarily for dedicated intelligent data entry, but may be combined with Remote Job Entry/Batch functions.

  #9072 Distributed Processing - Host-Dependent: Combinations of terminal control, file management, communications, peripheral control, data entry, and local processing with heavy dependency on a host processor for continuous operation.

  #9073 Distributed Business Processing - Stand-Alone, Large Account: Stand-alone batch or interactive system for business applications in an enterprise with large systems. Offline communications to a host system is optional.

  #9074 Business System - Small Account: Same as **#9073** but in new accounts or in enterprises with small or medium-sized systems only.

  #9075 Business Problem Solving: Series/1 installed for the primary purpose of providing non-DP professional business problem solving support.

  #9076 Office Automation: Series/1 installed primarily for text processing, electronic mail, audio distribution, etc., with or without some commercial applications.

  #9079 Other Business Applications: All other business data processing applications.

  Other Applications

  #9090 Applications not classified in any category above: For example, graphic arts (typesetting, etc.), design and drafting, undefined government, and any other.

4994 ASCII Device Control Unit (cont'd)

- Application Unknown

#9096 Applications temporarily unknown: Specify within 15 days of order entry.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Connectors/Tools : For information on connectors and tools ... see "Accessories" in M4959 pages.

Device Attachment Cable (#2056): Asynchronous local attachment cable.

EIA Data Set Cable (#2057): EIA data set attachment.

S/370 Channel Cables: Not provided with the 4994. These cables (Cable Group **1806**) should be identified and ordered through Field Engineering and the marketing divisions when the 4331, 4341, 4361, or 4381 planning associated with the 4994 is accomplished. See *IBM Series/1 Customer Site Preparation Manual* (GA34-0050) for details.

SUPPLIES (None)

5210 PRINTER MDLS G01, G02

PURPOSE

A bidirectional, impact printer providing correspondence quality printed output for the 3274 Control Unit (all mdls), a 3276 Control Unit Display Station (mdls 1-4, 11-14), a 4321, 4331 or 4361 Processor, a 4701 Finance Communication Controller, or a 8775 Control Unit Display Station. Print wheels in 10 pitch, 12 pitch, 15 pitch or proportional spacing are available to provide a selection of type style and graphic variations with appropriate application programming.

MODELS

Model G01	G01	40 cps	(13.2 inch writing line*)
Model G02	G02	60 cps	(13.2 inch writing line*)

* 11.69 inch writing line when using Automatic Cut Sheet Paper Handler (#7860), Front Exit Sheet Feed (#7870) or Front Exit Sheet and Envelope Feed (#7875).

Note: Actual printer throughput is dependent upon operational and system characteristics. Factors such as controller configuration and line transmission speed, output format, and programming application processing must be considered in determining actual throughput.

The FIVE 3270 SE Aid is available to estimate printer performance for a particular environment in which the 5210 model G01, G02 will be installed. Use of this Aid is essential for understanding the effects of transmission line speed, data stream, protocol, and message sizes on system throughput.

Prerequisites: Customer must supply the printer to system (controller) coax attachment cable. The 3274 requires an available category A terminal port. The 3276 requires an available port or added feature #3255, #3256, or #3257. The 4701 requires an available port on the Device Cluster Adapter feature #3101. An 8775 requires Printer Attachment feature #5580. The 4321, 4331 and 4361 require an available port on the display/printer adapter.

Customer Setup (CSU): The 5210 is designed as a Customer Setup device, thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM. The Marketing Representative must advise the customer of his responsibilities before receipt of the machine.

Limitations:

1. Continuous forms:

   Pin fed continuous forms can be used. (See "Special Features" for Forms Stand and Continuous Forms Feed Device.)

   Both edges of the pin fed forms must be fastened in the forms tractors.

   No staples are permitted in the areas exposed to the interchangeable print wheel.

   Printer operation and print quality vary with paper and number of copies. Multiple part forms should be tested in operating conditions to verify that results are satisfactory. See *Forms Design Reference Guide for Printers,* GA24-3488, for forms design considerations.

   Paper Specifications:
   - Maximum carbons: 5
   - Maximum paper width: 392mm (15.4 in)
   - Maximum pin-to-pin width on forms tractor is 368mm (14.5 in)
   - Maximum print-line width: 335mm (13.2).

2. Single sheet feed is by hand insertion, unless the optional Cut Sheet Feed Device (#7860), Front Exit Sheet Feed (#7870) or Front Exit Sheet and Envelope Feed (#7875) is used. A top margin of one third of an inch is minimum for cutsheet paper. Application attempts to print in this area will result in the printer first moving the writing line (vertically) such that the base line of the graphic to be printed will appear one third of an inch from the top of the sheet. First print lines which contain superscripts will print the superscripts on the base line.

   Printing should not include the last physical line area (0.19 of an inch - 4.8mm from the bottom of the sheet) on a cutsheet. Attempts to do so may result in loss of printed data.

3. Selection of paper and/or envelopes from the Front Exit Sheet and Envelope Feed options when used with the 5210 mdls G01/G02 is governed by the particular system data stream being used. Following is a summary of the ways paper and envelopes can be selected:

   - In LU3 (DSC/DSE) selection of source drawers is available via the printer control panel only.
   - In LU1 (SCS) selection of source drawers is available via the printer control panel or via a 2-B control in the Data Stream. The control is a Page Preparation Media (PPM) which is the same as the PPM of Document Content Architecture Final Form, Text Reference (L2-DCA). This control, if sent, will override the printer control panel setting.
   - In LU1 (L2-DCA), selection of source drawers is via the PPM control in the Data Stream only.

4. Cut Sheet Feed Paper Recommendations:

   Suitable Paper: All of the papers placed in the Cut Sheet Feed Device, Front Exit Sheet Feed or Front Exit Sheet and Envelope Feed Devices should be new, unused and without packaging damage. To insure feed reliability all papers should be "riffled" or "fluffed" before being placed into the supply trays. The papers defined in this section are the only papers considered acceptable for use in the Cut Sheet Feed Device, the Front Exit Sheet Feed, or the Front Exit Sheet and Envelope Feed Device.

   Type and Composition: Plain bond paper of one of the following compositions:

   - No. 1 sulfite (100% chemical wood pulp)
   - 25% cotton content
   - 50% cotton content
   - 100% cotton content
   - Paper made from recycled office paper

   Size: The following paper sizes can be fed either lengthwise or sidewise unless otherwise noted.

   - 178mm x 267mm * (7.0" x 10.5")
   - 185mm x 267mm * (7.25" x 10.5")
   - 191mm x 267mm * (7.5" x 10.5")
   - 203mm x 267mm (8.0" x 10.5")
   - 203mm x 330mm * (8.0" x 13.0")
   - 216mm x 279mm (8.5" x 11.0")
   - 216mm x 330mm * (8.5" x 13.0")
   - 216mm x 356mm * (8.5" x 14.0")

     * Feed lengthwise only.

   Basis weights:

   - 60g/square meter to 90g/square meter (16 to 24 lb.)
   - Optimum: 75g/square meter to 90g/square meter (20-24 lb. bond) 25% or 50% cotton content

   - Unsuitable Paper for the cut sheet feeders.

   Following is a list of paper supplies that may be found in an office that will not feed reliably and may cause misfeeds and paper jams. (This list is not intended to be all-inclusive).

   - Coated paper
   - Vellum paper
   - Coated erasable bond paper
   - Synthetic papers (rice paper, parchment, etc)
   - Translucent paper
   - Multi-sheet forms and documents (bound or unbound)
   - Peel-off, pressure sensitive labels
   - Some types of chemically-treated papers (such as paper used to make copies without carbon paper)
   - Preprinted forms requiring critical character placement
   - Dark colored paper
   - Envelopes
   - Card stock
   - Folded or creased documents
   - Paper with exposed gummed surfaces, holes, perforations, cutouts or windows
   - Highly embossed paper* (embossment height exceeding 0.508mm (0.02")
   - Preprinted papers containing chemicals or substances that leave a residue on the Cut Sheet Feed Device or printer components
   - A mix of different sizes and types of paper in a paper tray
   - Paper in unsatisfactory conditions:
     - Paper with excessive curl or waviness exceeding 3mm (0.118 inch)
     - Reams of paper with edges or corners folded or bonded together (fluffing may correct this condition.)
     - Paper with poorly cut (rough) edges

   Note: Paper should not be exposed to adverse temperature or humidity conditions (consult the paper manufacturer for recommended storage environment).

   Note: Embossments should not be located within 15mm (0.59") of any edge of the sheet.

5. Envelope Recommendations:

   Suitable Envelopes:

   Envelope feeding characteristics vary with the type, sizes and weight of envelopes used.

   All of the envelopes placed in the Front Exit Sheet and Envelope Feed should be new, unused, and without packaging damage. The envelopes defined in this section are the only ones considered acceptable for use in the Front Exit Sheet and Envelope Feed devices.

5210 Printer Mdls G01, G02 (cont'd)

Type and Composition:

United States: Plain bond envelopes of one of the following compositions:

- No. 1 sulfite (100% chemical wood pulp)
- 25% cotton content
- 50% cotton content
- 100% cotton content
- Paper made from recycled office paper
- White envelopes.

World Trade: Well sized boxed paper with non-coated surfaces.

Size: The following United States standard envelope sizes can be fed:

- No. 7 3/4 98.4mm x 190.5mm (3.875" x 7.5")
- No. 9 98.4mm x 225.4mm (3.875" x 8.875")
- No. 10 114.8mm x 241.3mm (4.5" x 9.5")

The size of World Trade envelopes which can be fed range from 98.4mm to 114.8mm (3.875" to 4.5") in width and 190.5mm to 241.3mm (7.5" to 9.5") in length.

Basis weights:

- Optimum: 75g/square meter (20 lb.) sulfite or 25% cotton content plain bond envelopes.

Unsuitable Envelopes:

Following is a list of envelope supplies that may be found in an office that will not feed reliably and may cause misfeeds and envelope jams. (This list is not intended to be all-inclusive.)

- Window envelopes
- Envelopes with holes, perforations, cut out or deep embossing
- Envelopes with side flaps, i.e., flaps that fold along the short dimension of the envelope
- Envelopes with flaps that extend more than 60mm (2.36") beyond the line of the fold

Unsuitable Envelope Conditions:

- Envelopes that are stuck together
- Envelopes that will not stack flat
- Envelopes that are damaged or bent such that they are interlocked

6. Each of the paper source trays in the Cut Sheet Feed, Front Exit Sheet Feed and Front Exit Sheet and Envelope Feed Device will hold approximately 200 sheets of paper and the exit tray holds approximately 400 sheets. The envelope source and exit tray on the Front EXit Sheet and Envelope Feed DEvice hold approximately 100 envelopes each.

7. The 5210 G01, G02, at power on (default) is set to 10 pitch 6 lines per inch and the Courier 10 data processing print wheel is assumed mounted. When the DCA-L2 data stream is selected, the printer is set to 10 pitch, 6 lines per inch and the operator will be instructed to mount the Courier 10 word processing printwheel. Other pitch line space selections and character print wheel arrangements supported by the printer must be transmitted to the printer via the data stream from the connecting host/controller or entered via the printer console by the operator when transmitting 3270 Display/Printer Data Streams. 5-1/3, 9.6, 12, 24 and 48 lines per inch, 1 line per cm and PSM require DCA-L2 data stream application support.

   Some configurations do not support all data stream architectures. See attaching system/controller for support provided.

8. Printer interface support when attached to 3274s, 3276s or 8775s is either LU type 3 using 3270 Display/printer data stream or as LU type 1 using the SCS data stream. 3274 also supports using the DCA-L2 data stream as LU type 1. Non-SNA (BSC/Direct Channel) data streams are also supported. The 4701 supports the SCS data stream only. The 4321, 4331 and 4361 Display/Printer Adapter support 3270 data stream is non-SNA mode only.

9. See the operators guide for additional super/subscripting limitations.

HIGHLIGHTS

- The 5210 consists of control functions, printer and indicator lights in one integrally designed desk-top unit. Special user selectable features (at time of order) permit tailoring of the printer to user requirements.
- Mdl G01 has a rated burst print speed of up to 40 cps (assumes 96-character set with 10 pitch). Mdl G02 has a rated burst print speed of up to 60 cps (assumes 96-character set with 10 pitch).
- Provides printing for either 3270 mode (SNA LU3 or BSC/Direct Channel), SCS (SNA LU1) mode or Document Content Architecture DCA-L2* (SNA LU1) mode (see note 5 under Limitations).
- Dual case operation.
- Accommodates horizontal character spacing of 10 pitch, 12 pitch, 15 pitch, or proportional spacing (DCA-L2 with 3274 only), according to the print wheel selected (see limitations 4).
- Vertical spacing of 3.4, 5-1/3, 6, 8, 9.6, 12, 24, or 48 lines per inch and 1 line per centimeter (see limitations 4 and 5).
- Cancel print.
- Half-line spacing for superscripts and subscripts to a single level (DCA-L2 only). (See limitations 2 and 6.)
- First line registration, form indexing and spacing performed at the console by the user and then controlled by the user program.
- Operator selectable national use character sets (SCS and 3270 data streams only).
- Maximum print positions available when using cutsheet manual or continuous form feed/10 pitch - 132; 12 pitch - 158; 15 pitch - 198; (PSM max is dependent upon text content).
- Multiple speed carriage with indexing at up to 6 inches per second vertically.
- Single sheet feeding by hand, or the optional Cut Sheet Feed Device, Front Exit Sheet Feed or Front Exit Sheet and Envelope Feed (see limitations 3).
- Variable width forms tractor for feeding continuous forms is optional (see limitations 1).
- Multiple 96-character print wheel options available by type style and language graphic variations. See "Specify" and "Print Wheel" chart in "Accessories" for details.
- Metric platen (1 line/cm with CDA-L2 control) optional.
- Ribbon Saver: Provides two modes of ribbon feed via a switch on the printer to allow two levels of print quality. General Correspondence Mode provides approximately one million character yield; Saver Mode provides approximately three million character yield with a decrease in print quality.
- Optional forms stand.
- Customer Setup for early availability and relocation flexibility.

Problem Determination Procedures: Problem Determination (and recovery) Procedures are provided by IBM with the 5210 Printer. These procedures are designed to be easy to follow and use by the customer and it is the customer's responsibility to follow them prior to calling for IBM service. See "Customer Responsibilities".

Customer Responsibilities: The customer is responsible for:

- Receipt, unpacking and placement of the 5210.
- Physical setup, connection of cables to IBM devices incorporating protected access areas, switch setting, and checkout in accordance with instructions provided by IBM.
- Notifying IBM of intent to relocate and follow IBM instructions for relocation of the 5210 Printer.
- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal or relocation instructions and packing materials (if required) will be ordered by the Branch Office.
- Relocation of the 5210, if required, to allow IBM service access.
- Procurement, installation and maintenance of coaxial signal cables and associated cable connectors for attaching the 5210 to the 3274, 3276 and 8775 controllers. Maximum length is 1.5 kilometers.

Basic Configuration: Base machine is shipped with the following specifications:

- Voltage 120V AC, 1-phase, 3-wire, 60Hz
- Power cord plug; nonlocking
- Power cord length; 3 meters (9.8 feet)
- Printwheel: 10 pitch Courier (data processing)
- Print ribbon cartridge: IBM Part No. 1299463
- Character print operation: 1920 bytes

Bibliography: See KWIC INDEX, GA20-1621, or specific system bibliography.

AAS Ordering Instructions: The 5210 is a system component.

SPECIFY

Note: A 3 meter power cord and plug are shipped from the plant of manufacture.

- Voltage (115V AC, 1-phase, 60 Hz): No specify for a standard nonlocking plug (uses customer standard type receptacle).

* DCA-L2 is supported by the 3274 only.

5210 Printer Mdls G01, G02 (cont'd)

Standard power cord is 3 meters (9.8 feet) and no specify is required. Some localities restrict power cord length to 1.8 meters (6 feet); if the 1.8 meter cord is required specify **#9986**.

- Color: Pearl white only (no specify required).
- Language: English (no specify required).
- Print Wheel Type Styles (no specify required) data processing Courier 10.
- Cables: See "Accessories" and *Installation Manual - Physical Planning,* GA27-2787 (3268 Printer), for cable details.
- Compatibility Options for the 3270 Data Stream Operation: Operation of the 5210 is defined as standard. Alternate operation may be specified. *Note:* Standard 5210 operation is the same as the standard 3287 mdls 1 and 2.

  The following feature selections are optional at time of original machine order only and are not field installable:

  1. CARRIAGE RETURN (CR) AT MPP PLUS 1

     Standard: An automatic New Line (NL) is executed at MPP plus 1, then the CR is executed. The next print position will be the first print position of the next line.

     #9608 No automatic New Line (NL) is executed. The CR is executed at MPP plus 1. The next print position will be the first print position of the current line. Compatible with 3287 RPQ S30219.

  2. NEW LINE (NL) AT MPP PLUS 1

     Standard: An automatic New Line (NL) is executed at MPP plus 1, then the NL is executed. The next print position will be the first print position of the current line plus 2.

     #9609 No automatic New Line (NL) is executed. The NL is executed at MPP plus 1. The next print position will be the first print position of the next line. Compatible with 3287 RPQ S30219.

  3. FORM FEED FOLLOWED BY DATA

     Standard: The form will be skipped to the first line of the next form and the next print position will be the second print position of that line.

     #9610 The form will be skipped to the first line of the next form and the next print position will be the first print position of that line. Compatible with 3289 RPQ S30220-SC3752.

  4. FORM FEED IS LAST CHARACTER IN PRINT ORDER

     Standard: An automatic New Line (NL) is executed after the form feed is completed. The next print position will be the first print position of the second line on the next form.

     #9611 The automatic New Line (NL) is suppressed at the completion of the form feed. The next print position will be the first print position of the first line of the next form. Compatible with 3287 RPQ S30219-SC3749.

  5. NULL SUPPRESSION

     Standard: If an entire print Line contains no printable characters, no New Line (NL) is performed. Space (X'40') is considered a printable character. Next print position is the first print position of current line.

     #9612 Prints all null lines as a blank line and performs a new Line (NL). Next print position is first print position of next line. Compatible with 3287 RPQ MLO442-SC 3741 or 3287 RPS MK3988 - SC3741.

  6. FORM FEED (FF) COMMAND POSITION

     Standard: Execute a Form Feed (FF) command only if it occurs at the first print position in a line or at MPP plus 1. Treat Form Feed (FF) at other positions as spaces.

     #9613 Execute a Form Feed (FF) command whenever it is encountered in the Data Stream. Compatible with 3287 RPQ ML0442 - SC3739 or 3287 RPQ MK3988 - SC3739.

  7. AUTOMATIC FUNCTION AT END OF PRINT BUFFER

     Standard: An automatic New Line (NL) is executed following a print order, unless a New Line, Carriage Return or Forms Feed was the last function executed.

     #9614 An automatic Form Feed (FF) is executed following a print order (unless a form feed was the last function executed). Next print position is first print position of first line of next form. Compatible with 3287 RPQ MK3988 - SC3740. This feature is ignored if feature #9604 is selected.

  8. SUPPRESS TIMEOUT - NO DATA LOSS I.R.

     Standard: A 1 minute or 10 minute timeout with message to host following an intervention required condition.

     #9605 Suppress 1 minute and 10 minute timeouts with message to host of intervention required.

  9. AUTO FORM FEED AT END OF LOCAL COPY

     Standard: Execute form feed command as encountered in data stream or setting.

     #9604 Execute auto form feed at end of operator initiated local copy operation (unless a form feed was the last function executed). The next print position is the first print position of line one of the next form (overrides #9614).

- Character Print Operation: The basic machine provides for operation with a program which requires a print buffer of 1,920 bytes while using Erase/Write Alternate Command. For other buffer size requirements, specify as listed below.

  #9521 (960 character print operation) for use with a program which requires a printer buffer size of 960 bytes while using Erase/Write Alternate Command.

  #9523 (2,560 character print operation) for use with a program which requires a printer buffer size of 2,560 bytes while using Erase/Write Alternate Command.

  #9524 (3,440 character print operation) for use with a program which requires a print buffer size of 3,440 bytes while using Erase/Write Alternate Command.

  #9525* (3,564 character print operation) for use with a program which requires a print buffer size of 3,564 bytes while using Erase/Write Alternate Command.

  * 3274 only

SPECIAL FEATURES

Metric Platen (#0300): An optional platen; the attaching system is required to support one line per centimeter index spacing (Set Single Line Density (SSLD in DCA-L2)). This option is effective only with friction feed. Tractor feeding is unaffected by this option. English index increments are nominally short by approximately .005mm per mm of platen movement. Available at time of order only (not field installable).

Continuous Forms Feed Device (#7850): Provides a variable width tractor for feeding continuous forms.

Cut Sheet Feed Device (#7860): Provides for feeding cut sheets of paper from two source trays under System Control. Consists of paper transport and output tray. Paper is stacked face down. See Limitations #3 for drawer selector and Paper Specifications.

Front Exit Sheet Feed (#7870): Provides for feeding cut sheets of paper from two source trays. Consists of paper transport and output tray. Paper is stacked face down. **Field Installation:** Yes. **Customer Setup:** Yes. See "Limitations" for Paper Specifications. Must have cable adapter for use with mdls G01 and G02. Cable adapter shipped with printer or with Front Exit Sheet Feed if ordered for field installation.

Front Exit Sheet and Envelope Feed (#7875): Provides for feeding cut sheets of paper from two paper source trays and envelopes from a separate source tray. Consists of paper transport and separate output trays for sheets and envelopes. Paper and envelopes are stacked face down. **Field Installation:** Yes. **Customer Setup:** Yes. See "Limitations" for paper and envelope specifications. Must have cable adapter for use with mdls G01 and G02. Cable adapter shipped with printer or with Front Exit Sheet Feed if ordered for field installation.

Add Envelope Feed Capability to the Front Exit Sheet Feed (#7876): Field Installation: Only. **Customer Setup:** No. **Prerequisites:** Must have #7870 installed.

MODEL CONVERSIONS

Model changes G01 to G02 are field installable.

ACCESSORIES

Cables: Cables and or associated parts to attach the 5210 to the 3274 Control Unit and 3276 Control Unit Display Station may be purchased from IBM or from a customer-selected source. For the proper

5210 Printer Mdls G01, G02 (cont'd)

identification, installation, and application of the subject cables and parts, see *IBM 3270 Installation Manual - Physical Planning,* GA27-2787 The customer is responsible for installation and maintenance of these cables and their associated parts.

Item	Number	Description
Assm	2577672	Cable Assembly In-Door
Bulk	0323921	Coax Wire (Note 1)
P/N	1836418	Connector Kit (Note 1)
Assm	1833108	Cable Assembly Out-Door
Bulk	5252750	Coax Wire (Note 2)
P/N	1836419	Connector Kit (Note 2)
P/N	2621414	Modification Kit (Note 3)
P/N	1833106	Station Protector Attachment Kit (Note 5)
P/N	5252643	Adapter (Note 7)
P/N	1830818	Station Protection Kit, Gas (Note 4)
P/N	5252899	Station Protector Element, Gas (Note 6)

Specify P/N, Assembly Number, or Bulk Number as appropriate. Allow a lead time of 6 weeks.

Notes:

1. Coax wire and one connector kit (includes two connectors P/N **1836446)** required for each indoor cable assembly.
2. Coax wire and one connector kit (includes two connectors P/N **1836447)** required for each outdoor cable assembly.
3. Customers replacing 2260 display stations may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
4. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
5. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
6. Replacement station protector elements.
7. Use to join two P/N **2577672** or two P/N **1833108** cable assemblies together.

Paper Trays (Top P/N 6819687) (Bottom P/N 6819442): Provides additional trays for Cut Sheet Feed Device (#7860). Eliminates paper removal/ installation from trays when customer uses a wide variety of paper.

Paper Stacker/Tray (P/N 1494596): Permits feeding of continuous forms from a carton and provides for form stacking on a single shelf after printing.

Paper Table (P/N 1495352): Provides paper support and a moveable guide to assist manual cut sheet insertion when Cut Sheet Feed Device (#7860) is not ordered.

5210 Print Wheel Assemblies - Word Processing: Additional print wheels are available in a variety of print styles and character sets. These are supply items and are interchangeable with the print wheel supplied with the machine. Replacement and installation of the print wheel is the customer's responsibility. Additional print wheels for the 5210 may be ordered from IBM. Specify quantity required, quoting following P/Ns as appropriate:

5210 Printer Mdls G01, G02 (cont'd)

Descriptions Specify Codes	Modern PSM	Boldface PSM	Essay PSM	Courier 10	Artisan 10	Prestige Pica 10
US/Australia KB ID 001-	1439517	1439504	1439526	1439511	1439520	1439503
Swiss-German/ Swiss-French KB ID 049&051-	1439518	1439509	1439527	1439512	1439521	1439505
Germany/Austria KB ID 029-	1439597	1439589	1439629	1439565	1439613	1439581
France KB ID 251-	1439598	1439590	1439630	1439566	1439614	1439582
UK/Israel/Latin KB ID 067-	1439599	1439591	1439631	1439567	1439615	1439583
Sweden/Finland KB ID 053-	1439602	1439594	1439634	1439570	1439618	1439586
French/Belgium KB ID 031-				1439650*		
Denmark/Norway KB ID 057&055-	1439519	1439510	1439528	1439513	1439522	1439506
US Accounting KB ID 017-				1439654*		
EBCDIC KB ID 101-				1439653*		
ASCII KB ID 103-				1439652*		
Canada/English KB ID 037-	1439550	1439538	1439562	1439546	1439558	1439534
Canada Bilingual KB ID 039-	1439551	1439539	1439563	1439547	1439559	1439535
Latin America/P/R. KB ID 025-	1439547	1439537	1439561	1439545	1439557	1439533
Italy KB ID 041-	1439600	1439592	1439632	1439568	1439616	1439584
Netherlands/So. Africa KB ID 043-	1439601	1439593	1439633	1439569	1439617	1439585
Spain KB ID 045-	1439603	1439595	1439635	1439571	1439619	1439587
UK/Israel/Latin 88 KB ID 066-				1439638*		
Canada/Bilingual 88 KB ID 038-				1439639*		
Sweden/Finland 88 KB ID 052-				1439640*		
Swiss/French 88 KB ID 048-				1439641*		
Swiss/German 88 KB ID 050-				1439642*		
Japan/English	1439552	1439540		1439548		1439536

5210 Printer Mdls G01, G02 (cont'd)

Descriptions and Specify Codes	Prest'g Elite 12	Courier 12	Letter Gothic 12	Prest'g 15	Symbol 12*	Rhetoric *
US/Australia KB ID001-	1439502	1439523	1439514	1439655	* 1439639	1439736
Swiss-German/ Swiss-French KB ID 049&051-	1439507	1439524	1439515	1439689		1439745
Germany/Austria KB ID 029-	1439573	1439605	1439621	1439681		1439738
France KB ID 251-	1439574	1439606	1439622	1439694		1439749
UK/Israel/Latin KB ID 067-	1439575	1439607	1439623	1439683		1439739
Sweden/Finland KB ID 053-	1439578	1439610	1439626	1439688		1439744
French/Belgium KB ID 031-	1439651			1439682		
Denmark/Norway KB ID 057&055-	1439508	1439525	1439516	1439690		1439746
Canada/English KB ID 037-	1439530	1439554	1439542	1439684		1439740
Canada Bilingual KB ID 039-	1439531	1439555	1439543	1439685		1439741
Japan/English	1439532		1439544			

* Only available as additional print wheels

SUPPLIES

Ribbons: The IBM 463 Ribbon (P/N 1299463).

5224 PRINTER MDLS 1, 2

PURPOSE

A table-top impact matrix line printer for the 5280 Distributed Data System, Series/1, System/34, System/36, and System/38.

MODELS

Maximum Rated Speeds*

Models		10 Characters per inch	15 Characters per inch
Mdl 1	001	140 lpm	95 lpm
Mdl 2	002	240 lpm	170 lpm

* For a 18.8cm (7.4 inch) print line.

See "Throughput Considerations" below for print speed factors.

Customer Setup (CSU): The 5224 is a customer setup machine, thereby offering the customer early availability and relocation flexibility. Customer responsibilities are set forth in *Information Bulletin for Customers - Customer Setup* (G120-2743). CSU allowance is one day. The CSU allowance is two days if installed concurrently with a 5280 system. CSU instructions are included with the 5224.

HIGHLIGHTS

The 5224 is an impact matrix line printer of table-top design with characteristics similar to the 5225 printer. A table is not provided with the 5224 (see "Accessories"). The character matrix is eight dots high and seven dots wide. Maximum character height is 2.92mm (0.115 inches). Three character sets are available. Character set selection has no effect on print speed. Upper and lower case is provided in all character sets. See "Type Catalog" for character set arrays. Horizontal print density of 10 or 15 characters per inch (cpi) is operator-selectable. Line spacing of six or eight lines per inch (lpi) is similarly selectable. System/34, System/36, and System/38 Programming supports programmable control of print density and line spacing. Operator selection of density and spacing can optionally be exercised. See "System Attachment" below. The 33.5cm (13.2 inch) print line provides for a maximum of 132 characters at 10 cpi and 198 characters at 15 cpi. Oversize and special characters, logos, business graphics, OCR-A, and bar-code printing can be printed dependent upon host program support. An audible alarm provides an indication to the operator when manual intervention is required due to one of nine printer error conditions. Cable-thru provides the capability of connecting a total of seven multiple 5219s, 5224s, 5225s, 5251 mdl 1 or 11, 5252s, and to a single twinaxial cable. Each unit on the cable, except the last, requires this feature. Only one additional printer may be attached via Cable-Thru if coax cable is used. A cartridge ribbon provides for fast, easy and clean ribbon changes. One cartridge ribbon and a ribbon shield, to prevent smudging, are provided with the 5224. A fully adjustable forms tractor provides for feeding margin-punched continuous forms. Up to 4-part forms may be utilized. Forms greater than four parts should be tested for customer acceptance. See *Forms Design Reference Guide for Printers* (GA24-3488) for forms design considerations. Forms skipping and vertical spacing are under program control.

Throughput Considerations: Six factors determine print speed:

1. The mdl of the 5224.
2. The print position of the right-most character in the line being printed.
3. The print density (10 cpi or 15 cpi).
4. Vertical spacing and skipping.
5. Communications and programming considerations.
6. Density (quantity of dots) in each line printed.

The 5224 maximizes throughput by taking advantage of short line lengths prevalent in most printing. Throughput of mdl 1 is line-length dependent as indicated by the position of the right-most character printed. The mdl 2 is similarly line-length dependent except for the left-most 18.8cm (7.4 inches) of the print line. Any print line 18.8cm (7.4 inches) long or less, as measured from the left, will print at the rate of 240 lines per minute at 10 cpi or 170 lines per minute at 15 cpi. Lines longer than 18.8cm (7.4 inches) will print at a rate reduced in proportion to the number of characters printed beyond 18.8cm (7.4 inches). The mdl 2 has a "design point" of 18.8cm (7.4 inches). A "design point" is not applicable to the mdl 1.

Care in forms design can significantly improve printer throughput. Unnecessary blanks between vertical columns should be avoided. Columns with low data content should be placed to the right of the form. Consideration should be given to print density; 10 or 15 cpi. By redesigning the form for 15 cpi, two-up output may be achieved, thereby improving final throughput.

The 5224 Printer uses an internal print management feature to guard against damaging the printer due to the quantity of dots in a print line. When printing a dense line (a line with a large number of dots), this safeguard may cause the print mechanism to print the line by using multiple passes of the print head. When the printer operates in multi-pass mode, each print line requiring multiple passes is considered to be full length 33.5 cm (13.2 inches). The nominal print speed in multi-pass mode for the mdl 1 is 20 lpm at 10 cpi and 15 lpm at 15 cpi. The mdl 2 in multi-pass mode operates at 25 lpm at 10 cpi and 20 lpm at 15 cpi. The additional time required for multi-pass printing lowers the overall throughput proportionally to the frequency of the dense lines printed.

Although some print lines may contain large quantities of dots (forcing multi-pass printing), usually only repetitive printing of the same character causes multi-pass printing. For example, a series of asterisks or dashes, normally used for highlighting are printed at a lower speed. In printing operations where speed is a primary concern, special techniques can be used to avoid multi-pass printing. For example:

Instead of using	Use
**********	* * * * * * * * * *
##########	# # # # # # # # # #
----------	_ _ _ _ _ _ _ _ _ _

Use of the Load Alternate Character (LAC) command on System/34 or System/36 via the Advanced Printer Function PRPQ, Bar Code Print FDP or other user-generated programs may result in the use of graphics which will result in multi-pass printing. Since print time may vary with each line printed, as line length varies, or due to skipping and spacing, typical customer documents should be benchmarked if specific throughput rates are desired.

The following charts show the relationship of these variable factors in determining print speed.

10 Character Per Inch Print Density

	Mdl 1	Mdl 2
Design Point	N/A	74 Characters 18.8cm (7.4 inches)
Throughput (74-character Lines)	140 lpm	240 lpm
Maximum (Characters per line)	132	132
Throughput (132-character Print Line)	90 lpm	120 lpm

15 Characters Per Inch Print Density

	Mdl 1	Mdl 2
Design Point	N/A	111 Characters 18.8cm (7.4 inches)
Throughput (111-character Lines)	95 lpm	170 lpm
Maximum (characters per line)	198	198
Throughput (198-character Print Line)	60 lpm	85 lpm
Throughput (132-character Print Line)	80 lpm	135 lpm

Problem Determination Procedures: Problem determination is aided by significant offline verification tests which have been designed into the printer control unit to provide greater printer availability to the customer. See *IBM 5224 Printer Operator's Guide* (GA34-0092) for procedures.

System Attachment

The 5224 attaches to System/34, System/36, System 38, and the 5280 System in a manner identical to the 5219, 5225, and 5256 printers.

For Direct Attachment to System/34: The 5224 Printer may be attached to System/34 in the following manner:

- When designated as the system printer, the 5224 connects to the workstation controller via one of the four twinaxial cable connectors (ports) on the 5340 System Unit. A 6 meter (20 foot) cable is provided with the 5340. Specify **#9308** on the 5340.
- When designated as a local workstation printer, the 5224 attaches in a manner similar to 5250 Information Display System devices.

See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for cabling information.

Direct Attachment to System/36: The 5224 Printer may be attached to System/36 in a manner similar to 5250 Information Display Station

5224 Printer Mdls 1, 2 (cont'd)

devices. See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337), for cabling information.

Direct Attachment to System/38: For use as a local workstation printer, the 5224 Printer may be directly attached to the System/38 via the workstation controller features on the 5381. Attachment is by twinaxial cable in a manner similar to the 5225 and 5256 printers. See M5381 pages for workstation controller information.

Remote Printing: For remote printing in a Communications Environment on System/34, System/36, and System/38, the 5224 may be attached to the 5251 mdl 2 or 12 with the Cluster Feature (#2550) or the Dual Cluster Feature (#2551) on the 5251. May also be attached to the 5294 workstation controller. See M5294 pages for workstation attachment limitations.

5280 Attachment: For Attachment to the 5280 Distributed Data System, the 5285 Programmable Data Station and the 5288 Programmable Control Unit provide for the attachment of the 5224 Printer via twinaxial cable, 1,525 meters (5,000 feet) maximum to the appropriate printer attachment. The prerequisite attachment feature on the 5285 is the Twinax® Printer Attachment (#1150). The prerequisite attachment feature on the 5288 can be the Single Twinax Printer Attachment (#1155); the Multiple Twinax Printer Attachment (#1160); or the Multiple Start/Stop-Twinax Printer Attachment (#1162). See *IBM 5280 Cable Assembly Manual* (GA21-9341) for cabling information. A maximum of eight printers can be attached to the 5288.

Attachment to Series/1: The 4952, 4954, 4955, 4956, 4959 Input/Output Expansion Unit, and 4965 Diskette Drive and I/O Expansion Unit provide for the attachment of the 5224 via the Printer Attachment - 5200 Series (#5640). A 6 meter (20 foot) twinaxial Attachment Cable (#5780), is available. The printer may be attached up to a maximum distance of 1,525 meters (5,000 feet) using twinaxial cable. See *Series/1 Customer Site Preparation Manual* (GA34-0050) for cabling information.

Publications: The following manuals are included with the 5224 when it is shipped to the customer: *IBM 5224 Printer Operator's Guide* (GA34-0092), *IBM 5224 Printer Customer Setup Guide* (GA34-0093).

AAS Ordering Instructions: The 5224 is a System Component.

SPECIFY

- Voltage (120V AC, 1-phase, 60 Hz): With a nonlocking plug on a 2.4 meter (8 foot) power cord. No specify is required.
- Color: Pearl White (no specify is required).
- Cables: See "Accessories". For cable specifications, see the *IBM 5250 Information Display Systems Planning and Site Preparation Guide* (GA21-9337), or *IBM 5280 Cable Assembly Manual* (GA21-9341).
- System Attachment: Specify one of the following:

Series/1	**#9566**
System/34	**#9561** for system printer **#9560** for local workstation printer **#9559** for remote workstation printer
System/36	**#9567** for system printer **#9568** for local workstation printer **#9569** for remote workstation printer
System/38	**#9563** for system printer **#9564** for local workstation printer **#9565** for remote workstation printer
5280 System	**#9562**

- Character Set: Specify one of the following: See "Type Catalog" for character set arrays. All workstations and printers attached to a System/34, System/36, and a 5251 mdl 2 or 12 must have the same character set.

  #9501 for 95-character EBCDIC
  #9470 for 184-character Multinational (includes ASCII graphics)
  #9570 for 95-character Spanish Speaking (N and n capability)

SPECIAL FEATURES (None)

MODEL CONVERSIONS

Field installation available. The upgrade purchase prices for model conversions may be greater than the purchase price differentials. Customers should carefully evaluate their future requirements when purchasing a 5224 Printer. Replaced parts from any model conversion become the property of IBM.

ACCESSORIES

Forms Stand (#4450): A one-shelf, floor-standing forms stand provides for stacking of continuous forms after printing. For field installation, order by feature number on MES.

Printer Table: SSD offers a table especially designed for the 5224 providing such features as a slot in the surface for paper feeding, a shelf for manuals, a paper stacking rack and a design that compliments the 5224 in style and color. Interested customers may order from IBM directly, toll-free at 800-631-5582 (in New Jersey use 800-352-4960 and in Hawaii and Alaska use 800-526-2484). For further information contact an IBM Marketing Representative.

Cables: Cables and/or associated parts to attach the 5224 Printer to the 5251 mdl 2 or 12, 5340, 5360, 5381, 5285, or 5288 may be purchased from IBM or from a customer-selected source. For the description of these cables and parts, see the *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337), or the *IBM 5280 Cable Assembly Manual* (GA21-9341). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the 5224.

Twinaxial Cabling: Order via MSORDER (Category = Bulk Cable) , specifying part number. Allow a lead time of 120 days.

Twinaxial Connector Kit (P/N **7362268**): Includes two connectors. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. Individual connectors P/N **7362229** are available for replacements.

Twinaxial Wire (P/N **7362211**): Order must specify the desired length. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. This is an indoor/outdoor cable.

Twinaxial Cable Assembly (P/N **7362267**): Includes a Connector Kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinaxial Adapter (P/N **7362230**): Permits two Twinaxial Cable Assemblies to be joined together.

Twinaxial Station Protector Kit: The kit (B/M 7361807) includes two protectors. One is required at each end of each Twinaxial Attachment Cable installed outdoors (either above or below ground level). Individual Twinaxial Station Protectors, P/N **7362426**, are available for replacement purposes. Order via MSORDER (Category = Accessory/Supplies) specifying bill of material number. Allow a lead time of 120 days. **Customer Setup:** Yes.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

Twinaxial Connector Kit: Includes two connectors. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362063** for Teflon-covered cable. Individual connectors P/N **7362229** are available for replacement.

Twinaxial Wire: Order must specify the desired length. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362061** for Teflon-covered cable.

Twinaxial Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order P/N **7362062** for Teflon-covered cable assembly.

Series/1 Attachment Cables: For a description of cables and/or associated parts to attach the 5224 Printer to the Series/1 (feature #5640), see *IBM Series/1 Customer Site Preparation Manual* (GA34-0050). Twinaxial cabling for attachment to the 4952, 4954, 4955, 4959, or 4965 (feature #5640):

Device (5224) connector	**P/N 7362229**
2x4 Berg Connector Kit	**P/N 6095524**
Twinaxial cable	**P/N 7362211**

SUPPLIES

Ribbons: A black cartridge ribbon, P/N **6845100**, or equivalent, is required. Contact IBM.

Ribbon Shields: One ribbon shield is included with each quantity of five ribbons purchased from IBM. Ribbon shields are also available separately. For additional information, call 800-631-5582.

5225 PRINTER MDLS 1, 2, 3, 4

PURPOSE

An impact matrix line printer for the 5280 Distributed Data System, Series/1, System/34, System/36, and System/38.

MODELS

Maximum Rated Speeds

		10 Characters Per Inch	15 Characters Per Inch
Model 1	001	280 lpm	195 lpm
Model 2	002	400 lpm	290 lpm
Model 3	003	490 lpm	355 lpm
Model 4	004	560 lpm	420 lpm

See "Throughput Considerations" below for print speed factors.

Prerequisites: All 5225 Printers used in applications printing characters more dense than normal must have E/C 323150 factory installed or field B/M 6844756 installed. 5225 mdl 1 Printers printing OCR-A or bar-code must have E/C 987958 factory installed or field B/M 6840638 installed.

Customer Setup (CSU): The 5225 is a Customer Setup machine. The CSU allowance is one day. The CSU allowance is two days if installed concurrently with a 5280 System. For additional information on CSU, see the GI section.

HIGHLIGHTS

An impact matrix printer utilizing refinements in technology to achieve line printer speeds. The character matrix is eight dots high and seven dots wide. Maximum character height is 2.92mm (0.115 inches). A variety of character sets are available. Character set size has no effect on print speed. Upper and lower case is provided in all character sets. See "Type Catalog" for character set arrays. Horizontal print density of 10 or 15 characters per inch (cpi) is operator-selectable. Line spacing of six or eight lines per inch (lpi) is also selectable. The 33.5cm (13.2 inch) print line provides for a maximum of 132 characters at 10 cpi and 198 characters at 15 cpi. Oversize and special characters, logos, business graphics, OCR-A, and bar-code printing can be printed dependent upon host programming support. See "Prerequisites" above. One ribbon and a ribbon shield, to prevent ink smudging, are provided with the 5225. A forms tractor provides for feeding margin punched continuous forms. See *Form-Design Printers Reference Guide* (GA24-3488) for forms design considerations. Forms skipping and vertical spacing are under program control.

Throughput Considerations: Five factors determine print speed:

1. The mdl of the 5225.
2. The print position of the right-most character in the line being printed.
3. The print density (10 cpi or 15 cpi).
4. Spacing and skipping.
5. Communications considerations.

Each mdl of the 5225 is designed to achieve maximum print speed for lines having up to a predetermined number of characters (design point). For each line exceeding the design point in length, print speed (lpm) will be reduced in proportion to the number of additional characters. Line lengths are determined by the print position of the right-most character in the line being printed, not by the number of characters actually printed in the line. The following charts show the relationship of these variable factors in determining print speed.

10 Characters Per Inch Print Density

	Mdl 1	Mdl 2	Mdl 3	Mdl 4
Design Point (Characters)	74	98	118	130
Throughput for Lines up to the Design Point in Length	280 lpm	400 lpm	490 lpm	560 lpm
Maximum Characters Per Line	132	132	132	132
Throughput for a 132-Character Print Line	130 lpm	205 lpm	330 lpm	520 lpm

15 Characters Per Inch Print Density

	Mdl 1	Mdl 2	Mdl 3	Mdl 4
Design Point (Characters)	111	147	177	195
Throughput for Lines up to the Design Point in Length	195 lpm	290 lpm	355 lpm	420 lpm
Maximum Characters Per Line	198	198	198	198
Throughput for a 198-Character Print Line	90 lpm	145 lpm	235 lpm	385 lpm
Throughput for a 132-Character Print Line	150 lpm	290 lpm	355 lpm	420 lpm

Form design, which reduces the number of lines exceeding the design point, can optimize printer throughput. Since print time may vary with each line printed, typical customer documents should be benchmarked if specific throughput rates are required. Multiple printer and display station operational loads may also affect performance.

Problem Determination Procedures: Problem determination is aided by significant offline verification tests which have been designed into the control unit to provide greater printer availability to the customer. See *IBM 5225 Printer Operator's Guide* (GA34-0054) for procedures.

For Direct Attachment to System/34: The 5225 Printer may be attached to System/34 in the following manner:

- When designated as the system printer, the 5225 connects to the Workstation Controller via one of the four twinaxial cable connectors on the 5340 System Unit. A 6 meter (20 foot) cable is provided with the 5340. Specify **#9307** on the 5340.
- When designated as a local workstation printer, the 5225 attaches in a manner similar to other 5250 Information Display System devices.

See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for cabling information.

For Direct Attachment to System/36: The 5225 Printer may be attached to the System/36 in a manner similar to 5250 Information Display Station devices. See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337), for cabling information.

For Direct Attachment to System/38: The 5225 printer may be attached to System/38 in the following manner:

- When designated as the system printer, the 5225 connects to the Workstation Controller feature on the 5381 via user-provided twinaxial cable. Specify **#9817** on the 5381.
- When designated as a local workstation printer, the 5225 attaches via the Workstation Controller feature on the 5381. Attachment is by user-provided twinaxial cable in a manner similar to the 5219, 5224, and 5256 Printers.

See M5381 pages for Workstation Controller information. See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for cabling information.

Remote Printing: For remote printing in a Communications Environment on System/34, System/36, and System/38, the 5225 may be attached to the 5251 mdl 2 or 12 with the Cluster feature (#2550) or the Dual Cluster feature (#2551) on the 5251. May also be attached to the 5294 workstation controller. See M5294 pages for workstation attachment limitations. See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for cabling and configuration information.

Series/1 Attachment: The 4952, 4954, 4955, 4956, 4959 Input/Output Expansion Unit, and the 4965 Diskette Drive and I/O Expansion Unit provide for the attachment of the 5225 via the Printer Attachment - 5200 Series (#5640). A 6 meter (20 foot) twinaxial Attachment Cable (#5780), is available. The printer may be attached up to a maximum distance of 1,525 meters (5,000 feet) using twinaxial cable. See *Series/1 Customer Site Preparation Manual* (GA34-0050) for cabling information.

5280 Attachment: For attachment to the 5280 Distributed Data System, the 5285 Programmable Data Station and the 5288 Programmable Control Unit each provide for the attachment of the 5225 Printer, via twinaxial cable 1,525 meter (5,000 foot) maximum, to the appropriate printer attachment. See *IBM 5280 Cable Assembly Manual* (GA21-9341) for cabling information.

Customer Responsibilities: The marketing representative must advise customers of their responsibilities before receipt of the machine. For additional information, see the GI section.

The customer is responsible for:

- Receipt, unpacking, and placement of the 5225.

5225 Printer Mdls 1, 2, 3, 4 (cont'd)

- Physical setup, connection of cables to IBM devices incorporating protected access areas, switch setting, and checkout in accordance with instructions supplied with the 5225.
- Notifying IBM of intent to relocate and for following IBM instructions for relocation of the 5225.
- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal instructions and packing materials (if required) will be ordered by the IBM Branch Office.
- Relocation of the 5225, if required, to allow IBM service access.
- Using and following the problem determination procedures for the 5225 prior to calling IBM for service.
- Installation and maintenance of signal cables and associated parts for attaching the 5225 to the 5251, 5285, 5288, 5340, or 5381.
- When adding additional printers to the System/34, System/36, System/38 or 5280 Distributed Data System, the customer must modify the system configuration specifications. See *IBM System/34 Program Product Installation and Modification Reference Manual* (SC21-7689), *System/36 - Preparing a Place for Your Computer* (SA21-9444), *Planning for System Configuration* (SA21-9440), *Changing Your System Configuration* (SC21-9052), *IBM System/38 Guide to Program Product Installation and Device Configuration* (GC21-7775), or *IBM 5280 System Control Programming Reference Manual* (GC21-7824).

Publications: *IBM 5250 Information Display System Introduction* (GA21-9246), *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337), *IBM 5280 Planning and Site Preparation Guide* (GA21-9351), *IBM 5280 Cable Assembly Manual* (GA21-9341) and *IBM 5225 Printer Operator's Guide* (GA34-0054).

SPECIFY

- Voltage (120V AC, 1-phase, 60 Hz): **#9890** for a locking plug or **#9891** for a standard nonlocking plug. 208V AC, 1-phase, 60 Hz: **#9884** for a locking plug or **#9885** for a nonlocking plug. 240V AC, 1-phase, 60 Hz: **#9894** for a locking plug or **#9895** for a nonlocking plug.
- Color: One color accent must be specified. Specify **#9060** for Willow Green, **#9061** for Garnet Rose, **#9062** for Sunrise Yellow, **#9063** for Classic Blue, **#9064** for Charcoal Brown, or **#9065** for Pebble Gray. Printer background color is Pearl White.
- Character Sets: Specify one of the following:

  #9501 for 95-Character EBCDIC
  #9470 for 184-Character Multinational (includes ASCII graphics)
  #9570 for 95-Character Spanish Speaking (N and n capability)

  See "Type Catalog" for character set arrays. All workstations and printers attached to a System/34, System/38, and 5251 mdl 2 or 12 must have the same character set.
- Cables: See "Accessories" for cable ordering instructions. For cable specifications, see the *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337), or *IBM 5280 Cable Assembly Manual* (GA21-9341).
- System Attachment: Specify one of the following:

Series/1:	**#9566**
System/34:	**#9561** for system printer **#9560** for local workstation printer **#9559** for remote workstation printer
System/36:	**#9567** for system printer **#9568** for local workstation printer **#9569** for remote workstation printer
System/38:	**#9563** for system printer **#9564** for local workstation printer **#9565** for remote workstation printer
5280 System:	**#9562**

SPECIAL FEATURES

Replaced parts from any special feature installation or removal remain the property of the customer.

Audible Alarm (#1470): Provides an indication to the operator when manual intervention is required due to one of nine printer error conditions or on command from the host. **Maximum:** One. **Field Installation:** Yes .

Cable-Thru (#2680): Provides the capability of connecting multiple 5219s, 5224s, 5225s, 5251 mdl 1 or 11, 5252s, and 5256s to a single twinaxial cable. Each unit on the cable, except the last, requires this feature. **(Note:** For relocation flexibility, the customer should have Cable-Thru on all workstations.) **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS

The upgrade purchase prices for model conversions may be greater than the purchase price differentials. Customers should carefully evaluate their future requirements when purchasing a 5225 Printer. Replaced parts from any model conversions become the property of IBM.

ACCESSORIES

Cables: Cables and/or associated parts to attach the 5225 Printer to the 5251 mdl 2 or 12, 5285, 5288, 5340, 5360, or 5381 may be purchased from IBM or from a customer-selected source. For description of these cables and parts, see *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) or *IBM 5280 Cable Assembly Manual* (GA21-9341). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the 5225.

Twinaxial Cabling (for attachment to the 5251 mdl 2 and 12, 5285, 5288, 5340, and 5360):

Twinaxial Connector Kit (P/N **7362268**): Includes two connectors. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. (Individual connectors, P/N **7362229**, are available for replacements.)

Twinaxial Wire (P/N **7362211**): Order must specify the desired length. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. (This is an indoor/outdoor cable.)

Twinaxial Cable Assembly (P/N **7362267**): Includes a Twinaxial Connector Kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinaxial Adapter (P/N **7362230**): Permits two Twinaxial Cable Assemblies to be joined together.

Twinaxial Station Protector Kit (B/M **7361807**): A kit includes two protectors. One is required at each end of each twinaxial attachment cable installed outdoors (either above or below ground level). Individual Twinaxial Station Protectors, P/N **7362426**, are available for replacement purposes. The station protector is a CSU accessory.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

Twinaxial Connector Kit: Includes two connectors. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362063** for Teflon-covered cable. Individual connectors P/N **7362229** are available for replacement.

Twinaxial Wire: Order must specify the desired length. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362061** for Teflon-covered cable.

Twinaxial Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order P/N **7362062** for Teflon-covered cable assembly.

Series/1 Attachment Cables: For a description of cables and/or parts to attach the 5225 printer to the Series/1 (feature #5640)... see *IBM Series/1 Customer Site Preparation Manual* (GA34-0050). Twinaxial cabling for attachment to the 4952, 4954, 4955, 4959, or 4965 (feature #5640):

Device (5225) connector	P/N **7362229**
2x4 Berg Connector Kit	P/N **6095524**
Twinaxial cable	P/N **7362211**

SUPPLIES

Ribbons: A black ribbon, P/N **4412372** or equivalent, is required. Contact IBM.

Ribbon Shields: One ribbon shield is included with each quantity of five ribbons purchased from SSD. Ribbon shields are also available separately from SSD. For additional information, contact an IBM Marketing Representative or call 800-631-5582.

5251 DISPLAY STATION

PURPOSE

The 5251 is an advanced function display station for Series/1, System/34, System/36, and System/38 for entering, editing, and displaying alphameric data. A movable keyboard permits the operator to display, enter, and manipulate data on the screen in a highly flexible and efficient manner.

MODELS

Model 1	001	[NO LONGER AVAILABLE.] For special features, see below. Displays up to 960 characters with 12 lines of 80 characters each. Attaches to the 5251 models 2 or 12, 5340, 5381, or Series/1. Used as the system console with System/34.
Model 2	002	[NO LONGER AVAILABLE.] For special features, see below. Displays up to 960 characters with 12 lines of 80 characters each. Provides communication capability with System/34 and System/38 in SNA/SDLC mode. Optional features allow up to eight additional workstations.
Model 11	011	Displays up to 1,920 characters with 24 lines of 80 characters each. Attaches to the 5251 models 2 or 12, 5294, 5340, 5360, 5381, or Series/1. Used as the system console with System/34, and System/36. See model 999.
Model 12	012	Displays up to 1,920 characters with 24 lines of 80 characters each. Provides communication capability with System/34, System/36, and System/38 in SNA/SDLC mode. Optional features allow up to eight workstations to be attached.
Model 999	999	Available for ease of order entry. Identical functions to model 11. Includes as standard the following: Specify **#9881** - Nonlocking line cord plug Feature #4600 - Typewriter-style keyboard Feature #2680 - Cable-Thru No other specify or features are available on the model 999.

Prerequisites: For mdls 1 and 11: A 5251 mdl 2 or 12 with Cluster feature (#2550) or Dual Cluster feature (#2551), a 5294, 5340, 5360, 5381, or Series/1 with 5250 Information Display System Attachment feature (#1210).

For mdl 2: Transmission via common carrier facility to a 5340 or 5381 with a communications adapter, requires a modem or a DDS Adapter. See "Special Features" for communications adapters.

For mdl 12: Transmission via common carrier facility to a 5340, 5360, or 5381 with a communications adapter, requires a modem or a DDS Adapter. See "Special Features" for communications adapters.

Customer Setup (CSU): The 5251 is designated as a Customer Setup device, thereby offering the customer early availability and relocation flexibility. For additional information on CSU, refer to the GI section. The IBM Marketing Representative must advise customers of their responsibilities before receipt of the machine. The CSU allowance is one day. Special features are not CSU.

HIGHLIGHTS

The standard character set includes 96 8x16 dot matrix characters including: 52 upper/lower case alphabetic, 10 numeric, and 34 special characters in addition to the space character. A 188-character Multinational Character Set (see "Special Features") is available, providing 112 alphabetic, 10 numeric, and 66 special displayable characters in addition to the space. See "Type Catalog" for character set and keyboard layout. Display functions in addition to normal intensity are high intensity, non-display, blink, underscore, column separator, and reverse image (dark characters on a light background) on a field basis. The operator can also reverse the image of the entire screen. An audible alarm, under program control, is provided to alert the operator to special conditions. The keyboard with 24 application-assigned command functions provides input and control flexibility. See "Special Features".

Security Enhancements: Data fields may be defined so data entered is accepted without being displayed on the screen. A Keylock (#4655) prevents operator usage of the display and keyboard when the key is in the locked position. The display is blanked and keyboard data entry is inhibited when the Keylock is locked. A Magnetic Stripe Reader (#4910) is available for entering user identification.

Field Editing: Individual data input fields may be edited as Alphameric, Alpha Only, Signed Numeric, Field Exit Required, Right Adjust, Mandatory Entry, Mandatory Fill, Bypass, Auto Enter, Dup Enable, Monocase, and Self-Check Modulus 10 and 11 (Self-Check is optional on the 5251 mdls 2 and 12).

Cabling: The cable attachments between 5250 Display System components and/or systems must be made with twinaxial cable. Maximum length of any one twinaxial cable is 1,525 meters (5,000 feet). Up to seven workstations may be attached to a twinaxial cable via a Cable-Thru feature (#2680) on each workstation.

See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for cabling information.

Clustering: Additional workstations may be attached to the 5251 mdl 2 or 12 with the Cluster (#2550) or the Dual Cluster (#2551) feature. The Cluster feature allows attachment of up to four workstations and the Dual Cluster feature allows attachment of up to eight workstations. See "Special Features".

Communications: The 5251 mdls 2 and 12 communicate with a System/34 or a System/38 equipped with compatible communications adapters operating in SDLC mode only. The 5251 mdl 12 can also communicate with System/36 equipped with a compatible communications adpter operating in SDLC mode. The mdls 2 and 12 communicate in half-duplex mode on nonswitched (leased) point-to-point and multipoint communication lines which may be duplex or half-duplex facilities (depending upon communication feature selected) at speeds up to 9600 bps, and on switched (dial) point-to-point communication lines at speeds up to 4800 bps. See M2700 pages for information on communications facilities. **Limitations:** The mdls 2 and 12 are not supported on the Series/1. Mdl 2 is not supported on System/36. A 1200 bps Integrated Modem (#5500, #5502), 2400 bps Integrated Modem (#5640, #5641), 4800 bps Integrated Modem (#5740, #5741), DDS Adapter (#5650, #5651), or Interface (#3701) is required. See "Specify" and "Special Features" for the required communication cable.

IBM Modems: One IBM modem may be attached to a 5251 mdl 2 or 12.

Modem	Speed (bps)
3863	2400
3868 mdl 1	2400
3872	2400/1200
3864	4800
3868 mdl 2	4800
3865	9600
3868 mdl 3/4	9600

Note: 5251 mdls 2 and 12 do not support Auto-Call Originate (#1091) on the 3872. For communications capabilities, product utilization, and special features, see M2700, 3863, 3864, 3865, and 3872 pages.

Prerequisites: EIA Interface (#3701).

IBM Data Encryption Devices: A 3845 or 3846 Data Encryption Device may be attached between the 5251 mdl 2 or 12 and the external modem.

Note: Refer to M2700, 3845, and 3846 pages for information on 3845 or 3846 configuration and communications capability. 3845 or 3846 devices operating with SDLC protocol will not operate with NRZI transmission mode.

Prerequisites: EIA Interface (#3701).

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided in the *IBM 5251 Operator's Guide* (GA21-9248). Also, see "Customer Responsibilities".

Customer Responsibilities: The customer is responsible for:

- Receipt, unpacking and placement of the 5251.
- Physical setup, connection of cables to TP lines/modems and IBM devices incorporating protected access areas, switch setting, and checkout in accordance with instructions supplied by IBM. Under certain conditions, when using integrated modems, an IBM CE may be required. Details of these conditions are described in the Customer Setup instructions.
- Notifying IBM of intent to relocate and following IBM instructions for relocation of the 5251.
- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal instructions and packaging materials (if required) will be ordered by the branch office.
- Relocation of the 5251, if required, to allow IBM service access.
- Using and following the problem determination procedures for the 5251 prior to calling for IBM service.
- Providing a desk or tabletop to support the 5251.
- Installation and maintenance of signal cables between 5250 Information Display System components and the attached system.

5251 Display Station (cont'd)

- The installation and maintenance of common carrier facilities/services. For further information, see M2700 pages and "Teleprocessing Systems" in the GI section.
- Obtaining a firm installation date for the start of transmission services (including any required modems). The IBM Marketing Representative must assure that a firm installation date is established prior to Order Confirmation.
- When adding additional display stations to Series/1, System/34, or System/38, the customer may have to modify the system configuration specifications. See *IBM System/34 Program Product Installation and Modification Reference Manual* (SC21-7689), *IBM System/38 Guide to Program Product Installation and Device Configuration* (GC21-7775), or *IBM Series/1 5250 Information Display System Attachment Feature Initialization and Configuration Operator's Guide* (GA34-0098).

Publications: *IBM 5250 Information Display System Introduction Manual* (GA21-9246) and *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337).

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9881** for a standard nonlocking plug (uses customer standard type receptacle) or **#9880** for a locking plug (requires customer locking type receptacle). **#9881** will be supplied on the mdl 999.
- Color: Pearl White only (no specify required).
- Keyboard: A keyboard must be selected (see "Special Features").
- Cables: See "Accessories" for 5251 mdls 1 and 11 cable ordering instructions. For cable specifications, see the *5250 Information Display System Planning and Site Preparation Guide* (GA21-9337).
- Power Cord: The standard power cord is 2.4 meters (8 feet) and no specify is required.
- Communication Cable (mdls 2 and 12 only): A 6 meter (20 foot) communication cable is provided as standard for attachment to an external modem, DDSA, or to a communication facility when an integrated modem is used. If a 12 meter (40 foot) cable is desired, specify **#9461**. (**#9461** is not available with #5641 or #5741.)
- DDSA (#5650, #5651) Transmission Speed: **#9822** for 2400 bps, **#9823** for 4800 bps, or **#9825** for 9600 bps.
- Default Order Entry: A default order entry procedure is available. Mdl 999 may be ordered in lieu of a mdl 11 and will automatically include a nonlocking line cord plug (**#9881**), a typewriter-style Keyboard (#4600), and Cable-Thru (#2680). No other specify nor special features may be ordered for a mdl 999. If a different configuration is desired, it must be ordered as a mdl 11 with the desired specify and special features.

  Field installation or removal of any specify or special feature on mdl 999 can be accomplished only as follows:

SPECIAL FEATURES

Cluster (#2550): Allows attachment of up to four workstations (5219, 5224, 5225, 5251 mdls 1 or 11, 5252, 5256, 5291, or 5292). Provides four cable connections. The maximum allowable length of each twinaxial cable is 1,525 meters (5,000 feet). To attach multiple workstations (up to four) to one twinaxial cable, see Cable-Thru feature (#2680) for the 5225, 5251 mdls 1 and 11, 5252, and 5256. **Limitations:** Available for mdls 2 and 12 only. Cannot be installed with Dual Cluster feature (#2551). A 5252 represents two workstations. **Maximum:** One. **Field Installation:** Yes.

Dual Cluster (#2551): Allows attachment of up to eight workstations (5219s, 5224s, 5225s, 5251 mdls 1 or 11, 5252s, 5256s, 5291s, and 5292s). Two sets of four cable connectors are provided and up to four workstations may be attached to each set. The maximum allowable length of each twinaxial cable is 1,525 meters (5,000 feet). To attach multiple workstations (up to four) to one twinaxial cable, see Cable-Thru feature (#2680) for the 5225s, 5251 mdls 1 and 11, 5252s, and 5256s. **Limitations:** Available for mdls 2 and 12 only. Cannot be installed with Cluster feature (#2550). A 5252 represents two workstations. **Maximum:** One. **Field Installation:** Yes.

Cable-Thru (#2680): Provides the capability of connecting multiple 5219s, 5224s, 5225s, 5251 mdls 1 and 11, 5252s, and 5256s to a single twinaxial cable. Each unit on the cable, except the last, requires this feature. **Notes:** For relocation flexibility, the customer should have Cable-Thru on all workstations. #2680 will be supplied as standard on mdl 999. **Limitations:** Available for mdls 1, 11, and 999 only. **Maximum:** One. **Field Installation:** Yes.

Expanded Function (#3600): Copy provides for the direct transfer and printing of a screen image from the 5251 mdl 2 or 12 or an attached 5251 mdl 1 or 11, 5252, 5291, or 5292 to a printer attached to the 5251 mdl 2 or 12. The selection and allocation of the printer is controlled by the system program. Not supported by System/34 or System/36.

Magnetic Stripe Reader Control provides control for Magnetic Stripe Readers feature (#4910) on the 5251 mdls 2 or 12 and on attached 5251 mdls 1 and 11 and 5252s.

Selector Light-Pen Control provides control for Selector Light-Pen feature (#6300) on the 5251 mdl 2 or 12 and on attached 5251 mdls 1 and 11. Not supported by System/34 or System/36.

Self-Check Number provides Modulus 10 and 11 checking to assure that all digits of a number have been correctly keyed from the 5251 mdl 2 or 12 keyboard or the attached 5251 mdl 1 or 11, 5252, 5291, or 5292 keyboards.

Limitations: Available for mdls 2 and 12 only. **Maximum:** One. **Field Installation:** Yes.

EIA Interface (#3701): Provides an interface for attachment of an IBM modem or non-IBM modem meeting RS-232-C characteristics. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Limitations:** Available for mdls 2 and 12 only. Cannot be installed with DDS Adapter (#5650, #5651), 1200 bps Integrated Modem (#5500, #5502), 2400 bps Integrated Modem (#5640, #5641), or 4800 bps Integrated Modem (#5740, #5741). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Specify **#9492**(Comm. Line Switch) when external modem has SNBU capability. **Notes:** **#9492** is not required if external modem is a 3863, 3864, or 3865. Internal Clock (#4703) is also required when the external modem does not provide its own clocking.

Keyboard (#4600, #4601, #4602): One of the following must be selected:

#4600 - An 83-key keyboard with the EBCDIC character set, typewriter-like layout, movable, with 49 alphameric keys, 24 control keys, and 10-key numeric pad. **Note:** #4600 will be supplied as standard on mdl 999.

#4601 - A 66-key data entry style keyboard, movable, with 36 alphameric keys, 23 control keys, and seven blank keys.

#4602 - A 66-key data entry style keyboard with proof arrangement, movable, with 36 alphameric keys, 23 control keys, and seven blank keys. The numeric keys are arranged similarly to those of an adding machine.

Limitations: #4601 and #4602 are not supported when 5251 is directly or remotely attached to the 5340, 5360, or Series/1, and are not available for mdl 999. **Maximum:** One of the above. **Field Installation:** Yes.

Keylock (#4655): Provides a lock and two keys, which prevents operator entry and display of data when in a locked position. **Limitations:** Not available for mdl 999. **Maximum:** One. **Field Installation:** Yes.

Internal Clock (#4703): Generates synchronizing and timing signals at 600 bps or 1200 bps when they are not provided by the modem. Contact IBM for determination of this feature's requirement with planned modems. **Limitations:** Available for mdls 2 and 12 only. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3701, #5500, or #5502.

Multinational Character Set (#4905): Provides the capability of displaying the 188-character Multinational Character Set to facilitate the interchange of information between systems with different language groups. **Limitations:** The keyboards do not include the additional characters of the Multinational Character Set. All characters may be entered via a single or multiple key sequence. Not available for mdl 999. **Maximum:** One. **Field Installation:** Not recommended. **Prerequisites:** #4905 on the 5340 or 5360. All workstations attached to the System/34, System/36, and 5251 mdl 2 or 12 must have the same character set. All workstations attached to the same Series/1 5250 Information Display System Attachment must have the same character set. However, multiple attachments may be configured differently.

Magnetic Stripe Reader (#4910): Provides the capability of reading numeric encoded information from a magnetic stripe on a wide range of credit cards, identification cards, and documents. The magnetic stripe may be encoded with up to 128 ABA numeric characters, including control characters. This feature enhances system data security by providing the ability to read an operator identification card without being displayed. See "Supplies" for magnetically striped and encoded identification cards. **Limitations:** Not available for mdl 999. Valid for numeric-only data and single data fields. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3600 on 5251 mdls 2 and 12 or #4900 on the 5340 and 5360 when displays are directly attached.

1200 bps Integrated Modem (#5500, #5502): A modem for operating at 1200 bps over a nonswitched or switched network. Available in two versions: #5500 - nonswitched, and #5502 - switched with manual answer. Attachment to the nonswitched (4-wire only) facilities is via an IBM-provided cable directly to the line, type 3002. Attachment to the switched network is via an IBM-provided cable to FCC-registered protective circuitry of the CDT type (or equivalent) provided by the user. The system communicating with the 5251 must also be equipped with

5251 Display Station (cont'd)

a 1200 bps Integrated Modem. **Limitations:** Available for mdls 2 and 12 only. Cannot be installed with Interface (#3701), 2400 bps Integrated Modem (#5640, #5641), DDS Adapter (#5650, #5651), or 4800 bps Integrated Modem (#5740, #5741). #5500 and #5502 cannot be installed together. **Note:** 5251s with a #5500 or #5502 cannot be field upgraded to a 2400 bps Integrated Modem (#5640, #5641) or a 4800 bps Integrated Modem (#5740, #5741). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4703.

2400 bps Integrated Modem (#5640, #5641): A self-clocked integrated modem that operates in half-duplex mode at speeds of 2400/1200 bps. Speed selection is under host control. Equalization is automatic and continuously performed. Available in two versions: #5640 - nonswitched, operates over 4-wire nonswitched communication facilities in point-to-point or multipoint mode, and #5641 - switched, operates over 2-wire switched communication facilities. Manual originate and auto-answer procedures are used to establish connections. The protective coupler required for FCC registration (required for direct connection to the Public Switched Network) is included with this feature. (Conditional upon FCC approval and registration.) The system communicating with the 5251 must also be equipped with a compatible 2400 bps Integrated Modem, a 3863 or a 3868 mdl 1 modem. **Limitations:** Available for mdls 2 and 12 only. Not compatible with Integrated Modems (#5600, #5601, #5602, #5610, #6600, #6601, #6602, or #6610) on the 5340. Cannot be installed with EIA Interface (#3701), 1200 bps Integrated Modem (#5500, #5502), DDS Adapter (#5650, #5651), or 4800 bps Integrated Modem (#5740, #5741). #5640 and #5641 cannot be installed together. **Maximum:** One. **Field Installation:** No. Field conversion from #5640/#5641 to #5740/#5741 is available via RPQ. Field conversion to EIA Interface (#3701) is not available.

Digital Data Service Adapter (#5650, #5651): An integrated adapter for point-to-point data transmission at speeds of 2400, 4800, or 9600 bps over the AT&T nonswitched Data-Phone® Digital Service network. The DDSA interfaces to a DDS channel service unit, the customer site termination of the DDS network. For point-to-point (#5650), for multipoint tributary (#5651), see "Specify" for speed selection. **Limitations:** Available for mdls 2 and 12 only. Cannot be installed with EIA Interface (#3701), 1200 bps Integrated Modem (#5500, #5502), 2400 bps Integrated Modem (#5640, #5641), or 4800 bps Integrated Modem (#5740, #5741). **Maximum:** One. **Field Installation:** Yes.

4800 bps Integrated Modem (#5740, #5741): A self-clocked integrated modem that operates in half-duplex mode at speeds of 4800/2400 bps. Speed selection is under host control. Equalization is automatic and continuously performed. Available in two versions: #5740 - nonswitched, operates over 4-wire nonswitched communication facilities in point-to-point or multipoint mode ... #5741 - switched, operates over 2-wire switched communication facilities. Manual originate and auto-answer procedures are used to establish connections. The protective coupler required for FCC registration (required for direct connection to the Public Switched Network) is included with this feature. (Conditional upon FCC approval and registration.)

The system communicating with the 5251 must also be equipped with a 3684 compatible 4800 bps Integrated Modem, a 3864 or a 3868 mdl 2 Modem. **Limitations:** Available for mdls 2 and 12 only. Cannot be installed with Interface (#3701), 1200 bps Integrated Modem (#5500, #5502), 2400 bps Integrated Modem (#5640, #5641), or DDS Adapter (#5650, #5651). #5740 and #5741 cannot be installed together. **Maximum:** One. **Field Installation:** No. Field conversion from #5740/5741 to #5640/5641 is available via RPQ. Field conversion to EIA Interface (#3701) is not available.

Selector Light-Pen (#6300): A hand-held, pen-like device that permits the operator to select fields of data from the display screen for system input. **Limitations:** Not available for mdl 999. Not supported when the 5251 is directly or remotely attached to the 5340, 5360, or directly attached to the Series/1. **Maximum:** One. **Field Installation:** Not recommended. **Prerequisites:** #3600 on 5251 mdls 2 or 12.

MODEL CONVERSIONS

A mdl 999 may be changed to a mdl 11 in the field (see "Default Order Entry"). No other mdl changes are available.

ACCESSORIES

Keylock, Keys: The 5251 with Keylock (#4655) is shipped with two keys. Additional keys may be purchased from IBM. (Vendor will supply additional keys to original purchaser.) Order additional keys on MES (your plant of manufacture). A letter of authorization with key identification number must accompany each order. Specify P/N 2546418. Allow six to eight weeks for delivery.

Display Screen Filter (#3225, #3226): #3225 for mdls 11 and 12, #3226 for mdls 1 and 2. A specially designed filter which attaches to the display screen, reducing reflected glare in those installations with adverse lighting conditions. Character contrast may also be enhanced. The filter is a CSU accessory. For 5251 mdls 11 and 12, B/M = 7361262. For 5251 mdls 1 and 2, B/M = 7361280.

Cables: The twinaxial cables and/or associated parts to interconnect the 5250 Information Display System components and attached systems may be purchased from IBM or from a customer-selected source. For the description of these cables and parts, see the *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the machine.

Twinax® Connector Kit (P/N 7362268): Includes two connectors. Twinax Wire and one Twinax Connector Kit are required for each attachment cable. (Individual connectors P/N 7362229 are available for replacement.)

Twinax Wire (P/N 7362211): Order must specify the desired length. Twinax Wire and one Twinax Connector Kit are required for each attachment cable. (This is an indoor/outdoor cable.)

Twinax Cable Assembly (P/N 7362267): Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinax Adapter (P/N 3762230): Permits two Twinax Cables Assemblies to be joined together.

Twinax Station Protector Kit (B/M 7361807): Two protectors. One is required at each end of each Twinax Attachment Cable installed outdoors (either above or below ground level). Individual Twinax Station Protectors, P/N 7362426, are available for replacement purposes.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

Twinax® Connector Kit: Includes two connectors. Twinax wire and one connector kit are required for each attachment cable. Order P/N 7362063 for Teflon-covered cable. Individual connectors P/N 7362229 are available for replacement.

Twinax Wire: Order must specify the desired length. Twinax wire and one connector kit are required for each attachment cable. Order P/N 7362061 for Teflon-covered cable.

Twinax Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order P/N 7362062 for Teflon-covered cable assembly.

SUPPLIES (None)

Magnetic-Stripe Cards: For magnetically striped and encoded cards for Magnetic Stripe Reader (#4910) see IBM.

5252 DUAL DISPLAY STATION

[NO LONGER AVAILABLE]

PURPOSE

The 5252 is an advanced function dual display station which attaches to the 5251 models 2 and 12, Series/1, 5340 System Unit or 5381 System Unit for entering, editing and displaying alphameric data. It may be used as the system console with System/34. The 5252 displays up to 960 characters on each display with 12 lines of 80 characters each. Two movable keyboards permit both operators to display, enter and manipulate data in a highly flexible and efficient manner.

MODELS

Model 1 001

Customer Setup (CSU): The 5252 is designated as a customer setup device, thereby offering the customer early availability and relocation flexibility. For additional information on CSU, refer to the GI section. The Marketing Representative must advise the customer of his responsibilities before receipt of the machine. The CSU allowance is one day.

HIGHLIGHTS

The 5252 functions as two independent display stations. The standard character set includes ninety-six 8x16 dot matrix characters - 52 upper/lower case alphabetic, 10 numeric, 34 special characters in addition to "space". A 188-character Multinational Character Set (see "Special Features") is available, providing 112 alphabetic, 10 numeric and 66 special displayable characters in addition to "space". See "Type Catalog" for character set and keyboard layouts. Each display provides functional characteristics which permit normal intensity, high intensity, non-display, blinking, underscore column separator, and reverse image (dark characters on a light background) on a field basis. The image of each display can be reversed independently. Audible alarms, under program control, are provided to alert each operator to special conditions. The keyboards with 24 application-assigned command functions provide input and control flexibility. See "Special Features".

Security Enhancements: Data fields can be defined allowing entered data to be accepted without being displayed on the screen. A Keylock (#4655) prevents operator usage of both displays and both keyboards when the key is in the locked position. The displays are blanked and keyboard data entry is inhibited when the keylock is locked. Two Magnetic Stripe Readers (#4910) are available for entering user identification.

Field Editing: Individual data input fields can be edited as Alphameric, Alpha Only, Signed Numeric, Field Exit Required, Right Adjust, Mandatory Entry, Mandatory Fill, Bypass, Auto Enter, Dup Enable, Monocase and Self-Check Modulus 10 and 11.

Cabling: The cable attachments between the 5250 Display System components and/or systems must be made with twinaxial cable. Maximum length of any one twinaxial cable is 1,525 meters (5,000 feet). Up to seven workstations may be attached to a twinaxial cable via a Cable-Thru feature (#2680) on each workstation. A second workstation may be attached via the Cable-Thru feature (#2680). Twinaxial cable must be used between the first and second workstation and the maximum allowable distance between these two workstations is 30 meters (100 feet). See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for cabling information.

Clustering: The 5252 may be attached to the 5251 mdl 2 or 12 with the Cluster (#2550) or the Dual Cluster (#2551) feature. The Cluster feature allows attachment of up to four workstations and the Dual Cluster feature allows attachment of up to eight workstations. The 5252 represents two workstations.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer through the use of problem determination and recovery procedures that are easily understood and used by the operators. The procedures are provided in the *IBM 5252 Operator's Guide* (GA21-9248). Also, see "Customer Responsibilities" below.

Customer Responsibilities: The customer is responsible for:

- Receipt, unpacking and placement of the 5252.
- Physical setup, connection of cables to IBM devices incorporating protected access areas, switch setting and checkout in accordance with instructions supplied by IBM.
- Notifying IBM of intent to relocate and following IBM instructions for relocation of the 5252.
- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal instructions and packaging materials (if required) will be ordered by the branch office.
- Relocation of the 5252, if required, to allow IBM service access.
- Using and following the problem determination procedures for the 5252 prior to calling for IBM service.
- Providing a desk or table-top to support the 5252.
- Installation and maintenance of signal cables and associated parts for attaching the 5252 to the 5251 mdl 2 or 12, 5340, 5381 or Series/1.
- When adding additional display stations to Series/1, System/34 or System/38, the customer may have to modify the system configuration specifications. See *IBM System/34 Program Product Installation and Modification Reference Manual* (SC21-7689) or *IBM System/38 Guide to Program Product Installation and Device Configuration* (GC21-7775) or *IBM Series/1 5250 Information Display System Attachment Feature Initialization and Configuration Operator's Guide* (GA34-0098).

Publications: *IBM 5250 Information Display System Introduction Manual* (GA21-9246) and *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337).

AAS Ordering Instructions: The 5252 is a System Component.

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9881** for a standard nonlocking plug (uses customer standard type receptacle) or **#9880** for locking plug (requires customer locking type receptacle). The standard power cord is 2.4 meters (8 feet)
- Color: Pearl white only (no specify required).
- Keyboards: Two must be selected. See "Special Features".
- Cables: See "Accessories". For cable specifications, see the *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337).

SPECIAL FEATURES

Cable-Thru (#2680): Provides the capability of connecting multiple 5225s, 5224s, 5219s, 5252s, 5251 mdls 1 and 11, and 5256s to a single twinaxial cable. Each unit on the cable, except the last, requires this feature. Note: For relocation flexibility, the customer should have Cable-Thru on all workstations. **Maximum:** One. **Field Installation:** Yes.

Keyboard (#4600, #4601, #4602): Two of the following must be selected:

#4600: 83-key keyboard with the EBCDIC character set, typewriter-like layout, movable, with 49 alphameric keys, 24 control keys and 10-Key numeric pad.

#4601: 66-key data entry style keyboard, movable with 36 alphameric keys, 23 control keys and seven blank keys.

#4602: 66-key data entry style keyboard with proof arrangement, movable, with 36 alphameric keys, 23 control keys and seven blank keys. The numeric keys are arranged similar to those of an adding machine.

Limitations: #4601 and #4602 are not supported when the 5252 is directly attached to the 5340 or Series/1. **Maximum:** Two of the above. **Field Installation:** Yes.

Keylock (#4655): Provides a lock and two keys which prevents operator entry and display of data on either workstation when in a locked position. **Maximum:** One. **Field Installation:** Yes.

Multinational Character Set (#4905): Provides the capability of displaying the 188-character Multinational Character Set to facilitate the interchange of information between systems with different language groups. **Limitations:** The keyboards do not include the additional characters of the Multinational Character Set. All characters may be entered via a single or multiple key sequence. **Maximum:** One. **Field Installation:** Not recommended. **Prerequisites:** Multinational Control (#4905) on 5340. All workstations attached to the System/34 and 5251 mdl 2 or 12, must have the same character set. All workstations attached to the same Series/1 5250 Information Display System Attachment must have the same character set. However, multiple attachments may be configured differently.

Magnetic Stripe Reader (#4910): Provides the capability of reading numerically encoded information from a magnetic stripe on a wide range of credit cards, identification cards and documents. The magnetic stripe may be encoded with up to 128 ABA numeric characters, including control characters. This feature may be used to enhance system data security by providing the ability to read an operator identification card without being displayed. Contact IBM for magnetically striped and encoded identification cards. **Limitations:** Valid for numeric-only data and single data field. **Maximum:** Two. **Field Installation:** Yes. **Prerequisites:** #3600 on 5251 mdls 2 or 12, or #4900 on 5340 when 5252 is directly attached.

MODEL CONVERSIONS (None)

5252 Dual Display Station (cont'd)

ACCESSORIES

Keylock and Keys: The 5252 with Keylock #4655 is shipped with two keys. Additional keys may be purchased from IBM. (Vendor will supply additional keys to original purchaser). A letter of authorization with key identification number must accompany each order. Specify P/N 2546418. Allow six to eight weeks for delivery.

Cables: Twinaxial cables and/or associated parts to attach the 5252 to other components or systems of the 5250 Information Display System, may be purchased from IBM or a from a customer-selected source. For the proper identification, installation, and application of the subject cables and parts refer to *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) or *IBM 5280 Cable Assembly Manual* (GH21-9341). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the machine.

Twinax® Adapter (P/N 7362230): For connecting two cable assemblies.

Twinax Cable Assembly (P/N 7363367): Cable with two connectors attached to bulk wire. The required length must be specified on the order.

Twinax Connector Kit (P/N 7362268): Two loose connectors. Individual connectors (P/N 7362229) are available for replacement. One Twinax Connector Kit and Twinax Wire are required for each attachment cable.

Twinax Wire (P/N 7362211): Bulk wire. Length must be specified. This is an indoor/outdoor cable.

Twinax Station Protector Kit (P/N 7361807): A kit Includes two protectors. One is required at each end of each Twinax attachment cable installed outdoors (either above or below ground level). Individual Twinax station protectors (P/N 7362426) are available for replacement purposes.

SUPPLIES (None)

5253 DISPLAY STATION

PURPOSE

The 5253 Display Station is an advanced function display station for the 5520 Administrative System which provides for entering, editing, and displaying word processing information. The 5253 displays up to 1,920 characters with 24 lines of 80 characters each. Dual text and attribute buffers allow vertical scrolling and horizontal segmenting of stored pages. See M5525 pages for limitations on operation when attached to the 5525 System Unit, supported by the 5520 Administrative Processing Program. A movable keyboard permits the operator to display, enter, and manipulate information on the screen in a highly flexible and efficient manner.

MODELS

Model 1 001

Customer Setup (CSU): The 5253 is designated as a Customer Setup device, thereby offering the customer early availability and relocation flexibility. For additional information on CSU, refer to the GI section. The marketing representative must advise customers of their responsibilities before receipt of the machine. The CSU allowance is one day.

HIGHLIGHTS

The displayable character set includes 187 8 x 16 dot matrix characters. See "Type Catalog" for character set and keyboard layouts. Display functions include: non-display, blinking, underscore, and reverse image (dark characters on a light background). Each of the above highlights may occur on a character, word, or line basis. In addition, individual character positions may be superimposed with a slash, dash, or double underscore. See M5525 pages for limitations on operation when attached to the 5525 System Unit, supported by the 5520 Administrative Processing Program.

Contextual cursor control is provided by four outboard keys on the keyboard. The cursor is positioned forward or backward on a character, word, line, page, etc., by the depression of a single key when using the contextual cursor. An additional ten outboard keys provide special function control.

Security Enhancements: Character positions may be defined so that entered data is accepted without being displayed on the screen. A Keylock (#4655) helps prevent operator usage of the display and keyboard when the key is in the locked position. The display is blanked and keyboard text entry is inhibited when the keylock is locked.

Attachment to the 5520 Administrative System: Twinaxial cable connectors are provided on the 5525 System Unit for attachment of the 5253 Display Stations (and the 5254 Dual Display Stations). The cumulative maximum length of any one twinaxial cable is 1,524 meters (5,000 feet). Up to seven display stations can be attached to any one cable via the Cable-Thru feature (#2680). The 5254 represents two display stations. See *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011) for additional cabling information.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided with each 5253. Also see "Customer Responsibilities" below.

Customer Responsibilities: The customer is responsible for:

- Receipt, unpacking, and placement of the 5253.
- Physical setup, connection of cables to IBM devices incorporating protected access areas, switch setting, and checkout in accordance with instructions provided by IBM.
- Notifying IBM of intent to relocate and following IBM instructions for relocation of the 5253.
- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal instructions and packing materials (if required) will be ordered by the branch office.
- Relocation of the 5253, if required, to allow IBM service access.
- Using and following the problem determination procedures for the 5253 prior to calling for IBM service.
- Providing a desk or table-top to support the 5253.
- Installation and maintenance of signal cables and associated parts for attaching the 5253 to the 5525 System Unit.
- When adding additional display stations on the 5520 Administrative System, the customer may have to modify the system configuration specifications; refer to the *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011).

Publications: Refer to M5525 pages for the available publications.

SPECIFY

- Voltage: 115V AC, 1-phase, 60 Hz (no specify required).
- Color: Pearl White only (no specify required).
- Power Cord and Plug: Standard power cord is 2.4 meters (8 feet) and no specify is required. Some localities restrict power cord length to 1.8 meters (6 feet); if this is required, specify **#9986**. Specify **#9881** for a standard nonlocking plug (uses customer standard type receptacle) or **#9880** for a locking plug (requires customer locking type receptacle).
- Keyboard: A keyboard must be selected (see "Special Features").
- Cables: See "Accessories" for 5253 cable ordering instructions. For cable specifications, see the *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011). Specify **#9050** if cable is ordered from IBM or **#9055** if cable is ordered from another source.

SPECIAL FEATURES

Cable-Thru (#2680): Provides the capability of connecting multiple 5253s and 5254s to a single cable. Each unit on the cable, except the last, requires this feature. Note: For relocation flexibility, the customer should consider including #2680 on all display stations. **Maximum:** One. **Field Installation:** Yes.

Function Extension Feature (#3270): This feature is a prerequisite for the 5520 Administrative System 3270 Emulation Capability. See M5525 pages for limitations on operation when attached to the 5525 System Unit, supported by the 5520 Administrative Processing Program. Refer to 5520 in "Programming" and M5525 pages for additional information. **Maximum:** One. **Field Installation:** Yes.

Keyboard (#4610, #4611): One of the following keyboards must be selected:

#4610: 92-character text keyboard with a typewriter-like layout, movable, with 46 alphameric keys and 36 control keys. **Maximum:** One. **Field Installation:** Yes.

#4611: 96-character text keyboard with a typewriter-like layout, movable, with 48 alphameric keys and 36 control keys. **Maximum:** One. **Field Installation:** Yes.

Keylock (#4655): Provides a lock and two keys which helps prevent operator entry and display of data when in a locked position. **Maximum:** One. **Field Installation:** Yes.

Symbol Display (EC #835667): Standard on all 5253s shipped from the plant after February, 1984. Without this EC symbols emanating from keyboard #202 and #204 are displayed on the screen as equivalent non-symbol characters, video-reversed. With this EC all symbols are displayed as fully-formed graphics. See 5520 programming for further details. **Maximum:** One. **Field Installation:** No.

MODEL CONVERSIONS (None)

ACCESSORIES

Keylock Keys: The 5253 with Keylock (#4655) is shipped with two keys. Additional keys may be purchased from IBM. (Vendor will supply additional keys to original purchaser of the keys only.) Key Identification Number must accompany each order. Specify P/N **2546418**. Allow six to eight weeks for delivery.

Display Screen Filter (#3225): A specially designed filter which attaches to the display screen reducing reflected glare in those installations with adverse lighting conditions. Character contrast may also be enhanced. The filter is a Customer Setup accessory. For shipment with the 5253, order by feature number. For shipment to the field, order by bill of material number. Specify B/M **7361433**.

Palm Rest (#7796): This accessory is an extension to the keyboard providing increased operator comfort. Customers must be advised that it is a customer-attachable option only. All attachment hardware is provided and no tools are required. **Limitations:** Not available for 5253s with serial numbers 03550 and below.

Cables: The cables and/or associated parts to attach the 5253 to the 5525 may be purchased from IBM or from a customer-selected source. For the description of these cables and parts, see the *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the 5253.

Twinaxial Connector Kit (P/N **7362268**): Includes two connectors. Twinaxial Wire and one connector kit are required for each attachment cable. (Individual connectors, P/N **7362229**, are available for replacement.)

Twinaxial Wire (P/N **7362211**): Order must specify the desired length. Twinaxial Wire and one connector kit are required for each attachment cable. (This is an indoor/outdoor cable.)

Twinaxial Cable Assembly (P/N **7362267**): Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be

5253 Display Station (cont'd)

added to the fixed assembly price to obtain the total price of the cable assembly.

Twinaxial Adapter (P/N **7362230**): Permits two Twinaxial Cable Assemblies to be joined together.

Twinaxial Station Protector (P/N **7362426**): One is required at each end of each twinaxial attachment cable installed outdoors (either above or below ground level). **Note:** This station protector is different from that used for printers or a System Unit attached via a printer line.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

Twinaxial Connector Kit: Includes two connectors. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362063** for Teflon-covered cable. Individual connectors P/N **7362229** are available for replacement.

Twinaxial Wire: Order must specify the desired length. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362061** for Teflon-covered cable.

Twinaxial Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order P/N **7362062** for Teflon-covered cable assembly.

SUPPLIES (None)

5254 DUAL DISPLAY STATION

[NO LONGER AVAILABLE]

PURPOSE

The 5254 Dual Display Station is an advanced function dual display station for the 5520 Administrative System which provides for entering, displaying, and editing word processing information. The 5254 displays up to 960 characters on each display with 12 lines of 80 characters each. Dual 8,000-character text and attribute buffer for each station allow vertical scrolling and horizontal segmenting of stored pages. See M5525 pages for limitations on operation when attached to the 5525 System Unit, supported by the 5520 Administrative Processing Program. Two movable keyboards permit both operators to display, enter, and manipulate information in a highly flexible and efficient manner.

MODELS

Model 1 001

Customer Setup (CSU): The 5254 is designated as a Customer Setup device, thereby offering the customer early availability and relocation flexibility. For additional information on CSU, refer to the GI section. The marketing representative must advise customers of their responsibilities before receipt of the machine. The CSU allowance is one day.

HIGHLIGHTS

The 5254 functions as two independent display stations. The displayable character set includes 187 8 x 16 dot matrix characters. See "Type Catalog" for character set and keyboard layouts. Display functions include: non-display, blinking, underscore, and reverse image (dark characters on a light background). Each of the above highlights may occur on a character, word, or line basis. In addition, positions may be superimposed with a slash, dash, or double underscore. See M5525 pages for limitations on operation when attached to the 5525 System Unit, supported by the 5520 Administrative Processing Program.

Contextual cursor control and directional cursor are provided by four outboard keys on the keyboard. The cursor is positioned forward or backward on a line, page, word, character, etc., by the depression of a single key when using contextual cursor. An additional ten outboard keys provide special function control.

Security Enhancements: Character positions may be defined so that entered data is accepted without being displayed on the screen. A Keylock (#4655) helps prevent operator usage of both displays and both keyboards when the key is in the locked position. The displays are blanked and keyboard text entry is inhibited when the keylock is locked.

Attachment to the 5520 Administrative System: Connectors are provided on the 5525 System Unit for attachment of the 5254 Dual Display Stations (and the 5253 Display Stations). The cumulative maximum length of any one twinaxial cable is 1,524 meters (5,000 feet). Up to seven 5253/5254 display stations can be attached to any one cable via the Cable-Thru feature (#2680). The 5254 represents two display stations. See *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011) for additional cabling information.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer through the use of problem determination and recovery procedures that are easily understood and used by the operators. The procedures are provided with each 5254. Also see "Customer Responsibilities" below.

Customer Responsibilities: The customer is responsible for:

- Receipt, unpacking, and placement of the 5254.
- Physical setup, connection of cables to IBM devices incorporating protected access areas, switch setting, and checkout in accordance with instructions provided by IBM.
- Notifying IBM of intent to relocate and following IBM instructions for relocation of the 5254.
- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal instructions and packing materials (if required) will be ordered by the branch office.
- Relocation of the 5254, if required, to allow IBM service access.
- Using and following the problem determination procedures for the 5254 prior to calling for IBM service.
- Providing a desk or table-top to support the 5254.
- Installation and maintenance of signal cables and associated parts for attaching the 5254 to the 5525 System Unit.
- When adding additional display stations on the 5520 Administrative System, the customer may have to modify the system configuration specifications; refer to the *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011).

Publications: Refer to M5525 pages for the available publications.

SPECIFY

- Voltage: 115V AC, 1-phase, 60 Hz (no specify required).
- Color: Pearl White only (no specify required).
- Power Cord and Plug: Standard power cord is 2.4 meters (8 feet) and no specify is required. Some localities restrict power cord length to 1.8 meters (6 feet); if this is required, specify **#9986**. Specify **#9881** for a standard nonlocking plug (uses customer standard type receptacle) or **#9880** for a locking plug (requires customer locking type receptacle).
- Keyboard: Two keyboards must be selected (see "Special Features").
- Cables: See "Accessories" for 5254 cable ordering instructions. For cable specifications, see the *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011). Specify **#9050** if cable is ordered from IBM or **#9055** if cable is ordered from another source.

SPECIAL FEATURES

Cable-Thru (#2680): Provides the capability of connecting multiple 5253s and 5254s to a single cable. Each unit on the cable, except the last, requires this feature. Note: For relocation flexibility, the customer should consider including #2680 on all display stations. **Maximum:** One. **Field Installation:** Yes.

Keyboard (#4610, #4611): Two of the following keyboards must be selected:

#4610: 92-character text keyboard with a typewriter-like layout, movable, with 46 alphameric keys and 36 control keys. **Maximum:** Two. **Field Installation:** Yes.

#4611: 96-character text keyboard with a typewriter-like layout, movable, with 48 alphameric keys and 36 control keys. **Maximum:** Two. **Field Installation:** Yes.

Keylock (#4655): Provides a lock and two keys which helps prevent operator entry and display of data when in a locked position. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES

Keylock Keys: The 5254 with Keylock (#4655) is shipped with two keys. Additional keys may be purchased from IBM. (Vendor will supply additional keys to original purchaser of the keys only.) Key Identification Number must accompany each order. Specify P/N 2546418. Allow six to eight weeks for delivery.

Palm Rest (#7796): This accessory is an extension to the keyboard providing increased operator comfort. Customers must be advised that it is a customer-attachable option only. All attachment hardware is provided and no tools are required. **Limitations:** Not available for 5254s with serial numbers 00085 and below.

Cables: The cables and/or associated parts to attach the 5254 to the 5525 System Unit may be purchased from IBM or from a customer-selected source. For the description of these cables and parts, see the *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the 5254.

Twinax® Connector Kit (P/N 7362268): Includes two connectors. Twinax Wire and one connector kit are required for each attachment cable. (Individual connectors, P/N 7362229, are available for replacement.)

Twinax Wire (P/N 7362211): Order must specify the desired length. Twinax Wire and one connector kit are required for each attachment cable. (This is an indoor/outdoor cable.)

Twinax Cable Assembly (P/N 7362267): Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinax Adapter (P/N 7362230): Permits two Twinax Cable Assemblies to be joined together.

Twinax Station Protector (P/N 7362426): One is required at each end of each twinaxial attachment cable installed outdoors (either above or below ground level). Note: This station protector is different from that used for printers or a System Unit attached via a printer line.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

5254 Dual Display Station (cont'd)

Twinax® Connector Kit: Includes two connectors. Twinax wire and one connector kit are required for each attachment cable. Order P/N 7362063 for Teflon-covered cable. Individual connectors P/N 7362229 are available for replacement.

Twinax Wire: Order must specify the desired length. Twinax wire and one connector kit are required for each attachment cable. Order P/N 7362061 for Teflon-covered cable.

Twinax Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order P/N 7362062 for Teflon-covered cable assembly.

SUPPLIES (None)

5256 PRINTER

PURPOSE

The 5256 provides printed output for the 5280, Series/1, System/34, System/36, and System/38. It is a bidirectional impact matrix printer with dual 256 byte buffers and full buffer formatting capabilities.

MODELS

Model 1	001	40 cps maximum
Model 2	002	80 cps maximum
Model 3	003	120 cps maximum

Customer Setup (CSU): The 5256 is designated as Customer Setup, thereby offering the customer early availability and relocation flexibility. Customer responsibilities are set forth in *Information Bulletin for Customers - Customer Setup* (G120-2743). CSU instructions are included with the 5256.

CSU allowance is as follows:

5280 System (with initial system installation) - 2 days
5280 System (subsequent installation) - 1 day
Series/1 (initial and subsequent installation) - 1 day
System/34 (initial and subsequent installation) - 1 day
System/36 (initial and subsequent installation) - 1 day
System/38 (initial and subsequent installation) - 1 day

The marketing representative must advise customers of their responsibilities before receipt of the machine.

When adding additional printers to the 5280, Series/1, System/34, System/36, or System/38, the customer may have to modify the system configuration specifications. See *IBM 5280 System Control Programming Reference Manual* (GC21-7824), *IBM Series/1 5250 Information Display System Attachment Feature Initialization and Configuration Operator's Guide* (GA34-0098), *IBM System/34 Program Product Installation and Modification Reference Manual* (SC21-7689), *IBM System/36 - Changing Your System Configuration* (SC21-9052), or *IBM System/38 Guide to Program Product Installation and Device Configuration* (GC21-7775).

HIGHLIGHTS

Maximum printer throughput is obtained with bidirectional serial matrix printing and indexing without unnecessary print head movement. Matrix characters are formed by eight vertical wires printing dots in up to four of seven possible horizontal positions, giving high legibility with character spacing at 10 characters to the inch for the standard upper/lower case 95-character set. A 184-character Multinational Character Set is available. See "Specify" below. The maximum print line is 132 print positions.

The operator can select six or eight lines per inch (lpi) vertical spacing. Overlapped printing may result when printing at eight lpi. A variable width forms tractor provides for feeding continuous forms. Single cut forms may be processed in typewriter fashion. For optimum handling of continuous forms, a Forms Stand (#4450) is recommended. See "Accessories". Refer to *Form-Design Printers Reference Guide* (GA24-3488) for forms design considerations and limitations. See "Type Catalog" for character set arrays.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided in the *IBM 5256 Operator's Guide* (GA21-9260).

For Direct Attachment to the 5280: The 5280 Distributed Data System provides cable connectors for attachment of the 5256 Printer to the 5285 Programmable Data Station and to the 5288 Programmable Control Unit. The 5285 Programmable Data Station will allow local attachment of the 5256 Printer to the Twinaxial Printer Attachment (#1150). The 5288 Programmable Control Unit will allow local attachment of the 5256 Printer to the Single Twinaxial Printer Attachment (#1155), the Multiple Twinaxial Printer Attachment (#1160), or the Multiple start/Stop-Twinaxial Printer Attachment (#1162). If multiple printers are attached to one port (see M5285, 5288 pages), each printer except the last requires Cable-Thru (#2680) on the 5256. All connections use twinaxial cable only. The maximum length of the cable is 1,525 meters (5,000 feet). See *IBM 5280 Cable Assembly Manual* (GA21-9341) for cabling information. See the M5288 pages for description of these special features.

For Direct Attachment to Series/1: The Series/1 5250 Information Display System Attachment (#1210) provides four ports for attachment of the 5251 mdl 1 or 11, 5252, 5256, 5291, and 5292, and supports up to eight of these workstations. The 5252 represents two workstations. The Series/1 5250 Information Display System Attachment Cable (#5760) enables attachment to be made with twinaxial cable. Maximum length of twinaxial cable attached to any one port is 1,525 meters (5,000 feet). Up to seven workstations may be attached to a twinaxial cable via Cable-Thru (#2680) on each workstation. See *IBM Series/1 Customer Site Preparation Manual* (GA34-0050) and *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for cabling information.

For Direct Attachment to System/34: The 5340 System Unit provides four cable connectors for attachment of the 5219, 5224, 5225, 5251 mdl 1 and 11, 5252, 5256, 5291, and 5292. One cable connector is dedicated to the exclusive attachment of a display station utilized as the system console. No other devices may be attached to this cable. The three additional cable conectors on the 5340 are provided for attachment of additional workstations (5219, 5224, 5225, 5251 mdl 1 or 11, 5252, 5256, 5291, or 5292). Up to eight workstations, including the system console, may be attached to the 5340 without special features. Optional features on the 5340 allow up to 16 workstations to be directly attached. The 5252 represents two workstations. The maximum length of any one twinaxial cable is 1,525 meters (5,000 feet). Up to three such cables may be attached to the 5340. Multiple workstations (up to seven) may be attached to one cable via Cable-Thru (#2680) with each workstation. If a 5256 Printer is designated as the system printer, a 6 meter (20 foot) cable is provided with the 5340. Specify **#9306** on the 5340. See "Specify" in the M5340 pages. See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for additional cabling information.

For Direct Attachment to System/36: The 5256 Printer may be attached to the System/36 in a manner similar to 5250 Information Display Station devices. See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for additional cabling information.

For Direct Attachment to System/38: The 5381 System Unit provides eight cable connectors for attachment of the 5219, 5224, 5225, 5251 mdl 1 and 11, 5252, 5256, 5291, and 5292, and supports up to 12 of these workstations. Optional features on the 5381 allow up to 80 workstations to be attached. The 5252 represents two workstations. The cable attachment is made with twinaxial cable. Maximum length of any one twinaxial cable is 1,525 meters (5,000 feet). Up to seven workstations may be attached to a twinaxial cable via Cable-Thru (#2680) on each workstation. See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for cabling information.

Clustering: The 5256 may be attached to the 5251 mdl 2 or 12 with the Cluster (#2550) or the Dual Cluster (#2551). The Cluster feature allows attchment of up to four workstations (5219, 5224, 5225, 5251 mdl 1 or 11, 5252, 5256, or 5292), and the Dual Cluster feature allows attachment of up to eight workstations. The 5252 represents two workstations. The 5256 may also be attached to the 5294 workstation controller. See M5294 pages for workstation attachment limitations. See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for cabling information.

Publications: *IBM 5250 Information Display System Introduction* (GA21-9246) and *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337).

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): Specify **#9881** for a standard nonlocking plug (uses customer standard type receptacle) or **#9880** for a locking plug (requires customer locking type receptacle).
- Color: Pearl White only (no specify required).
- Print Spanish N: Specify **#9570**. See "Type Catalog" for details.
- Character Set: The 95-character EBCDIC character set is provided as standard. If the 184-character Multinational Character Set is desired, specify **#9470**. All workstations and printers attached to a System/34, System/36, and a 5251 mdl 2 or 12 must have the same character set. All workstations attached to the same Series/1 5250 Information Display System Attachment must have the same character set. However, multiple attachments may be configured differently.
- Cables: See "Accessories" for cable ordering instructions. For cable specifications, see the *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337). Specify **#9050** if cable is ordered from IBM, **#9055** if cable is ordered from another supplier, **#9060** if the 5256 is used with System/34 as the system printer (no cable order required), or **#9065** if existing cable will be used (no cable order required).
- System Attachment: Specify the unit to which the 5256 is attached: **#9559** for 5251 mdl 2, **#9560** for 5251 mdl 12, **#9561** for 5340, **#9565** for 5360, **#9562** for 5381, **#9563** for Series/1, or **#9564** for 5280.

SPECIAL FEATURES

Audible Alarm (#1470): Provides an audible indication to the operator when manual intervention is required. **Maximum:** One. **Field Installation:** Yes.

Cable-Thru (#2680): Provides the capability of connecting multiple 5219s, 5224s, 5225s, 5251 mdls 1 or 11, 5252s, and 5256s to a single twinaxial cable. Each unit on the cable, except the last, requires this feature. **Note:** For relocation flexibility, the customer should have Cable-Thru on all workstations. **Maximum:** One. **Field Installation:** Yes.

5256 Printer (cont'd)

MODEL CONVERSIONS

Model conversions are field installable.

ACCESSORIES

Forms Stand (#4450): Permits feeding of continuous forms from a carton and provides for forms stacking on a single shelf after printing. This accessory is a one-shelf forms stand. For field installation, order by feature number on MES.

Cables: The twinaxial cables and/or associated parts to attach the printers to the 5251 mdl 2 or 12, 5285, 5288, 5340, 5360, 5381, or the Series/1 5250 Information Display System Attachment Cable (#5760) may be purchased from IBM or from a customer-selected source. For the description of these cables and parts, see the *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the 5256.

Twinaxial Connector Kit (P/N **7362268**): Includes two connectors. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. (Individual connectors, P/N **7362229**, are available for replacements.)

Twinaxial Wire (P/N **7362211**): Order must specify the desired length. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. This is an indoor/outdoor cable.

Twinaxial Cable Assembly (P/N **7362267**): Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinaxial Adapter (P/N **7362230**): Permits two Twinaxial Cable Assemblies to be joined together.

Twinaxial Station Protector Kit (B/M **7361807**): A kit includes two protectors. One is required at each end of each twinaxial attachment cable installed outdoors (either above or below ground level). Individual Twinaxial Station Protectors, P/N **7362426**, are available for replacement purposes. The station protector is a CSU accessory.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

Twinaxial Connector Kit: Includes two connectors. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362063** for Teflon-covered cable. Individual connectors P/N **7362229** are available for replacement.

Twinaxial Wire: Order must specify the desired length. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362061** for Teflon-covered cable.

Twinaxial Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order P/N **7362062** for Teflon-covered cable assembly.

SUPPLIES

Ribbons: A black ribbon, P/N **1136653** or equivalent, is required. A black cartridge ribbon, P/N **7034535** or equivalent, is required for all machines shipped on or after September 19, 1980 or on machines having RPQ D09005 installed. Contact IBM.

5258 PRINTER

PURPOSE

An ink jet printer providing high-quality printer output for the 5520 Administrative System. A selection of print fonts is available to provide 10 pitch, 12 pitch, or proportional spacing of an international set of graphics.

MODELS

Model 1 001

Prerequisites: In the 5525 System Unit, Local Device Control feature (#4710, #4711, #4712); LDC Attachment feature #4715; and either feature #1105, #1700, #1701, #1702, or #1704. See M5525 pages for details.

HIGHLIGHTS

- Automatic feeding of cut sheet paper from two drawers (e.g., letterhead and plain) and envelopes from a hopper.
- Rated burst print speed of up to 92 characters per second (12 pitch).
- Horizontal spacing of 10 pitch, 12 pitch, or proportional.
- Vertical spacing is 5-1/3 and 6 lines per inch and half-line spacing for superscripts and subscripts (single level).
- One type style font standard, two more selectable (at time of manufacture), and a further two optional (possible five in total); each supports 187 characters from English and eight other language character sets (Artisan 10 U/C English only). Optional print font supports Greek alphabet and other symbol characters.
- Type style and format may be chosen by the user and then automatically changed under program control.
- Standard Cable-Thru capability to allow multiple printers (5219s and 5258s) to be multidropped up to a cumulative total of 1,524 cable-meters (5,000 cable-feet) radially from the 5525 System Unit on a single twinaxial cable.
- The printer is equipped with an envelope hopper and two paper drawers. The envelope hopper holds 600 75 g/sq.m (20 pound) bond envelopes. The envelope stacker holds 500 envelopes of the same weight. The paper drawers hold 600 sheets of 75 g/sq.m (20 pound) bond or 500 sheets of 90 g/sq.m (24 pound) bond each. The paper stacker holds 700 sheets of 75 g/sq.m (20 pound) bond.

Paper Specifications:

Paper sizes include:

178mm x 267mm (7 inches x 10.5 inches) *
184mm x 267mm (7.25 inches x 10.5 inches) *
191mm x 267mm (7.5 inches x 10.5 inches) *
203mm x 267mm (8 inches x 10.5 inches)
203mm x 330mm (8 inches x 13 inches)
216mm x 279mm (8.5 inches x 11 inches)
216mm x 330mm (8.5 inches x 13 inches)
216mm x 356mm (8.5 inches x 14 inches)

* Feed lengthwise only

Paper weights include:

60 g/sq.m (16 pound) bond
75 g/sq.m (20 pound) bond
90 g/sq.m (24 pound) bond

Envelope Specifications:

Envelope sizes include:

Number 7-3/4	98.4mm x 190.5mm (3.874 inches x 7.5 inches)
Number 9	98.4mm x 225.4mm (3.874 inches x 8.87 inches)
Number 10	104.8mm x 241.3mm (4.125 inches x 9.5 inches)

Envelope weights include:

48 g/sq.m (13 pound)
60 g/sq.m (16 pound)
75 g/sq.m (20 pound)
90 g/sq.m (24 pound)

Problem Determination Procedures: Problem determination (and recovery) procedures are provided by IBM with the 5258 Printer, and extended when attached to the 5525 System Unit using Licensed Program 5611-SS1 or 5611-SS2 to help provide increased availability of the printer, and other parts of the system, to the user.

These procedures are described in the reference cards accompanying the printer, in the HELPs and Messages facilities of the licensed program, and in *IBM 5258 Printer Operators Guide* (GA23-1005) and *IBM 5520 Administrative Systems Messages and Recovery Aids* (SC23-0733 or SC23-0748).

These procedures are designed to be easy to follow and use by the customer, and it is the customer's responsibility to use them prior to calling for IBM service.

Publications: *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011), and *IBM 5258 Operator Guide* (GA23-1005).

Customer Responsibilities: The customer is responsible for providing and installing requisite cabling and for providing paper and envelopes as appropriate prior to the installation of the printer by the CE; also for following the problem determination procedures prior to calling for the CE.

Operator intervention is required for replenishing the ink supply, paper, and envelopes, and handling exceptional conditions such as feed jams, stacker full, power on/off, and invalid format requests.

When adding additional printers to the 5520 Administrative System, the customer may have to modify the system configuration specifications. See *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011).

Cabling: When used with the 5520 Administrative System, the 5258 is connected via a twinaxial cable to local device attachment connectors in a protected customer access area on the 5525 System Unit. Depending on the 5525 mdl, up to eight printers can be multidropped on the same cable up to a maximum length of 1,524 cable-meters (5,000 cable-feet). Depending on the mdl, up to eight cables (maximum of 12 printers) can be attached to the 5525. See M5525 pages.

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): With a standard nonlocking plug (uses customer standard type receptacle). No specify required.
- Print Fonts: Available at time of manufacture only. Prestige Elite (12 pitch) is standard on every machine. Two additional fonts must be selected using specify numbers from the following. See "Type Catalog" for character set arrays.

Font (select two)

Pitch	Style	Feature Number	Specify Number
12	Letter Gothic	#7809	**#9809**
10	Courier	#7811	**#9811**
12	Courier	#7810	**#9810**
10	Courier Italic	#7825	**#9825**
12	Courier Italic	#7826	**#9826**
10	Prestige Pica	#7812	**#9812**
10	Artisan	#7813	**#9813**
10	Artisan (U/C)	#7822	**#9822**
10	Bookface Academic	#7824	**#9824**
PSM	Essay	#7814	**#9814**
PSM	Arcadia	#7815	**#9815**
PSM	Boldface	#7816	**#9816**
10/12	Symbol	#7830	**#9830**

The symbol font allows printing of symbol characters supported by keyboard IDs #202 and #204. See "Type Catalog" for details of these keyboards.

- Color: Pearl White with Pebble Gray accents. (No specify required.)
- Cables: Customer-supplied; see "Accessories" and the *IBM 5520 Administrative Systems Installation Manual - Physical Planning* (GA23-1002 or GA23-1011) for ordering information. Specify **#9050** if cable is ordered from IBM or **#9055** if cable is ordered from another supplier.
- Data Rate: The data transfer rate is determined by the Local Device Control feature and the 5525 System Unit mdl. Specify **#9300** for printers attaching through feature #4710 on the 5525 mdl 020 or 021; **#9305** for printers attaching through feature #4710 on the 5525 mdl 030, 031, or 032; and **#9315** for printers attaching through feature #4711 or #4712 on any mdl 5525.

SPECIAL FEATURES

Optional Additional Print Fonts: Up to two optional print fonts may be ordered from the font list given in "Specify". Purchase only. Order by feature number. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES

Cables: The cables and/or associated parts to attach the 5258 to the 5525 may be purchased from IBM or from a customer-selected source. For the proper identification, installation, and application of the subject cables and parts, see the *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM,

5286 Dual Programmable Data Station (cont'd)

- When adding a 5281 or 5282 to the 5286, the customer may have to modify the system configuration specifications. See *IBM 5280 System Control Programming Reference/Operation Manual* (GC21-7824).
- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal instructions and packing materials (if required) will be ordered by the branch office.

Publications: *IBM 5280 General Information* (GA21-9350) and *IBM 5280 Planning and Site Preparation Guide* (GA21-9351).

Notes:

1. Device Attachments: Appropriate special features are required to attach an auxiliary data station (5281, 5282) and some I/O units see "Special Features".
2. IBM 5280 System Control Programming (5708-SC1) should be ordered at equipment order entry time.
3. For physical planning information, see *IBM 5280 Planning and Site Preparation Guide* (GA21-9351).

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9881** for a standard non-locking plug (uses customer standard type receptacle) or **#9880** for a locking plug (requires customer locking type receptacle).
- Color: Pearl White only (no specify required).
- Two keyboards must be selected (see "Special Features").
- Primary host system that will process the data captured by the 5286:

Series/1	#9505
System/3	#9501
System/32	#9502
System/34	#9503
System/36	#9503
System/38	#9504
Other Small IBM System	#9506
System/360	#9507
System/370:	
– Mdl 138 and below	#9508
– Mdl 145 and above	#9509
3031, 3032, 3033	#9510
4331, 4341	#9511
8100	#9512
Other Large IBM System	#9513
Non-IBM System	#9514
Host System Unknown	#9515
No Host System	#9516

SPECIAL FEATURES

Replaced parts from any special feature installation or removal remain the property of the customer.

Auxiliary Data Station Attachment (#1200, #1215: To attach one 5281 Data Station or one 5282 Dual Data Station. Attachment is by cable. See M5281 or 5282 "Accessories". The maximum cable length is 61m (200 feet). Select one feature from the table below.

Data Station	Display Size	Order Feature Number
5281	480	#1200 *
5282	480	#1215

* Not available as of July 31, 1983.

Maximum: One. **Field Installation:** Yes.

Remote Diskette Drive Attachment (#1240): Required if an attached 5281 Data Station or 5282 Dual Data Station has either one or two diskette drives. A cable is required. See M5281 or 5282 "Accessories". **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1200 or #1215.

Elapsed Time Counter (#3610): Used to measure elapsed real time. It is required by DE/RPG (5708-DE1) and the Key Entry Utility (part of the 5280 Utilities, 5708-UT1) if the user desires to maintain the elapsed time production statistic. **Limitations:** Cannot be installed with the Magnetic Stripe Reader Adapter/Elapsed Time Counter (#4955). **Maximum:** One. **Field Installation:** Yes.

Keyboard (#4600, #4601, #4602 , #4603): Two of the following must be selected ... both must be the same type:

#4600: 83-key keyboard with the EBCDIC character set, typewriter-like layout, movable, with 49 alphameric keys, 24 function keys, and 10-key numeric pad.

#4601: 66-key data entry style keyboard, movable, with 36 alphameric keys, and 30 function keys.

#4602: 66-key data entry style keyboard with proof arrangement, movable, with 36 alphameric keys, and 30 function keys. The numeric keys are arranged similar to those of an adding machine.

#4603: 83-key keyboard with ASCII character set, typewriter-like layout, movable, with 49 alphameric keys, 24 function keys, and 10-key numeric pad.

Maximum: Two of the above. **Field Installation:** Yes.

Magnetic Stripe Reader (#4950): Provides the capability of reading numeric encoded information from a magnetic stripe on a wide range of credit cards, identification cards and documents. The magnetic stripe may be encoded with up to 128 ABA numeric characters, including control characters. This feature enhances system data security by providing the ability to read an operator identification card without being displayed. See "Supplies" for magnetically striped and encoded identification cards. **Limitations:** Valid for numeric-only data. If only one Magnetic Stripe Reader is used with the 5286, it will be assigned to and can only be used in conjunction with the keyboard located on the side of the 5286 which has the power switch. **Maximum:** Two. **Field Installation:** Yes. **Prerequisites:** #4955.

Magnetic Stripe Reader Adapter/Elapsed Time Counter (#4955): The Magnetic Stripe Reader Adapter provides control for up to four Magnetic Stripe Readers (#4950) on the 5286 and an attached 5281 Data Station or 5282 Dual Data Station. The Elapsed Time Counter is used to measure elapsed real time. It is required by DE/RPG (5708-DE1) and the Key Entry Utility (part of 5280 Utilities, 5708-UT1) if the user desires to maintain the elapsed time production statistic. **Limitations:** Cannot be installed with the Elapsed Time Counter feature (#3610). **Maximum:** One. **Field Installation:** Yes.

Security Keylock (#6340): Provides a single, key-operated switch for controlling operations on the 5286 and an attached 5281 Data Station or 5282 Dual Data Station. Prevents operator entry and display of data when in a locked position. **Maximum:** One. **Field Installation:** Yes.

Second Application Microprocessor (#6800): A microprocessor which performs identical function and operates concurrently with the first (base) application microprocessor. This feature provides more processing power and is designed as an aid to performance improvement in a multiprogramming environment which has heavy processor utilization. **Maximum:** One. **Field Installation:** Yes.

MODEL CONVERSIONS

Field installable.

The upgrade purchase prices for model conversions may be greater than the purchase price differentials. The customers should carefully evaluate their future requirements when purchasing a system.

Replaced parts from any model conversion become the property of IBM.

ACCESSORIES

Keylock, Keys: The 5286 with Security Keylock (#6340) is shipped with two unique keys. Additional keys may be purchased from IBM. (Vendor will supply additional keys only to original purchaser.) With each order of quantity of one, the customer receives two keys (one key of each type). A letter of authorization with key identification numbers must accompany each order. **Specify:** P/N **4177799** or, if EC 868325 is installed, specify P/N **6044248**. Allow six to eight weeks for delivery.

SUPPLIES

For IBM diskettes and magnetically striped and encoded identification cards, consult IBM.

5288 PROGRAMMABLE CONTROL UNIT

PURPOSE

Provides processing, control, main storage, diskette storage, communications features, and device attachment capabilities for the 5280 Distributed Data System. Allows attachment of multiple 5281 Data Stations and/or 5282 Dual Data Stations and 5217, 5222, 5224, 5225, 5242, and 5256 Printers.

MODELS

5288 models are available depending on main storage capacity and the type of diskette drive included in the base machine. One drive is standard.

Model	Main Storage Capacity	Diskette
A01 *	32K	1
A05 *	32K	2D
C01	64K	1
C05	64K	2D
D01	96K	1
D05	96K	2D
E01	128K	1
E05	128K	2D
F01	160K	1
F05	160K	2D
H01	224K	1
H05	224K	2D
J01	288K	1
J05	288K	2D

* Not available after July 31, 1983.

Minimum Configuration: Any mdl of the 5288 with one 5281 Data Station or one 5282 Dual Data Station.

Customer Setup (CSU): The 5288 is designated Customer Setup, and offers customers ease of setup and relocation flexibility. The customer setup allowance is two days . One copy of *IBM 5280 User's Setup Procedures* (GA21-9365) is included with each 5288.

HIGHLIGHTS

- System flexibility allows specification of configuration to meet specific user requirements for data entry, associated processing, and communications.
- Base unit contains controller, main storage, and diskette drive capability.
- Multiple microprocessors provide processing and independent I/O control.
- Stored program function.
- Multiprogramming capability with up to eight main storage partitions.
- Powerful and extensive data editing function.
- 10MB disk storage drives available.
- Compact diskette drives housed within the 5288 support Diskette 1 or Diskette 1, 2, and 2D providing up to 4.8M bytes of storage capacity.
- Addition of optional disk and/or diskette drives within attached 5281 Data Stations and/or 5282 Dual Data Stations (diskette only) provide a total system capacity of eight drives ... one diskette and seven disk or diskette drives in any combination.
- Maximum of four keyboard/displays with attachment of 5281 and/or 5282 data stations.
- Attachment capability for up to eight printers.
- Security features for data asset protection.
- Independent data station operation through multiprogramming and system resource sharing.
- Communications adapters provide both SDLC and BSC capability.
- Communications programming support available for RJE, batch, and interactive communications via SNA/SDLC or BSC.

5288 Components

Controller: Provides processing capability, control, main storage, and optional I/O attachments and communications features. Controls all functions of the 5288 and attached 5281 Data Stations, 5282 Dual Data Stations, and 5217, 5222, 5224, 5225, 5242, and 5256 Printers. Multiple microprocessor architecture allows processing and I/O operations (e.g., diskette, keyboard/display, communications) to operate independently. The 5288 provides 64K of main storage that can be expanded to a maximum of 288K. Multiprogramming capability is available through a partitioned memory. The number of partitions (up to eight) and their size (6K to 64K) are user-specified with a facility provided in 5280 System Control Programming (5708-SC1). Special features provide for the attachment of 5281 and 5282 data stations (maximum, four keyboards), and 5217, 5222, 5224, 5225, 5242, and 5256 Printers (maximum, eight printers). The communications adapters (special features) each provide both SDLC and BSC communications under stored program control.

Disk/Diskette: One diskette drive is standard, and its type is determined by the 5288 mdl number. Three physical drive positions are available on the 5288 for optional disk and/or diskette drives ... see "Special Features". For the optional drives, any combination (up to three) of disk and/or diskette drives is allowed. For a 5288 system, including auxiliary data stations, the maximum number of optional disk/diskette drives is seven.

Disk: In addition to one diskette drive, the 5288 can contain up to three 10MB Disk Storage Drives ... see "Special Features". The disk storage is a non-removable direct access medium. Capacity and access times are as follows:

Bytes/Sector	256
Bytes/Cylinder	32,768
Cylinders *	303
Capacity * (bytes)	9,928,704
Access Time (ms)	
Minimum (cyl to cyl)	16.6
Average (102 cyl)	85
Maximum	205
Rotation Speed (rpm)	3,600

* Available to the user for programs and data.

Diskette: Two types of compact diskette drives are available with the 5288: a diskette drive which can read/write Diskette 1 and a diskette drive which can read/write Diskette 1, 2, and 2D. Capacity per drive ranges from 0.25M bytes to 1.2M bytes. The formats for the diskettes are:

Diskette 1

Format	Bytes/Sector	Capacity
1	128	246KB *
2	256	284KB
3	512	303KB

* 243KB when used for Basic Exchange

Diskette 2

4	128	492KB
5	256	568KB
6	512	606KB

Diskette 2D

7	256	985KB
8	512	1136KB
9	1024	1212KB

For diskette data exchange with other systems, the following exchange types are supported: Basic Exchange (Formats 1 and 4 above), H Exchange (Format 7 above), and I Exchange (all of the above formats). Diskettes can be interchanged with other IBM systems and devices which support a compatible diskette exchange type. Examples are the System/3, System/32, System/34, System/38, Series/1, S/370, 303X, 4300, 3540, 3740, 3747, 3770, 3790, 5110, 5230, 5260, and 8100.

The instantaneous data transfer rate using Diskette 1 or 2 is 31.2K bytes/sec; for Diskette 2D, 62.5K bytes/sec. Rotational speed of both types of drives is 360 rpm. Diskette read or write is overlapped with seek. Diskette operations are overlapped with processing and other I/O device operations.

Auxiliary Data Stations: The 5281 Data Station and the 5282 Dual Data Station can be attached to the 5288 in any combination to provide a maximum of four keyboards. In Chart A below, all possible combinations are presented. Each vertical column represents a valid combination of machine type quantities. At least one 5281 or 5282 must be attached.

Chart A

Machine	Quantity							
5281	1	2	3	4	1	2	0	0
5282	0	0	0	0	1	1	1	2

For maintenance purposes, one auxiliary data station (designated as the "First Auxiliary Data Station") must be installed within sight of, and have easy access to, the 5288. This data station is attached via the First Auxiliary Data Station Attachment (special feature). All other data stations are attached via an Auxiliary Data Station Attachment, Additional (special feature). *Each data station requires a separate attachment.* Each data station is cable attached (see M5281 or 5282 "Accessories"). The maximum cable length is 61 meters (200 feet).

The display size (480, 960, or 1920 characters) of attached data stations is determined by the 5288 auxiliary data station attachment (special

5288 Programmable Control Unit (cont'd)

feature). *All data stations must have the same display size(s).* The 5280 Communications Utilities licensed program (5708-DC1) requires a display size(s) of 960 or 1920 characters.

An attached 5281 can have zero, one or two disk or diskette drives. An attached 5282 can have zero, one, or two diskette drives. These drives are designated "remote" (from the 5288). Remote drives are attached via a Remote Disk/Diskette Drive Attachment to the 5288 ... see "Special Features". A cable is required ... see M5281 or 5282 "Accessories".

Printers: The 5217, 5222, 5224, 5225, 5242, and 5256 printers are available for attachment to the 5288. A maximum of eight printers can be attached ... see 'Special Features".

Security: A non-display input mode on attached 5281 Data Stations and 5282 Dual Data Stations allows data to be entered from the keyboard without being displayed on the screen. A Security Keylock (special feature) prevents keyboard entry or display of data on all auxiliary data stations and, on a communicating 5288, prevents initiation of communications. In addition, a communicating 5288 can exchange identification sequences with the host, which assists the user in controlling access to data. A Magnetic Stripe Reader (special feature) is available for the 5281 and 5282 which may be used to enter user identification. This assists user program routines in auditing and controlling operator access to data.

Communications: The Communications Adapter (#2500) operates under stored program control and allows for either SDLC or BSC data link control over a single communications line. This feature allows the 5288 to communicate on a switched point-to-point, nonswitched point-to-point, or multipoint line at speeds up to 4800 bps. On a multipoint line, the 5288 operates as a tributary station. The 3270 Emulation Communications Adapter (#3270) provides the same function as #2500 (above) and, in addition, provides support for the 5280 - 3270 Emulation (5708-EM1) licensed program.

Connection to the line is supported by a Line Interface feature. Operation is half-duplex mode over a switched network on half-duplex facilities, or half-duplex mode over nonswitched (or equivalent private) communications lines on duplex or half-duplex facilities. Switched network support includes manual dial and manual or auto-answer (where the attached modem supports this capability). The 5288 at each termination (drop point) of a communications line must use the same clocking source (modem or business machine). Units must be set to operate at the same transmission rate, use the same transmission code, and the same 2- or 4-wire connection to the line. Compatible modems must be used at all terminations on a network.

The 5288, using stored program control, communicates using BSC protocol with:

- A Series/1 equipped with #2074, #2075, or #2093/#2094.
- A System/3 equipped with #2074, #2084, or #2094.
- A System/32 equipped with #2074.
- A System/34 equipped with #2500, #3500, or #4500.
- A System/36 equipped with #2500 or #4500.
- A System/38 with appropriately configured BSC adapter and sub-features (point-to-point only).
- A S/370 via an Integrated Communications Adapter, a 4331 via a Communications Adapter, or a S/370, 303X, or 4300 via a 2701 Data Adapter Unit, or a 3704, 3705, or 3725 Communications Controller with the Network Control Program (ACF/NCP) or the Partitioned Emulation Program (PEP), any of which are equipped with a binary synchronous communications adapter and appropriate sub-features.
- A 3741 mdl 2 or 4.
- A 3747 Data Converter equipped with #1660.
- A 5265 communicating mdl (XX2).
- A 5280 equipped with #2500 or #3270.

The 5288, using stored program control, communicates in SNA/SDLC mode with a 4331 via a Communications Adapter, a S/370 via an Integrated Communications Adapter, an 8100 with DPPX/BASE, or a S/370, 303X, or 4300 via a 3704, 3705, or 3725 Communications Controller equipped with appropriate features. See M3704, 3705, or 3725 pages. The 5288, using the 3270 Emulation Communications Adapter, communicates in SNA/SDLC mode with an 8100 Information System. See the 5280 programming pages for a description of the communications program support available and any special feature requirements.

IBM Modems: One IBM modem can be attached to the Communications Adapter (#2500) or the 3270 Emulation Communications Adapter (#3270). **Prerequisites:** #3701.

Modem	Speed (bps)	Facility
3863	2400	Switched, Nonswitched
3868 mdl 1	2400	Nonswitched
3864	4800	Switched, Nonswitched
3868 mdl 2	4800	Nonswitched
3872	2400/1200	Nonswitched

Note: The 5288 does not support Automatic Call Originate (#1091) on the 3872. For communication capabilities, product utilization, and special features see M2700, 3863, 3864, and 3872 pages.

IBM Data Encryption Devices: An IBM 3845 or 3846 Data Encryption Device may be attached between the 5288 communications adapter and the external modem. **Note:** Refer to M2700, 3845, and 3846 pages for information on 3845 or 3846 configuration and communication capability. The 3845 or 3846 device operating with SDLC will not operate with NRZI transmission mode. **Prerequisites:** #3701.

Communications References:

- See the Programming pages for possible restrictions.
- See M2700 pages for additional information concerning modems, communications facility, machine attachment requirements, terminal intermix, operating capabilities and customer responsibilities.
- Refer to the *IBM 5280 Planning and Site Preparation Guide* (GA21-9351) for physical planning information.

Communications Cable: A communications cable length is required. See "Specify".

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of the problem determination procedures and recovery routines that are easily understood and used by the operator. The procedures are described in the *IBM 5280 Machine Verification Manual* (GA21-9357).

Customer Responsibilities: The customer is responsible for:

- Adequate site, system, and other vendor preparation.
- Obtaining a firm installation date for the start of communications facilities and services (including any required modems). The IBM Marketing Representative must assure that a firm installation date is established prior to Order Confirmation.
- Receipt, unpacking, and placement of the 5288.
- Installation and maintenance of signal cables and associated parts for attaching a 5217, 5222, 5224, 5225, 5242, 5256, 5281, or 5282 to the 5288.
- The customer must be advised, in writing, of certain responsibilities related to the installation and maintenance of common carrier facilities/services as well as the IBM equipment. For further information, see M2700 pages.
- Physical setup, connection of cables to communications lines/modems and IBM devices incorporating protected access areas, modem attenuation setting and checkout in accordance with instructions supplied by IBM.
- To provide an FCC registered protective circuit when attaching an integrated modem to the public switched telephone network. This registered protective circuit should be equivalent to either the CBS type coupler (for manual/automatic answering) or the CDT type coupler (for manual only answering).
- Using and following the 5280 problem determination procedures prior to calling for IBM service.
- Notifying IBM of intent to relocate and following IBM instructions for relocation of the 5288.
- Relocation of the 5288, if required, to allow IBM service access.
- When adding a 5281 or 5282 to the 5288, the customer may have to modify the system configuration specifications. See *IBM 5280 System Control Programming Reference/Operation Manual* (GC21-7824).
- Disconnecting, packing, and removal to the customer's shipping dock at the time of discontinuance. Removal instructions and packing materials (if required) will be ordered by the branch office.

Publications: *IBM 5280 General Information* (GA21-9350), *IBM 5280 Planning and Site Preparation Guide* (GA21-9351).

Notes:

1. Device Attachments: Appropriate special features are required to attach auxiliary data stations (5281, 5282) and some I/O units ... see "Special Features".

5288 Programmable Control Unit (cont'd)

2. 5280 System Control Programming (5708-SC1) should be ordered at equipment order entry time.
3. For physical planning information, see *IBM 5280 Planning and Site Preparation Guide* (GA21-9351).

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): **#9881** for a standard non-locking plug (uses customer standard type receptacle), or **#9880** for a locking plug (requires customer locking type receptacle).
- Color: Pearl white only (no specify required).
- Primary host system that will process the data captured by the 5288:

System/3	#9501
System/32	#9502
System/34	#9503
System/36	#9503
System/38	#9504
Series/1	#9505
Other Small IBM System	#9506
S/360	#9507
S/370 mdl 138 and Below	#9508
S/370 mdl 145 and Above	#9509
3031, 3032, 3033	#9510
4331, 4341	#9511
8100	#9512
Other Large IBM System	#9513
Non-IBM System	#9514
Host System Unknown	#9515
No Host System	#9516

- Communications Cable Length (with #2500 or #3270): Required for attaching the 5288 to the communications facility. **#9010** for a 6 meter (20 foot) cable or **#9015** for a 12 meter (40 foot) cable. Specify this cable length only once per system.
- Mandatory Specify Codes for Communications: One selection must be specified from each of the following tables. Entries selected from Tables D, E, and F will be used to preset hardware functions during manufacture. Selection from each of the other tables should be based on prime usage.

Table A - Line Control

BSC	#9400
SDLC	#9401

Table B - Transmission Code

EBCDIC	#9060
ASCII	#9061

Table C - Prime Usage

S/360	#9570
3031 or S/370 mdl 138 and Below	#9277
3032, 3033, or S/370 mdl 145 and Up	#9278
4300	#9596
4381	#9597
Series/1	#9599
System/3	#9580
System/32	#9591
System/34	#9593
System/36	#9593
System/38	#9594
3740/3747	#9579
5260	#9600
5280	#9598
Other IBM	#9275
Non-IBM	#9276

Table D - Transmission Rate

600 bps	#9750
1200 bps	#9751
2000 bps	#9752
2400 bps	#9753
4800 bps	#9754

Table E - Network Attachment

Point-to-Point (nonswitched)	#9481
Point-to-Point (switched)	#9483
Multipoint Tributary	#9482
Local Attach	#9485

Table F - Line Facility Attachment

Duplex (4-wire only)	#9391
Half-Duplex	#9392

Table G - Host Application

RJE, MRJE, SRJE	#9440
CICS/VS	#9441
IMS/VS	#9442
Other	#9443

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES

Replaced parts from any special feature installation or removal remain the property of the customer.

Printers: Attachment of the 5217, 5222, 5224, 5225, 5242, and 5256 Printers is provided by one of four special features. Up to eight printers, in any combination, may be attached consistent with special feature limitations. Printer speeds may be affected by the customer's program, application load, forms design and/or the number of printers attached to the system.

Single Twinaxial Printer Attachment (#1155): Provides a single port for the attachment of 5224 (mdl 1 or 2), 5225 (mdl 1, 2, 3, or 4) and/or 5256 (mdl 1, 2, or 3) Printers to a single twinaxial port. A maximum of seven printers can be attached. The maximum cable length is 1,525 meters (5,000 feet). **Limitations:** Cannot be installed with the Multiple Twinaxial Printer Attachment (#1160), the Single 5222 Printer Attachment (#1157), or the Multiple Start/Stop-Twinaxial Printer Attachment (#1162). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** If multiple printers are attached, each printer on the cable, except the last, requires a Cable-Thru feature.

Single 5222 Printer Attachment (#1157): [Not available after July 31, 1983] Provides a single port for the attachment of one 5222 Printer. Attachment is by a double twisted pair cable. A 6 meter (20 foot) cable is provided with the printer. An extension cable accessory is available to provide a total cable length of up to 61 meters (200 feet) (see M5222 "Accessories"). **Limitations:** Cannot be installed with the Multiple Start/Stop-Twinaxial Printer Attachment (#1162), the Single Twinaxial Printer Attachment (#1155), or the Multiple Twinaxial Printer Attachment (#1160). **Maximum:** One. **Field Installation:** Yes.

Multiple Twinaxial Printer Attachment (#1160): [Not available after July 31, 1983] Provides four ports for attaching, via twinaxial cable, 5224 (mdl 1 or 2), 5225 (mdl 1, 2, 3, or 4) and/or 5256 (mdl 1, 2, or 3) Printers. A maximum of eight printers can be attached. The maximum cable length is 1,525 meters (5,000 feet). **Limitations:** Cannot be installed with the Single Twinaxial Printer Attachment (#1155), the Single 5222 Printer Attachment (#1157), or the Multiple Start/Stop-Twinaxial Printer Attachment (#1162). A maximum of seven printers can be attached to a single port (using Cable-Thru feature). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** If multiple printers are attached to one port, each printer on the cable, except the last, requires a Cable-Thru feature.

Multiple Start/Stop-Twinaxial Printer Attachment (#1162): Attaches up to eight printers. Provides four Start/Stop (5217, 5222, 5242) Printer ports and one Twinaxial Printer (5224/5225/5256) port. A single 5217, 5222, or 5242 mdl 2 Printer can be attached to each Start/Stop port. Each Start/Stop Printer is attached by a double-twisted pair cable. A 6 meter (20 foot) cable is provided with each printer. For the 5222, an extension cable accessory is available to provide a maximum cable length of up to 61 meters (200 feet) ... see M5222 "Accessories". From one to seven twinaxial printers (5224 mdl 1 or 2 and/or 5225 mdl 1, 2, 3, or 4 and/or 5256 mdl 1, 2, or 3) can be attached to the twinaxial port, using a single twinaxial cable. The maximum cable length is 1,525 meters (5,000 feet). **Limitations:** Cannot be installed with the Single Twinaxial Printer Attachment (#1155), the Single 5222 Printer Attachment (#1157), or the Multiple Twinaxial Printer Attachment (#1160). A maximum of seven printers can be attached to the twinaxial port (using Cable-Thru feature). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** If multiple printers are attached to the twinaxial printer port, each printer on the cable, except the last, requires a Cable-Thru feature. If #1162 was shipped before April 1, 1983, the 5288 also requires EC 467318 for attachment of the 5217 or 5242.

First Auxiliary Data Station Attachment (#1245, #1250, #1255, #1260, #1265 : To attach the first 5281 Data Station or 5282 Dual Data Station. This feature also determines the display size of the auxiliary data station. All data stations on the 5280 system must have the same display size(s). Attachment is by cable ... see "Accessories". The maximum cable length is 61 meters (200 feet). Select one feature from the table below.

Data Station	Display Size(s)	Order Feature Number
5281	480	#1245 *

Limitations: Cannot be installed with the Auxiliary Data Station, Add'l (#1275, #1280, #1290).

5281	960	#1250 *

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Limitations: Cannot be installed with the Auxiliary Data Station, Add'l (#1270, #1280, #1285).

5281 1920 #1255

Limitations: Cannot be installed with Auxiliary Data Station, Add'l (#1270, #1275, #1285, #1290).

5282 480 #1260 *

Limitations: Cannot be installed with the Auxiliary Data Station, Add'l (#1275, #1280, #1290).

5282 960 #1265 *

Limitations: Cannot be installed with Auxiliary Data Station, Add'l (#1270, #1280, #1285).

* Not available after July 31, 1983.

Maximum: One of the above. **Field Installation:** Yes.

Auxiliary Data Station Attachment, Add'l (#1270, #1275, #1280, #1285, #1290): To attach one 5281 Data Station or one 5282 Dual Data Station. This feature also determines the display size of the auxiliary data station. All data stations on the 5280 system must have the same display size(s). Attachment is by cable ... see "Accessories". The maximum cable length is 61 meters (200 feet). Select the appropriate features from the table below.

Data Station	Display Size(s)	Order Feature Number
5281	480	#1270 *

Limitations: Cannot be installed with the Auxiliary Data Station, Add'l (#1275, #1280, #1290). **Prerequisites:** #1245 or #1260.

5281 960 #1275 *

Limitations: Cannot be installed with the Auxiliary Data Station, Add'l (#1270, #1280, #1285). **Prerequisites:** #1250 or #1265.

5281 1920 #1280

Limitations: Cannot be installed with Auxiliary Data Station, Add'l (#1270, #1275, #1285, #1290). **Prerequisites:** #1255.

5282 480 #1285 *

Limitations: Cannot be installed with the Auxiliary Data Station, Add'l (#1275, #1280, #1290). **Prerequisites:** #1245 or #1260.

5282 960 #1290 *

Limitations: Cannot be installed with Auxiliary Data Station, Add'l (#1270, #1280, #1285). **Prerequisites:** #1250 or #1265.

* Not available after July 31, 1983.

Maximum: The 5281 and 5282 can be attached in any combination to provide a maximum of four keyboards ... see Chart A above for valid combinations. **Field Installation:** Yes.

Auxiliary Data Station Disk/Diskette Drives: Disk and diskette drives housed within a 5281 Data Station or 5282 Dual Data Station (diskette only) are designated as "remote" (from the 5288). The drives can be any combination of disk or diskette. Remote drives require the 5288 attachment special features (#1300, #1301, #1302) described after Chart B below. An attachment can service two disk or diskette drives, and the drives may be in the same or different data stations. A cable is required ... see M5281 or 5282 "Accessories".

If the base 5288 contains one or two disk or diskette drives, the maximum number of remote drives is six. If the base 5288 contains three or four drives, the maximum number of remote drives is four.

Chart B below presents all valid disk/diskette drive quantities and location combinations with respective special feature requirements.

Chart B

These Combinations		Require These Special Features *		
Number of Drives				
Base 5288	Remote	#1300	#1301	#1302
1 or 2	0			
1 or 2	1	X		
1 or 2	2	X		
1 or 2	3	X	X	
1 or 2	4	X	X	
1 or 2	5	X	X	X
1 or 2	6	X	X	X
3 or 4	0			
3 or 4	1		X	
3 or 4	2		X	
3 or 4	3		X	X
3 or 4	4		X	X

* **Note:** If an attachment services two drives, the drives may be in the same or different data stations.

Remote Disk/Diskette Drive Attachment, 1st (#1300): Required to attach disk, Diskette 1 or Diskette 2D drives housed within a 5281 or 5282 (diskette only for 5282). When the base 5288 contains one or two drives, this feature is required to attach the first and second remote drives. **Maximum:** One. **Field Installation:** Yes. **Corequisites:):** #4400 , if one or more #3410s are installed in one or more attached 5281s.

Remote Disk/Diskette Drive Attachment, 2nd (#1301): Required to attach disk, Diskette 1 or Diskette 2D drives housed within a 5281 or 5282 (diskette only for 5282). When the base 5288 contains one or two drives, this feature is required to attach the third and fourth remote drives. When the base 5288 contains three or four drives, this feature is required to attach the first and second remote drives. **Maximum:** One. **Field Installation:** Yes. **Corequisites:** #4400 , if one or more #3410s are installed in one or more attached 5281s.

Remote Disk/Diskette Drive Attachment, 3rd (#1302): Required to attach disk, Diskette 1, or Diskette 2D drives housed within a 5281 or 5282 (diskette only for 5282). When the base 5288 contains one or two drives, this feature is required to attach the fifth and sixth remote drives. When the base 5288 contains three or four drives, this feature is required to attach the third and fourth remote drives. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1301.

Disk/Diskette Drives (#3401, #3402, #3410):

Diskette 1 Drive (#3401): An additional diskette drive which can read/write Diskette 1.

Diskette 2D Drive (#3402): An additional diskette drive which can read/write Diskette 1, 2, and 2D.

Disk Storage Drive (#3410): A 10MB non-removable direct access storage device. **Note:** The disk storage drive(s) must be installed to the right of the diskette drive(s).

Maximum: The maximum number of optional disk and/or diskette drives housed within a 5288 is three. The maximum number of optional drives on a 5288 system, including auxiliary data stations, is seven. The drives may be any combination of disk and diskette. **Field Installation:** Yes.

Elapsed Time Counter (#3610): Used to measure elapsed real time. It is required for SNA operations under the 5280 Communications Utilities (5708-DC1) and 5280 - 3270 Emulation (5708-EM1). It is required by DE/RPG (5708-DE1) and the Key Entry Utility [part of 5280 Utilities (5708-UT1)], if the user desires to maintain the elapsed time production statistic. **Limitations:** Cannot be installed with the Magnetic Stripe Reader Adapter/Elapsed Time Counter (#4955). **Maximum:** One. **Field Installation:** Yes.

Remote Disk Prerequisite (#4400): Provides control function required to accommodate one or more Disk Storage Drives (#3410) installed in one or more attached 5281 Data Stations. **Maximum:** One. **Field Installation:** Yes. **Corequisites:** #1300 and/or #1301.

Magnetic Stripe Reader Adapter/Elapsed Time Counter (#4955): Provides the following: The Magnetic Stripe Reader Adapter provides control for up to four Magnetic Stripe Readers (#4950) on attached 5281 Data Stations and/or 5282 Dual Data Stations. The Elapsed Time Counter is used to measure elapsed real time. It is required for SNA operations under the 5280 Communications Utilities (5708-DC1) and 5280 - 3270 Emulation (5708-EM1). It is required by DE/RPG (5708-DE1) and the Key Entry Utility [part of 5280 Utilities (5708-UT1)], if the user desires to maintain the elapsed time production statistic. **Limitations:** Cannot be installed with the Elapsed Time Counter feature (#3610). **Maximum:** One. **Field Installation:** Yes.

Security Keylock (#6340): Provides a single, key-operated switch with three positions for controlling operations on all attached 5281 Data Stations and 5282 Dual Data Stations: "Lock" position prevents

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operator entry and display of data and prevents initiation of communications. "Local" position allows operator entry and display of data. "Normal" position allows initiation of communications in addition to operator entry and display of data. Two unique keys are provided: one allows selection of "Lock"/"Local", the other allows selection of "Lock"/"Normal". On a non-communicating 5288, both operating positions ("Local" and "Normal") provide "Local" position operation. **Maximum:** One. **Field Installation:** Yes.

2nd Application Microprocessor (#6800): A microprocessor which performs identical functions and operates concurrently with the first (base) application microprocessor. This feature provides more processing power and is designed as an aid to performance improvement in a multiprogramming environment which has heavy processor utilization. **Maximum:** One. **Field Installation:** Yes.

COMMUNICATIONS FEATURES

Communications Adapter (#2500): Required to attach a communications line via appropriate interface or modem. In conjunction with stored program control, this feature permits the 5288 to function on a switched or nonswitched public or private communications line. The adapter provides both BSC and SDLC. The proper line protocol is enabled at program execution time. The adapter also provides a 1200 bps clocking capability for use with the 1200 bps Integrated Modem (#5500, #5501, #5502, #5507, #5508) or an external modem. A Communications Utilities (5708-DC1) parameter activates this capability. **Limitations:** Cannot be installed with the 3270 Emulation Communications Adapter (#3270). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** [1] A line interface special feature; #5500, #5501, #5502, #5507, #5508, #3701, or #5650 or #5651. [2] See the Programming section for 5280 Communications Utilities (5708-DC1) minimum system and feature requirements. See "Specify" for required communications cable length and mandatory specify codes.

3270 Emulation Communications Adapter (#3270): Supports the 5280 - 3270 Emulation (5708-EM1) licensed program and, in conjunction with stored program control, permits the 5288 to function on a switched or nonswitched public or private communications line. This adapter is required to attach to a communications line via the appropriate interface or modem and provides both BSC and SDLC. The proper line protocol is enabled at program execution time. The adapter also provides a 1200 bps clocking capability for use with the 1200 bps Integrated Modem (#5500, #5501, #5502, #5507, #5508) or an external modem. A Communications Utilities (5708-DC1) parameter activates this capability. Keyboard interpretation functions are provided in support of the 5280 - 3270 Emulation licensed program. **Limitations:** Cannot be installed with Communications Adapter (#2500). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** [1] A line interface special feature; #5500, #5501, #5502, #5507, #5508, #3701, or #5650 or #5651. [2] Attached 5281 Data Station(s) with a display size of 1920 characters (5288 feature #1255, #1280); [3] See the Programming section for 5280 Communications Utilities (5708-DC1) and 5280 - 3270 Emulation (5708-EM1) minimum system and feature requirements. See "Specify" for required communications cable length and mandatory specify codes.

EIA Interface (#3701): Provides the appropriate cable and interface logic necessary to attach an external modem (either an IBM or non-IBM modem meeting RS-232-C characteristics). Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Limitations:** Cannot be installed with Digital Data Service (DDS) Adapter feature (#5650or #5651) or 1200 bps Integrated Modem (#5500, #5501, #5502, #5507, #5508). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2500 or #3270.

1200 bps Integrated Modem (#5500, #5501, #5502, #5507, #5508): [#5500, #5502, #5507 not available after July 31, 1983] A modem for SDLC or BSC data transmission at 600/1200 bps over nonswitched or switched facilities. Half-speed operation at 600 bps is indicated via a 5280 Communications Utilities (5708-DC1) parameter. Available in five different versions: #5500 - nonswitched, #5501 - switched with auto-answer, #5502 - switched without auto-answer, #5507 - nonswitched with switched network backup manual answer capability, and #5508 - nonswitched with switched network backup auto-answer capability. The nonswitched versions (#5500, #5507, and #5508) provide a cable for attachment directly to a nonswitched (2- or 4-wire) line, Type 3002. The switched with auto-answer versions (#5501 and #5508) provide a cable for attachment to the switched network via an FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. The switched with manual answer versions (#5502 and #5507) provide a cable for attachment to the switched network via an FCC registered protective circuitry of the CDT type (or equivalent) provided by the user. The devices communicating with the 5288 must also be equipped with a compatible 1200 bps modem. **Limitations:** Cannot be installed with EIA Interface (#3701) or Digital Data Service (DDS) Adapter (#5650 or #5651). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2500 or #3270.

Digital Data Service (DDS) Adapter (#5650 for Point-to-Point Operation ... #5651 for Multipoint Operation): An adapter for SDLC or BSC data transmission at speeds of 2400 or 4800 bps over AT&T nonswitched Data-Phone® digital data service. The DDS Adapter provides the appropriate cable and interface to the DDS channel service unit, the customer site termination of the DDS network. The DDS Adapter may only be used to locally connect a 5288 to another supported device which has a compatible DDS Adapter. This connection requires a special DDS Adapter Connector (see "Accessories") and supports point-to-point connections only. The maximum length of the connection is the sum of the modem cable lengths supported by the two devices. No modem or channel service unit is required. **Limitations:** Cannot be installed with EIA Interface (#3701) or 1200 bps Integrated Modem (#5500, #5501, #5502, #5507, #5508). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2500 or #3270.

MODEL CONVERSIONS

Field installable.

PURCHASE CONSIDERATIONS

The upgrade purchase prices for model conversions may be greater than the purchase price differentials. The customers should carefully evaluate their future requirements when purchasing a system. Replaced parts from any model conversion become the property of IBM.

ACCESSORIES

Keylock Keys: The 5288 with Security Keylock (#6340) is shipped with two unique keys. Additional keys may be purchased from IBM. (Vendor will supply additional keys only to original purchaser.) With each order of quantity of one, customer receives two keys (one key of each kind). Key identification numbers must accompany each order. Specify P/N **4177799** or, if EC 868325 is installed, specify P/N **6044248**. Allow six to eight weeks for delivery.

DDS Adapter Connector: A specially designed connector allows the cable from a 5288 DDS Adapter to be connected to the cable of another supported device which has a compatible DDS Adapter. This provides for the local connection of two devices without the use of any modems or channel service units. Only one DDS Adapter Connector is required per connection. The maximum length of the connection is the sum of the modem cable lengths of the two devices. This is a purchase-only item. Specify P/N **4236967**. Allow six to eight weeks for delivery. **Maximum:** One per Digital Data Service (DDS) Adapter. **Field Installation:** Yes.

SUPPLIES

For IBM diskettes, see IBM.

5291 DISPLAY STATION

PURPOSE

The 5291 Display Station is a member of the 5250 Information Display System and can be used with Series/1, System/34, System/36, and System/38 for entering, editing and displaying alphameric data. A movable keyboard permits the operator to enter, display, and manipulate data on the screen in a highly flexible and efficient manner. This display station performs the same basic functions as the 5251 model 11, in a compact package with a low profile keyboard and a tiltable display screen. Displays up to 1,920 characters with 24 lines of 80 characters each. The display station status, including cursor location (row/column), is shown on the 25th line.

MODELS

Model 1 001

Prerequisites: A 5251 mdl 2 or 12 with #2550 or #2551, a 5294, or a 5340 (System/34 must be at SSP release 7 level or greater, and if the 5291 is to be used as a console, the System/34 must be at diagnostic release level 9.2 or greater), or a System/36, 5381, or Series/1 with #1210.

HIGHLIGHTS

The standard character set includes 96 characters: 52 upper/lower case alphabetic, 10 numeric, and 33 special characters in addition to "space". Cable-Thru is a standard capability. A Display Screen Glare Reduction Filter is also provided as a standard feature. See "Type Catalog" for keyboard layout. Display functions in addition to normal intensity are: high intensity, nondisplay, blinking, underscore, column separator, and reverse image (dark characters on a color background) on a field basis. The operator can reverse the image of the entire screen. An operator-adjustable audible alarm, under program control, is provided to alert the operator to special conditions. The low profile keyboard with adjustable slope and 24 application assigned command functions provides input and control flexibility.

Security Enhancements: Data fields can be defined allowing entered data to be accepted without being displayed on the screen.

Field Editing: Individual data input fields can be edited as Alphameric, Alpha Only, Numeric Only, Signed Numeric, Field Exit Required, Right Adjust, Mandatory Entry, Mandatory Fill, Bypass, Auto Enter, Dup Enable, Monocase and Self-Check Modulus 10 and 11.

Cabling: The cable attachment between the 5291 and other 5250 system components and/or systems must be made with twinaxial cable. Cable connection: Maximum length of any one twinaxial cable is 1,525m (5,000 feet). Up to seven workstations may be attached to a twinaxial cable via the Cable-Thru capability of the 5291. See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for cabling information.

Clustering: The 5291 may be attached to the 5294, or 5251 mdl 2 or 12 with the Cluster (#2550) or the Dual Cluster (#2551) feature. The Cluster feature allows attachment of up to four workstations and the Dual Cluster feature allows attachment of up to eight workstations.

Communications: The 5291 can communicate with a System/34, System/36, System/38 via a 5251 mdl 12, or a 5294 (the 5294 is not supported on the System/34 or System/38). The 5291 can also communicate with a System/34 or System/38 via a 5251 mdl 2. See M5251 pages for communicating capability of the mdl 2 or 12, or M5294 pages for communicatimg capability of the workstation controller.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided in the *IBM 5291 Display Station Operator's Guide* (GA21-9409). Also, see "Customer Responsibilities" below.

Customer Setup (CSU): The 5291 is designated as a customer setup device, thereby offering the customer early availability and relocation flexibility. The Marketing Representative must advise the customer of his responsibilities before receipt of the machine. The CSU allowance is one day.

Customer Responsibilities: The customer is responsible for:

- Receipt, unpacking and placement of the 5291.
- Physical setup, connection of cables to IBM devices incorporating protected access areas, switch setting and checkout in accordance with instructions supplied by IBM. Details of these conditions are described in the Customer Setup instructions.
- Relocation of the 5291, if required, to allow IBM service access.
- Using and following the problem determination procedures for the 5291 prior to calling for IBM service.
- Providing a desk or table-top to support the 5291.
- Installation and maintenance of signal cables between 5250 Information Display System components and the attached system.
- When adding additional direct or remote display stations to Series/1, System/34, System/36, or System/38, the customer may have to modify the system configuration specifications. See *IBM System/34 Program Product Installation and Modification Reference Manual* (SC21-7689), *IBM System/36 Changing Your System Configuration* (SC21-9052), *IBM System/38 Guide to Program Product and Device Configuration* (GC21-7775), or *IBM Series/1 5250 Information Display System Attachment Feature Initialization and Configuration Operator's Guide* (GA34-0098).

Documentation: *IBM 5250 Information Display System Introduction Manual* (GA21-9246), *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337), *IBM 5291 Display Station Operator's Guide* (GA21-9409), and *IBM 5291 Set-up Procedures* (GA21-9408) (shipped with the product).

AAS Ordering Instructions: The 5291 is a System Component.

SPECIFY

- Default Order Entry: Specify Codes are not required when ordering a 5291. Associated system ID must be indicated on the order.
- Power Default (100-127V AC, 1-phase, 50/60 Hz): A standard non-locking plug (uses customer standard type receptacle) will be furnished. Standard Power cord is 2.4m (8 feet), no specify is required.
- Color Default: Pearl White only.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Power Cable: A 1.8m (6 foot) power cable with standard non-lock plug is available. The power cable is pluggable at the machine.

Cables: The twinaxial cables and/or associated parts to interconnect the 5250 Information Display System components and attached systems may be purchased from IBM or from a customer-selected source. For the description of these cables and parts, see the *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the machine.

Twinaxial Wire (P/N 7362211): Order must specify the desired length. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. This is an indoor/outdoor cable.

Twinaxial Connector Kit (P/N 7362268): Includes two connectors. Twinaxial wire and one Twinaxial Connector Kit are required for each attachment cable. Individual connectors P/N 7362269 are available for replacement.

Twinaxial Cable Assembly (P/N 7362267): Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinaxial Adapter (P/N 3762230): Permits two Twinaxial Cables Assemblies to be joined together.

Twinaxial Station Protector Kit (B/M 7361807): Two protectors. One is required at each end of each Twinaxial Attachment Cable installed outdoors (either above or below ground level). Individual Twinaxial Station Protectors, P/N 7362426, are available for replacement purposes.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code Requirements for low smoke-producing, plenum-installed cables.

Twinaxial Connector Kit: Includes two connectors. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N 7362063 for Teflon-covered cable. Individual connectors P/N 7362229 are available for replacement.

Twinaxial Wire: Order must specify the desired length. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N 7362061 for Teflon-covered cable.

Twinaxial Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order P/N 7362062 for Teflon-covered cable assembly.

SUPPLIES (None)

5292 COLOR DISPLAY STATION

PURPOSE

The 5292 is an advanced color display station for use in 5250 Information Display System networks. It is attachable to System/34, System/36, System/38, and 5251 model 2 or 12.

Model 1: The 5292 model 1 is a 7-color display station plug compatable in 5250 Information Display System networks. It can be used with System/34, System/36, and System/38 for entering, editing and displaying alphameric data. Displayable colors are red, green, turquoise, yellow, pink, blue and white. A low profile, typewriter-style movable keyboard permits the operator to enter, display, and manipulate data on the screen in a highly flexible and efficient manner. This display station performs the same basic functions as the 5251 model 11, but utilizes a color display screen. Displays up to 1,920 characters with 24 lines of 80 characters each. The display station status is shown on a 25th line. Optionally, the user can also display the cursor location (row/column) on this status line.

Model 2: In addition to being able to operate exactly like a model 1 in alphameric mode (described above), the 5292 model 2 provides the capability of producing business graphics utilizing up to eight colors (black plus seven from a palette of 512 colors -- requires host system programming support). Examples of graphic images which can be displayed include bar charts, pie charts, line graphs, and surface graphs. High flexibility in creating graphic images is achieved by the inclusion of an All Points Addressable (APA) display and a customized vector-to-raster conversion processor. Also included in the model 2 are three standard output ports: IEEE 488 (requires host system programming support), parallel printer (requires RPQ for 5292 mdl 2 microcode support), and video. These ports allow the direct attachment of various plotters, printers, and electronic film cameras, monitors, or projectors.

MODELS

Model 1 001

Model 2 002

Prerequisites: A 5251 mdl 2 or 12 with Cluster (#2550) feature or Dual Cluster (#2551) feature, 5294, or a 5340 (System/34 must be at SSP release 7 level or greater), 5360, or a 5381 (Release 4.1 or higher). For the mdl 2, programming graphics support is provided on System/36 via System/36 Business Graphics Utilities, 5799-BNW, (PRPQ P84056). The 5292 mdl 2 will attach to the System/34 and System/38 and operate as a mdl 1 but graphics programming support is not available. An RPQ is required to provide the microcode to support a parallel printer attachment to the 5292 mdl 2.

HIGHLIGHTS

Mdls 1 and 2 Alphameric Mode: The standard character set includes 96 dot-matrix characters: 52 upper/lower case alphabetic, 10 numeric, and 33 special characters in addition to "space". The display of colors is achieved through the use of already existing attribute codes and can be used without program modification. (For example, the high intensity attribute code will result in white color; the blink attribute code will result in red color, etc.) For optimum use of color, changes may be desired in existing programming support for the customer 5251 or 5252 Display Stations. See *IBM 5292 Color Display Station Programmer's Guide to Using Color* (GA21-9413). Cable-Thru and Screen Glare Reduction are provided as standard features. See "Type Catalog" for keyboard layout. Display functions include: nondisplay, blinking, underscore, column separator, and reverse image (dark characters on a color background) on a field basis. An operator-adjustable audible alarm is provided to alert the operator to special conditions. The low profile keyboard with adjustable slope and 24 application assigned command functions provides input and control flexibility. Easy-to-use select options, provided from the keyboard, allow the operator to utilize a block or underscore cursor, cursor blink or non-blink, limit line space and limited use of color. The operator can also elect to display the cursor location (row/column) and the screen attribute codes being utilized as well as set the audible alarm volume.

Mdl 2 in Graphics Mode: Inclusion of the vector-to-raster conversion processor provides for host offload, area fill of complex shapes, flexible line styles, and double width line generation. The All Points Addressable (APA) capability gives access to 480 addressable points in the horizontal direction by 288 points in the vertical direction utilizing eight colors (black plus seven colors from a palette of 512 colors). Color selection is a function of host system graphics software support. Three output ports are provided on the mdl 2: The IEEE output port provides for attachment of various plotters (requires host system programming support), the parallel printer output port allows attachment of various mono/color printers for screen copy (requires RPQ for 5292 mdl 2 microcode support), the video output port provides RGB (red, green, blue) plus synchronization signals to provide for attachment of various electronic film cameras, monitors, or projectors (host programming support is not required). Also provided on the mdl 2 when used in graphics mode are additional operator controls including graphics on/off, erase graphics display, terminate graphics processing, and screen copy (local hard copy via the parallel printer port). When in graphics mode the mdl 2 utilizes limited line space.

Security Enhancements: Data fields can be defined so entered data is accepted without being displayed on the screen.

Field Editing: Individual data input fields can be edited as Alphameric, Alpha Only, Numeric Only, Signed Numeric, Field Exit Required, Right Adjust, Mandatory Entry, Mandatory Fill, Bypass, Auto Enter, Dup Enable, Monocase and Self-Check Modulus 10 and 11.

Cabling: The cable attachment between 5250 system components and/or systems must be made with twinaxial cable. Maximum length of any one twinaxial cable is 1,525m (5,000 feet). Up to seven workstations may be attached to a twinaxial cable via the Cable-Thru capability of the 5292. See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for cabling information. See "Accessories" for twinaxial cable and associated accessories.

Clustering: The 5292 Color Display Station may be attached to the 5251 mdl 2 or 12 with the Cluster (#2550) or the Dual Cluster (#2551) feature, or the 5294. The Cluster feature allows attachment of up to four workstations and the Dual Cluster feature allows attachment of up to eight workstations. See "Special Features" in M5251 pages.

Communications: The 5292 Color Display Station can communicate with a System/34, System/36, System/38 via a 5251 mdl 12, or 5294 (the 5294 is not supported on the System/34 or System/38). The 5292 can also communicate with a System/34 or System/38 via a 5251 mdl 2. See M5251 pages for communicating capability of the mdl 2 or 12, or M5294 pages for communicating capability of the workstation controller.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided in the *IBM 5292 Color Display Station Color Alignment and Problem Determination Procedures* (GA21-9420) which is shipped with the machine. Also, see "Customer Responsibilities" below.

Customer Setup (CSU): The 5292 Color Display Station is designated as a customer setup device, thereby offering the customer early availability and relocation flexibility. The Marketing Representative must advise the customer of his responsibilities before receipt of the machine. The CSU allowance is one day.

Customer Responsibilities: The customer is responsible for:

- Receipt, unpacking and placement of the 5292.
- Physical setup, connection of cables to IBM devices incorporating protected access areas, switch setting and checkout in accordance with instructions supplied by IBM. Details of these conditions are described in the Customer Setup instructions.
- Relocation of the 5292, if required, to allow IBM service access.
- Using and following the problem determination procedures for the 5292 prior to calling for IBM service.
- Providing a desk or table-top to support the 5292.
- Installation and maintenance of signal cables between 5250 Information Display System components and the attached system. The customer is also responsible for providing and installing cables from any of the output ports of the mdl 2 to the output device if not supplied with the device.
- When adding display stations to System/34, System/36, or System/38, the customer may have to modify the system configuration specifications. See *IBM System/34 Program Product Installation and Modification Reference Manual* (SC21-7689), *IBM System/36 Changing Your System Configuration* (SC21-9052), or *IBM System/38 Guide to Program Product and Device Configuration* (GC21-7775).

Publications: *IBM 5250 Information Display System Introduction Manual* (GA21-9246), *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337), *IBM 5292 Color Display Station Operator's Guide* (GA21-9416), and, *IBM 5292 Color Display Station Programmer's Guide to Using Color* (GA21-9413), *IBM 5292 Color Display Station Color Alignment and Problem Determination Procedures* (GA21-9420). The *IBM 5250 Functions Reference Manual* (SA21-9247), containing mdl 2 output port interface description, will be available in September, 1983.

AAS Ordering Instructions: The 5292 is a System Component.

SPECIFY

- Default Order Entry: Specify Codes are not required when ordering a 5292. Associated system ID must be indicated on the order. Default parameters are shown below.
- Power Default (100-127V AC, 1-Phase, 60 Hz): A standard non-locking plug (uses customer standard type receptacle) will be furnished. Standard power cord is 2.4m (8 feet). See also "Accessories" for alternate cord.
- Color Default: Pearl White only.

5292 Color Display Station (cont'd)

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Cables: The twinaxial cables and/or associated parts to interconnect the 5292 and attached systems may be purchased from IBM or from a customer-selected source. For the description of these cables and parts, see the *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the machine.

Twinaxial Connector Kit (**P/N 7362268**): Includes two connectors. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. (Individual connectors **P/N 7362229** are available for replacement.)

Twinaxial Wire (**P/N 7362211**): Order must specify the desired length. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. (This is an indoor/outdoor cable.)

Twinaxial Cable Assembly (**P/N 7362267**): Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinaxial Adapter (**P/N 3762230**): Permits two Twinaxial Cables Assemblies to be joined together.

Twinaxial Station Protector Kit (**B/M 7361807**): Two protectors. One is required at each end of each Twinaxial Attachment Cable installed outdoors (either above or below ground level). Individual Twinaxial Station Protectors, **P/N 7362426**, are available for replacement purposes.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

Twinaxial Connector Kit: Includes two connectors. Twinaxial wire and one connector kit are required for each attachment cable. Order **P/N 7362063** for Teflon-covered cable. Individual connectors **P/N 7362229** are available for replacement.

Twinaxial Wire: Order must specify the desired length. Twinaxial wire and one connector kit are required for each attachment cable. Order **P/N 7362061** for Teflon-covered cable.

Twinaxial Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order **P/N 7362062** for Teflon-covered cable assembly.

Power Cord: A 1.8m (6 foot) power cord with standard non-locking plug is available. The power cord is pluggable at the machine.

SUPPLIES (None)

5294 REMOTE CONTROL UNIT

PURPOSE

The 5294 is a remote control unit for the following workstations: 5251 models 11 and 999, 5291, 5292; 5219 models D01 and D02, 5224, 5225, 5256 printers, and the Personal Computer (with 5251 model 11 emulation only).

MODELS

Model 001

Prerequisites: Transmission via common carrier facility to a 5360 with a communications adapter, requires a modem/DCE and the appropriate interface feature or a DDS adapter. See "Special Features" for communications adapters. At least one display station with a keyboard installed within 6m (20 feet) of the 5294 is required for Customer Setup (CSU) of the 5294.

HIGHLIGHTS

The 5294 control unit is a remote workstation controller which can attach up to eight workstations consisting of the Personal Computer (with 5251-11 emulation feature) display stations, and printers.

The basic machine has two ports and allows attachment of up to four workstations. Using Cable-Thru, the workstations can be distributed in any combination on the two ports. The workstation may be installed up to a maximum of 1,525m (5,000 Feet) from the 5294.

The 5294 communicates in SNA/SDLC half-duplex mode via half-duplex or duplex communication facilities. It features high-speed communications capability ... up to 56,000 bps via the DDS adapter and up to 48,000 bps via X.21 adapter.

The 5294 is customized (via a display station) during CSU utilizing battery powered memory in the 5294 to store the customized workstation configuration, character sets, features, and communication connection data. Detailed information for initial customizing and for customizing made necessary by changing configurations is contained in the *IBM 5250 Planning and Site Preparation Guide* (GA21-9337-5) and the *IBM 5294 Remote Control Unit Setup Procedures* (GA21-9369.

Cabling: See *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337) for cabling information.

Clustering: Additional workstations may be attached to the 5294 with Extended Cluster (#2550). This feature allows attachment of a total of eight workstations. See "Special Features".

Communications: The 5294 communicates with a System/36 equipped with compatible communications adapters operating in SDLC or X.25 mode. In SDLC mode, the 5294 communicates in half-duplex mode on nonswitched (leased) point-to-point and multipoint communication lines which may be duplex or half-duplex facilities (depending upon communication feature selected) at speeds up to 56,000 bps and on switched (dial) point-to-point communication lines at speeds up to 9600 bps as allowed by available facilities. In X.25 mode, the 5294 communicates in full-duplex mode on nonswitched (leased) point-to-point duplex facilities. See M2700 pages for Information on communications facilities. **Limitations:** EIA Interface (#3701) or DDS Adapter (#5650 or #5651) X.21 Adapter (#5655) is required.

IBM Modems: One IBM modem may be attached to the 5294:

Modem	Speed (bps)
3863	2400
3864	4800
3865	9600
3868-1	2400
3868-2	4800
3868-3	9600 PTP
3868-4	9600 MP
3872	2400
3874	4800
3875	7200

Note: The 5294 does not support Autocall Originate (#1091) on the 3872. For communications capabilities, product utilization, and special features, see M2700, 3863, 3864, 3865, 3872, 3874, and 3875 pages.

Prerequisites: #3701.

Data Encryption Devices: A 3845 or 3846 Data Encryption Device may be attached between the 5294 and the external modem.

Note: Refer to M2700, 3845, and 3846 pages for information on the 3845 or 3846 configuration and communications capability. 3845 or 3846 devices operating with SDLC protocol will not operate with NRZI transmission mode. **Prerequisites:** #3701.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided in the *IBM 5294 Operator's Guide and Problem Determination Procedures* (GA21-9370). Also, see "Customer Responsibilities".

Customer Setup (CSU): The 5294 is designated as a customer setup device, thereby offering the customer early availability and relocation flexibility. The Marketing Representative must advise the customer of his responsibilities before receipt of the machine. The CSU allowance is one day.

Customer Responsibilities: The customer is responsible for:

- Receipt, unpacking and placement of the 5294.
- Physical setup, connection of cables to TP lines/modems incorporating protected access areas, switch setting and checkout in accordance with instructions supplied by IBM. Details of these conditions are described in the Customer Setup instructions shipped with the product.
- Relocation of the 5294, if required, to allow IBM service access.
- Using and following the problem determination procedures for the 5294 prior to calling for IBM service.
- Providing a desk or table-top to support the 5294.
- Installation and maintenance of signal cables and associated parts for attaching the 5294.
- The installation and maintenance of common carrier facilities or services. For further information, see M2700 pages.
- Obtaining a firm installation date for the start of transmission services (including any required modems). The IBM Marketing representative must assure that a firm installation date is established prior to order confirmation.

Publications: *IBM 5294 Remote Control Unit Operator's Guide and Problem Determination Procedures* (GA21-9370), *IBM 5294 Remote Control Unit Setup Procedures* (GA21-9369), *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337), *IBM 5250 Information Display System Introduction* (GA21-9246), *IBM 5250 Information Display System Functions Reference Manual* (GA21-9247).

SPECIFY

- Default Order Entry: Specify Codes are not required when ordering a 5294. Default parameters are shown below.
- Power Default (100-127V AC, 1-Phase, 60 Hz): A standard non-locking plug (uses customer standard type receptacle) will be furnished. Standard power cord is 2.4m (8 feet). See also "Accessories" for alternate cord.
- Color Default: Pearl white only. No specify code required.
- Communication Cable: The appropriate 6m (20 foot) communication cable is provided as standard for the communication feature ordered. No specify code required.

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES

Extended Cluster (#2550): Provides two additional cable connections. Allows attachment of up to eight workstations (5219 mdl D01, or D02, 5224, 5225, 5251 mdls 11 and 999, 5256, 5291, 5292, or Personal Computer). The maximum allowable length of twinaxial cable on each port is 1,525m (5,000 feet). To attach multiple workstations to one twinaxial cable, see Cable-Thru (#2680) for the 5225, 5251 mdls 11 and 999, and 5256. **Limitations:** If X.25 Support Feature (#5680) is installed, the maximum number of workstations that can be attached is six. **Maximum:** One. **Field Installation:** Yes.

Expanded Function (#3600): Provides the following functions:

Magnetic Stripe Reader control provides control for Magnetic Stripe Reader (#4910) on the attached 5251 mdl 11 (or magnetic slot reader control, RPQ 841500 - on the attached 5292).

Self-Check Number provides Modulus 10 and 11 checking to assure that all digits of a number have been correctly keyed from the attached 5251, 5291, or 5292 keyboards.

Field Installation: Yes. **Prerequisites:** #3610 must be installed. #3610 is a prerequisite to either #3600 or #5680 but should be ordered only once, even if both of these features are installed.

Feature Adapter Card (#3610): This adapter provides the necessary card space within the 5294 to install either Expanded Function (#3600) or the X.25 Support Feature (#5680). **Prerequisites:** #3610 is a prerequisite to either of these features but should be ordered only once, even if both Expanded Functions and X.25 Support Feature are installed. **Maximum:** One. **Field Installation:** Yes.

COMMUNICATIONS FEATURES

EIA Interface (#3701): Provides an interface for attachment of an IBM modem or non-IBM modem meeting RS-232-C characteristics. Non-IBM modems (other than PTT mandatory modems may be attached subject to the Multiple Supplier Systems Policy. An integrated adapter for nonswitched point-to-point, multipoint, and switched

5294 Remote Control Unit (cont'd)

point-to-point data transmission at speeds of 2400, 4800 and 9600 bps. A 6m (20 foot) EIA RS-232-C interface cable is provided with this feature. **Limitations:** Cannot be installed with X.21 Adapter (#5655) or DDSA (#5650 or #5651). **Maximum:** One. **Field Installation:** Yes.

Digital Data Service Adapter (#5650, #5651): An integrated adapter for point-to-point data transmission at speeds of 2400, 4800, 9600, or 56,000 bps over the AT&T nonswitched Data-Phone® Digital Service. The DDSA interfaces to a customer-provided Channel Service Unit (CSU). #5650 for point-to-point, #5651 for multipoint tributary.

® Data-Phone is a trademark of AT&T.

One of the following transmission speeds must be specified when ordering DDSA (#5650 or #5651): **#9822** for 2400 bps, **#9823** for 4800 bps, **#9825** for 9600 bps, or **#9830** for 56,000 bps. **Limitations:** Cannot be installed with EIA Interface (#3701) or X.21 Adapter (#5655).

Note: Regulatory changes in 1983 regarding customer premises equipment (CPE) prohibit AT&T from providing the CSU as part of the tariffed DDS facilities. The customer must now provide the CSU (or equivalent) device. The CSU provided must be an FCC registered (or grandfathered) device per FCC Part 68. The CSU must interface the DDS adapter as described in *AT & T Technical Reference* (Pub 41021) and interface the DDS facilities as described in *AT & T Technical Reference* (Pub 62310). **Maximum:** One. **Field Installation:** Yes.

X.21 Adapter (#5655): This feature provides an interface for connecting to a DCE which has an interface that complies with CCITT recommendation X.21 and X.24/X.27 for electrical characteristics and interface pin assignments. This feature may be used with the 5294 for SDLC communication over nonswitched public data network facilities. It provides point-to-point data transmission speeds of 2400, 4800, 9600, or 48,000 bps. Refer to Chart N (nonswitched) in the M2700 pages for the networks and data circuit-terminating equipment (DCE) that are supported. The network establishes the data rate and supplies the clock. Usage of this feature on an X.21 network is dependent on the availability of an X.21 network that is compatible with IBM's implementation of X.21 as described in the *IBM Implementation of X.21 General Information Manual* (GA27-3287). This feature may also be used with #5680 for attachment to those X.25 Packet Switched Networks which use an interface that complies with CCITT recommendation X.21 and X.24/X.27 for electrical characteristics and interface pin assignments. Refer to Chart Q in the M2700 pages for the networks and DCEs supported. The 5294 can communicate via the X.21bis interface to a System/36. In this method of attachment, the 5294 uses the EIA RS-232-C interface. Also, the 5294 can communicate via the X.21 Adapter with a System/36 that has an X.21bis interface. Refer to Chart M (X.21 nonswitched) in the M2700 pages for information on the X.21 facilities. **Limitations** : Cannot be installed with EIA Interface (#3701) or DDSA (#5650 or #5651). **Maximum:** One. **Field Installation:** Yes.

X.25 Support Feature (#5680): Provides the support for attaching the 5294 to the X.25 packet switching networks. It provides the HDLC protocol for X.25 communications. The installation of this feature is dependent on the availability of a Packet Switching Network that is compatible with IBM's implementation of X.25 as described in *IBM Implementation of X.25 General Information Manual* (GA27-3345). **Prerequisites:** (1) Either #3701 or #5655 must be installed. (2) #3610 must be installed. #3610 is a prerequisite to either #5680 or #3600 but should be ordered only once, even if both of these features are installed. **Limitations:** Cannot be installed with DDSA (#5650) or (#5651). **Field Installation:** Yes.

MODEL CONVERSIONS: None

ACCESSORIES

Power Cable: A 1.8m (6 foot) power cable with a standard non-locking plug is available. The power cable is pluggable at the machine.

EIA Adapter Cable: An 18-inch adapter cable is available in all countries if a modem eliminator is to be used with interface #3701. Order specifying P/N **2452096**.

Cables: The twinaxial cables and/or associated parts to interconnect the 5294 and attached system may be purchased from IBM or from a customer-selected source. For the description of these cables and parts, see the *IBM 5250 Information Display System Planning and Site Preparation Guide* (GA21-9337). Twinaxial cables are available with either vinyl or Teflon® covering. Teflon-covered cable complies with the National Electrical Code Requirements for low smoke-producing, plenum-installed cables. The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the machine.

® Teflon is a trademark of the El DuPont De NeMours Co., Inc.

Twinaxial Cabling:

Twinaxial Connector Kit: Includes two connectors. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. Individual connectors are available for replacement. Order as follows:

P/N **7362268**	Connector kit for vinyl-covered cables.
P/N **7362063**	Connector kit for Teflon-covered cables.
P/N **7362229**	Individual connector (replacement) for vinyl or Teflon-covered cables.

Twinaxial Wire: Order must specify the desired length. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. (Vinyl-covered cable is an indoor/outdoor cable.) Order as follows:

P/N **7362211**	For vinyl-covered cable.
P/N **7362061**	For Teflon-covered cable.

Twinaxial Cable Assembly: Includes two connectors attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order as follows:

P/N **7362267**	Cable assembly with vinyl-coated wire.
P/N **7362062**	Cable assembly with Teflon-coated wire.

Twinaxial Adapter (**P/N 3762230**): Permits two Twinaxial Cable Assemblies to be joined together. Allow a lead time of 120 days.

SUPPLIES (None)

5320 SYSTEM UNIT

[NO LONGER AVAILABLE]

Special features, accessories, RPQs, and MESs may be obtained on an "as available" basis only.

PURPOSE

The System/32 is a compact commercial data processing system designed primarily for small businesses.

MODELS

Model	Printing Speed	Disk Storage Capacity (Bytes)
A01	40 cps unidirectional	3,210,240
A02	40 cps unidirectional	5,053,440
A03	40 cps unidirectional	9,169,920
A04	40 cps unidirectional	13,777,920
A11	40 cps bidirectional	3,210,240
A12	40 cps bidirectional	5,053,440
A13	40 cps bidirectional	9,169,920
A14	40 cps bidirectional	13,777,920
A21	80 cps bidirectional	3,210,240
A22	80 cps bidirectional	5,053,440
A23	80 cps bidirectional	9,169,920
A24	80 cps bidirectional	13,777,920
A31	120 cps bidirectional	3,210,240
A32	120 cps bidirectional	5,053,440
A33	120 cps bidirectional	9,169,920
A34	120 cps bidirectional	13,777,920
B11	50 lpm	3,210,240
B12	50 lpm	5,053,440
B13	50 lpm	9,169,920
B14	50 lpm	13,777,920
B21	100 lpm	3,210,240
B22	100 lpm	5,053,440
B23	100 lpm	9,169,920
B24	100 lpm	13,777,920
B31	155 lpm	3,210,240
B32	155 lpm	5,053,440
B33	155 lpm	9,169,920
B34	155 lpm	13,777,920
C41	285 lpm	3,210,240
C42	285 lpm	5,053,440
C43	285 lpm	9,169,920
C44	285 lpm	13,777,920

Note: All models have 16,384 bytes of main storage standard.

Limitations: See the appropriate host system programming pages for possible restrictions.

HIGHLIGHTS

- Operator-oriented data processing.
- Direct keyboard data entry.
- Display screen.
- Batch processing with stored job stream procedures.
- RPG II programming support.
- Communications capability via SDLC or BSC.
- Word processing functions.
- Metal Oxide Semiconductor Field Effect Transistor (MOSFET) main storage.
- 600-nanosecond main storage cycle time.
- Main storage available in 16K, 24K, or 32K bytes with 2K bytes reserved for SCP functions.
- Internal structure is EBCDIC 8-bit byte.

Keyboard: Used for data entry and operator/system communication. It features a familiar typewriter layout plus a 10-key proof keyboard and function keys. The top row of typewriter keys are dual-defined, providing 24 command keys. In addition to the standard alphameric keys, the keyboard has record, field, character advance, backspace, repeat, and printer control keys. A Dual Case Keyboard and Display feature provides upper/lower case and special character/graphic support and a code key used by application programs to simulate the Mag Card (Selectric, II, A, and Executive) Typewriter code key.

Display Screen: Provides operator guidance and prompting and auxiliary output under program control. Up to 240 characters can be displayed, six rows of 40 characters each. All data entered through the keyboard is displayed on the screen by the programming system.

Disk Storage: Capacity of 3.2, 5.0, 9.1, or 13.7 million bytes of nonremovable high-speed direct access storage. The disk rotates at 2,964 rpm, yielding a data rate of up to 889,000 bytes per second, and so permitting efficient sequential and random access processing. The following table provides corresponding capacity data and access times. For more specific access times, refer to timing charts. Average latency is 10.1 milliseconds.

	3.2MB	5.0MB	9.1MB	13.7MB
Bytes/Sector	256	256	256	256
Sectors/Track	60	60	60	60
Tracks/Cylinder	2	2	2	3
Bytes/Cylinder	30,720	30,720	30,720	46,080
Cylinders	104.5	164.5	298.5	299.0
Access Time (ms)				
Minimum	13.0	13.0	14.2	14.2
Average	50.4	70.0	72.5	72.5
Maximum	121.0	180.0	166.9	166.9

Line Printing: B and C mdls with a 48-character print belt provide printed output at nominal rated speeds of 50, 100, 155, or 285 lpm depending upon mdl. Included as standard is one engraved font print belt. See "Specify" for proper ordering. Nominal printing speeds are as follows:

	Character Set Size		
Mdl	48	64	96
B1X	50 lpm	50 lpm	50 lpm
B2X	100 lpm	100 lpm	80 lpm
B3X	155 lpm	120 lpm	80 lpm
C4X	285 lpm	225 lpm	160 lpm

Mdl C4X, 96-character set prints at 80 lpm when used with Word Processor/32 (5725-XX1) PP.

Horizontal spacing is 10 characters to the inch with a 132-position print line. Vertical spacing is six lines to the inch. For eight lines to the inch vertical spacing and programming support, see RPQ S40127. A variable width forms tractor provides for feeding continuous forms. Refer to *Forms-Design Printers Reference Guide* (GA24-3488) for forms design considerations and limitations. Forms jam detection is standard. See "Type Catalog" for character set arrays and styles.

Serial Printing: The A mdls print at a maximum rate of 40 cps in a unidirectional mode or 40, 80, or 120 cps in a bidirectional mode depending on mdl. Matrix characters are formed by eight vertical wires. Horizontal spacing is 10 characters to the inch with a 132-position print line. Vertical spacing is six lines to the inch. A variable width forms tractor provides for feeding continuous forms. Refer to *Forms-Design Printers Reference Guide* (GA24-3488) for forms design considerations and limitations. Single form/ledger cards may be processed typewriter-fashion. See "Type Catalog" for character set arrays.

Notes:

- Differences between line and serial printing are transparent to RPG II object code for continuous forms and recompilation is not required when changing printer mdls.
- System/32 printed output is not recommended for optical character reading.
- A forms stand, providing for the feeding and stacking of continuous forms, is provided with the system.
- Printed output utilizing Artisan or Modified Courier print belts should not be expected to compare in quality to the Selectric typewriter.

Diskette Drive: Provides the capability of entering data recorded offline and also is a load/dump backup facility via the Diskette 1. The diskette also provides compatible media for interchange with other systems utilizing Diskette 1 (up to 242,944 byte capacity). For System/32 use, Diskette 1 capacity is 246,272 bytes in standard interchange format and 303,104 bytes in 512-byte extended format. 128-byte records are processed at rates of up to 3,400 per minute reading and up to 1,800 per minute writing. "Read" and "Write" are not overlapped with processing or other devices. However, "one track forward seek" is overlapped.

Card I/O: Utilizing the 129 Card Data Recorder (80-column) provides reading up to 50 cards per minute and punching or punching and printing from 12 to 50 cards per minute. In punch mode, throughput may vary. When two or more adjacent columns are blank, the equivalent of read speed is achieved until a non-blank column is encountered. Utilizing the 5496 Data Recorder (96-column) provides reading, punching, and printing speeds of up to 21 cards per minute. Cannot be installed with 5321 Mag Card Unit Attachment (#4900) and Half-Line Space Printing (#4530). Card I/O operation within the same program as the diskette drive, BSCA, or SDLC is not supported.

Mag Card I/O: Utilizing the 5321 Mag Card Unit provides reading and recording of information up to 102 characters per track and 50 tracks per card. Reading is at the rate of 230 milliseconds per track; recording is at the rate of 450 milliseconds per track. The 5321 Mag Card Unit uses the same card and recording discipline as the Mag Card products. Operation of the Mag Card Unit within the same program as the diskette drive, BSCA, or SDLC is not supported.

5320 System Unit (cont'd)

Magnetic Character Reading: Utilizing the 1255 Magnetic Character Reader provides reading and sorting of MICR-inscribed documents at 500 documents per minute for mdl 1 and 750 documents per minute for mdls 2 and 3. Six stackers are provided on mdls 1 and 2, and 12 stackers on mdl 3. Operation of the 1255 within the same program as the diskette drive, BSCA, or SDLC is not supported.

Customer Responsibilities: The customer must be advised, in writing, of certain responsibilities related to the installation and maintenance of common carrier facilities/services as well as the IBM equipment. For further information, see M2700 pages and "Teleprocessing Systems" in the GI section.

The marketing representative must have the customer obtain a firm installation date for the start of transmission services (including any required modems) prior to processing the Order Confirmation card.

Publications: *System/32 Bibliography* (GC20-0032). Refer to *IBM System/32 Installation Manual - Physical Planning* (GA21-9177) for physical installation requirements.

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): Specify **#9884** for 208V or **#9886** for 230V.
- Color: Specify **#9041** for red, **#9042** for yellow, **#9043** for blue, or **#9045** for light gray.
- Print Belt (B and C mdls): Available at time of manufacture only, except when upgrading an installed A mdl. Specify one of the following:

Belt Description	Specify Code .079 Inches	Specify Code .095 Inches
48-character EBCDIC	**#9491** *	**#9497**
48-character FORTRAN	N/A	**#9492**
64-character ASCII	**#9493** *	**#9498**
64-character EBCDIC	**#9490** *	**#9496**
96-character Artisan	N/A	**#9487**
96-character Modified Courier	N/A	**#9499**

* Recommended for use with six or eight lpi RPQ S40127.

- ASCII Key Tops and Display Screen Graphics: Specify **#9370.** Note: Includes ASCII graphics on serial printing (A mdls).
- Modem Cable (SDLC or BSCA only): Required for attaching System/32 to the communications facility regardless of whether an IBM integrated modem or an external modem is used. Specify **#9460** for a 6 meter (20 foot) cable or **#9461** for a 12 meter (40 foot) cable.
- Upending: If required, upending may be accomplished by following the instructions shipped with the system.

SPECIAL FEATURES

Non-Communications Features

Additional Storage (#1005): Provides an additional 8,192 bytes of main storage. **Maximum:** Two. **Field Installation:** Yes.

1255 Attachment (#1100): To attach a 1255 Magnetic Character Reader mdl 1, 2, or 3 equipped with a System/3/32/34 Adapter (#6303). See *IBM System/32 Installation Manual - Physical Planning* (GA21-9177) for cabling information. **Limitations:** Cannot be installed with Data Recorder Attachment (#3200) or 5321 Mag Card Unit Attachment (#4900). **Maximum:** One. **Field Installation:** Yes.

Control Storage Increment (#1500): Provides additional control storage and access to a Scientific Instruction Set, a group of additional instructions which perform functions commonly required in scientific programs. Required for execution of FORTRAN IV (5725-FO1) generated object programs. #1500 is not required for compiling programs. **Maximum:** One. **Field Installation:** Yes.

Data Recorder Attachment (#3200): To attach either a 129 Card Data Recorder mdl 2 equipped with a 3741/5320 Attachment (#8201) or a 5496 Data Recorder mdl 1 equipped with a 2772/3741/5320 Attachment (#7850). A 3 meter (10 foot) cable and connector required to attach a 129 or 5496 to the 5320 is included. Card I/O operation within the same program as the diskette drive, BSCA, or SDLC is not supported. **Limitations:** Cannot be installed with 1255 Attachment (#1100) or 5321 Mag Card Unit Attachment (#4900). **Maximum:** One. **Field Installation:** Yes.

Dual Case Keyboard and Display (#3400): [B, C mdls] Provides upper and lower case characters and new graphics and redefines the character/graphic arrangement of the System/32 keyboard and display. See "Type Catalog" for character/graphic arrangements supported. One set of prompt templates (ten keyboard arrangements) is supplied with #3400. See "Accessories" for additional sets. **Limitations:** Not compatible with ASCII Key Tops and Display Screen Graphics (**#9370**), RPQ GG0339 (additional print belt -- 96-character) or RPQ S40127 (six or eight lines per inch spacing). **Field Installation:** Yes.

Half-Line Space Printing (#4530): [B, C mdls] Provides half-line vertical spacing for printing. This feature supports superscript and subscript requirements normally associated with the character sets provided by Artisan and Modified Courier print belts. **Limitations:** Application programs using half-line spacing must include repositioning to the next full vertical space where full space alignment is required. Cannot be installed with RPQ S40127 (eight lines per inch spacing) or Data Recorder Attachment (#3200). **Field Installation:** Yes.

Keylock (#4655): Replaces on/off power switch to protect against unauthorized use. See "Accessories" for additional information. **Field Installation:** Yes.

5321 Mag Card Unit Attachment (#4900): [B, C mdls] To attach a 5321 Mag Card Unit Mdl 1 to a System/32, A 4.5 meter (15 foot) cable and connector required to attach the 5321 is included. **Limitations:** Cannot be installed with Data Recorder Attachment (#3200) or 1255 Attachment (#1100). **Maximum:** One. **Field Installation:** Yes.

Communications Features

Binary Synchronous Communications Adapter (BSCA) (#2074): In conjunction with stored program control, this feature permits System/32 to function on a switched, nonswitched, or private communications line as a processor/terminal communicating in binary synchronous mode with:

- Another System/32 equipped with #2074.
- A System/34 equipped with a communication adapter.
- A System/38 with appropriately configured BSC adapter and sub-features (point-to-point only).
- A 6640 Document Printer equipped with BSC/EBCDIC feature. Requires communicating features #3700 and #3701 or #5501, #5508, or #5510. System/32 requires SCP (#6002) with WPCU.
- Office System 6/430, 6/440, and 6/450 equipped with BSC/EBCDIC feature. Requires communicating features #3700 and #3701 or #5501, #5508, or #5510. System/32 requires SCP (#6002) with WPCU.
- A Mag Card II Typewriter - Communicating.
- A System/3 equipped with #2074 or #2084.
- A System/360 mdl 20 equipped with #2074.
- A System/360 or System/370 (which is supported by OS or DOS BTAM, OS TCAM, OS/VS1 or OS/VS2 BTAM, TCAM or VTAM, DOS/VS BTAM, or VTAM) via an Integrated Communications Adapter, a 2701 Data Adapter Unit, or a 3704/3705 Communications Controller with the Network Control Program (NCP) or the Partitioned Emulation Program (PEP), any of which are equipped with a binary synchronous adapter and appropriate sub-features.
- A 3741 Data Station mdl 2 or 3741 Programmable Workstation mdl 4.
- A 3747 Data Converter equipped with Communications Adapter (#1660).
- A 5110 Computer equipped with BSCA #2074 (as a 3741 mdl 2 or 4).
- A 5231 mdl 2 equipped with BSCA (#2074) (point-to-point unidirectional transmission only).
- A 5280 Distributed Data System equipped with Communications Adapter (#2500).
- A System/7 equipped with BSCA (#2074).

See the System/32 programming pages for a description of the program support provided on System/32 for this feature.

The BSCA feature is designed to operate at speeds between 600 and 7200 bps over common carrier switched or nonswitched facilities or equivalent privately-owned communication facilities.

The BSCA feature (#2074) will allow System/32 to communicate on a nonswitched point-to-point or multipoint line at speeds of up to 7200 bps and on a switched point-to-point line at speeds of up to 4800 bps. See M2700 pages for information on communication facilities.

On a multipoint line System/32 operates as a tributary station. No support is provided for System/32 to operate as a control station on a multipoint line. Therefore, communication with other devices which do not provide control station capability must be done on a point-to-point line only.

This feature, Binary Synchronous Communications Adapter, will operate in half-duplex mode over dial (switched network) facilities, and in half-duplex mode over nonswitched (or equivalent private) communication lines which may be duplex or half-duplex facilities. Operation of this feature on System/32 will be overlapped at all transmission rates with processing and/or I/O device operations including disk. BSC units at each termination or drop point of a data link to which the System/32 is attached must use the same clocking source (modem or

5320 System Unit (cont'd)

business machine) and must be set to operate at the same transmission rate and to use the same transmission code.

Switched network versions include as a basic capability support of manual dial and manual or auto-answer operations (where the attached modem supports this capability).

ASCII, EBCDIC or EBCDIC Text Transparency are standard. One of the above transmission codes is selected at program compilation time.

Limitations: Cannot be installed with SDLC (#6301). Card I/O, the 5321 Mag Card Unit, the 1255 Magnetic Character Reader, and the diskette drive cannot be operated within the same program as the BSCA. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3701, #5500, #5501, #5600, #5602, or #5610. **Specify:** Modem cable (see "Specify").

EIA Interface (#3701): Provides a cable and interface for the attachment of an IBM modem or non-IBM data set meeting RS-232-C characteristics. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Note:** This feature may also require Internal Clock (#4703) if the external modem does not provide its own clocking. **Limitations:** Cannot be installed with 1200 bps Integrated Modem (#5500, #5501) or 2400 bps Integrated Modem (#5600, #5602 , #5610). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2074 or #6301.

Internal Clock (#4703): Generates synchronizing and timing signals for SDLC or BSC operation when they are not provided by the modem. Clocking speeds available with this feature are 600 bps and 1200 bps. Selection of speed is indicated via a system utility program (SCP). When this feature is installed on System/32, all other SDLC or BSC stations attached to the same data link must also be equipped with a similar Internal Clock feature. **Limitations:** Cannot be installed with 2400 bps Integrated Modem (#5600, #5602, #5610). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2074 or #6301 and #3701, #5500, or #5501.

1200 bps Integrated Modem (#5500, #5501): A modem for SDLC or BSC data transmission at 1200 bps over nonswitched facilities or switched network. Half-speed operation at 600 bps is indicated via a system utility program (SCP). Available in two different versions: #5500 - nonswitched and #5501 - switched with auto-answer. Attachment to the nonswitched (2- or 4-wire) facilities is via an IBM-provided cable directly to the line, Type 3002. Attachment to the switched network is via an IBM-provided cable to FCC-registered protective circuitry of the CBS Type (or equivalent) provided by the user. The device communicating with System/32 must also be equipped with 1200 bps integrated modem/line adapter. **Limitations:** Cannot be installed with EIA Interface (#3701) or 2400 bps Integrated Modem (#5600, #5602, #5610). #5500 and #5501 cannot be installed together. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2074 or #6301 and #4703.

2400 bps Integrated Modem (#5600, #5602): A modem for SDLC or BSC data transmission at 2400 bps over nonswitched facilities, equivalent to and compatible with similarly featured 3872 modems. Half-speed operations at 1200 bps is indicated via a system utility program (SCP). Available in two different versions: #5600 - nonswitched point-to-point and #5602 - nonswitched multipoint tributary. Attachment to nonswitched (2- or 4-wire) facilities is via an IBM-provided cable directly to the line, Type 3002. Attachment to the switched network is via an IBM-provided cable to FCC-registered protective circuitry of the CBS Type (or equivalent) provided by the user. The device communicating with System/32 must also be equipped with 2400 bps integrated modem/line adapter or 3872 modem. **Limitations:** Cannot be installed with EIA Interface (#3701) or 1200 bps Integrated Modem (#5500, #5501). 2400 bps Integrated Modems (#5600, #5602 , #5610) cannot be installed together. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2074 or #6301 and #5733.

2400 bps Integrated Modem (#5610): A modem for SDLC or BSC data transmission at 2400 bps over the switched network with automatic answer capability. This modem is equivalent to and compatible with similarly featured 3872 modems. Half-speed operation at 1200 bps is indicated via a system utility program (SCP). Attachment to the switched network is via an IBM-provided cable to FCC-registered protective circuitry of the CBS Type (or equivalent) provided by the user. The device communicating with System/32 must also be equipped with a 2400 bps integrated modem/line adapter or 3872 modem. **Limitations:** Cannot be installed with EIA Interface (#3701) or 1200 bps Integrated Modem (#5500, #5501). #5600, #5602, and #5610 cannot be installed together. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2074 or #6301 and #5733.

Processing Unit Expansion (#5733): Provides for mounting of one 2400 bps Integrated Modem (#5600, #5602, #5610). **Limitations:** Cannot be installed with EIA Interface (#3701) or 1200 bps Integrated Modem (#5500, #5501). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2074 or #6301 and #5600, #5602, or #5610.

Synchronous Data Link Control Communications (SDLC) (#6301): In conjunction with stored program control, this feature provides communications capability with S/370 mdls 115, 125, 135, 145, 155II, 158, 158MP, 165II, 168, and 168MP via a 3704 or 3705 Communications Controller equipped with appropriate features. See M3704 and 3705 pages. The S/370 must be operating under control of DOS/VS, OS/VS1, or OS/VS2 VTAM and the 3704/3705 under control of the Network Control Program/VS (NCP/VS). See the System/32 programming pages for a description of the program support provided on System/32 for this feature.

The SDLC feature is designed to operate at speeds between 600 and 7200 bps over common carrier switched or nonswitched facilities or equivalent privately-owned communication facilities.

SDLC (#6301) will allow System/32 to communicate on a nonswitched point-to-point or multipoint line at speeds of up to 7200 bps and on a switched point-to-point line at speeds of up to 4800 bps. See M2700 pages for information on communication facilities.

This SDLC feature will operate in half-duplex mode over dial (switched network) facilities, and in half-duplex mode over nonswitched (or equivalent private) communication lines which may be duplex or half-duplex facilities. Operation of this feature on System/32 will be overlapped at all transmission rates with processing and/or I/O device operations including fixed disk. SDLC units at each termination or drop point of a data line to which the System/32 is attached must use the same clocking source (modem or business machine), the same transmission encoding option (NRZ or NRZI), and must be operating at the same transmission rate.

Switched network versions include as a basic capability support of manual dial and manual or auto-answer operations (where the attached modem supports this capability).

The System/32 operates as an SDLC secondary station and can operate on a communication line with other IBM SDLC terminals.

Limitations: Cannot be installed with BSCA (#2074). Card I/O, the 5321 Mag Card Unit, the 1255 Magnetic Character Reader, or the diskette drive cannot be operated within the same program as SDLC. SDLC supported by SCP (5723-SC1) requires 24K bytes of main storage. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3701, #5500, #5501, #5600, #5602, or #5610. **Specify:** Modem cable (see "Specify").

Switched Network Backup (SNBU) (#7951): Provides for backup attachment of System/32 to the public switched network when the 2400 bps Integrated Modem (#5600, #5602, #5610) is used on a nonswitched line as the primary facility. It can communicate with another 2400 bps Integrated Modem or a 3872 modem when either is equipped with switched network capability. Selection of the primary or backup facility is via an operator-invoked system utility program (SCP). Attachment to the switched network is made via FCC-registered protective circuitry of the CDT Type (or equivalent) provided by the user. Calls must be established and answered manually. Operator intervention, program modification, or both may be required on the using system/terminal. This feature can be used with BTAM programs for DOS, DOS/VS, OS, OS/VS1, and OS/VS2 in certain configurations or with TCAM/VTAM under OS/VS1 or OS/VS2. Additional customer program routines will be required, in existing BTAM programming, to fully utilize the capabilities of Switched Network Backup. For additional information, see the *3872 Modem User's Guide* (GA27-3058). **Limitations:** Cannot be installed with SDLC (#6301) or Switched Network Backup with Auto-Answer (#7952). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2074, #5600 or #5602, and #5733.

Switched Network Backup with Auto-Answer (SNBU/AA) (#7952): Same as Switched Network Backup (#7951) plus the added capability of automatically answering incoming calls when attached to FCC-registered protective circuitry of the CBS Type (or equivalent) provided by the user. Selection of the primary or backup facility is via an operator-invoked system utility program (SCP). Operator intervention, program modification, or both may be required on the using system/terminal. This feature can be used with BTAM programs for DOS, DOS/VS, OS, OS/VS1 or OS/VS2 in certain configurations or with TCAM/VTAM under OS/VS1 or OS/VS2. Additional customer program routines will be required, in existing BTAM programming, to fully utilize the capabilities of the Switched Network Backup feature. For additional information, see the *3872 Modem User's Guide* (GA27-3058). **Limitations:** Cannot be installed with SDLC (#6301) or Switched Network Backup (#7951). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2074, #5600 or #5602, and #5733.

IBM Modems:

Modem	Speed (bps)
3863	2400
3864	4800
3865	9600
3872	2400/1200

Note: System/32 does not support Auto-Call Originate (#1091) on the 3872. For communications capabilities, product utilization, and special features, see M2700, 3863, 3864, 3865, and 3872 pages.

5320 System Unit (cont'd)

To verify the proper integrated modem or external modem interface configuration, refer to the following chart. Select one of the categories numbered from 1 to 3 and follow across for the required and optional special features.

Modem/Interface Feature Configurator

Modem/Interface	Internal Clock (#4703)	Processing Unit Expansion (#5733)	SNBU (#7951) or SNBU/AA (#7952)
EIA Interface (#3701)	Optional	-	-
1200 bps Integrated Modem:			
Nonswitched (#5500)	Required	-	-
Switched with Auto-Answer (#5501)	Required	-	-
2400 bps Integrated Modem:			
Nonswitched Point-to-Point (#5600)	-	Required	Optional
Nonswitched Multipoint Tributary (#5602)	-	Required	Optional
Switched Network Auto-Answer (#5610)	-	Required	-

Maximum: One IBM modem can be attached to a System/32. **Field Installation:** Yes. **Prerequisites:** #2074 or #6301 and #3701.

References:

Contact IBM for information concerning external modems attachable to the System/32 SDLC or BSCA features.

See M2700 pages for additional information concerning modems, communications facilities, machine attachment requirements, terminal intermix, and operating capabilities.

Refer to SCP (#6002) for Word Processing Communications Utility support of 6640 Document Printer, Office Systems 6/430, 6/440, 6/450, a second Word Processing System/32, and a Mag Card II Typewriter - Communicating.

MODEL CONVERSIONS

Model conversions are field installable.

Any model conversion that involves a disk storage capacity requires replacement of the disk storage mechanism. Adequate provision must be made for retaining the data contained on the replaced disk mechanism and elimination of user proprietary information.

Model conversions between A, B, and C models require replacement of the print mechanism and may require replacement of the power supply. A0X, A1X, or A2X models, when converted to A31, A32, A33, or A34 models, must be at EC level 828749 or the print mechanism must be replaced.

When upgrading from model A, a print belt must be specified. See "Specify".

The upgrade purchase prices for model conversions may be greater than the purchase price differentials. Customers should carefully evaluate their future requirements when purchasing a system.

Replaced parts from any model conversion become the property of IBM.

ACCESSORIES

Locks and Keys: The 5320 with Keylock (#4655) is shipped with two keys. Additional keys may be purchased from IBM. (Vendor will supply additional keys to original purchaser.) Key identification number and P/N **2546418** must accompany each order. Allow six to eight weeks for delivery.

Additional Print Belts: [B, C mdls] Permits the customer to print more than one character set for various applications. Can be interchangeably used with the belt provided with the machine. Order by feature number with the machine or by MES for field installation.

Belt Description	Feature Code .079 Inches	Feature Code .095 Inches
48-character EBCDIC	#5906 *	#5911
48-character FORTRAN	N/A	#5552
64-character ASCII	#5907 *	#5912
64-character EBCDIC	#5905 *	#5910
96-character Artisan	N/A	#5914
96-character Modified Courier	N/A	#5913

* Recommended for use with six or eight lpi RPQ S40127.

Dual Case Keyboard Prompt Templates (P/N 2773082): A set of ten keyboard redefine prompt templates support the keyboard options as identified in the "Type Catalog". One set is provided with Dual Case Keyboard and Display (#3400).

Cables: A modem cable is required. See "Specify". No other cable order is required for the System/32.

SUPPLIES

Ribbons: A black ribbon is required: P/N **1136653** or equivalent for A mdls, P/N **1136634** or equivalent for B mdls, and P/N **1136670** or equivalent for C mdls.

Diskettes: For Diskette 1, contact IBM.

Mag Cards: For Mag Cards and related supply items, contact IBM.

5321 MAG CARD UNIT

PURPOSE

The 5321 provides magnetic card input and output for System/32 and allows reading and recording to magnetic cards for the 5520 Administrative System.

MODELS

Model 1 001

Limitations: Cannot be installed on 5320 A models. Cannot be installed on 5320 B or C models with 1255 Attachment (#1100) or Data Recorder Attachment (#3200) installed.

Maximum: Only one 5321 may be attached to a system.

Prerequisites: For System/32, the 5321 Mag Card Unit Attachment (#4900) and System Control Program (SCP) (5725-SC1) with #6002. For attachment to the 5525, the 5321 Mag Card Unit Attachment (#1100) and the 5520 Administrative Processing Program (5611-SS1) Release 2.

HIGHLIGHTS

The 5321 reads and records information using 50 track magnetic cards. Reading is at the maximum rate of 20 seconds per card (102 characters per track). Recording is at the maximum rate of 30 seconds per card (102 characters per track). Mag Card products may be used to prepare the cards to be read by the 5321. Playback of the cards recorded by the 5321 can be on Mag Card Selectric Typewriters, Mag Card II, 6640 Document Printer, Mag Card/A, 6240 Communicating Mag Card Typewriter, and the 6670 Information Distributor. Character sets and command codes are supported by application programming under licensed programs such as Word Processor/32 (5725-XX1) on System/32. For the 5520 Administrative System, however, see 5520 Programming pages for operating characteristics and restrictions in this area. The input hopper holds a maximum of 50 cards and the output stacker a maximum of 60 cards.

Publications: *System/32 Bibliography* (GC20-0032).

SPECIFY

- Voltage (115V AC, 1-phase, 60 Hz): No specify required.
- Color: Cloud White (no specify required).
- Attachment: Specify **#9457** for attachment to the 5320 or **#9458** for attachment to the 5525. Note that **#9458** must also be specified when changing attachment of an existing Mag Card Unit from the 5320 to the 5525.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES

Cables: The 5321 is shipped with a 4.6 meter (15 foot) cable and connector.

SUPPLIES

Magnetic Cards: Only diagnostic magnetic cards are shipped with the 5321. Magnetic cards for customer applications must be ordered separately. For magnetic cards and erase magnets, contact IBM.

5322 COMPUTER

[NO LONGER AVAILABLE]

PURPOSE

The System/23 Datamaster is a compact, desk-top, data processing system designed with many functions intended to simplify use by first time computer users. It is a distributed logic system architecturally structured to support file sharing by multiple workstations. Function-oriented hardware combined with licensed programs provide the additional capabilities of word processing and a flexible communications facility.

The 5322 Computer is a processor unit for the System/23. It contains main storage, arithmetic and logical processing circuits, control functions for I/O units on System/23 and also the keyboard/CRT. Most models have integrated diskette drive(s). A significant standard function of System/23 processors is an interpretive BASIC language processor which provides an integrated, high level, interactive language designed for commercial data processing applications.

MODELS

The model number of the 5322 is determined by the function, memory size, and integrated diskette capability as follows:

Model	Main Storage	Diskette Capacity	Number of Drives
Data Processing Models			
110*	32KB	0MB	0
111*	32KB	.3MB	1
112*	32KB	.6MB	2
113*	32KB	1.1MB	1
114*	32KB	2.2MB	2
120	64KB	0MB	0
121	64KB	.3MB	1
122*	64KB	.6MB	2
123*	64KB	1.1MB	1
124	64KB	2.2MB	2
130*	96KB	0MB	0
131*	96KB	.3MB	1
132*	96KB	.6MB	2
133*	96KB	1.1MB	1
134*	96KB	2.2MB	2
140	128KB	0MB	0
141	128KB	.3MB	1
142*	128KB	.6MB	2
143*	128KB	1.1MB	1
144	128KB	2.2MB	2
*Data Processing and Word Processing** Models*			
420	64KB	0MB	0
421	64KB	.3MB	1
422*	64KB	.6MB	2
423*	64KB	1.1MB	1
424	64KB	2.2MB	2
430*	96KB	0MB	0
431*	96KB	.3MB	1
432*	96KB	.6MB	2
433*	96KB	1.1MB	1
434*	96KB	2.2MB	2
440	128KB	0MB	0
441	128KB	.3MB	1
442*	128KB	.6MB	2
443*	128KB	1.1MB	1
444	128KB	2.2MB	2

* These models are no longer available.
** See System/23 Word Processing requirements under "Standard Features".

The first digit of the mdl number indicates Data Processing function only (1XX) or Data Processing and Word Processing (4XX). The second digit of the mdl number indicates main storage size, and the third digit indicates the number of diskette drives and their capacity.

Maximum Configuration:

Attachable to the 5322 are:

- Up to two printers 5217, 5241, or 5242.
- Single or dual additional diskette drives with the 5246 Diskette Unit.
- High performance, fixed disk storage with the 5247 Disk Storage Unit.

Up to two 5322 Computers can be included in a configuration by attachment to a shared function model of the 5246 Diskette Unit (mdls 21 or 22) or the 5247 Disk Storage Unit.

Prerequisites: Every System/23 must have a diskette storage facility available for system support and maintenance diagnostic support purposes. Therefore, each 5322 must have either the Integrated Diskette Controller (#3780), the 5246 Diskette Unit Controller (#3775), the Extended 5246 Controller (RPQ 8N5008), or the 5247 Disk Unit Adapter Controller (#3770).

Word Processing system configurations must have at least .6MB of diskette capacity available in order to use the word processing licensed program (5715-WP1). See "Special Features" for a description of limitations and prerequisites.

HIGHLIGHTS

- User-oriented system design.
- Wide choice of main memory and diskette storage options provide configuration flexibility to satisfy specific customer requirements.
- Integrated high level interactive language - BASIC.
- Easy-to-use, adjustable typewriter-like keyboard with numeric keypad and control keys.
- Full screen processing ability with 1920-character CRT display screen.
- Customer Support Function diskettes provide easy start-up and simplified diskette data handling.
- Optional word processing capability.
- Dual workstation capability.
- Flexible communications adapter feature and licensed program for either asynchronous or binary synchronous operations.
- Field upgrades provide for future system growth.

Standard Features

Processor: Main storage is available in 32K, 64K, 96K, or 128K bytes (12K bytes of which are permanently allocated for use by the BASIC language interpreter, display, printer and diskette buffers). Main storage cycle time is 975 nanoseconds with internal parity checking. All features and mdl upgrades (see "Model Conversions") are field installable. One printer attachment is standard on all mdls and three special feature slots are provided on the Data Processing mdls (1XX). Two special feature slots are provided on the combined Data and Word Processing mdls (4XX).

Diskette Capability: Two types of diskette drives are supported by the 5322 Computer; a diskette that can read/write IBM Diskette 1 (5322 mdls XX1 and XX2) and a diskette drive which can read/write IBM Diskette 1, 2, and 2D (5322 mdls XX3 and XX4 or the 5246 Diskette Drive). The 5322 uses the 512 byte format when operating under the BASIC language. However, the Customer Support Functions can use other formats to copy files for data interchange purposes. The possible formats for the diskettes are:

Diskette	Format	Bytes/ Sector	Capacity
1	1	128	*243KB
1	2	512	303KB
2	3	128	*486KB
2	4	512	606KB
2D	5	256	985KB
2D	6	512	1136KB

* Basic Exchange format

For diskette data exchange with other systems, the following exchange types are supported: Basic Exchange (Formats 1 and 3 above) and H Exchange (Format 5 above). Diskettes can be interchanged with other IBM systems and devices which support a compatible diskette exchange type. Data exchange with other system types may require code translation for character set integrity.

Examples are the System/3, System/32, System/34, System/36, System/38, Series/1, S/370, 303X, 4300, 3540, 3740, 3747, 3790, 5110, 5120, 5230, 5260, and 8100.

The instantaneous data transfer rate using IBM Diskette 1 or 2 is up to 31.2K bytes/sec, and for IBM Diskette 2D is up to 62.5K bytes/sec. Rotational speed of both types of drives is 360 rpm.

For information on System/23 diskette operations, see *System/23 Customer Support Functions Volume I* (SA34-0175), *BASIC Language Reference Manual* (SA34-0109), or *System/23 Operator Reference* (SA34-0108).

BASIC Language: The System/23 BASIC Language Interpreter provides convenient and powerful facilities and features for the development and execution of application programs. Among these facilities are:

- Residence in read-only storage requiring no control program load.
- Improved program diagnostic tools, such as the TRACE statement.
- Several new functions, statements and commands to simplify:

5322 Computer (cont'd)

- Character String Processing
- Error Recovery
- File Processing and Management
- Printer Control
- Display/Keyboard Processing
- Procedure Control

- File sharing between two 5322 computers.
- Fully overlapped printing and program execution.
- Encyclopedia format reference manual with extensive cross referencing, examples and in-depth description of system function.

Word Processing (WP): The Word Processing mdls consist of additional logic and microcode hardware to be used in conjunction with one of the System/23 Word Processing licensed programs to provide word processing capabilities. Word processing requires a minimum of 64K of main storage and .6MB of diskette storage. See the programming pages for Word Processing systems requirements.

Some functions supported by the Word Processing hardware and licensed programs to create, edit, print, etc., are:

Word Processing II (5715-WP2) Licensed Program provides all of the functions shown for Word Processing (5715-WP1) plus those shown in the WPII column.

WP (5715-WP1)	WP II (5715-WP2)
• **Input**	
-Create document	-Get page/display
-Formats	
-Automatic word wrap	
• **Edit**	
-Delete	-Spelling verification
-Find	-Spelling Assistance
-Indent	-Automatic hyphenation
-Block operations	-Synonym assistance
-Word underscore glossary	-Phrase glossary
-Page delete/restore	-Column alignment right, center, and decimal
	-Page GOTO
	-Page split
• **Merge**	
-DP/WP merge	-DP/WP merge with multiple record types
	-Basic language operations
	-Display files
• **Pagination**	
-Character and line count	-Widow line control
-Syllable hyphen control	-Keep
-Page end control	
• **Document**	
-Copy document	-Operator personalization
-Delete document	-Change document profiles
-Change document profiles	
-List drive contents	

For further information on Word Processing, see the System/23 programming pages (5715-WP1 , 5715-WP2) or the *Word Processing Operator Reference Manual* (SA34-0613).

The keyboard has a familiar typewriter-like layout plus a numeric keypad. Four arithmetic function keys (+, -, *, /) located above the numeric pad provide convenient entry of data in desk calculator mode. Many of the keys in the top row provide system commands when depressed in connection with the COMMAND key. Special BASIC command words can be entered via the keys in conjunction with the COMMAND key. Thus, the COMMAND key can be used to reduce keying time. The keys on the 10-key keypad can also be defined by the user to perform special functions and may be activated with the COMMAND key under program control.

A variety of different language keyboard layouts may be specified when the machine is ordered. For user reference, a Keyboard Aid (SX34-0051) (language and keyboard dependent) is supplied with each 5322. This aid is a set of plasticized printed cards that will lie above the top row of keys, and contain:

- Selected BASIC keywords.
- Operator Commands and user-defined function keys.
- Operator messages for each action code.
- Non-native language characters and block graphics.

See "Keyboard/Keyboard Aid/Publications Set" in the "Specify" section. A single specify code is used to order the desired Keyboard/Keyboard Aid.

Display: The screen (CRT) displays keyed input, output, and provides user guidance. Up to 1840 characters can be displayed, 23 lines of 80-characters each. The 24th line is used to report status and system information. The user is permitted full screen management and display of upper/lower case characters. The size of a full screen display is 205mm (8.1 inches) by 160mm (6.3 inches). At any time, 128 different character images may be displayed in addition to 11 block graphics for presentation of blocks, bar charts, frames, etc. User-controlled field attributes are underline, blink, reverse image, high intensity, and non-display. The cursor can be positioned at any input field and optional field attributes of automatic advance and automatic enter are also available.

Character Sets: Any one of five Display Character Subsets may be selected from the keyboard (using ALTERNATE keying) because they are all stored within the system. This selection has no effect on internal data representation but, affects only the set of displayed graphics. This "internally stored" language capability is significant because any 5322 can utilize all five Display Character Subsets. The stored character sets are:

1. US, Canada-English
2. Canada-French
3. European countries (except Spain)
4. Nordic (including Iceland)
5. Spain and Spanish speaking countries

The primary set of display graphics at "Power On" is set at the plant of manufacture based upon the keyboard specified. See the *Basic Language Reference* (SA34-0109) for further details. For character sets that may be printed, see the appropriate printer pages.

Printers: Each 5322 may attach up to two 5241 or 5242 table-top impact matrix printers. The first printer attachment is standard and the Second Printer Attachment (#6350) is optional. The optional Second Printer Attachment (#6350) must be installed if the 5217 printer is attached. Either attachment may be used with the 5217, 5241, or 5242 Printers. The 5241 provides printing speeds of 80 characters per second and the 5242 provides 160 characters per second. In addition, the 5242 mdl 2 provides the capability of quality printing at 40 cps. Quality print provides additional matrix dots per character and is suitable for applications such as letter writing which require typewriter-like quality. See the pages for operating characteristics.

Communications

System Communications: System/23 may communicate with the following systems:

Systems	BSC	Asynchronous
Series/1 (EDX, RPS)	X	X
System/3	X	
System/23	X	X
System/34	X	
System/36	X	
System/38	X	
5110/5120	X	
5280	X	
5265	X	

Using Asynchronous Communications, System/23 can communicate with S/370, mdls 135-168, 3031, 3032, 3033, 3081, or 4300 via 3704/3705-EP Release 3.0 to VM/370, using the American National Standard Code for Information Interchange (ASCII) translate table and the Asynchronous Communication Terminal function of the licensed program. The 3135 and 3138 attach via ICA to VM/370 and the 4331 attaches via CA to VM/370. System/23 attachment to VM/370 is provided through VM/System Product, VM/Basic Systems Extension and VM/System Extensions Program Products with VM/370 Release 6 PLC 4 level or higher.

System/23 is supported for attachment to S/370 mdls 115-168, 3031, 3032, 3033, 3081, and 4300 through CICS/VS using BTAM under VSE, VS1 or MVS. 3741 BSC protocol is provided for communications using point-to-point leased or switched facilities via ICA or CA (where applicable), or 3704/3705. In particular, support is provided for the following CICS/VS release/versions:

CICS/DOS/VS	Version 1.5	On VSE/AF	Release 2
CICS/OS/VS	Version 1.5	On VS1	Release 7
CICS/OS/VS	Version 1.5	On MVS	Release 3.8

Asynchronous Communications: Asynchronous communication is provided by the licensed program (5715-AC1). The physical interface is EIA RS-232-C/CCITT V24-V28. Transfer of data is via American National Standard Code for Information Interchange (ASCII). Auto-answer is supported in a switched network.

The ASCII code and the asynchronous communication interface allows System/23 to communicate with the above mentioned processors using a capability that is commonly referred to as TTY-compatible. Various communications options, such as line speed and parity bits, can be selected by the customer.

The communications are via start/stop on point-to-point facilities. For communications to VM/370, the facilities are full duplex, switched up to 300 bps. Series/1 support is half duplex, switched facilities up to 300 bps. For communication to another System/23, the facilities are full or half duplex, switched or nonswitched, up to 1200 bps.

5322 Computer (cont'd)

Binary Synchronous Communications: The licensed program (5715-BC1) supports data transmission rates up to 4800 bps and is implemented to support the line protocol of the 3741. This protocol is supported for point-to-point on switched or nonswitched lines. For communication to another System/23 or 5265 in point-to-point configurations, one System/23 is required to act as a primary station. For all other configurations, the System/23 is the secondary station. Transfer of data is in EBCDIC in either non-transparent or transparent mode. The physical interface is EIA RS-232-C/CCITT V.24-V.28 with clocking supplied by modem.

One of the IBM modems, 3863 (2400 bps), 3864 (4800 bps), 3872 (2400 bps), or 3874 (4800 bps) may be attached to the Communications Adapter Feature (#2550). For more information on the capabilities of these modems refer to M3863 or 3864 and 3872 pages.

Additional Information: Communications facilities attachments for the Communication Adapter Feature (#2550) are designed to operate on transmission facilities such as:

- Common carrier leased telephone line service (voice grade) .
- Voice grade (common carrier or private) lines supporting a 4800 bps transmission rate. Channel requirements may vary according to the data circuit terminating equipment selected. The data circuit terminating equipment manufacturer should be consulted by the customer for this information.
- Common carrier switched network telephone (voice grade) service at up to 4800 bps.
- Private (customer-owned) communications facilities equivalent to the above common carrier facilities.

References:

See M2700 pages for additional information concerning communication facilities, machine attachment requirements, operating capabilities, and customer responsibilities.

Refer to *System/23 Communications Guide* (SA34-0111) for further details.

See appropriate programming pages for requirements relating to System/23 licensed programs (5715-AC1, 5715-BC1).

Customer Responsibilities: The marketing representative must advise the customers of their responsibilities before receipt of the machine:

- They are responsible for making arrangements for installation, pricing and charges for the data communication facility and attachment of selected data sets.
- They are responsible for paying toll charges, if required for installation and/or maintenance of the Communications Adapter Feature (#2550).
- The IBM Marketing Representative must have the customer obtain a firm installation date for transmission services (including modems) before the order for Communications Adapter Feature (#2550) can be confirmed.
- The customer is responsible for providing a desk or table to support System/23 table-top units.

For further information, refer to the M2700 pages.

Customer Support Functions: Customer Support Functions are commonly used system functions distributed with the 5322 on diskette and are also utilized as part of power-up procedures. The functions provided include:

- A loader for machine updates.
- Diskette preparation.
- Alternative collating sequences.
- Diskette-to-diskette copy.
- Diskette compression to another diskette.
- Diskette recovery.
- Index file generation.
- Label display.
- An Audible Alarm to signal operator attention required and, under program control, operator messages such as "end of job."
- Twenty-four Hour Time Clock and Date functions that are set by the operator when starting up the system.
- A sort function is also provided on the CSF diskette as a special feature.

See "Special Features" section and *System/23 Customer Support Functions* (SA34-0175 and SA34-0176) for more details.

Customer Set-Up (CSU): The 5322 is designated for Customer Set-up. Setup details can be found in *System/23 Set-Up Instructions* (GA34-0107). The CSU allowance is two days.

SPECIFY

- Power (120V AC, 1-phase, 60 Hz): Non-locking plug.
- Color: Pearl White.
- Power Cables: Standard power cord is 2.4m (8 feet).
- Adapter Cables: A 6m (19.8 foot) modem cable for communications features is standard.
- Keyboard/Keyboard Aid/Publications Set: Publication Set includes;
  - Set-up Instructions.
  - Learning to Use System/23.
  - Operator Reference.
  - Messages.
  - Customer Support Function Volumes I and II.
  - Diskette(s) containing Customer Support Functions.
  - Diskette(s) containing Operator Training

  (Machine-readable material above may be combined in one or more diskettes).

Keyboard	Keyboard Aid	Publication Aid	Specify
US	English US	English US	Std

- Word Processing Publications: For Word Processing mdls (4XX), or MES upgrades to a 4XX mdl, specify: **#9850** for publications supporting 5715-WP1, or **#9851** for publications supporting 5715-WP2.
  If no specify is entered, default will be to **#9850**.
  Upgrades from **#9850** to **#9851** may be ordered via MES.

SPECIAL FEATURES

All features may be field installed.

Communications Adapter Feature (#2550): Communications interface hardware and System/23 Licensed Programs (5715-BC1 for BSC and/or 5715-AC1 for ASC) have been combined to provide a flexible, easy-to-use communications facility for System/23.

The hardware feature provides the communications interface logic and circuitry, an installation test diskette and cable wrap connector, the *System/23 Communications Guide* (SA34-0111), and a 6m (19.8 foot) modem cable assembly.

The licensed programs give the user the ability to tailor the communications function to meet their specific requirements through the use of a step-by-step prompting procedure. These programs also provide a user-programmable interface through BASIC language statements and commands. These interactive programs and the accompanying documentation are available only in English and Japanese. For further information see "Communications", the appropriate programming pages (5715-BC1 or 5715-AC1), or *System/23 Communications Guide* (SA34-0111). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** One available feature slot on the 5322.

5246 Diskette Unit Controller (#3775): [NO LONGER AVAILABLE] Provides direct connection and control function of any mdl of 5246 to any mdl of the 5322. It also provides the function of the Integrated Diskette Controller (#3780) for integrated diskette drives. Either this feature or the Extended 5246 Controller (RPQ 8N5008, NO LONGER AVAILABLE) is required on mdls with no integrated diskettes. No feature slot required. **Limitations:** Mutually exclusive with #3780 and RPQ 8N5008 (NO LONGER AVAILABLE). **Maximum:** One. **Field Installation:** Yes.

Integrated Diskette Controller (#3780): Provides control function for diskette drives that are integral to mdls XX1, XX2, XX3 or XX4 of the 5322. Either this feature or the 5246 Diskette Unit Controller (#3775) or the Extended 5246 Controller (RPQ 8N5008, NO LONGER AVAILABLE) is required with every 5322. No feature slot required. **Limitations:** Mutually exclusive with #3775 and RPQ 8N5008 (NO LONGER AVAILABLE). **Maximum:** One. **Field Installation:** Yes.

Disk(ette) Sort Feature (#6300): Provides the 5322 Computer user with the ability to sort disk(ette) data files. Both full record sorts and address out (ADDROUT) sorts are possible. This function is shipped on the Customer Support Functions diskette when ordered with the 5322. See *Customer Support Functions* (SA34-0175) for details. **Limitations:** This feature or the No Disk(ette) Sort (**#9300**) feature must be ordered for every 5322. **Maximum:** One. **Field Installation:** Yes.

5322 Computer (cont'd)

Second Printer Attachment (#6350): This feature allows the attachment of a second printer which may be either a 5241 or 5242 mdl 1 or 2, and is required for attachment of the 5217. The hardware attachment is identical for all three printers. Output may be directed to a second printer by specifying it in a PRINT statement following a FILE OPEN statement for that printer. This feature is attractive for specific applications in that no physical changing of forms, etc., is required to run a priority interim job such as a management summary report or a short job requiring quality print using a 5242 mdl 2. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** One available feature slot in the 5322.

Extended 5246 Controller (RPQ 8N5008): [NO LONGER AVAILABLE] Provides the function of the 5246 Diskette Unit Controller (#3775) plus the capability to locate one 5322 (in a Dual Configuration only) up to 60m (200 feet) from the attached 5246. The standard cable length supplied with the 5246 is 4m (13 feet). **Limitations:** Not available on XX0 mdls. Mutually exclusive with 5246 Diskette Unit Controller (#3775) or Integrated Diskette Controller (#3780). **Maximum:** One. **Prerequisites:** RPQ 8N5009 or 8N5023 on the attached 5246 and Extended Cable RPQ SW2901, SW2902 or SW2903, or equivalent. Requires one available feature slot on the 5322.

MODEL CONVERSIONS (None)

ACCESSORIES

Diskettes: For Diskettes see IBM. See *Customer Support Function Vol. I* (SA34-0175) to determine diskette type (1, 2, 2D) required.

5324 COMPUTER

PURPOSE

The System/23 is a compact data processing system designed with many functions intended to simplify use by first-time computer users. It is a distributed logic system architecturally structured to support file sharing by multiple workstations. Function-oriented hardware combined with licensed programs provide the additional capabilities of word processing and a flexible communications facility. A significant standard function of System/23 processors is an interpretive BASIC language processor which provides an integrated, high level, interactive language designed for commercial data processing applications. The 5324 Computer is a processor unit for the System/23. It is a compact, floor-standing unit convenient for office environments, and contains the processor, integrated diskette units (optional), power supply, and space for optional attachments.

The Display Module (#1000) and Keyboard Module (#1020) are compact, table-top units which are cable-connected to the 5324 computer. This modularity allows flexible unit positioning and, when combined with the adjustments on these modules, provides maximum individual workstation convenience considering variations in system use, operator size, posture, furniture dimensions, or lighting conditions.

MODELS

The model number of the 5324 Computer is determined by the function, memory size, and integrated diskette capability as follows:

Model	Main Storage	Diskette Capacity	Number of Drives
Data Processing Models			
120	64KB	0MB	0
123	64KB	1.1MB	1
124	64KB	2.2MB	2
140	128KB	0MB	0
143	128KB	1.1MB	1
144	128KB	2.2MB	2
Data Processing and Word Processing Models*			
420	64KB	0MB	0
423	64KB	1.1MB	1
424	64KB	2.2MB	2
440	128KB	0MB	0
443	128KB	1.1MB	1
444	128KB	2.2MB	2

* See Word Processing System Requirements in the programming pages.

The first digit of the model number indicates Data Processing function only (1XX) or Data Processing and Word Processing (4XX). The second digit of the model number indicates main storage size, and the third digit indicates the number of diskette drives and their capacity.

One diskette drive is required in a system configuration for Customer Support Functions and maintenance.

Maximum Configuration:

Attachable to the 5324 are:

- Up to two Printers (5217, 5241, or 5242 in any combination).
- High performance, fixed disk storage with the 5247 Disk Storage Unit.

Multiple 5324 or 5322 Computers can be included in a configuration by attachment to the 5247 Disk Storage Unit.

HIGHLIGHTS

- Flexible modular structure for maximum operator convenience.
- Wide choice of main memory and diskette storage options provide configuration flexibility to satisfy specific customer requirements.
- Integrated high level interactive language - BASIC.
- Easy-to-use, adjustable typewriter-like keyboard module with numeric keypad and control keys.
- Full screen processing ability with 1,920-character CRT display module screen.
- Customer Support Function diskettes help provide easy start-up and simplified diskette data handling.
- Optional word processing capability.
- Multiple workstation capability.
- Flexible communications adapter feature and licensed program for either asynchronous or binary synchronous operations.
- Field upgrades provide for future system growth.

Components

Processor: Main storage is available in 64K, or 128K bytes (12K bytes of which are permanently allocated for use by the BASIC language interpreter, display, printer and diskette buffers). Main storage cycle time is 975 nanoseconds with internal parity checking. All features and mdl upgrades (see "Model Conversions") are field installable. One printer attachment is standard on all mdls and three special feature slots are provided on the Data Processing mdls (1XX). Two special feature slots are provided on the combined Data and Word Processing mdls (4XX).

Every System/23 5324 or 5322 Computer must have a disk or diskette storage facility available for system support and maintenance diagnostic support purposes. Therefore, each 5324 or 5322 must have either the Integrated Diskette Controller (#3780), the 5246 Diskette Unit Controller (#3775), the Extended 5246 Controller (RPQ 8N5008), or the 5247 Disk Unit Adapter (#3770). See "Special Features" for a description of limitations and prerequisites.

Diskette Capability: The type of diskette drive supported by the 5324 Computer can read/write IBM Diskette 1, 2, and 2D (5324 mdls XX3 and XX4). The System/23 uses the 512 byte format when operating under the BASIC language. However, the Customer Support Functions can use other formats to copy files for data interchange purposes. The possible formats for the diskettes are:

Diskette	Format	Bytes/ Sector	Capacity
1	1	128	*243KB
1	2	512	303KB
2	3	128	*486KB
2	4	512	606KB
2D	5	256	985KB
2D	6	512	1136KB

* Basic Exchange format

For diskette data exchange with other systems, the following exchange types are supported: Basic Exchange (Formats 1 and 3 above) and H Exchange (Format 5 above). Diskettes can be interchanged with other IBM systems and devices which support a compatible diskette exchange type. Data exchange with other system types may require code translation for character set integrity.

Examples are the System/3, System/32, System/34, System/38, Series/1, S/370, 303X, 4300, 3540, 3740, 3747, 3790, 5110, 5120, 5230, 5260, and 8100.

The instantaneous data transfer rate using IBM Diskette 1 or 2 is up to 31.2K bytes/sec, and for IBM Diskette 2D is up to 62.5K bytes/sec. Rotational speed of both types of drives is 360 rpm.

For information on System/23 diskette operations, see *System/23 Operator Reference* (SA34-0108), *System/23 Customer Support Functions, Volume I* (SA34-0175), or *BASIC Language Reference Manual* (SA34-0109).

BASIC Language: The System/23 BASIC Language Interpreter provides convenient and powerful facilities and features for the development and execution of application programs. Among these facilities are:

- Residence in read-only storage requiring no control program load.
- Program diagnostic tools, such as the TRACE statement, status line, and split-screen mode for operator intervention in error situations.
- Several new functions, statements and commands to help simplify:
  - Character String Processing
  - Error Recovery
  - File Processing and Management
  - Printer Control
  - Display/Keyboard Processing
  - Procedure Control
- File sharing between multiple System/23 processors.
- Overlapped printing and program execution.
- Encyclopedia format reference manual with extensive cross referencing, examples and in-depth description of system function.

Word Processing (WP): The Word Processing mdls provide additional logic and microcode hardware to be used in conjunction with one of the System/23 Word Processing licensed programs to provide word processing capabilities. See the programming sales pages for Word Processing systems requirements.

Some functions supported by the Word Processing hardware and licensed programs to create, edit, print, etc., are shown below. Word Processing II (5715-WP2) licensed program provides all of the functions shown for Word Processing (5715-WP1), plus those shown in the Word Processing II column.

5324 Computer (cont'd)

WP (5715-WP1)	WP II (5715-WP2)
• **Input**	
-Create document	-Get page/display
-Formats	
-Automatic word wrap	
• **Edit**	
-Delete	-Spelling verification
-Find	-Spelling assistance
-Indent	-Automatic hyphenation
-Block operations	-Synonym assistance
-Word underscore glossary	-Phrase glossary
-Page delete/restore	-Column alignment right, center, and decimal
	-Page GOTO
	-Page split
• **Merge**	
-DP/WP merge	-DP/WP merge with multiple record types
	-BASIC language operations
	-Display files
• **Pagination**	
-Character and line count	-Widow line control
-Syllable hyphen control	-Keep
-Page end control	
• **Document**	
-Copy document	-Operator personalization
-Delete document	-Change document profiles
-Change Document profiles	
-List drive contents	

For further information on Word Processing function, and system requirements, see the System/23 programming sales pages or the *Word Processing Operator Reference Manual* (SA34-0613).

Keyboard Module: The Keyboard Module (#1020) is connected to the 5324 Computer by a 1.8m (6 foot) cable, which may be routed under the Display Module. The keyboard has a palm rest beneath the keys and space for the Keyboard Aids above the keys. A slope adjustment mechanism at the top of the keyboard allows positioning for individual comfort and convenience. One Keyboard Module is required for each 5324.

The keyboard has a familiar typewriter-like layout plus a numeric keypad. Many of the keys in the top row provide system commands when depressed in connection with the COMMAND key. Special BASIC command words can be entered via the keys in conjunction with the COMMAND key. Thus, the COMMAND key can be used to reduce keying time. The keys on the 10-key keypad can also be defined by the user to perform special functions and may be activated with the COMMAND key under program control.

For user reference, a Keyboard Aid (language and keyboard dependent) is supplied with each 5324 Computer. This aid is a set of plasticized printed cards that will lie above the top row of keys, and contain:

- Programmer Commands.
- Operator Commands.
- Operator action codes.
- Additional language characters and other symbols.

See "Keyboard/Keyboard Aid/Publications Set" in the "Specify" section. See Appendix A in *System/23 Operator Reference* (SA34-0108) for keyboard layouts.

Display Module: The Display Module (#1000) is a compact, desk-top unit connected to the 5324 Computer by two 1.8m (6 foot) cables. With a minimum of effort, vertical height and screen angle may be adjusted for variations in workstation layout, display usage, lighting conditions, and operator preference.

The screen displays keyed input, output, and provides user guidance. Up to 1840 characters can be displayed, 23 lines of 80-characters each. The 24th line is used to report status and system information. The user is permitted full screen management and display of upper/lower case characters. At any time 127 different character images may be displayed in addition to 11 block graphics for presentation of blocks, bar charts, frames, etc. User-controlled field attributes are underline, blink, reverse image, high intensity, and non-display. The cursor can be positioned at any input field and optional field attributes of automatic advance and automatic enter are also available.

Character Sets: Any one of five Display Character Subsets may be selected from the keyboard (using ALTERNATE keying) because they are all stored within the system. This selection has no effect on internal data representation but, affects only the set of displayed graphics. This "internally stored" language capability is significant because any 5324 can utilize all five Display Character Subsets. The stored character sets are:

1. US, Canada-English
2. Canada-French
3. European countries (except Spain)
4. Nordic (including Iceland)
5. Spain and Spanish speaking countries

The primary set of display graphics at "Power On" is set at the plant of manufacture based upon the keyboard specified. See the *Basic Language Reference* (SA34-0109) for further details. For character sets that may be printed, see the appropriate printer pages.

Printers: Each 5324 Computer may attach up to two printers. The first printer attachment is standard and the Second Printer Attachment (#6350) is optional. The optional Second Printer Attachment must be installed if the 5217 Printer is attached. The 5217 may then be attached to either printer attachment. The 5241 or 5242 may be attached to either attachment without restriction. (See the M5217, 5241, and 5242 pages for operating characteristics.)

Communications

System Communications: System/23 may communicate with the following systems:

Systems	BSC	Asynchronous
Series/1 (EDX, RPS)	X	X
System/3	X	
System/23	X	X
System/34	X	
System/36	X	
System/38	X	
5110/5120	X	
5265	X	
5280	X	

Using Asynchronous Communications, System/23 can communicate with S/370, mdls 135-168, 3031, 3032, 3033, 3081, or 4300 via 3704/3705-EP Release 3.0 to VM/370, using the American National Standard Code for Information Interchange (ASCII) translate table and the Asynchronous Communication Terminal function of the licensed program. The 3135 and 3138 attach via ICA to VM/370 and the 4331 attaches via CA to VM/370. System/23 attachment to VM/370 is provided through VM/System Products, VM/Basic System Extensions and VM/System Extensions Program Products with VM/370 Release 6 PLC 4 level or higher.

System/23 is supported for attachment to S/370 Models 115-168, 3031, 3032, 3033, 3081, 4300 through CICS/VS using BTAM under VSE, VS1 or MVS. 3741 BSC protocol is provided for communications using point-to-point leased or switched facilities via ICA or CA (where applicable), or 3704/3705. In particular, support is provided for the following CICS/VS release/versions:

CICS/DOS/VS	Version 1.5	On VSE/AF	Release 2
CICS/OS/VS	Version 1.5	On VS/1	Release 7
CICS/OS/VS	Version 1.5	On MVS	Release 3.8

Asynchronous Communications: Asynchronous communication is provided by the licensed program (5715-AC1). The physical interface is EIA RS-232-C/CCITT V24-V28. Transfer of data is via American National Standard Code for Information Interchange (ASCII). Autoanswer is supported in a switched network.

The ASCII code and the asynchronous communication interface allows System/23 to communicate with the above mentioned processors using a capability that is commonly referred to as TTY-compatible. Various communications options, such as line speed and parity bits, can be selected by the customer.

The communications are via start/stop on point-to-point facilities. For communications to VM/370, the facilities are full-duplex, switched up to 300 bps. Series/1 support is half-duplex, switched facilities up to 300 bps. For communication to another System/23, the facilities are full- or half-duplex, switched or nonswitched, up to 1200 bps.

Binary Synchronous Communications: The licensed program (5715-BC1) supports data transmission rates up to 4800 bps and is implemented to support the line protocol of the 3741. This protocol will be supported for point-to-point on switched or nonswitched lines. Autoanswer is supported on a switched line. Transfer of data is in EBCDIC in either non-transparent or transparent mode. The physical interface is EIA RS-232-C/CCITT V24-V28 with clocking supplied by modem.

One of the IBM modems, 3863 (2400 bps), or 3864 (4800 bps), 3872 (2400 bps) or 3874 (4800 bps), may be attached to the Communications Adapter (#2550). For more information on the capabilities of these modems refer to M3863, 3864, and 3872 pages.

Customer Responsibilities: The customers must be advised that:

- They are responsible for making arrangements for installation, pricing and charges for the data communication facility and attachment of selected data sets.

5324 Computer (cont'd)

- Toll charges, if required for installation and/or maintenance of the Communications Adapter (#2550), are to be paid by the customer.
- The IBM Marketing Representative must have the customer obtain a firm installation date for transmission services (including modems) before the order for Communications Adapter (#2550) can be confirmed.

For further information, refer to the M2700 pages.

Additional Information: Communications facilities attachments for the Communication Adapter (#2550) are designed to operate on transmission facilities such as:

- Common carrier leased telephone line service (voice grade) .
- Voice grade (common carrier or private) lines supporting a 4800 bps transmission rate. Channel requirements may vary according to the data circuit terminating equipment selected. The data circuit terminating equipment manufacturer should be consulted by the customer for this information.
- Public switched network telephone (voice grade) service at up to 4800 bps.
- Private (customer-owned) communications facilities equivalent to the above common carrier facilities.

References:

See M2700 pages for additional information concerning communication facilities, machine attachment requirements, operating capabilities, and customer responsibilities.

Refer to *System/23 Communications Guide* (SA34-0111) for further details.

See appropriate programming pages for requirements relating to System/23 licensed programs (5715-AC1, 5715-BC1).

Customer Support Functions: Customer Support Functions are commonly used system functions distributed with the 5324 Computer on diskette and are also utilized as part of power-up procedures. The functions provided include:

- A loader for machine updates.
- Volume preparation (disk or diskette).
- Alternative collating sequences.
- Diskette-to-diskette copy.
- Backup-restore disk.
- Data recovery (disk or diskette).
- Index file generation.
- Label display.
- An Audible Alarm to signal operator attention required and, under program control, operator messages such as "end of job."
- Twenty-four Hour Time Clock and Date functions that are set by the operator when starting up the system.
- A sort function is also provided on the CSF diskette as a Special Feature.

See "Special Features" section and, *System/23 Customer Support Functions* (SA34-0175 and SA34-0176) for more details.

Customer Setup (CSU): The 5324 Computer is designated for Customer Setup. The marketing representative must advise the customers of their responsibilities before receipt of the machine. Setup instructions are shipped with the 5324. The customer is responsible for providing a desk or table to support System/23 table-top units. The CSU Allowance is two days.

SPECIFY

- Power (120V AC, 1-phase, 60 Hz): Non-locking plug.
- Color: Pearl White.
- Power Cables: Standard power cord is 2.4m (8 feet). A 6m (19.8 foot) modem cable for communications feature is standard.
- Keyboard/Keyboard Aid/Publications Set: Publication Set includes:
  - Setup Instructions.
  - Learning to Use System/23.
  - Operator Reference.
  - Messages.
  - Customer Support Function Volumes I and II.
  - Diskette(s) containing Customer Support Functions.
  - Diskette(s) containing Operator Training (Machine-readable material above may be combined in one or more diskettes).

Keyboard	Keyboard Aid	Publication Aid	Specify
US	English US	English US	Std

- Word Processing Publications: For Word Processing mdls (4XX), or MES upgrades to a 4XX mdl, specify: **#9850** for publications supporting 5715-WP1, or **#9851** for publications supporting 5715-WP2. If no specify is entered, default will be to **#9850**. Upgrades from **#9850** to **#9851** may be ordered via MES.

SPECIAL FEATURES

Display Module (#1000): Provides a free-standing display screen for the 5324 Computer. One required for each 5324 Computer. No feature slot required. **Limitations:** Not available for MES orders. **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** Yes. Customer setup instructions are included with the 5324.

Keyboard Module (#1020): Provides the keyboard for attachment to the 5324 Computer. One required for each 5324 Computer. No feature slot required. **Limitations:** Not available for MES orders. **Maximum:** One. **Field Installation:** Yes. **Customer Setup:** Yes. Customer setup instructions are included with the 5324.

Communications Adapter (#2550): Communications interface hardware and System/23 Licensed Programs (5715-BC1 for BSC and/or 5715-AC1 for ASC) have been combined to provide a flexible, easy-to-use communications facility for System/23. The hardware feature provides the communications interface logic and circuitry, an installation test diskette and cable wrap connector, the *System/23 Communications Guide* (SA34-0111), and a 6m (19.8 foot) modem cable assembly.

The licensed programs give the user the ability to tailor the communications function to meet their specific requirements through the use of a step-by-step prompting procedure. These programs also provide a user-programmable interface through BASIC language statements and commands. These interactive programs and the accompanying documentation are available only in English, German, and Japanese. For further information see "Communications", the appropriate programming pages (5715-BC1 or 5715-AC1), or *System/23 Communications Guide* (SA34-0111). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** One available feature slot on the 5324.

5247 Disk Unit Adapter (#3770): Provides direct connection and control function for any mdl of the 5247 to any mdl of the 5324 or 5322 Computer. **Limitations:** If this attachment is for the first or only 5324 or 5322 attached to the 5247, the 5324 or 5322 must have a diskette capability, be attached to the 5247 via the standard 4m cables and be located adjacent to the 5247. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** One available feature slot in the 5324 or 5322.

Integrated Diskette Controller (#3780): Provides control function for diskette drives that are integral to mdls XX3 or XX4 of the 5324 Computer. Either this feature or the 5247 Disk Unit Adapter (#3770) is required with every 5324. No feature slot required. **Maximum:** One. **Field Installation:** Yes.

Disk(ette) Sort Feature (#6300): Provides the 5324 Computer user with the ability to sort disk(ette) data files. Both full-record sorts and address-out (ADDROUT) sorts are possible. This function is shipped on the Customer Support Functions diskette when ordered with the 5324. See *Customer Support Functions* (SA34-0175) for details. **Limitations:** This feature or the No Disk(ette) Sort (**#9300**) feature must be ordered for every 5324. **Maximum:** One. **Field Installation:** Yes.

Second Printer Attachment (#6350): This feature allows the attachment of a second printer which may be either a 5241 or 5242 mdls 1 or 2 and is required for attachment of the 5217. The hardware attachment is identical for all three printers. Output may be directed to a second printer by specifying it in a PRINT statement following an OPEN statement for that printer. This feature is attractive for specific applications in that no physical changing of forms, etc., is required to run a priority interim job such as a management summary report or a short job requiring quality print using a 5242 mdl 2. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** One available feature slot in the 5324.

5324 Computer (cont'd)

MODEL CONVERSIONS

Any model processor may be field upgraded to any other model through addition of main storage or diskette drives or diskette drive capacity.

All features may be field installed.

Model conversion features are not CSU.

The upgrade purchase price for model conversion may be greater than the purchase price differentials. Customers should carefully evaluate their requirements prior to purchasing a system.

All replaced parts from model conversions become the property of IBM.

ACCESSORIES

Diskettes: For Diskettes see IBM. See *Customer Support Function Vol. I* (SA34-0175) to determine diskette type (1, 2, 2D) required.

5340 SYSTEM UNIT

PURPOSE

Contains main storage, disk storage, diskette drive, facilities for addressing main storage, and logical processing circuits and control for I/O units on System/34.

MODELS

Model	Main Storage	Diskette	Disk Storage Capacity (MB)
A11	32K	Diskette 1	8.6
A12	32K	Diskette 1	13.2
A13	32K	Diskette 1	27.1
A14	32K	Diskette 1	63.9
A15	32K	Diskette 1	128.4
A21	32K	Diskette 2D	8.6
A22	32K	Diskette 2D	13.2
A23	32K	Diskette 2D	27.1
A24	32K	Diskette 2D	63.9
A25	32K	Diskette 2D	128.4
A31	32K	Magazine	8.6
A32	32K	Magazine	13.2
A33	32K	Magazine	27.1
A34	32K	Magazine	63.9
A35	32K	Magazine	128.4
B11	48K	Diskette 1	8.6
B12	48K	Diskette 1	13.2
B13	48K	Diskette 1	27.1
B14	48K	Diskette 1	63.9
B15	48K	Diskette 1	128.4
B21	48K	Diskette 2D	8.6
B22	48K	Diskette 2D	13.2
B23	48K	Diskette 2D	27.1
B24	48K	Diskette 2D	63.9
B25	48K	Diskette 2D	128.4
B31	48K	Magazine	8.6
B32	48K	Magazine	13.2
B33	48K	Magazine	27.1
B34	48K	Magazine	63.9
B35	48K	Magazine	128.4
C11	64K	Diskette 1	8.6
C12	64K	Diskette 1	13.2
C13	64K	Diskette 1	27.1
C14	64K	Diskette 1	63.9
C15	64K	Diskette 1	128.4
C21	64K	Diskette 2D	8.6
C22	64K	Diskette 2D	13.2
C23	64K	Diskette 2D	27.1
C24	64K	Diskette 2D	63.9
C25	64K	Diskette 2D	128.4
C31	64K	Magazine	8.6
C32	64K	Magazine	13.2
C33	64K	Magazine	27.1
C34	64K	Magazine	63.9
C35	64K	Magazine	128.4
C36	64K	Magazine	192.9
C37	64K	Magazine	257.4
D11	96K	Diskette 1	8.6
D12	96K	Diskette 1	13.2
D13	96K	Diskette 1	27.1
D14	96K	Diskette 1	63.9
D15	96K	Diskette 1	128.4
D21	96K	Diskette 2D	8.6
D22	96K	Diskette 2D	13.2
D23	96K	Diskette 2D	27.1
D24	96K	Diskette 2D	63.9
D25	96K	Diskette 2D	128.4
D31	96K	Magazine	8.6
D32	96K	Magazine	13.2
D33	96K	Magazine	27.1
D34	96K	Magazine	63.9
D35	96K	Magazine	128.4
D36	96K	Magazine	192.9
D37	96K	Magazine	257.4
E11	128K	Diskette 1	8.6
E12	128K	Diskette 1	13.2
E13	128K	Diskette 1	27.1
E14	128K	Diskette 1	63.9
E15	128K	Diskette 1	128.4
E21	128K	Diskette 2D	8.6
E22	128K	Diskette 2D	13.2
E23	128K	Diskette 2D	27.1
E24	128K	Diskette 2D	63.9
E25	128K	Diskette 2D	128.4
E31	128K	Magazine	8.6
E32	128K	Magazine	13.2
E33	128K	Magazine	27.1
E34	128K	Magazine	63.9
E35	128K	Magazine	128.4
E36	128K	Magazine	192.9
E37	128K	Magazine	257.4
F22	256K	Diskette 2D	13.2
F23	256K	Diskette 2D	27.1
F24	256K	Diskette 2D	63.9
F25	256K	Diskette 2D	128.4
F33	256K	Magazine	27.1
F34	256K	Magazine	63.9
F35	256K	Magazine	128.4
F36	256K	Magazine	192.9
F37	256K	Magazine	257.4

Minimum System Configuration: A 5340 System Unit, a display/console (5251 mdl 1, 11, or 999, 5252, 5291, or 5292), and printer (serial -- 5219, 5256, ... line -- 5211, 5224, 5225, or 3262). A system printer must be provided to satisfy IBM maintenance requirements when using System Support Program (5726-SS1) or Preconfigured System Support Program (5726-SS2). Special microcode for the Preconfigured System Support Program (5726-SS2) must also be specified.

HIGHLIGHTS

- Multiple workstation system capability
- Multiprogramming and printer spooling provided with System Support Licensed Program (5726-SS1)
- Multiprogramming and printer spooling for entry level systems with Preconfigured System Support Program (5726-SS2)
- Extension of System/32 capabilities
- Local and remote workstation attachment flexibility:
  - 5219 Printer
  - 5224 Printer
  - 5225 Printer
  - 5251 Display Station
  - 5252 Dual Display Station
  - 5256 Printer
  - 5291 Display Station
  - 5292 Color Display Station
- I/O units:
  - 1255 Magnetic Character Reader
  - 3262 Printer
  - 5211 Printer
  - 5219 Printer
  - 5224 Printer
  - 5225 Printer
- Diskette Magazine Drive
- Communications capability via BSC or SDLC through attachment of one to four lines
- Easy-to-use workstation utility programming support available
- Facilities to provide high-level of system availability
- Main Storage Failure Recovery
- Scientific Instruction Set
- Fixed interval timer
- Address Translation Registers
- Storage protection
- MICR document processing capability
- 5211/3262 translation tables for character substitution

Processor Unit: The main storage processor represents a hardwired System/3 language processor with 32K, 48K, 64K, 96K, 128K, or 256K bytes of main storage. A microprocessor, with 16K words of control storage, operates in parallel with the main storage processor, and supports a microcoded control function and each of the I/O devices. The processor unit uses a combination of LSI/MSI - large and medium scale integration for the logic circuitry. Memory technology is Metal Oxide Semiconductor Field Effect Transistor (MOSFET). Data and instructions are stored as EBCDIC characters. Each EBCDIC character is stored in an 8-bit byte. A ninth bit is added for parity checking. Main storage internal cycle time is 600 nanoseconds.

Workstation Controller: The 5250 Information Display System devices (5251 mdls 1, 11, and 999 Displays, 5252 Dual Displays, 5291 Displays, 5292 Color Displays, 5219 Printer, 5224 Printer, 5225 Printer and the 5256 Printer), used as locally attached System/34 workstations, attach to a controller in the 5340 System Unit via four twinaxial cable connectors on the 5340.

One cable connector must be dedicated to attachment of a 5251 mdl 1, 11, or 999, or 5252, or 5291, or 5292 to be used as the system console. **Note:** If the 5291 or 5292 is to be attached to the System/34, the system must be at SSP Release 7 level or higher. Also, if the 5291 or 5292 is to be used as the console the System/34 must be at Diagnostic Release Level 9.2 or higher. For maintenance reasons, only one of the above machine types 5251, 5252 or 5291 should be attached to this cable. A 6 meter (20 foot) twinaxial cable is provided with the 5340 for attachment of the system console.

Up to three additional cables may be connected to the 5340 for attachment of additional workstation devices. A maximum of 16 display stations and printers (the 5252 counts as two display stations), including the console, may be attached when the optional Workstation Control Expansion B (#4901) is installed. The maximum length of any one twinaxial cable attached to the 5340 cable connector is 1,525 meters (5,000 feet). Multiple workstations (up to seven) may be attached to one cable via the Cable-Thru on the display station or printer (Cable-Thru is a standard capability on the 5291 Display

5340 System Unit (cont'd)

Station). See *IBM System/34 Installation Manual - Physical Planning* (GA21-9242).

Diskette: Included in the mdls X1X of the System Unit is the Diskette 1 drive, mdls X2X incorporate the Diskette 2D drive, and the mdls X3X use the Diskette Magazine drive.

The Diskette 1 drive is capable of reading and writing the Diskette 1 in Basic format or Extended format. The Diskette 2D drive can read and write either the Diskette 1 (Basic or Extended format) or the 2-sided double density Diskette 2D (Basic or Extended format).

The Diskette Magazine drive can process individual diskettes or magazines. The magazine holds up to ten operator accessible diskettes. The magazine drive can accommodate two magazines and three individual diskettes. The selecting of diskettes within a magazine, and proceeding from the first magazine to the second, is automatic (under program control). The magazines will typically be used for Save/Restore functions. The three individual slots may be used for smaller jobs. Selection of up to three individual diskettes is automatic (under program control). Both Diskette 1 (Basic or Extended format) or the 2-sided double density Diskette 2D (Basic or Extended format) can be used in the Diskette Magazine. The select cycle time (eject diskette, move to next diskette, load diskette) is approximately three seconds.

The compatible media for data exchange with other devices such as 3740 is the Diskette 1 in Basic format or the 5280 is the Diskette 1 or 2D in Basic format. The formats for diskettes are:

	Diskette 1	Diskette 2D
Data Tracks/Diskette	74	148 (74 Cylinders)
Capacity		
Basic Format		
Bytes/Sector	128	256
Sectors/Track	26	26
Tracks/Cylinder	1	2
Data Bytes/Diskette	246,272	985,088
Extended Format		
Bytes/Sector	512	1,024
Sectors/Track	8	8
Tracks/Cylinder	1	2
Data Bytes/Diskette	303,104	1,212,416

The data transfer rate for the Diskette 1 drive is 31.2KB/sec; for Diskette 2D drive it is 62.5KB/sec (using Diskette 2D); and for the Diskette Magazine drive it is 125.0KB/sec (using Diskette 2D).

"Read or Write" of diskettes is overlapped with processing and other device functions except disk storage data transfer. All diskette seek operations are overlapped with processing and I/O devices.

Disk Storage: The 5340 System Unit can contain one of seven disk storage capacities. The disk storage is physically non-removable, high speed, direct access media, and the primary processing file in the system. Programs and data are stored on the disk for processing. Data can be stored off-line for security or backup purposes by first copying the data from disk storage to either of the two diskette media. The System/34 with the Diskette 1 drive, the Diskette 2D drive, or the Diskette Magazine drive, plus a multiprogramming capability provide flexible combinations to optimize diskette functions with system disk storage. Disk storage capacities available to the users may be reduced by the installation of optional features.

Disk Storage Specifications:

	8.6MB	13.2MB	27.1MB	63.9MB
Bytes/Sector	256	256	256	256
Bytes/Cylinder	46,080	46,080	46,080	180,224
Disk Spindles	1	1	2	1
Cylinders	187	288	589.33	354.5
Capacity *	8,616,960	13,271,040	27,156,480	63,905,792
Access Time (ms)				
Cyl-to-Cyl	10	10	10	9
Average **	33	38	38	27
Maximum	55	70	70	46
	(201 cyl/ spindle)	(302 cyl/ spindle)	(302 cyl/ spindle)	(359 cyl/ spindle)
Rotational Speed (rpm)	2,964	2,964	2,964	3,125
Data Transfer Rate (MB/sec)	.889	.889	.889	1.031

	128.4MB	192.9MB	257.4MB
Bytes/Sector	256	256	256
Bytes/Cylinder	180,224	180,224	180,224
Disk Spindles	2	3	4
Cylinders	712.5	1,070.5	1,428.5
Capacity *	128,425,984	192,946,176	257,466,368
Access Time (ms)			
Cyl-to-Cyl	9	9	9
Average **	27	27	27
Maximum	46	46	46
	(359 cyl/ spindle)	(359 cyl/ spindle)	(359 cyl/ spindle)
Rotational Speed (rpm)	3,125	3,125	3,125
Data Transfer Rate (MB/sec)	1.031	1.031	1.031

* These capacities (available to the user) may be reduced by installation of optional features. See "Limitations" under optional feature MLCA (#4500), and Workstation Control Expansion C (#4902).

** Average of all possible disk accesses.

System Console: A system console is not a component of the 5340 System Unit. The system console may be a 5251 Display Station, mdl 1, 11, or 999 a 5252 Dual Display Station, a 5291 Display Station, or a 5292 Color Display Station which is physically attached to the System Unit similar to other locally attached workstation devices. When using the 5291 or 5292 as the system console, the System/34 must be at SSP Release 7 or higher and Diagnostic Release Level 9.2 or higher. For system operation and service reasons, the console is required to be located within 6 meters (20 feet) of the System Unit. Its primary use is to facilitate operator control of the system via operator commands and to allow the operator to respond to system messages presented on the display. It may also be used as a data entry/inquiry workstation, interacting with a user application. The mode of operation is easily switched from workstation mode to console mode for servicing system requests.

Customer Responsibilities: The customer must be advised, in writing, of certain responsibilities related to the installation and maintenance of common carrier facilities/services as well as the IBM equipment. For further information see M2700 pages.

The marketing representative must have the customer obtain a firm installation date for the start of transmission services (including any required modems) prior to processing Order Confirmation.

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): Specify **#9902** for 208V or **#9904** for 230V.
- Color: Pearl white only (no specify code required).
- Communications Cable (with #2500, #3500): Required for attaching System/34 to the communications facility regardless of whether an IBM integrated modem, an external modem, or DDSA is used. Specify **#9460** for a 6 meter (20 foot) cable or **#9461** for a 12 meter (40 foot) cable. Specify this cable only once per system. If two Communications Adapters are installed, the cable length will be the same on both.

  The communications cable for MLCA (#4500) will be 12 meters (40 feet) for each line. No specify for cable length is required nor can one be made. The cable for the 4800 bps Integrated Modem with Auto-Answer and Integrated Protective Coupler (#536X) will be 5.5 meters (18 feet).
- Twinaxial Cable: A 6 meter (20 foot) twinaxial cable is included with the system unit for the system console [5251 mdl 1, 11, or 999, 5252, 5291, or 5292]. A 6 meter (20 foot) cable is also included if a 5224, 5225 or 5256 Printer is used as the system printer . See M5251, 5252, 5291, 5292, 5224, 5225, and 5256 pages for additional workstation cable order information.
- System Printer: Specify **#9301** if 5211 mdl 1 is attached; **#9302** if 5211 mdl 2 is attached; **#9303** if 3262 mdl B1 is attached; **#9306** or if a 5256 is the system printer (no 5211 or 3262); **#9308** if a 5224 is the system printer, or **#9307** if a #5225 is the system printer (no 5211 or 3262).
- Up-Ending Kit: **(#9845)** enables the 5340 to be up-ended for installation or moving purposes. This kit is furnished only as necessary and remains the property of IBM.

Notes:

1. I/O Unit Attachments: Appropriate special features are required to attach some I/O units. See "Special Features".
2. System Support Licensed Program (5726-SS1): Should be ordered at equipment order entry time. See System Support Program (5726-SS1) for additional information.
3. Refer to *IBM System/34 Installation Manual - Physical Planning* (GA21-9242) for physical installation requirements.

SPECIAL FEATURES

Non-Communications Features

1255 Attachment (#1100): Required to attach 1255 Magnetic Character Reader mdls 1, 2, or 3. **Limitations:** The 1255 attachment cannot operate with the Communications Adapter (#2500, #3500) which has been assigned as the low-priority line. therefore, only the Communications Adapter (#2500, #3500) with the high-priority address can be used while operating the 1255. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Processor Unit Expansion A and/or E may be required on certain mdls. See "Processor Unit Expansion

5340 System Unit (cont'd)

Feature Configurator" and *IBM System/34 Installation Manual - Physical Planning* (GA21-9242) for cabling information.

1255 Attachment Expansion (#1105): Required when using the System/34 Assembler Macros to provide 1255 stacker logic programs. This feature provides an additional 28K of user programmable storage. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1100.

5211/3262 Base Printer Attachment (#1110): Required when attaching either the 3262 or the 5211 Printer. **Maximum:** One. **Field Installation:** Yes.

Keylock (#4655): Replaces on/off power switch to protect against unauthorized use. See "Accessories" for information concerning additional keys. **Maximum:** One. **Field Installation:** Yes.

Internal Clock (#4703): Generates synchronizing and timing signals for BSC or SDLC operation when they are not provided by the modem on either Communications Adapter (#2500 or #3500). Clocking speeds available with this feature are 600 bps and 1200 bps. Selection of full or half-speed is indicated via a system utility program. When this feature is installed on System/34, all other BSC or SDLC stations attached to the same data link must also be equipped with a similar IBM Internal Clock feature. See IBM, for determination of the feature's requirement with planned modems. **Maximum:** One per system; will handle either or both lines. **Field Installation:** Yes. **Prerequisites:** Communications Adapter (#2500 or #3500), Interface (#3701 or #3702) or 1200 bps Integrated Modem (#5500, #5501, #6500, or #6501).

Workstation Control Expansion A (#4900): Required if Magnetic Stripe Reader (#4910) is installed on any 5251 or 5252 that is locally attached to the 5340. Also required when using the 3270 Device Emulation Licensed Program (5726-EM1). **Limitations:** May not be installed with Workstation Control Expansion B (#4901). **Maximum:** One. **Field Installation:** Yes.

Workstation Control Expansion B (#4901): Required when attaching nine to sixteen 5250 workstations and/or printers locally to the 5340 System Unit. This feature also contains the control necessary if Magnetic Stripe Readers (#4910) are installed on any 5251 or 5252 that is locally attached to the 5340. Also required when using the 3270 Device Emulation Licensed Program (5726-EM1). **Limitations:** May not be installed with Workstation Control Expansion A (#4900). **Maximum:** One. **Field Installation:** Yes.

Multinational Control (#4905): Required if Multinational Character Set (#4905) is installed on any 5251 or 5252 attached to the 5340 or if #9470 is installed on any 5224, 5225 or 5256. **Maximum:** One. **Field Installation:** Not recommended for field installation.

Internal Clock (#5321): Generates synchronizing and timing signals for BSC or SDLC operation when they are not provided by the modem used with any of the Line Base Adapters on the Multiline Communications Adapter (#4500). Clocking speeds available with this feature are 600 and 1200 bps. Selection of full or half-speed and the appropriate line is indicated via a system utility program. When this feature is installed on System/34, all other BSC or SDLC stations attached to the same data link must also be equipped with a similar IBM Internal Clock feature. See IBM, for determination of the feature's requirement with planned modems. **Maximum:** One per system; will handle one to four lines. **Field Installation** Yes. **Prerequisites:** #4500 and EIA Interface or 1200 bps Integrated Modem for the MLCA.

Processor Unit Expansion A (#5732): This is a feature I/O board required for 1255 Attachment (#1100). Not required on XX3 (27.1MB) mdls. **Limitations:** See "Processor Unit Expansion Feature Configurator". **Maximum:** One. **Field Installation:** Yes.

Processor Unit Expansion B (#5733): Additional power for communications. Required for 2400 bps Integrated Modem (#5600, #6600, #5601, #6601, #5602, #6602, #5610, #6610). Not required on XX4, XX5, XX6 and XX7 mdls. **Limitations:** See "Processor Unit Expansion Feature Configurator". **Maximum:** One. **Field Installation:** Yes.

Processor Unit Expansion C (#5734): I/O modem regulator required for Interface (#3701 or #3702), or 1200 bps Integrated Modem, (#5500, #5501, #6500, #6501). Not required on XX4, XX5, XX6, and XX7 mdls. Not required if Processor Unit Expansion B (#5733) is already installed. **Limitations:** Not used with the MLCA (#4500). See "Processor Unit Expansion Feature Configurator". **Maximum:** One. **Field Installation:** Yes.

Processor Unit Expansion D (#5735): Gate Assembly required for 2400 bps Integrated Modem (#5600, #6600, #5601, #6601, #5602, #6602, #5610, #6610). See "Processor Unit Expansion Feature Configurator". **Maximum:** One. **Field Installation:** Yes.

Processor Unit Expansion E (#5736): Additional power required for 1255 Attachment (#1100) on certain mdls. See "Processor Unit Expansion Feature Configurator". **Maximum:** One. **Field installation:** Yes.

Processor Unit Expansion Feature Configurator:

	5340 Mdls				
			X14		
			X15		
			X24		
			X25		
	X11		X34		
	X12		X35		
	X21	X13	X36	X31	
	X22	X23	X37	X32	X33
Attachments					
#1255	A	-	A, E	A, E	E
EIA/1200 IM *	C **	C **	-	C **	C **
2400 IM *	B, D	B, D	D	B, D	B, D

* These IM (Integrated Modem) features apply only to the First or Second Communications Adapter (#2500 or #3500).

** C is not required if both B and 2400 IM are installed.

Notes: Processor Unit Expansion Features required for communications features (EIA Interface or Integrated Modems) are required only once per system regardless of whether one or two Communications Adapters (#2500 or #3500) are installed. If 2400 bps Integrated Modem is installed on either Communication Adapter (#2500, #3500), order Processor Unit Expansion Feature B and D. If 2400 bps Integrated Modem is not installed on either Communications Adapter, order Processor Unit Expansion C for EIA or 1200 bps Integrated Modem. No Processor Unit Expansion Feature is required if DDSA is installed on both Communications Adapters.

5211 Printer Attachment (#5811): Required to attach a 5211 Printer mdl 1 or 2. A translation capability provides for use of translation tables for substituting characters when the characters to be printed are not contained on the print belt. **Limitations:** Cannot be installed with 3262 Printer Attachment (#5815). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "System Printer" in "Specify" above. 5211/3262 Base Printer Attachment (#1110).

3262 Printer Attachment (#5815): Required to attach a 3262 mdl B1 Printer. A translation capability provides for use of translation tables for substituting characters when the characters to be printed are not contained on the print belt. **Limitations:** Cannot be installed with 5211 Printer Attachment (#5811). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "System Printer" in "Specify" above. 5211/3262 Base Printer Attachment (#1110).

Communications Features

Communications Adapters - General: System/34 can attach up to four communications lines depending upon the adapters selected. Three separate adapters are available. The First and Second Communications Adapters (#2500 and #3500) allow one line each to be attached to the system. When these adapters are used, a total of two communications lines can be attached. The Multiline Communications Adapter (MLCA - #4500) can provide for attachment of from one to four communications lines but is mutually exclusive with the First and Second Communications Adapters. The MLCA has up to four Line Base Adapters, each allowing attachment of one line.

Below is a discussion of the communications hardware support: (1) common to both BSC and SDLC, (2) specific to BSC support, and (3) specific to SDLC support.

1. Support Common to Both BSC and SDLC:

   Communications Adapters #2500 and #3500 will allow System/34 to communicate on a nonswitched point-to-point or multipoint line at speeds up to 9600 bps and on a switched point-to-point line at speeds up to 4800 bps. Each adapter operates independently under program control; however, the maximum aggregate bit rate for adapters #2500 and #3500 operating concurrently is 9600 bps. The maximum aggregate bit rate for all lines for adapter #4500 is 65,600 bps. When one line operates at 19,200, 48,000, 50,000, or 56,000 bps, the remaining lines are restricted to a total aggregate rate of 9600 bps. See M2700 pages for information on communication facilities.

   The System/34 operates as a control station on a multipoint line for the 5251 mdl 2 or 12, 3601, 3694, 4701, System/36, and another System/34, all under SDLC. If the other device on a multipoint line is a control station, the System/34 operates as a tributary station for BSC or a secondary station for SDLC. Otherwise, communication with other devices must be on a point-to-point line only.

   Each communications adapter will operate in half-duplex mode over dial (switched network) facilities, and half-duplex mode over nonswitched (or equivalent private) communications lines which may be duplex or half-duplex facilities. Operation of each feature will be overlapped at all transmission rates with processing and/or I/O device operations. See tables below. Units at each termination, or drop point, of a communications line to which the System/34 is attached must use the same clocking source (modem

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or business machine) and must be set to operate at the same transmission rate and to use the same transmission code. Compatible modems must be used at all terminations on a network and must use the same mode of attachment (2- or 4-wire). Switched network versions include, as a basic capability, support of Manual Dial and Manual or Auto-Answer (where the attached modem supports this capability) operations.

2. Support Specific to BSC Operations:

   The communication adapter allows operation in BSC mode as requested by the executing program.

   See the System/34 programming pages for a description of the program support provided for this feature. ASCII, EBCDIC, or EBCDIC Text Transparency are standard. ASCII or EBCDIC transmission codes are selected at program compilation time. In conjunction with stored program control, this feature permits System/34 to function on a switched or nonswitched communications line as a processor/terminal communicating in binary synchronous mode with:

   - A Series/1 equipped with BSCA (#2074, #2075, #2093, or #2094) (as a System/3).
   - A System/3 equipped with #2074, #2084, or #2094.
   - A System/7 equipped with BSCA (#2074) (as a System/3).
   - A System/32 equipped with #2074.
   - Another System/34 equipped with #2500, #3500, or #4500.
   - A System/36 equipped with #2500 or #4500.
   - A System/38 with appropriately configured BSC adapter and subfeatures, (point-to-point only).
   - An S/360 mdl 20 equipped with #2074.
   - An S/370 via an Integrated Communications Adapter, a 4331 Communications Adapter, a 2701 Data Adapter Unit, a 2703 Transmission Control Unit, or a 3704/3705 Communications Controller with the Network Control Program (NCP) or the Partitioned Emulation Program (PEP), any of which are equipped with a binary synchronous adapter and appropriate sub-features.
   - A 3741 Data Station mdl 2 or 3741 Programmable Workstation mdl 4.
   - A 3747 Data Converter equipped with Communications Adapter (#1660).
   - A 5110 Computer equipped with BSCA #2074 (as a 3741 mdl 2 or 4).
   - A 5231 mdl 2 equipped with BSCA (#2074) (as a 3741 mdl 2 or 4 in transmit mode only).
   - A 5265 communicating mdl (point-to-point, batch transmission only).
   - A 5280 Distributed Data System equipped with #2500.

3. Support Specific to SDLC Operations:

   The communications adapter allows operation in SDLC mode as requested by the executing program. The System/34 provides SDLC communications support for multipoint line control when the 5251 mdl 2 or 12 Display Stations, 3601 Finance Communications Controller, 3694 Document Processor, 4700 Finance Communications System, System/36, or another System/34 are attached to the communications adapter. In conjunction with stored program control, this feature provides communications capability with 4331 Communications Adapter or a S/370, 303X, or 4300 via a 3704 or 3705 Communications Controller equipped with appropriate features. See M3704, 3705, or 4331 pages. Switched network backup and speed select modem features are not supported under program control when communicating with 5251 mdl 2, 12. See the System/34 programming pages for a description of the program support provided on System/34 for SNA/SDLC operations. ASCII support for 5251 mdl 2 or 12 is by RPQ only.

First Communications Adapter - BSC/SDLC (#2500): Required to attach a communications line via appropriate interface or modem. In conjunction with stored program control, this feature permits System/34 to function on a switched, nonswitched public or private communications line. The adapter provides both BSC and SDLC. The proper line protocol is loaded into the control processor at program execution time. The communications adapters (#2500 and #3500) operate at speeds up to 9600 bps on a nonswitched point-to-point or multipoint common carrier facility or equivalent privately owned communication facility and up to 4800 bps on a switched point-to-point facility. However, the aggregate bit rate when both adapters (#2500 and #3500) are operating concurrently is 9,600 bps. **Limitations:** Cannot be installed with Multiline Communications Adapter (#4500). SDLC support by System Support Program (5726-SS1) requires at least 48K bytes of main storage (5340 mdl BXX or larger). The 1255 attachment cannot operate concurrently with the Communications Adapter (#2500, #3500) which has been assigned as the low-priority line. Therefore only the Communications Adapter (#2500, #3500) with the high-priority address can be used while operating the 1255. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** One of the Integrated Modems, EIA Interface, or DDSA for this adapter. See "Specify" for required modem cable and attachment codes.

Second Communications Adapter - BSC/SDLC (#3500): Required to attach a second communications line via appropriate interface or modem. In conjunction with stored program control, this feature permits System/34 to function on a switched, nonswitched public or private communications line. The adapter provides both BSC and SDLC. The proper line protocol is loaded into the control processor at program execution time. The Communications Adapter features (#2500 and #3500) operate at speeds up to 9600 bps on a nonswitched point-to-point or multipoint common carrier facility or equivalent privately owned communication facility and up to 4800 bps on a switched point-to-point facility. However, the aggregate bit rate when both adapters (#2500 and #3500) are operating concurrently is 9600 bps. The Second Communications Adapter (#3500) may be physically attached to System/34 which also has the 1255 Attachment (#1100), but these two attachments (#1100 and #3500) cannot operate concurrently. **Limitations:** Cannot be installed with Multiline Communications Adapter (#4500). SDLC support by System Support Program (5726-SS1) requires at least 48K bytes of main storage (5340 mdl BXX or larger). The 1255 attachment cannot operate concurrently with the Communications Adapter (#2500, #3500) which has been assigned as the low-priority line. Therefore only the Communications Adapter (#2500, #3500) with the high-priority address can be used while operating the 1255. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2500, one of the Integrated Modems, EIA Interface, or DDSA for this adapter. See "Specify" for required modem cable and attachment codes.

EIA Interface (#3701): Provides a cable and interface for attachment of an IBM modem or non-IBM modem meeting RS-232-C characteristics. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Limitations:** Cannot be installed with 1200 bps Integrated Modem (#5500, #5501), or 2400 bps Integrated Modem (#5600, #5601, #5602, #5610), or DDSA (#5650, #5651). Maximum speed is 9600 bps. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2500 and may require #5734. See "Processor Unit Expansion Feature Configurator". **Note:** This feature may also require Internal Clock (#4703) if the external modem does not provide its own clocking. See "Modem/Interface Feature Configurator".

EIA Interface (#3702): Provides a cable and interface for attachment of an IBM modem or non-IBM modem meeting RS-232-C characteristics. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Limitations:** Cannot be installed with 1200 bps Integrated Modem (#6500, #6501) or 2400 bps Integrated Modem (#6600, #6601, #6602, #6610) or DDSA (#5652, #5653). Maximum speed is 9600 bps. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3500 and may require #5734. See "Processor Unit Expansion Feature Configurator". **Note:** This feature may also require Internal Clock (#4703) if the external modem does not provide its own clocking. See "Modem/Interface Feature Configurator".

IBM Data Encryption Device (#3845, #3846): A 3845 or 3846 Data Encryption Device may be attached between the System/34 communications adapter and the external modem. **Limitations:** The 3845 or 3846 device operating with SDLC will not operate with NRZI transmission mode. **Prerequisites:** #3701, #3702, or #531X. **Note:** Refer to M2700, 3845, and 3846 pages for information on 3845 or 3846 configuration and communication capability.

Multiline Communications Adapter - MLCA (#4500): Four communications lines can be attached to System/34 using the MLCA. The MLCA is a microprocessor that operates in parallel with the main storage processor and other microprocessors in the system. Each communications line provides either BSC or SDLC protocol. The proper line protocol is loaded into the control processor at program execution time. This feature permits, in conjunction with stored program control, System/34 to function on a switched, nonswitched public or private communications line. Each communications line operates independently up to 9600 bps concurrently with the other lines. One line may operate at high-speed (above 9600 bps) independent of the other lines. However, the aggregate rate of the remaining lines must not exceed 9600 bps and the aggregate rate of all four lines must not exceed 65,600 bps. For BSC multipoint tributary operation, an auto-monitoring function is provided that allows the line to be monitored without a main storage program being required. In this mode, a negative response is sent to all polls and selects received from the host. For BSC processing to become active in main storage the operator must activate BSC data management. An SDLC auto-response mode is implemented in MLCA for secondary SDLC. The MLCA will handle some redundant supervisory responses, thus eliminating the need to always utilize the SDLC task is main storage for nonproductive activity. The MLCA in a primary SDLC environment off-loads from the main storage processor, the majority of the work required for nonproductive polling. In either case, an SNA/SDLC task must be active in main storage. The Multiline Communications Adapter (#4500) may be installed in place of the First and Second Communications Adapters (#2500 and #3500) providing for up to four communications lines. The maximum aggregate bit rate when all four lines of the MLCA are operating concurrently is 65,600 bps. One line may operate at 19,200, 50,000, or 56,000 bps, but the remaining lines must not exceed a total aggregate bit rate of 9600 bps. **Limitations:** When installed will reduce the disk storage available to the user by 80,640 bytes. Cannot be installed with First or Second

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Communications Adapter (#2500 or #3500). SDLC support by System Support Program (5726-SS1) requires at least 48K bytes of main storage (5340 mdl BXX or larger). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Specify" for mandatory attachment codes. A Line Base Adapter must be configured for each line. **Note:** The units position of features #53XX and #54XX corresponds to the line number position; e.g., #5301 refers to the Line Base Adapter for line 1.

Line Base Adapter (#5301, #5302, #5303, #5304): Required for attachment of communication lines to the MLCA. Each line is independent of the others and may be ordered in any sequence. However, it is recommended that lines be ordered and installed in sequence. **Limitations:** See "Multiline Communications Adapter Configurator" for possible combinations of features. **Maximum:** Four. **Field Installation:** Yes. **Prerequisites:** #4500 and an Integrated Modem, DDS Adapter, Wideband Adapter, Auto-Call Adapter, or EIA Interface.

EIA Interface (#5311, #5312, #5313, #5314): Provides a cable and interface for attachment of an IBM modem or non-IBM modem meeting RS-232-C characteristics. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Limitations:** Cannot be installed with an Integrated Modem, Analog Wideband Adapter, Auto-Call Adapter, or DDS Adapter on the same Line Base Adapter. Maximum speed is 9600 bps. See "Multiline Communications Adapter Configurator" for possible combinations of features. **Maximum:** One per Line Base Adapter (four total). **Field Installation:** Yes. **Prerequisites:** The Line Base Adapter corresponding to line using the EIA Interface. This feature may also require Internal Clock (#5321) if the external modem does not provide its own 1200 bps clocking.

1200 bps Integrated Modem (#5331, #5332, #5333, #5334, #5341, #5342, #5343, #5344): A modem integrated into the system for SDLC or BSC data transmission at 1200 bps over nonswitched or switched facilities. Half-speed operation at 600 bps is indicated via system utility program. It is available in two different versions: #533X for nonswitched and #534X for switched with auto-answer. Attachment to the nonswitched (2- or 4-wire) facilities is via an IBM-provided cable directly to the line, type 3002. Attachment to the switched facilities is via an IBM-provided cable or to an FCC registered protective circuitry provided by the user. **Limitations:** Cannot be installed with EIA Interface, Analog Wideband Adapter, Auto-Call Adapter, another integrated modem, or DDS Adapter on the same Line Base Adapter. #533X and #534X cannot be installed together on the same Line Base Adapter. See "Multiline Communications Adapter Configurator" for possible combinations of features. **Maximum:** One per Line Base Adapter (four total). **Field Installation:** Yes. **Prerequisites:** Line Base Adapter corresponding to the line using the 1200 bps Integrated Modem and #5321. **Note:** The device communicating with System/34 must also be equipped with a 1200 bps Integrated Modem using the same 2-wire or 4-wire mode of attachment to the line.

4800 bps Integrated Modem (#5351, #5352, #5353, #5354, #5361, #5362, #5363, #5364): A modem integrated into the system for SDLC or BSC data transmission at 4800 bps over nonswitched facilities or switched network. Half-speed operation at 2400 bps is possible via a systems utility program. Configuration options such as "local speed control" or "remote speed control" are performed by Field Engineering at install time. For additional information on configuration options refer to M3864 pages. The 4800 bps modem is available in two different versions: #535X for nonswitched and #536X for switched with auto-answer and Integrated Protective Coupler (contingent upon FCC registration). Attachment to nonswitched (4-wire) facilities is via an IBM-provided cable directly to the line, type 3002 . Attachment to the switched network is directly to the line for the Integrated Protective Coupler . The 4800 bps Integrated Modem is equivalent to and compatible with the 3864 Modem. The device communicating with the System/34 must also be equipped with a 3864 compatible integrated 4800 bps modem or a stand-alone 3864 using the same 2- or 4-wire mode of attachment to the line. For additional information on the 3864, refer to *IBM 3863, 3864, 3865 Introduction and Site Preparation Guide* (GA27-3200).

Communications Facilities - Nonswitched Lines: Nonswitched modems attach to a 4-wire voiceband line, type 3002 (or equivalent). Special conditioning is not necessary. Attachment to the line is by a cable that is terminated with a 4-prong plug (WE 283B or equivalent). A 12 meter (40 foot) cable is furnished. The plug mates with a receptacle (WE 404B or 549A surface mount or 493A flush mount, or equivalent) which is connected to the line. The receptacle is a conventional item of communications equipment and is, upon customer request, ordinarily furnished by the telecommunications service supplier. Communications Facilities - Switched Lines: Switched modems attach to a 2-wire voiceband line. Attachment to the line is by a cable that is terminated with an 8-pin mini plug (USOC 45A or 41S). A 5.5 meter (18 foot) cable is furnished. The mini plug mates with a programmed data jack that is provided by the telecommunications service supplier.

Limitations: Cannot be installed with EIA Interface, 1200 bps Integrated Modem, Analog Wideband Adapter, Auto-Call Adapter, or DDS Adapter on the same Line Base Adapter. See "MLCA Feature Configurator" for possible combination of features. **Maximum:** One per Line Base Adapter; two per MLCA. **Field Installation:** Yes. **Prerequisites:** Line Base Adapter corresponding to the line using the 4800 bps Integrated Modem.

Digital Data Service (DDS) Adapter (#5391, #5392, #5393, #5394): An integrated adapter for BSC or SDLC data transmission at speeds of 2400, 4800, 9600, and 56,000 bps over the AT&T nonswitched Data-Phone® digital service network. The DDS Adapter interfaces to a channel service unit (not a Data Service Unit), the customer site termination of the DDS network. **Note:** This service is available only in certain cities within the U.S. The DDS Adapter may also be used to locally connect a System/34 to another supported device with a DDS Adapter. This connection requires a special accessory adapter cable and supports point-to-point connections only. No modem or channel service unit is required. See "DDS Adapter Connector" under "Accessories". **Limitations:** Cannot be installed with an Integrated Modem, Analog Wideband Adapter, Auto-Call Adapter, or EIA Interface on the same Line Base Adapter. When a DDS Adapter is operating at 56,000 bps, the other lines cannot exceed an aggregate rate of 9600 bps. See "Multiline Communications Adapter Configurator" for possible combinations of features. **Maximum:** One per Line Base Adapter (four total) **Field Installation:** Yes. **Prerequisites:** Line Base Adapter corresponding to the line using the DDS Adapter.

Analog Wideband Adapter (#5401, #5402, #5403, #5404): Provides a cable and interface for attachment of a WE 303 type modem or equivalent operating at 19,200 bps or 50,000 bps. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Limitations:** Cannot be installed with an Integrated Modem, EIA Interface, Auto-Call Adapter, or DDS Adapter on the same Line Base Adapter. Other lines cannot exceed an aggregate speed of 9600 bps when operating in conjunction with the Analog Wideband Adapter. See "Multiline Communications Adapter Configurator" for possible combinations of features. **Maximum:** One per MLCA. **Field Installation:** Yes. **Prerequisites:** The Line Base Adapter corresponding to line using the Analog Wideband Adapter.

Auto-Call Adapter (#5411, #5412, #5413, #5414): Permits the System/34 when attached to a switched network facility via an appropriate external modem and Auto-Call unit, (meeting EIA Standard RS-366) to initiate a data link connection to a remote device. Provides automatic dialing under program control. An Auto-Call Adapter (#541X) must always be installed in conjunction with an Interface (#531X) on another line , thus utilizing two line positions on the MLCA. Therefore, the use of auto-call will reduce the total number of lines available. **Limitations:** Cannot be installed with an EIA Interface, Integrated Modem, Analog Wideband Adapter, or DDS Adapter on the same Line Base Adapter as the Auto-Call feature. See "Multiline Communications Adapter Configurator" for possible combination of features. **Maximum:** One per Line Base Adapter, two per MLCA. **Field Installation:** Yes. **Prerequisites:** Line Base Adapter corresponding to the line using the Auto-Call Adapter.

1200 bps Integrated Modem (#5500, #5501): A modem for SDLC or BSC data transmission at 1200 bps over nonswitched facilities or switched network. Half-speed operation at 600 bps is indicated via a system utility program. Available in two different versions: #5500 for nonswitched or #5501 for switched with auto-answer. Attachment to the nonswitched (2- or 4-wire) facilities is via an IBM-provided cable directly to the line, type 3002 . Attachment to the switched network is via an IBM-provided cable to an FCC registered protective circuitry of the CBS type (or equivalent) provided by the user . The device communicating with System/34 must also be equipped with a 1200 bps Integrated Modem. **Limitations:** Cannot be installed with Interface (#3701) or 2400 bps Integrated Modem (#5600, #5601, #5602, #5610), or DDSA (#5650, #5651). #5500 and #5501 cannot be installed together. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2500, #4703, and may require #5734. See "Processor Unit Expansion Feature Configurator" and "Modem/Interface Feature Configurator".

2400 bps Integrated Modem (#5600, #5601, #5602): A modem for SDLC or BSC data transmission at 2400 bps over nonswitched facilities, equivalent to and compatible with similarly featured 3872 Modems. Available in three different versions: #5600 for nonswitched, point-to-point, #5601 for nonswitched, multipoint control and #5602 for nonswitched, multipoint tributary. Attachment to nonswitched (2- or 4-wire) facilities is directly to the line, type 3200 via an IBM-provided cable. The 2400 IM is equivalent to and compatible with the 3872 Modem. The device communicating with the System/34 must also be equipped with a 3872 compatible integrated 2400 bps modem or a stand-alone 3872 Modem. **Limitations:** Cannot be installed with Interface (#3701) or another Integrated Modem (#5500, #5501, #5610), or DDSA (#5650, #5651). #5600, #5601, and #5602, or #5610 cannot be installed together. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2500, #5733 and/or #5735. See "Processor Unit Feature Expansion Configurator" and "Modem/Interface Feature Configurator".

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2400 bps Integrated Modem (#5610): A modem for SDLC or BSC data transmission at 2400 bps over a switched network with automatic answer capability. This modem is equivalent to and compatible with similarly featured 3872 Modems. Half-speed operation at 1200 bps is indicated via a system utility program. Attachment to the switched network is via an IBM-provided cable to an FCC registered protective circuitry provided by the user, type CBS or equivalent. The 2400 IM is equivalent to and compatible with the 3872 Modem. The device communicating with the System/34 must also be equipped with a 3872 compatible integrated 2400 bps modem or a stand-alone 3872 Modem. **Limitations:** Cannot be installed with Interface (#3701) or another Integrated Modem #5500, #5501, #5600, #5601, #5602), or DDSA (#5650, #6551). **Maximum:** One. **Note:** This feature is not compatible with the 2400 bps Integrated Modem available on the 5251. **Field Installation:** Yes. **Prerequisites:** #2500, #5733 and/or #5735. See "Modem/Interface Feature Configurator" and "Processor Unit Expansion Feature Configurator". (

Digital Data Service (DDS) Adapter (#5650, #5651): An integrated adapter for BSC or SDLC data transmission at speeds of 2400, 4800 or 9600 bps over the AT&T nonswitched Data-Phone® digital service network. The DDSA interfaces to a DDS channel service unit (not a Data Service Unit), the customer site termination of the DDS network. Available at three speeds: 2400, 4800, or 9600 bps. For point-to-point or multipoint control (#5650), for multipoint tributary (#5651). **Notes:** This service is available only in certain cities within the U.S. The DDS Adapter may also be used to locally connect a System/34 to another supported device with a DDS Adapter. This connection requires a special accessory adapter cable and supports point-to-point connections only. No modem or channel service unit is required. See "DDS Adapter Connector" under "Accessories". **Limitations:** Cannot be installed with EIA interface (#3701) or 1200 bps Integrated Modem (#5500, #5501) or 2400 bps Integrated Modem (#5600, #5601, #5602, #5610). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2500.

Digital Data Service (DDS) Adapter (#5652, #5653): An integrated adapter for BSC or SDLC data transmission at speeds of 2400, 4800,or 9600 bps over the AT&T nonswitched Data-Phone® digital service network. The DDSA interfaces to a DDS channel service unit (not a Data Service Unit), the customer site termination of the DDS network. Available at three speeds: 2400, 4800, or 9600 bps. For point-to-point or multipoint control (#5652), for multipoint tributary (#5653). **Note:** This service is available only in certain cities within the U.S. The DDS Adapter may also be used to locally connect a System/34 to another supported device with a DDS Adapter. This connection requires a special accessory adapter cable and supports point-to-point connections only. No modem or channel service unit is required. See "DDS Adapter Connector" under "Accessories". **Limitations:** Cannot be installed with EIA Interface (#3702) or 1200 bps Integrated Modem (#6500, #6501) or 2400 bps Integrated Modem (#6600, #6601, #6602, #6610). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3500.

1200 bps Integrated Modem (#6500, #6501): A modem for SDLC or BSC data transmission at 1200 bps over nonswitched facilities or switched network. Half-speed operation at 600 bps is indicated via a system utility program. Available in two different versions: #6500 for nonswitched, #6501 for switched with auto-answer. Attachment to the nonswitched (2- or 4-wire) facilities is via an IBM-provided cable directly to the line, type 3002 . Attachment to the switched network is via an IBM-provided cable to an FCC registered protective circuitry provided by the user type CBS or equivalent. . The device communicating with System/34 must also be equipped with a 1200 bps Integrated Modem. **Limitations:** Cannot be installed with Interface (#3702) or 2400 bps Integrated Modem (#6600, #6601, #6602, #6610), or DDSA (#5652, #5653). #6500 and #6501 cannot be installed together. **Maximum:** One. **Prerequisites:** #3500, #4703, and may require #5734. See "Modem/Interface Feature Configurator" and "Processor Unit Expansion Feature Configurator".

2400 bps Integrated Modem (#6600, #6601, #6602): A modem for SDLC or BSC data transmission at 2400 bps over nonswitched facilities, equivalent to and compatible with similarly featured 3872 Modems. Available in three different versions: #6600 for nonswitched, point-to-point, #6601 for nonswitched multipoint control, and #6602 for nonswitched multipoint tributary. Attachment to nonswitched (2- or 4-wire) facilities is directly to the line, type 3002 via an IBM-provided cable. The 2400 IM is equivalent to and compatible with the 3872 Modem. The device communicating with the System/34 must also be equipped with a 3872 compatible integrated 2400 bps modem or a stand-alone 3872 Modem. **Limitations:** Cannot be installed with Interface (#3702) or another Integrated Modem (#6500, #6501, #6610), or DDSA (#5652, #5653). #6600, #6601, #6602, and #6610 cannot be installed together. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #6500, #5733 and/or #5735. See "Processor Unit Expansion Feature Configurator".

2400 bps Integrated Modem (#6610): A modem for SDLC or BSC data transmission at 2400 bps over a switched network with automatic answer capability. This modem is equivalent to and compatible with similarly featured 3872 Modems. Half-speed operation at 1200 bps is indicated via a system utility program. Attachment to the switched network is via an IBM-provided cable to an FCC registered protective circuitry provided by the user type CBS. The 2400 IM is equivalent to and compatible with the 3872 Modem. The device communicating with the System/34 must also be equipped with a 3872 compatible integrated 2400 bps modem or a stand-alone 3872 Modem. **Limitations:** Cannot be installed with Interface (#3702) or another Integrated Modem (#6500, #6501, #6600, #6601, #6602). **Note:** This feature is not compatible with the 2400 bps Integrated Modem available on the 5251. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3500, #5733 and/or #5735. See "Modem/Interface Feature Configurator" and "Processor Unit Expansion Feature Configurator".

Switched Network Backup (SNBU) (#7951): Provided for backup attachment of System/34 to the public switched network when the 2400 bps Integrated Modem (#5600, #5601, #5602) is used on a nonswitched line as the prime facility. It can communicate with a compatible 2400 bps Integrated Modem or a 3872 Modem when either is equipped with switched network capability. Selection of the primary or backup facility is via an operator invoked system utility program. Attachment to the switched network is made via an FCC registered protective circuitry provided by the user type CDT or equivalent. Calls must be established and answered manually. Operator intervention, program modification, or both may be required on the using system/terminal. Additional customer program routines will be required, in existing BTAM programming, to fully utilize the capabilities of the Switched Network Backup feature. For additional information, see the *IBM 3872 Modem User's Guide* (GA27-3058). **Limitations:** Cannot be installed with Switched Network Backup with Auto-Answer (#7952). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2500 and #5600, #5601, or #5602, and appropriate Processor Unit Expansion Features for 2400 bps Integrated Modem.

Switched Network Backup with Auto-Answer (SNBU/AA) (#7952): Same as Switched Network Backup (#7951) plus the added capability of automatically answering incoming calls when attached to an FCC registered protective circuitry provided by the user of the CBS type (or equivalent). Selection of the prime or backup facility is via an operator invoked system utility program. Operation intervention, program modification, or both may be required on the using system or terminal. Additional customer program routines will be required, in existing BTAM programming, to fully utilize the capabilities of Switched Network Backup. For additional information see the *IBM 3872 Modem User's Guide* (GA21-3058). **Limitations:** Cannot be installed with Switched Network Backup (#7951). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2500, #5600, #5601, or #5602, and appropriate Processor Unit Expansion Features for 2400 bps Integrated Modem.

Switched Network Backup (SNBU) (#7953): Provided for backup attachment of System/34 to the public switched network when the 2400 bps Integrated Modem (#6600, #6601, #6602) is used on a nonswitched line as the prime facility. It can communicate with a compatible 2400 bps Integrated Modem or a 3872 Modem when either is equipped with switched network capability. Selection of the primary or backup facility is via an operator invoked system utility program. Attachment to the switched network is made via an FCC registered protective circuitry provided by the user type CDT or equivalent. Calls must be established and answered manually. Operator intervention, program modification, or both may be required on the using system/terminal. Additional customer program routines will be required, in existing BTAM programming, to fully utilize the capabilities of the Switched Network Backup feature. For additional information, see the *IBM 3872 Modem User's Guide* (GA21-3058). **Limitations:** Cannot be installed with Switched Network Backup with Auto-Answer (#7954). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3500 and #6600, #6601, or #6602.

Switched Network Backup with Auto-Answer (SNBU/AA) (#7954): Same as Switched Network Backup (#7953) plus the added capability of automatically answering incoming calls when attached to an FCC registered protective circuitry provided by the user type CDT or equivalent. Selection of the prime or backup facility is via operator invoked system utility program. Operation intervention, program modification, or both may be required on the using system/terminal. Additional customer program routines will be required, in existing BTAM programming, to fully utilize the capabilities of the Switched Network Backup feature. For additional information see the *3872 Modem User's Guide* (GA21-3058). **Limitations:** Cannot be installed with Switched Network Backup (#7953). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3500 and #6600, #6601, or #6602.

IBM Modems: One IBM Modem can be attached to each Communications Adapter. **Prerequisites:** Communications Adapter (#2500, #3500); Interface (#3701, #3702), Processor Unit Expansion (#5734) or Multiline Communications Adapter (#4500), Line Base Adapter (#5301, #5302, #5303, #5304), and Interface (#5311, #5312, #5313, #5314).

5340 System Unit (cont'd)

Modem	Speed (bps)
3863	2400
3868 mdl 1	2400
3864	4800
3863 mdl 2	4800
3865	9600
3868 mdl 3,4	9600
3872	2400/1200

Note: For communications capabilities, product utilization, and special features, see M2700, 3863, 3864, 3865, and 3872 pages. To verify the proper integrated or external modem interface configuration to #2500 and #3500, refer to "Modem/Interface Feature Configurator" below. Select one of the categories and follow across for the required and optional special features. To verify the proper integrated or external modem interface configuration to #4500, refer to "Multiline Communications Adapter Configurator" below.

Modem/Interface Feature Configurator: (#2500 or #3500) only.

Modem/ Interface	Internal Clock (#4703)	Processor Unit Expansion (1) B (#5733)	C (#5734)	D (#5735)	SNBU, SNBU/AA (#7951, #7952, #7953, #7954)
EIA Interface (#3701, #3702)	Optional	-	Required (2)	-	-
1200 bps Integrated Modem:					
Nonswitched (#5500, #6500)	Required	-	Required (2)	-	-
Switched with Auto-Answer (#5501, #6501)	Required	-	Required (2)	-	-
2400 bps Integrated Modem:					
Nonswitched Point-to-Point (#5600, #6600)	-	Required (3)	-	Required	Optional
Nonswitched Multipoint Tributary (#5602, #6602)	-	Required (3)	-	Required	Optional
Switched Network with Auto-Answer (#5610, #6610)	-	Required (3)	-	Required	-
Nonswitched Multipoint Control (#5601, #6601)	-	Required (3)	-	Required	Optional

Notes:

(1) See "Processor Unit Expansion Feature Configurator".

(2) Not required if Processor Unit Expansion B (#5733) and 2400 IM are installed. Not required on XX4, XX5, XX6, and XX7 mdls.

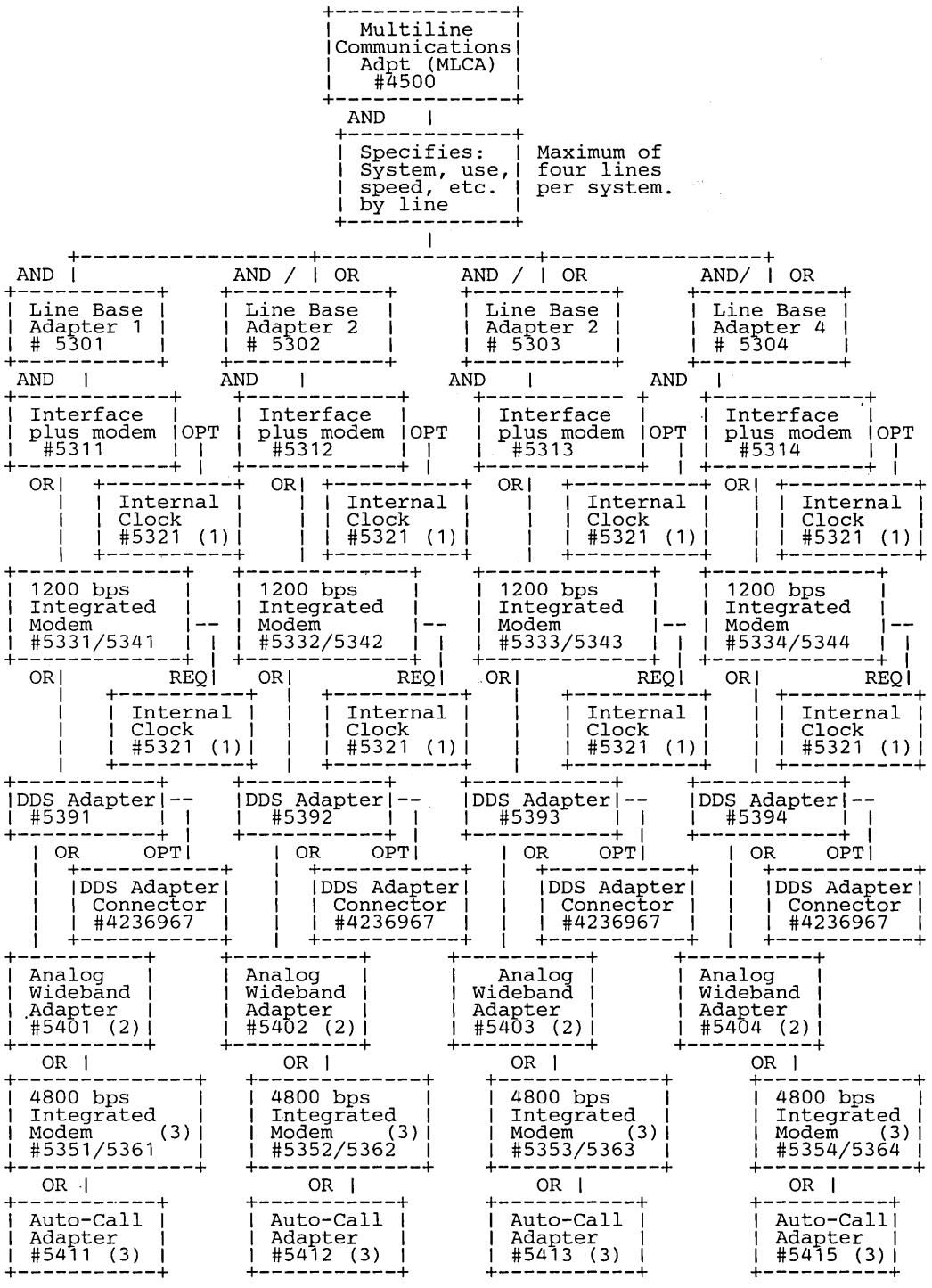
n(3) Not required on XX4, XX5, XX6, and XX7 mdls.

Adapter/Facility Specify Codes For Communications: One selection must be specified from each of the following four categories for each Adapter/Line:

	Line	1 #2500 or (#4500)	2 #3500 or (#4500)	3 (#4500)	4 (#4500)
A	**Transfer Rate (bps):**				
	600	#9001	#9401	#9501	#9601
	1200	#9002	#9402	#9502	#9602
	2000	#9003	#9403	#9503	#9603
	2400	#9004	#9404	#9504	#9604
	4800	#9005	#9405	#9505	#9605
	7200/3600	#9006	#9406	#9506	#9606
	9600	#9007	#9407	#9507	#9607
	High-Speed (above 9600)	#9008	#9408	#9508	#9608
B	**Network Attachment:**				
	Point-to-Point (nonswitched)	#9101	#9102	#9103	#9104
	Point-to-Point (switched)	#9111	#9112	#9113	#9114
	Multipoint Tributary	#9121	#9122	#9123	#9124
	Multipoint Control	#9131	#9132	#9133	#9134
	Local Attach via DDSA	#9141	#9142	#9143	#9144
C	**Line Facility:**				
	Duplex (4-wire)	#9311	#9411	#9511	#9611
	Half-Duplex (2-wire)	#9310	#9410	#9510	#9610
D	**Primary Line Control:**				
	BSC	#9201	#9202	#9203	#9204
	SDLC	#9211	#9212	#9213	#9214

5340 System Unit (cont'd)

Multiline Communications Adapter (#4500) Configurator:



Notes:

(1) Total of one per system, one will handle any or all lines.

(2) One only per system.

(3) Two only per system.

5340 System Unit (cont'd)

System Utility Support: A system utility program is used for the selection of certain data communications characteristics such as: full-speed or half-speed, internal or external modem clocking, line type, station address, etc. See the *System/34 System Support Reference Manual* (SC21-5155) for a complete description of $SETCF utility.

References: See the appropriate host system programming pages for possible restrictions.

See M2700 pages for additional information concerning modems, communications facilities, machine attachment requirements, terminal intermix, operating capabilities, and customer responsibilities.

Refer to *System/34 Installation Manual - Physical Planning* (GA21-9242) for physical installation requirements.

Replaced Parts: Replaced parts from any special feature installation or removal remain the property of the customer.

MODEL CONVERSIONS

All conversions may be field installed.

Any model upgrade that involves a disk storage capacity change may require replacement of the disk storage mechanism. Adequate provision must be made for retaining the data contained on the replaced disk mechanism and elimination of user proprietary information.

The upgrade purchase prices for model conversions may be greater than the purchase price differentials. The customer should carefully evaluate his future requirements when purchasing a system.

Replaced parts from any model conversion that includes a disk storage capacity change become the property of IBM.

Replaced parts from any model conversion which changes the diskette remain the property of the customer.

ACCESSORIES

Keys: The 5340 with Keylock (#4655) is shipped with two keys. Additional keys may be purchased from IBM. (Vendor will supply additional keys only to the original purchaser). Order , specifying P/N 2546418. A letter of authorization with key identification number must accompany each order. Allow six to eight weeks for delivery.

DDS Adapter Connector: A specially designed connector allows the cables from a System/34 DDS Adapter to be connected to another supported device with a DDS Adapter. This provides for the local connection of two devices without the use of any modems or channel service units. This is a purchase only item. Order , specifying P/N 4236967. Allow six to eight weeks for delivery. **Maximum:** One per Digital Data Service (DDS) Adapter (four per system total). **Field Installation:** Yes.

Cables: Required, see "Specify".

SUPPLIES

For Diskettes and Diskette Magazines see IBM.

5360 SYSTEM UNIT

PURPOSE

Contains main storage, disk storage, diskette drive, communications features, logical processing circuits and control for I/O units on System/36.

MODELS

Model	Main Storage*	Diskette Drive	Disk Storage**
A11	128K	Single	30MB
A21	128K	Magazine	30MB
A12	128K	Single	60MB
A22	128K	Magazine	60MB
B13	256K	Single	200MB
B23	256K	Magazine	200MB
B14	256K	Single	400MB
B24	256K	Magazine	400MB
B15	256K	Single	600MB
B25	256K	Magazine	600MB
B16	256K	Single	800MB
B26	256K	Magazine	800MB

* Additional main storage (up to a maximum of 256K on AXX models and 1024K on BXX models) is available as features.

** The actual capacity of the first disk on each system is reduced by 1.67MB. This area is required for microcode, service aids, error logs, and diagnostics, and is not available to the user.

Disk Storage	Actual Capacity	User Capacity
30MB	30.84MB	29.17MB
60MB	61.69MB	60.02MB
200MB	200.20MB	198.53MB
400MB	400.40MB	398.73MB
600MB	600.60MB	598.93MB
800MB	800.80MB	799.13MB

Minimum System Configuration: A 5360 System Unit, a system console (5251 mdl 11, 5291, or 5292), and a printer (3262, 5224, 5225, or 5256). A system printer (not a 5219) must be identified to satisfy IBM maintenance requirements when using the System Support Program (5727-SS1).

Customer Setup: The 5360 is designated Customer Setup (CSU) and offers customers ease-of-setup and relocation flexibility. The Customer Setup Allowance is one day. One copy of *Setting Up Your Computer* (SA21-9430), is included with each 5360.

HIGHLIGHTS

- Multiple workstation system with multiprogramming capability provided by the System Support Licensed Program (5727-SS1).
- Extension of System/34 capabilities.
- Local and remote workstation devices (up to 36 Local, 64 Remote):

  Workstation Controller: (remote only)
  5294 - 001

  Printers:
  5219 - D01, D02
  5224 - 001, 002
  5225 - 001, 002, 003, 004
  5256 - 001, 002, 003

  Displays: (selected countries)
  5150 Personal Computer *
  5160 Personal Computer (XT) *
  * The 5150 and 5160 XT require the Personal Computer Display Adapter with the 5250 Emulation Program.
  5251 - 011
  5251 - 012 (remote only)
  5291 - 001
  5292 - 001
  5292 - 002

- Other I/O devices:

  1255 Magnetic Character Reader mdls 1,2,3 (available 2Q84)
  3262 Printer mdls B1, C1
  8809 Magnetic Tape Units mdls 1C, 2C (available 2Q84)

- Customer setup to offer earlier availability and relocation flexibility.
- Customer Problem Determination aids are provided to assist users in correcting problems or deciding who to call if service is required.
- High level of system availability
- Data error checking and correction for disk and main storage
- Fixed interval timer
- Storage protection
- Security keylock
- Communications: Communication lines may be attached to System/36 using either a Single Line Communications Adapter or a Multiline Communications Adapter.

  The Single Line Communications Adapter permits half-duplex operation at speeds from 600 bps to 9600 bps. The following interface adapters are available for use with the SLCA.

  - EIA RS-232-C
  - 1200 bps integrated modem (switched and nonswitched)
  - Digital Data Service Adapter
  - X.21 (nonswitched operation only)
  - X.25 Support

  The Multiline Communications Adapter (MLCA) permits attachment of up to four communication lines, each of which is capable of half-duplex operation at speeds from 600 bps to 9600 bps. In addition, one line is capable of operating at speeds up to 57.6K bps in half-duplex mode, provided the aggregate of the remaining three lines does not exceed 9600 bps, or one line can operate at 50K bps in half-duplex mode and the remaining lines (up to three) at speeds up to 4800 bps each, or one line can operate at 19.2K bps and the remaining lines (up to three) at speeds up to 9600 bps each. Operation at speeds greater than 9600 bps is limited to Line-4 of the MLCA. The following interface adapters are available for use with the MLCA. See the communications configurator for possible combinations of adapters.

  - EIA RS-232-C
  - V.35
  - Autocall
  - 1200 bps integrated modem (switched and nonswitched)
  - Digital Data Service
  - X.21 (switched and non-switched)
  - X.25 Support

  Both communications adapters support Binary Synchronous Communications (BSC) and Synchronous Data Link Control (SDLC) protocols. In BSC mode, switched, nonswitched point-to-point and multipoint tributary operation is supported. ASCII, EBCDIC, or EBCDIC Text Transparency is standard and is program selectable by line. In SDLC mode, switched, nonswitched, and multipoint operation is supported. The System/36 can operate as either a primary or a secondary station on a multipoint line. Refer to the M2700 pages for a description of attachment capability.

5360 System Unit Components

Processors: The 5360 has a multiple processor architecture. The main storage processor is an enhanced System/34 instruction processor with 128K, 256K, 384K, 512K, 768K, or 1024K bytes of main storage. A control storage processor operates in parallel with the main storage processor, and provides microcoded control function for the I/O processors and interfaces. A data storage controller is added when 8809 Magnetic Tape Attachment (#7960) is installed. This processor will then manage the device-to-device data transfers between disk, diskette, and tape. Additional processors are included to control other I/O functions. The processors use LSI (Large Scale Integration) for the logic circuitry. Storage technology is MOSFET (Metal Oxide Semiconductor Field Effect Transistor). Data and instructions are stored as EBCDIC characters. Each EBCDIC character is stored in an 8-bit byte. ECC (Error Correction Code) is maintained in main storage. Single-bit error correction and double-bit error detection is performed on every two bytes. Parity is added for all data transfers to and from main storage.

Workstation Controller: All displays and printers used as locally attached workstations connect to a controller in the 5360 System Unit via twinaxial cable connectors on the 5360. Up to six cables can be connected to the 5360 for attachment of workstations. Up to seven workstations may be attached to one cable via the Cable-Thru feature on displays and printers. The maximum aggregate length of twinaxial cable attached to one 5360 cable connector is 1,525 meters (5,000 feet). **Maximum:** A maximum of six [36 with Workstation Controller Expansion (#4900)] workstations, including the system console, may be locally attached via twinaxial cable to the 5360. See *Preparing a Place for Your Computer* (SA21-9444), for physical planning information.

Diskette Drive: Mdls X1X of the 5360 have a single diskette drive incorporated. Mdls X2X have a diskette magazine drive incorporated. Both drives can read and write either the Diskette 1 (Basic or Extended format) or the 2-sided double density Diskette 2D (Basic or Extended format).

5360 System Unit (cont'd)

Diskette Specifications:

	Diskette 1	Diskette 2D
Data Tracks/Diskette	74	148 (74 Cylinders)
Capacity		
Basic Format		
Bytes/Sector	128	256
Sectors/Track	26	26
Tracks/Cylinder	1	2
Data Bytes/Diskette	246,272	985,088
Extended Format		
Bytes/Sector	512	1,024
Sectors/Track	8	8
Tracks/Cylinder	1	2
Data Bytes/Diskette	303,104	1,212,416

The reading, writing, and seek operations of diskettes are overlapped with processing and I/O device operations. The diskette magazine drive can process individual diskettes or magazines. A magazine holds up to ten operator accessible diskettes. The magazine drive can accommodate two magazines and three diskettes. The selection of diskettes within a magazine, and processing from the first magazine to the second, is under program control. The select cycle time (eject diskette, move to next diskette, load diskette) is approximately three seconds. In addition to the two magazines, the magazine drive contains three diskette slots which can be used for loading one to three diskettes. The data transfer rate for the single diskette drive is 62.5K B/sec (using Diskette 2D); and for the diskette magazine drive, it is 125.0K B/sec (using Diskette 2D).

Disk Storage: The 5360 can contain one of six disk storage capacities: 30MB, 60MB, 200MB, 400MB, 600MB, or 800MB. Disk storage is high-speed, direct access media and is not physically removable from the system. Programs and data are stored on the disk for processing. Data can be stored offline for security or backup purposes by copying the data to diskettes or magnetic tape.

I≤Disk Storage Specifications:

	30/60MB	200/400/ 600/800MB
Bytes/Sector	256	2x256
Bytes/Cylinder	69,632	351,232
Blocks/Cylinder	27.2	137.2
Cylinders/Drive	443	570
Capacity/Drive(bytes)	30,845,440	200,202,240
Capacity/Two Drives (bytes)	61,690,880	400,404,480
Capacity/Three Drives (bytes)		600,606,720
Capacity/Four Drives (bytes)		800,808,960
Access Time (ms)		
Cyl-to-Cyl	*7	7
Average	**35	25
Maximum	**65	45
Rotational Speed (rpm)	3,151	2964
Instantaneous Data Rate (MB/sec)	1.25	1.50

Notes:
* Seven or less.
** Less than shown.

System Control Panel: The system control panel contains controls and indicators required for system operation. This panel combines the hardware/programming service representative and operator functions that serve as diagnostic aids for locating hardware and programming problems. The system control panel, in conjunction with the system console, provides the primary interface between the system and the operator or hardware/programming service representative. A 3-position keylock switch, located on the panel, can be used to prevent unauthorized personnel from accessing storage through the panel or turning on the system power.

System Console: The system console is not a component of the 5360 System Unit. The console may be any one of the supported display station devices except (selected countries) the 5150 Personal Computer, or the 5160 Personal Computer (XT) locally attached to the 5360 System Unit. For servicing reasons, the primary system console (alternative may be assigned through programming) is required to be located within 6 meters (20 feet) of the System Unit. It is used to facilitate operator control of the system via operator commands and to allow the operator to respond to system messages presented on the display. It can also be used as a data entry/inquiry workstation, interacting with a user-application.

Customer Responsibilities: The customer is responsible for:

- Adequate site and system planning and preparation. Customers who request CSD personnel to perform these activities are subject to a charge.

d• Receipt, unpacking, and placement of the 5360.

- Ordering, installation, and maintenance of signal cables (including the system console cable and system printer cable except 3262) and associated parts for attaching devices to the 5360 twinaxial ports.
- Physical setup, connection of cables to communications lines/modems and IBM devices, incorporating protected access areas, and checkout in accordance with instructions supplied by IBM.
- Using and following the System/36 problem determination procedures before calling IBM for service.
- Relocation of the 5360, if required, to allow IBM service access.
- Disconnecting and moving of the 5360 to the customer's shipping dock at the time of discontinuance.

Publications: *Guide to Publications* (GC21-9015).

SPECIFY

Non-Communications Specify Codes

Unless indicated, otherwise, these specify codes are available only at time of manufacture.

- Voltage (180-254V, 1-phase, 3-wire, 60 Hz): 250V locking-type plug provided. No specify code required.
- Color: Pearl White with Pebble Gray accent ... end covers only. No specify code required or permitted.
- Attaching 3262 mdl B1: Specify **#9876** only if attaching a 3262 mdl B1 that was previously attached to a System/34. Do not use this code if attaching a 3262 mdl C1. Also, if attaching a 3262 mdl B1, refer to the M3262 mdl B1 pages for additional ordering information.
- Specify **#9877**: Specify **#9877** for the field removal of specify code **#9876** or if attaching a 3262-C01. **Field Installation:** Yes (field installation only).
- Multinational Character Set: Specify **#2990** for Multinational Character Set. Special feature #4900 (on the 5360) is required as a prerequisite. All display stations and printers attached locally or remotely, must have Multinational Character Set capability.
- Twinaxial cables: Cables for the system console and system printer are *Not* supplied with the 5360 System Unit. See "Accessories" and the 5219, 522X, 525X, or 529X pages for cable ordering information.
- I/O Unit Attachments: Appropriate special features are required to attach any I/O device that does not have twinaxial connection capability. See "Special Features".
- For physical planning information, refer to *Preparing a Place for Your Computer* (SA21-9444).

Mandatory Specify Codes for Communications

- Specify Codes for Remote Device Types: Enter a specify code from the following list for each type of device with which the System/36 communicates. Codes are for record purposes only and do not affect the operation of the communication hardware or programming.

Code	System/Terminal Type
#9000	S/370, 303X, 308X, 43XX
#9001	System/34
#9002	System/36
#9003	System/38
#9004	Series/1
#9005	5251-12, 5294-001
#9006	5260
#9007	5280
#9008	5322 Datamaster
#9009	5520
#9010	6580 Displaywriter
#9011	OS/6, 6670
#9012	3601, 4701
#9013	3694
#9014	Other IBM
#9015	Non-IBM

- Line Position: Use the following table to specify where line interfaces are to be installed. For each line interface, select the desired interface type from the first column of the table. The second column shows the features that need to be ordered for each type of interface, and the third section of the table indicates the specify codes that are required to indicate line position. For example, to order an X.21 adapter on Line-2 of the MLCA, order feature #5301 and feature #5655 and specify **#9702** and **#9782**.

5360 System Unit (cont'd)

For each line using the interface shown below	Order the Feature Below Note (1)	AND	OR	Specify Line Position with Position Specify Codes MLCA			
		SLCA		Line-1	Line-2	Line-3	Line-4
Interface Note (2)	#5301 #3701	#9697 #9711		#9701 #9711	#9702 #9712	#9703 #9713	#9704 #9714
CCITT V.35 Interface	#5301 #5401						#9704 #9804
Autocall Interface Note (3)	#5301 #5411				#9702 #9722		#9704 #9724
1200 bps Int. Modem Nonswitched Note (4)	#5301 #5500	#9697 #9731		#9701 #9731	#9702 #9732	#9703 #9733	#9704 #9734
1200 bps Int. Modem Switched/AA Note (4)	#5301 #5501	#9697 #9741		#9701 #9741	#9702 #9742	#9703 #9743	#9704 #9744
Digital Data Service Interface	#5301 #5650	#9697 #9751		#9701 #9751	#9702 #9752	#9703 #9753	#9704 #9754
CCITT X.21 Interface Note (5)	#5301 #5655	#9697 #9781		#9701 #9781	#9702 #9782	#9703 #9783	#9704 #9784
CCITT X.25 Interface	#5301 #5680				#9702 #9792		#9704 #9794

Notes:
(1) Maximum quantity of each feature is one.
(2) Interface EIA RS-232-C
(3) Interface EIA RS-366-A
(4) #5321 is a prerequisite.
(5) X.21 switched is mutually exclusive with Autocall or X.25.

- Internal Clocking: If internal (business machine) clocking is required for use with an external modem, specify the lines which require internal clocking using the following specify codes. The internal clocking specify code applies only to lines using Adapter (#3701). Clocking speed is 1200 bps only. **Prerequisites:** #5321 is a prerequisite for the following codes.

Single Line	OR	MLCA Line-1	Line-2	Line-3	Line-4
#9261		#9261	#9262	#9263	#9264

- Network Type: Specify the type of network to which each communication interface attaches. The network type should be described as seen by the System/36. The network type specified will be supplied to the customer on a system description listing that will be shipped with the system.

	Single Line	OR	MLCA Line-1	Line-2	Line-3	Line-4
Point-to-Point Nonswitched	#9101		#9101	#9102	#9103	#9104
Point-to-Point Switched	#9111		#9111	#9112	#9113	#9114
Multipoint Tributary	#9121		#9121	#9122	#9123	#9124
Multipoint Control	#9131		#9131	#9132	#9133	#9134
Local Attach. via DDSA	#9141		#9141	#9142	#9143	#9144

- Line Speed: Specify the communication line speed to be used with each communication interface on the System/36. The line speed specified will be supplied to the customer on a system description listing that will be shipped with the system.

Speed (bps)	Single Line	OR	MLCA Line-1	Line-2	Line-3	Line-4
1200	#9201		#9201	#9202	#9203	#9204
2400	#9211		#9211	#9212	#9213	#9214
4800	#9221		#9221	#9222	#9223	#9224
9600	#9231		#9231	#9232	#9233	#9234
Greater than 9600 bps						#9244

SPECIAL FEATURES

Replaced parts from any special feature installation on a purchased 5360 remain the property of the customer.

Non-Communications Features

Add'l Storage - 128K (#1005): Provides an additional 128K bytes of main storage. **Limitations:** Mutually exclusive with Add'l Storage - 256K (#1006). **Maximum:** One. **Field Installation:** Yes.

Add'l Storage - 256K (#1006): Provides an additional 256K bytes of main storage. **Limitations:** BXX mdls only, and mutually exclusive with Add'l Storage - 128K (#1005). **Maximum:** Three. **Field Installation:** Yes.

1255 Attachment (#1100): Required to attach 1255 Magnetic Character Reader mdls 1, 2, or 3. **Limitations:** Not available until 2Q84. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** None on BXX mdls. AXX mdls require #5732. #5733 is required if #5830 is installed.

1255 Attachment Expansion (#1105): Required when using the System/36 Assembler Macros to provide 1255 stacker logic programs. This feature provides an additional 28K of user-programmable storage. **Limitations:** Not available until 2Q84. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1100.

Workstation Controller Expansion (#4900): Required when attaching more than six workstations (36 maximum) locally to the 5360. This feature also supports: Hex Key operation, the 3270 Device Emulation program, the Multinational Character Set (**#2990**) installed on displays or printers, and the Magnetic Stripe Reader on displays. **Maximum:** One. **Field Installation:** Yes.

Processor Unit Expansion A (#5732): This is a feature I/O board required on AXX mdls for the 1255 Attachment (#1100), 3262 Printer Attachment (#5830), or the 8809 Magnetic Tape Attachment (#7960). **Limitations:** AXX mdls only. **Maximum:** One. **Field Installation:** Yes.

Processor Unit Expansion B (#5733): Additional power feature required on AXX mdls for the 8809 Magnetic Tape Attachment (#7960) or if attaching both the 1255 and 3262. **Limitations:** AXX mdls only. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5732.

3262 Printer Attachment (#5830): Required when attaching a 3262 mdl B1 or C1 Printer. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** None on BXX mdls, AXX mdls require #5732, #5733 if #1110 is installed. **#9876** if 3262 mdl B1 is to be attached.

8809 Magnetic Tape Attachment (#7960): Required when attaching the 8809 mdl 1C Magnetic Tape Unit (8809 mdl 2C attaches to the mdl 1C). **Limitations:** Not available until 2Q84. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** None on BXX mdls, AXX mdls require #5732 and #5733.

Communications Special Features

Single Line Communications Adapter - SLCA (#2500): Provides for attachment of a single communication line to the System/36. It permits half-duplex operation at speeds from 600 bps to 9600 bps using either BSC or SDLC protocols. Both switched and nonswitched operation is supported. **Note:** Only nonswitched operation is supported when using an X.21 interface. **Limitations:** Cannot be installed with the MLCA (#4500). **Maximum:** One. **Field Installation:** Yes. **Specify:** Network type line speed and remote station type for line attached to SLCA. See "Mandatory Specify Codes for Communications".

EIA Adapter (#3701): Provides a cable (40 foot) and interface for attachment of an IBM modem or a non-IBM modem meeting RS-232-C characteristics. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Limitations:** Cannot be installed with another EIA Adapter, V.35 Adapter, Autocall Adapter, integrated modem, Digital Data Service Adapter or X.21 Adapter on the same Communications Line Base Adapter (#5301). Maximum speed is 9600 bps. See the "Communications Configurator" for possible combination of features. **Maximum:** One per Communications Line Base Adapter (#5301). **Field Installation:** Yes. **Prerequisites:** #5301 corresponding to the line using the EIA Adapter. This feature may also require #5321 if the external modem does not provide its own 1200 bps clocking. **Specify:** Network type, line speed, line position and remote station type. See "Mandatory Specify Codes for Communications".

Multiline Communications Adapter - MLCA (#4500): Four communication lines can be attached to System/36 using the MLCA. The MLCA is a microprocessor that operates in parallel with the main storage processor and other microprocessors in the system. Each communications line uses either BSC or SDLC protocol. The proper line protocol is loaded into the MLCA microprocessor at program execution time. This feature, in conjunction with stored program control, permits System/36 to function on a switched or nonswitched, public or private communications line. For BSC multipoint tributary operation, an auto-monitoring function is provided that allows the line to be monitored without a user's main storage program being required. In this mode, a negative

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response is sent to all polls and selects received from the control station. For BSC processing to become active in main storage, the operator must activate BSC data management. An SDLC auto-response mode is implemented in MLCA for secondary SDLC. The MLCA will handle some redundant supervisory responses, thus, eliminating the need to always utilize the SDLC task in main storage for nonproductive activity. The MLCA in a primary SDLC environment offloads from the main storage processor the majority of the work required for nonproductive polling. In either case, a SNA/SDLC task must be active in main storage. **Limitations:** Each line is capable of half-duplex operation at speeds from 600 bps to 9600 bps. In addition, one line may operate at speeds up to 57.6K bps in half-duplex mode provided the aggregate of the remaining three lines does not exceed 9600 bps, or one line can operate at 50K bps and the remaining lines at speeds up to 4800 bps each, or one line can operate at 19.2K bps and the remaining lines at speeds up to 9600 bps each. Operation at speeds greater than 9600 bps is limited to Line-4 of the MLCA. Cannot be installed with SLCA (#2500). **Maximum:** One. **Field Installation:** Yes. **Specify:** Network type, line speed, line position and remote station type for lines attached to MLCA. See "Mandatory Specify Codes for Communications".

Multiline Communications Adapter Expansion (#4501): A storage expansion for the MLCA microprocessor which supports the X.25 feature or allows switched operation of X.21 lines attached to the MLCA. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4500.

Communications Line Base Adapter (#5301): Required for attachment of line interface adapters to the MLCA or the SLCA. **Maximum:** One per communication line. Four total when using the MLCA or a total of one when when using the SLCA. **Field Installation:** Yes. **Prerequisites:** #4500 when using multiline attachment option. #2500 when using single line option.

Communications Internal Clock (#5321): Generates synchronizing and timing signals for BSC or SDLC operation when they are not provided by the modem used with Adapter (#3701). #5321 is required for use with the 1200 bps Integrated Modem (#5500, #5501). Clocking speeds available with this feature are 600 and 1200 bps. Selection of full- or half-speed and the appropriate line is indicated via a system utility program. When this feature is installed on System/36, all other BSC or SDLC stations attached to the same data link must also be equipped with a similar IBM Internal Clock feature. **Maximum:** One per system. One clock can control all lines on system. **Field Installation:** Yes. **Prerequisites:** At least one line with #3701 or with #5500 or #5501 installed. **Specify:** Lines for which internal clocking is to be used with external modem. See "Mandatory Specify Codes for Communications".

V.35 Adapter (#5401): Provides a cable (40 foot) and interface for attachment of an external modem meeting CCITT V.35 characteristics. The V.35 Adapter will operate at speeds of 20.4K bps, 24K bps, 40.8K bps, 48K bps, and 56K bps. The adapter will also operate at 57.6K bps for local 3705 attachment. **Limitations:** Restricted to Line-4 of MLCA (#4500). Cannot be installed with another V.35 Adapter, EIA Adapter, integrated modem, Digital Data Service Adapter, X.21 Adapter, or X.25 on the same Communications Line Base Adapter (#5301). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5301 installed on Line-4 of #4500. **Specify:** Network Type, line speed, line position and remote station type. See "Mandatory Specify Codes for Communications".

Autocall Adapter (#5411): Provides a cable (40 foot) and interface for attachment to an external automatic calling unit. This adapter allows automatic dialing under program control. The remote device must have auto answer capability. Automatic calling equipment which complies with EIA RS-366-A may be attached under the provisions of the IBM Multiple Supplier Systems Policy. **Limitations:** Available only on Line-2 and -4 of the MLCA (#4500). An EIA Adapter must be installed on Line-1 for operation with an Autocall Adapter on Line-2 or on Line-3 for operation with an Autocall Adapter on Line-4. Cannot be installed with another Autocall Adapter, EIA Adapter, V.35 Adapter, integrated modem, Digital Data Service Adapter, X.21 Adapter, or X.25 on the same Communications Line Base Adapter (#5301). The Autocall Adapter cannot be used on a System/36 that has X.21 switched lines. See the "Communication Configurator" for possible combination of features. **Maximum:** Two per system. **Field Installation:** Yes. **Prerequisites:** #5301 corresponding to the Line-2 or -4 using the Autocall Adapter. #4500 is required. See "Mandatory Specify Codes for Communications".

1200 bps Integrated Modem (#5500, #5501): A modem integrated into the system for SDLC or BSC data transmission at 1200 bps over nonswitched or switched facilities. Half-speed operation at 600 bps is controlled by a system utility program. It is available in two different versions: #5500--nonswitched and #5501--switched with auto-answer. Attachment to the nonswitched (4-wire) facility is via an IBM-provided cable directly to the line Type 3002. Attachment to the switched facilities is via an IBM-provided cable to an FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. **Note:** The device communicating with System/36 must also be equipped with a 1200 bps integrated modem. **Limitations:** Cannot be installed with another integrated modem, EIA Adapter, V.35 Adapter, Autocall Adapter, Digital Data Service Adapter, X.21 Adapter, or X.25 on the same Communications Line Base Adapter (#5301). See the "Communication Configurator" for possible combination of features. **Maximum:** Four per system when using MLCA (#4500). One per system when using SLCA (#2500). **Field Installation:** Yes. **Prerequisites:** #5301 corresponding to the line using the integrated modem, Internal Clock (#5321). **Specify:** Network type, line speed, line position, and remote station type. See "Mandatory Specify Codes for Communications".

Digital Data Service Adapter (#5650): An integrated adapter for BSC or SDLC data transmission at speeds of 2400, 4800, 9600, and 56,000 bps over the AT&T nonswitched Data-Phone® digital service network. The Digital Data Service Adapter interfaces to a channel service unit (not a Data Service Unit) which is the customer site termination of the digital network. **Note:** This service is available only in certain cities within the US. The Digital Data Service Adapter may also be used to locally connect a System/36 to another supported device with a Digital Data Service Adapter. This connection requires a special accessory adapter cable and supports point-to-point connections only. No modem or channel service unit is required. See DDS Adapter Connector under "Accessories". **Limitations:** Operation at speeds greater than 9600 bps is limited to Line-4 of the MLCA (#4500). See the "Communication Configurator" for possible combination of features. **Maximum:** Four per system when using MLCA (#4500). One per system when using SLCA (#2500). **Field Installation:** Yes. **Prerequisites:** #5301 corresponding to the line using the Digital Data Service Adapter. **Specify:** Network type, line speed, line position, and remote station type. See "Mandatory Specify Codes for Communications". ® Trademark of AT&T.

X.21 Adapter (#5655): This feature provides an interface for attachment to either an X.21 switched or an X.21 nonswitched network. Both BSC and SDLC communications are supported. The network establishes the data rate and supplies the clock. The System/36 can communicate via the X.21 Adapter with devices that do not have native X.21 Adapters. These devices must be attached to the network via an X.21bis DCE. This method of attachment uses the EIA RS-232-C interface. Refer to Chart K (switched) and Chart M (nonswitched) in the M2700 pages for the list of devices that can be attached via an X.21bis DCE. On switched networks: Communications at 2400, 4800, 9600 and 48K bps are supported. Autocall function is provided for switched lines. On nonswitched networks: Transmission may be at speeds of 2400, 4800, 9600, or 48K bps for point-to-point operations and 2400, 4800, or 9600 bps for multipoint operations. Some X.21 networks may not support multipoint operations. The installation of these features is dependent on the availability of an X.21 network that is compatible with IBM's implementation of X.21 as described in *IBM Implementation of X.21 General Information Manual* (GA27-3287). **Limitations:** The X.21 Adapter cannot be configured to support switched lines on a System/36 that has an Autocall Adapter (#5411) installed. Operation at speeds greater than 9600 bps is limited to Line-4 of the MLCA (#4500). Switched operation is limited to the MLCA. Cannot be installed with another X.21 Adapter, Adapter, V.35 Adapter, Autocall Adapter, integrated modem, or Digital Data Service Adapter on the same Communication Line Base Adapter. See the "Communication Configurator" for possible combination of features. **Maximum:** One per Communications Line Base Adapter (#5301). Four per system when using MLCA (#4500) or one per system when using SLCA (#2500). **Field Installation:** Yes. **Prerequisites:** #5301 corresponding to the line using the X.21 Adapter. #4501 is required for switched operation. **Specify:** Network type, line speed, line position and remote station type. See "Mandatory Specify Codes for Communications".

X.25 Feature (#5680): The X.25 Feature (#5680) for the System/36 will provide the capability to attach to data transmission services having interfaces complying with Recommendation X.25 (Geneva 1980) of the International Telegraph and Telephone Consultative Committee (CCITT). This interface support will be in conformance with the functional description contained in *IBM General Information Manual - The X.25 Interface for Attaching IBM SNA Nodes to Packet-Switched Data Networks* (GA27-3345).

If network suppliers require certification of this feature it is the responsibility of the customer or the network supplier to obtain the certification.

This feature provides an interface for attachment to an X.25 Packet Switched Network through either an X.21 (#5655) or an X.21bis (#3701) point-to-point, nonswitched facility. Transmission may be at speeds of 2400, 4800, or 9600 bps. Refer to Charts P and Q in the M2700 pages for the facilities supported. Refer to Chart 3 in the M2700 pages for the possible intercommunications.

The following functions are available:

- Three versions of Logical Link Control:
  - Physical Services Header (PSH)
  - Qualified Logical Link Control (QLLC)
  - Enhanced Logical Link Control (ELLC)

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- An improved level of error recovery for certain network conditions when communicating with another System/36 or 5294-001 through the use of the ELLC protocol.
- Both Permanent Virtual Circuit and Virtual Call support.
- Up to 16 concurrent Virtual Circuits which may be a mixture of SNA Primary and Secondary.
- Packet sequence numbering by modulo 8 and 128.
- Packet sizes of 64, 128, 256, and 512 bytes.
- Window sizes from 2 to 15 packets.
- Optional User Facilities are:
  - Reverse Charging
  - Closed User Group
  - Connection Password
  - Unique Network Facilities (Priority Service, Throughput Class)
- Address list capability for Auto-Call/Auto-Answer type support.
- Virtual Circuit status and configuration maintenance capability.
- Tariff related statistics with display capability.

Limitations: Cannot be installed with an integrated modem, Digital Data Service Adapter, V.35 Adapter, or an Auto-Call Adapter on the same Line Base Adapter. X.25 is mutually exclusive with X.21 switched. **Maximum:** One X.25 feature per system. **Field Installation:** Yes. **Prerequisites:** #4500, #4501, #5301 on lines 1 and 2 or lines 3 and 4, #3701 or X.21 (#5655) on line 1 or 3, and 256K of main storage. See "Multiline Communications Adapter Configurator". **Specify:** Network type (**#910X**), line speed, line position, and remote station type. For Public Packet Switched Networks providing a CCITT X.21bis interface (Chart P in M2700 pages), the **#92XX** specify code designates the second line used for X.25. The X.25 Feature (#5680) may be installed on Lines 1 and 2 or on lines 3 and 4. When X.25 is installed on lines 1 and 2, line 1 must have #3701 installed, lines 1 and 2 must have #5301 installed, and line 2 must specify **#92X2**. When X.25 is installed on lines 3 and 4, line 3 must have #3701 installed, lines 3 and 4 must have #5301 installed, and line 4 must specify **#92X4**. For Public Packet Switched Networks providing a CCITT X.21 interface (Chart Q in M2700 pages), the specify code **#92XX** designates the line on which X.25 is installed. The X.25 Feature (#5680) may be installed on line 2 or line 4. When X.25 is installed on line 2, line 1 must have #5655 installed. When X.25 is installed on line 4, line 3 must have #5655 installed. See "Mandatory Specify Codes for Communications".

ADDITIONAL COMMUNICATIONS INFORMATION

IBM Modems: One IBM modem can be attached to each Adapter. **Prerequisites:** #3701 and #5301 used with either #2500 or #4500.

Modem	Speed (bps)
3863	2400
3864	4800
3865	9600
3872	2400/1200

IBM Data Encryption Devices: A 3845 or 3846 Data Encryption Device may be attached between the System/36 #3701 Adapter and the external modem. Refer to M2700, 3845, and 3846 pages for information on 3845 or 3846 configuration and communication capability.

References: See the appropriate host system programming pages for possible restrictions. Refer to *Preparing to Receive Your Computer* (SA21-9442) for physical installation requirements. See IBM for additional information concerning modems, communications facilities, machine attachment requirements, terminal intermix, operating capabilities, and customer responsibilities.

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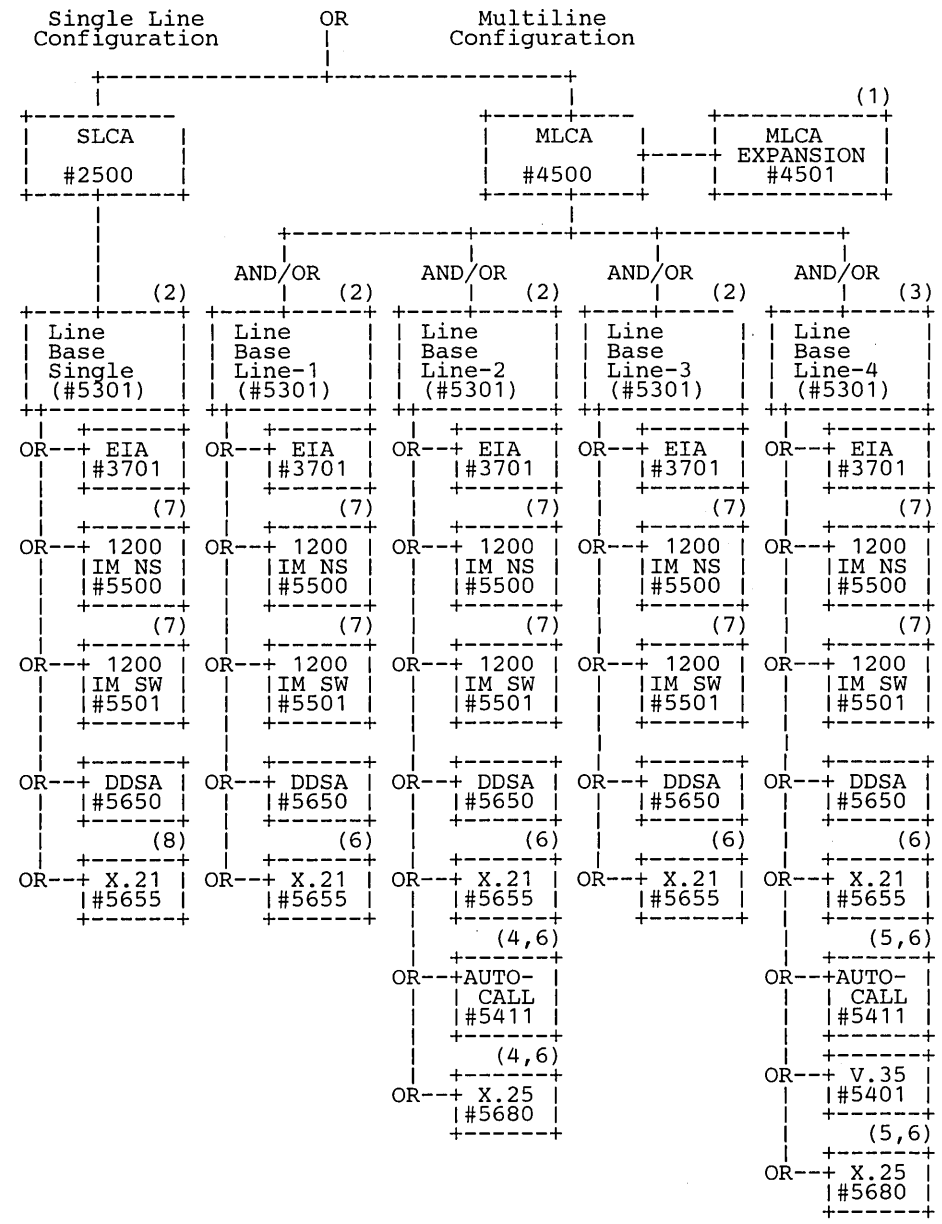
Communication Configurator:



Notes:

(1) Required for X.21 switched or X.25.
(2) Half-duplex operation at speeds from 600 bps to 9600 bps allowed.
(3) Half-duplex operation at speeds from 600 bps to 57.6K bps allowed. See MLCA (#4500) description for allowable aggregate data rate considerations.
(4) Must be used in conjunction with EIA Adapter (#3701) on line 1 of MLCA.
(5) Must be used in conjunction with EIA Adapter (#3701) on line 3 of MLCA.
(6) X.21 switched is mutually exclusive with Autocall or X.25.
(7) Communications Internal Clock (#5321) required.
(8) Nonswitched operation only.

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MODEL CONVERSIONS

Any model can be converted to another model. All model conversions are field installable. Conversions from model AXX to model BXX require replacement of the base main storage card and the disk storage device(s). Adequate provision must be made for retaining the data contained on the replaced disk storage device(s) and elimination of user-proprietary information. Customer Price quotations and customer order acknowledgment letters for purchased model conversion from model AXX to model BXX or from model X1X to X2X, must state: "Installation of this model upgrade involves the removal of parts which become the property of IBM".

Purchase Considerations: An additional charge has been added to the purchase price for certain model conversions. Users should carefully evaluate their future requirements before final selection of a 5360 System Unit.

ACCESSORIES

Cables: The twinaxial cables and/or associated parts to interconnect the 5360 and components may be purchased from IBM or from a customer-selected source. The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the machine.

Twinaxial Connector Kit (P/N **7362268**): Includes two connectors. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. Individual connectors P/N **7362229** are available for replacement.

Twinaxial Wire (P/N **7362211**): Order must specify the desired length. Twinaxial Wire and one Twinaxial Connector Kit are required for each attachment cable. This is an indoor/outdoor cable.

Twinaxial Cable Assembly (P/N **7362267**): Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinaxial Adapter (P/N **3762230**): Permits two Twinaxial Cables Assemblies to be joined together.

Twinaxial Station Protector Kit (B/M **7361807**): Two protectors. One is required at each end of each Twinaxial Attachment Cable installed outdoors (either above or below ground level). Individual Twinaxial Station Protectors, P/N **7362426**, are available for replacement purposes.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

Twinaxial Connector Kit: Includes two connectors. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362063** for Teflon-covered cable. Individual connectors P/N **7362229** are available for replacement.

Twinaxial Wire: Order must specify the desired length. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362061** for Teflon-covered cable.

Twinaxial Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order P/N **7362062** for Teflon-covered cable assembly.

DDS Adapter Connector: A specially designed connector allows the cables from a System/36 DDS Adapter to be connected to another supported device with a DDS Adapter. This provides for the local connection of two devices without the use of any modems. This is a purchase-only item. Allow eight weeks for delivery. **Maximum:** One per Digital Data Service (DDS) Adapter. **Field Installation:** Yes. **Specify:** P/N **4236967**.

Keylock Keys: The 5360 is shipped with two keys. Additional keys may be purchased from IBM. Vendor will supply additional keys only to the original purchaser. A letter of authorization with Key Identification Number must accompany each order. Allow 6-8 weeks for delivery. **Specify:** P/N **2546418**.

SUPPLIES

Diskettes and Diskette Magazines: For diskettes and diskette magazines, see IBM.

5381 SYSTEM UNIT

PURPOSE

Contains main storage, control storage, workstation controllers, communications controller (optional), disk storage, diskette magazine drive, system console keyboard/display, operator/service panel, facilities for addressing main storage, arithmetic and logical processing circuits and control functions for I/O units on System/38.

MODELS

5381 Model Designation: A B C Where:

A = System Unit Model* (Nominal Internal Cycle per 4-Byte Access)	
3	= 1100 Nanoseconds
4	= 1100 Nanoseconds
5	= 600 Nanoseconds
6	= 400 Nanoseconds
7	= 400 Nanoseconds
8	= 400 Nanoseconds

B = Main Storage Capacity Available by System Unit Model:	3	4	5	6	7	8
4 = 1024K	X	X	X			
6 = 1536K	X	X	X			
8 = 2048K		X	X	X	X	X
C = 3072K				X	X	X
G = 4096K				X	X	X
L = 5120K						X
Q = 6144K						X
U = 7168K						X
Y = 8192K						X

C = Integrated Disk Storage Available by System Unit Model:		3	4	5	6	7	8
1 = 64.5MB	**		X	X	X	X	X
2 = 129.0MB	**	X	X	X	X	X	X
3 = 193.5MB		X	X	X	X	X	X
4 = 258.0MB		X	X	X	X	X	X
5 = 322.6MB		X	X	X	X	X	X
6 = 387.1MB		X	X	X	X	X	X
A = 64.5MB			X	X	X	X	X
B = 129.0MB		X	X	X	X	X	X

* In relationship to the mdl 3XX, the mdl 4XX has approximately 1.35 times the internal performance; The mdl 6XX has approximately 2.2 times the internal performance; the mdl 5XX has approximately 1.75 times the internal performance; and the mdl 7XX and mdl 8XX have approximately 3.5 times the internal performance. (This may not have a corresponding relationship to throughput.) It is not advisable to field upgrade a 4MB mdl 7 to a 4MB mdl 8 if performance is a primary objective, because no performance improvement should be expected.

** These mdls do not include the expansion enclosure.

Notes:

- Mdls XXA and XXB are required when the user only requires 64.5MB or 129.0MB of integrated disk storage and any one of the following:
  - Workstation Controller, 3rd (#5303) or Workstation Controller - Extended, 3rd (#5403)
  - Workstation Controller, 4th (#5304) or Workstation Controller - Extended, 4th (#5404)
  - Communication Attachment, 2nd (#1502)
- The Workstation Controller - Extended is standard in controller position 1 of mdls 4XX (shipped on or after February 10, 1984), 6XX, and 8XX; Workstation Controller is standard in controller position 1 of mdls 3XX, 4XX (shipped before February 10, 1984), 5XX, and 7XX.

Minimum Configuration: Any model of the 5381 System Unit. **Note:** The minimum amount of auxiliary storage required to support IBM-supplied program products will exceed 64.5MB.

Although a customer may order a System/38 without a line printer, he must be made aware that IBM's ability to diagnose the system without an attached line printer may be impaired and thus have an adverse effect on the system's availability.

Note: To order cables, see *IBM System/38 Installation Manual - Physical Planning* (GA21-9293) for cable order requirements.

HIGHLIGHTS

- Interactive workstation system.
- System architecture oriented to workstation environment.
- Virtual storage for efficient management of main storage.

System Architecture: A primary feature of System/38 is the 5381 unit advanced instruction set which embodies many basic supervisory, resource and data base management functions. As an example of the power, the instruction set includes data base operations that retrieve, update, and logically order data records.

The 5381 has an object-oriented architecture fundamental to its overall design. Objects are structures such as programs, processes, and data base files, which are manipulated at a logical level through the unit's instruction set. The 5381 manages storage on an object basis, thereby reducing user dependence on main storage size, physical disk location, and internal implementation.

Access to objects is machine controlled providing a high level of integrity, automatic serialization of concurrent operations on an object, and effective authority enforcement.

Units of work are managed as independent processes (tasks) which share the machine resources (processor, storage, devices). Interprocess communication is accomplished through queues and event signals. Objects can be locked to control and serialize concurrent access to them by several processes.

All objects reside in virtual storage which is managed by the IBM-supplied data management. Objects are allocated space on permanent disk storage and are brought into main storage (as needed) where they may be shared by all processes. Although system performance may be affected by main storage size, applications are not limited in the number or size of objects used. This allows additional disk or main storage to be added without a need to restructure applications.

Input/output operations offer improved device independence through the use of the 5381 device support (source/sink) functions which manage the channel, communications, and other asynchronous hardware operations. This high level of function is standard on all System/38 mdls.

Microcode Main Storage Utilization: The System/38 accomplishes much of its advanced function using main storage resident microcode. The amount of main storage used depends on system size and configuration, and the number of system functions active at any specific time.

HARDWARE FEATURES

- Main storage capacity: 1024K, 1536K, 2048K, 3072K, 4096K, 5120K, 6144K, 7168K, and 8192K bytes. Main storage capacities vary by System Unit mdl; see Table B above for specific capacity.
- Single level storage management: Manages main storage and disk storage as one logical storage resource which contains all programs and data.
- Main storage internal cycle time per 4-byte access (nominal):
  - Mdl 3XX - 1100 nanoseconds
  - Mdl 4XX - 1100 nanoseconds
  - Mdl 5XX - 600 nanoseconds
  - Mdl 6XX - 400 nanoseconds
  - Mdl 7XX - 400 nanoseconds
  - Mdl 8XX - 400 nanoseconds
- Control storage capacity (32-bit word):
  - Mdl 3XX - 8K words
  - Mdl 4XX - 8K words
  - Mdl 5XX - 8K words
  - Mdl 6XX - 8K words
  - Mdl 7XX - 12K words
  - Mdl 8XX - 12K words
- Control storage instruction cycle time (minimum):
  - Mdl 3XX - 400 nanoseconds
  - Mdl 4XX - 200 nanoseconds
  - Mdl 5XX - 200 nanoseconds
  - Mdl 6XX - 133 nanoseconds
  - Mdl 7XX - 133 nanoseconds
  - Mdl 8XX - 133 nanoseconds
- From one to six integrated disk storage devices (64.5MB - 387.1MB). Two to six (129.0MB - 387.1MB) on mdl 3XX.

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- From one to eight 3370 Direct Access Storage Units (571.3MB to 5,838.8MB).
  - One to four direct access storage units on mdls 4XX, 5XX, 6XX, and 7XX (571.3MB to 2,919.4MB)
  - One to eight direct access storage units on mdl 8XX (571.3MB to 5,838.8MB)
  - Not available on mdl 3XX
- Direct attachment capability of 5250 workstation devices:
  - Mdl 3XX, 5XX, and 7XX ... 116 maximum
  - Mdl 4XX, 6XX, and 8XX ... 128 maximum
- 5424 MFCU mdl A1/A2 .
- Maximum of two adapter-attached printers in any speed combination.
- 3410/3411 Magnetic Tape Unit and Control mdls 1, 2, or 3.
- 3430 Magnetic Tape Subsystem:
  - Mdl A01, Tape Unit and Control.
  - Mdl B01, Tape Unit.
  - Not available on mdl 3XX.
- Diskette magazine drive is standard.
- System console/keyboard display is standard.
- Up to a maximum of eight SNA/SDLC and/or BSC communication lines, in any combination.
- Main storage error checking and correction.
- Instruction retry capability (except where "results" field is also an operand field).
- I/O controller retry.
- Reliability, Availability, and Serviceability (RAS) features are implemented throughout the system and are all supported by new and improved diagnostic aids.

Note: In device operations, the nominal or rated throughputs represented in this publication may not be achieved in an actual customer environment when used with the customer's control program or application load.

SYSTEM UNIT COMPONENTS

Processor Unit: Main storage capacities and internal cycle times as well as control storage capacities and instruction cycle times are detailed under "Hardware Features" above. For performance comparisons, see the chart above.

Virtual Address Translation (VAT) is a standard facility on the 5381. Virtual Address Translation converts virtual addresses to real addresses.

The VAT facilities include:

- Primary Directory (PD) - indicates the virtual address and status information of a page stored in a block of real storage called a page frame.
- Hash Table (HT) - a list of entries used to index the Primary Directory.
- Lookaside Buffer (LB) - a high-speed buffer storage which contains certain information specified in the primary directory. The translation process time is reduced if the referenced virtual address is listed in the LB.

Main storage technology is dynamic Metal Oxide Semiconductor Field Effect Transistor (MOSFET). The processor unit uses LSI (Large Scale Integration) for the logic circuitry.

The processor provides overlap operation of instruction fetch and execution functions. The time-of-day clock provides a measure of time suitable for elapsed time measurements and time-of-day indications.

The high-speed integrated channel has an instantaneous character transfer rate of up to 2.5 million bytes per second in byte mode, or up to 5.0 million bytes per second in half-word mode. The 3370 Direct Access Storage attachment and 3430 Magnetic Tape Subsystem on the 5381 operate in half-word mode. The other devices on the 5381 operate in byte mode.

The System Control Adapter (SCA) provides the capability to initiate a power-on off sequence and also provides a central serviceability point to all system units. The SCA provides a dual interface between the operator/service panel and the console to the system. At initial power-on or Initial Microprogram Load (IMPL) time, the SCA performs functional testing of the processor and diagnostic check-out of main storage prior to loading the control store with microcode. Execution of the microcode initializes the system and control is then transferred to the operator. The SCA is an integral part of the hardware system.

The operator/service panel is located on the system where it is easily accessible to the operator and service personnel. The operator/service panel contains 24 indicators (LEDs), one LOAD pushbutton switch, one power-on pushbutton switch, one display intensity switch, one unit emergency power control switch (labeled "Emergency Pull"), and two rotary switches. Three optional features may be included on the panel: An audible alarm and attention indicator, a power keylock switch, and an automatic IMPL switch.

System Console/Keyboard Display: System console functions are invoked by the standard CRT display and keyboard. They are physically integrated into the right top section of the system. The console display uses a 12-inch CRT, and contains 1024 character positions, 16 lines of 64 character positions each. The large characters improve readability for the operator. Upper/lower case characters are standard , as well as four display indicators (attention, input inhibited, reset required, and upper shift).

Display attributes include protected fields, underscore, and non-display. The keyboard has a typewriter-like layout with 24 Command Function keys and a HEX key. The Multinational character set provides the overstrike function. Overstrike is the capability to create, process, and output national usage characters. In addition, the Multinational character set provides the capability for multi-country processing. See "Type Catalog" for character sets and keyboard layout. A display station of the 5250 Information Display System can be attached to serve as an alternate console should the user desire the console in a different location or require a desk-top sitting position.

Diskette Magazine Drive: A diskette drive is standard on the System/38 and provides three significant functions: save/restore, diskette I/O, and CE servicing. The diskette drive is designed to accept two 10-diskette magazines which can be used for save/restore and other diskette I/O operations. In addition to the two magazines, the diskette drive contains three diskette slots which can be used for loading one to three diskettes manually. Diskette types 1, 2, and 2D may be read or written.

Disk Storage: The System Unit can contain from one to six spindles (two to six for 3XX mdls) of integrated nonremovable disk storage. The following table provides capacity and access times.

Bytes/Sector	512
Bytes/Cylinder	180,224
Capacity (bytes)	64,520,192
Access Time	
Minimum (Cyl to Cyl) Seek (ms)	9
Maximum Average Seek (ms)	27
Maximum Seek (ms)	46
Average Rotational Delay (ms)	9.6
Rotational Speed (rpm)	3,125
Data Transfer Rate (Nominal) (MB/sec)	1.031

Data can be stored offline for security or backup purposes by writing the data to diskettes or magnetic tape.

Workstation Controller: Direct local attachment of 5250 Information Display System devices as well as the 5219 Printer (i.e., 5219 Printer, mdls D01 and D02, 5224 Printer mdls 1 and 2, 5225 Printer mdls 1, 2, 3, and 4, 5251 Display Station mdls 1, 11, 999, 5252 Dual Display Station mdl 1, 5256 Printer mdls 1, 2, and 3, 5291 Display Station mdl 1, and 5292 Color Display Station mdl 1 or 2; 5251 mdl 1 and 5252 mdl 1 are no longer available, but are still supported), is provided by the Workstation Controller. One Workstation Controller is standard on mdls 3XX, 5XX, and 7XX, of System/38 (up to four may be attached) It provides eight ports for attaching up to 12 workstations (keyboard displays and/or printers) directly to the system in any combination.

Workstation Controller - Extended: Direct local attachment of 5250 Information Display System devices and the 5219 Printer (i.e., 5219 Printer, mdls D01 and D02, 5224 Printer mdls 1 and 2, 5225 Printer mdls 1, 2, 3, and 4, 5251 Display Station mdls 11, 999, 5256 Printer mdls 1, 2, and 3, 5291 Display Station mdl 1, and 5292 Color Display Station mdl 1 or 2), is provided by the Workstation Controller - Extended. Up to three Workstation Controller - Extended features, along with the standard Workstation Controller in the base (position 1), can be installed on mdls 3XX, 5XX, and 7XX. Mdl 6XX, and 8XX can have up to four Workstation Controller - Extended features, including the standard feature in position one of the base. Mdl 4XX can have either three or four Workstation Controller - Extended features, depending on which controller is installed in the base (position 1). Each provides eight ports for attaching up to 32 workstations (keyboard displays and/or printers) directly to the system in any combination.

Publications: *IBM System/38 Guide to Publications* (GC21-7726).

Customer Responsibilities: See M2700 pages for customer responsibilities regarding communications facilities and services.

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): Specify **#9903** for 208V or **#9905** for 230V.

5381 System Unit (cont'd)

- Accent Panel Color (one must be specified): **#9060** for Willow Green, **#9061** for Garnet Rose, **#9062** for Sunrise Yellow, **9063** for Classic Blue, **#9064** for Charcoal Brown, or **#9065** for Pebble Gray. (**Note:** The color for the base enclosure is Pearl White.)
- Console Character Sets: Specify **#9540** for the English US character set. **#9535** provides the Multinational character set. See "Type Catalog" for details. **Maximum:** One. **Field Installation:** Yes.
- I/O Attachments: Appropriate special features are required to attach most I/O units. See "Special Features".
- 3370 Direct Access Storage Device Attached: Select only one specify code from each group (as applicable) to designate the 3370 units to be attached.

  CPU Mdl 4XX, 5XX, 7XX and 8XX (1-4 3370s):

Mdl A11	#9560
Mdl A11 and one B11	#9561
Mdl A11 and two B11s	#9562
Mdl A11 and three B11s	#9563

  CPU Mdl 8XX Only (5-8 3370s):

Mdl A11	#9564
Mdl A11 and one B11	#9565
Mdl A11 and two B11s	#9566
Mdl A11 and three B11s	#9567

  Note: It is not required that the first 3370 Disk Storage Attachment (#1130) have a maximum number of 3370 Direct Access Storage (DAS) units (four) attached before the second 3370 Disk Storage Attachment (#1132) is attached. For example, the first 3370 attachment feature could have only two 3370 DAS units attached, and the second 3370 attachment feature could have from one to four 3370 DAS units attached.
- All mdl 4XX orders shipped prior to February 10, 1984 automatically will have feature **#9070**, which indicates (for inventory tracking purposes) that the workstation controller is installed in controller position 1.
- Feature code **#3000** is required when the first 3770 mdl A12 or B12 is added to an installed 5381.
- Diagnostic and Analysis Support: Systems that will use Control Program Facility (CPF) must specify **#9995**. This will ensure that the customer receives the Diagnostic and Analysis Support. For systems that will not use CPF, the customer must submit a PRPQ to obtain diagnostic and analysis support relative to his needs.
- When attaching previously installed 5251 mdl 11s to a System/38, a no charge RPQ S40213 may be needed. Review the RPQ description for S40213

  to determine if applicable to the previously installed 5251 mdl 11s.
- When designating a 5225 as a system printer, specify **#9817**.
- The Up-Ending Kit **#9845** is described in the *IBM System/38 Installation Manual - Physical Planning* (GA21-9293) only.

SPECIAL FEATURES

PROCESSOR UNIT

5211/3262 Printer Attachment, 1st (#1100): To attach the first 5211/3262 Printer, one of the following feature codes must also be specified: 5211-2 (#1204), or 3262-B1 (#1208). **Limitations:** Attachment #1100 is mutually exclusive with Printer Attachment #1135. **Maximum:** One. **Field Installation:** Yes.

5211/3262 Printer Attachment, 2nd (#1110): To attach a second 5211/3262 Printer, one of the following feature codes must also be specified: 5211-2 (#1232) or 3262-B1 (#1234). **Limitations:** Attachment #1110 is mutually exclusive with Printer Attachment #1136. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator" to determine requirements.

3370 Disk Storage Attachment, 1st (#1130): To attach the first 3370 mdl A11 or A12 disk storage drive. **Limitations:** Not available on the mdl 3XX. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator".

3370 Disk Storage Attachment, 2nd (#1132): To attach the second 3370 mdl A11 or A12 Disk Storage Drive. **Note:** It is not required that the first 3370 Disk Storage Attachment (#1130) have a maximum number of 3370 Direct Access Storage (DAS) units (four) attached before the second 3370 Disk Storage Attachment (#1132) is attached. For example, the first 3370 attachment feature could have only two 3370 DAS units attached, and the second 3370 attachment feature could have from one to four 3370 DAS units attached. **Limitations:** Not available on mdls 3XX, 4XX, 5XX, 6XX, or 7XX. **Maximum:** One on mdl 8XX only. **Prerequisites:** #1130. See "Processor Unit Expansion Feature Configurator".

3203 Mdl 5 Printer Attachment, 1st (#1135): Required to attach one or two 3203-5s to the 5381. Specify code **#9550** must be specified for the second 3203-5. **Limitations:** Attachment #1135 is mutually exclusive with Printer Attachment, 1st (#1100). The second 3203-5 (**#9550**) is mutually exclusive with Printer attachments #1100, #1110, and #1136. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator" to determine overall requirements.

3203 Mdl 5 Printer Attachment, 2nd (#1136): Required to attach the 3203-5 when a 3262/5211 is the first printer attached to the 5381. **Limitations:** Attachment #1136 is mutually exclusive with #1135 and #1110. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator" to determine overall requirements. **Note:** A second printer attachment should not be installed without a first printer attachment. If two attachments exist on a System/38 and the first is removed, then the second should be removed and installed as the first.

Multifunction Card Unit Attachment 250/60/60 CPM (#1220): To attach a 5424 MFCU mdl A1. **Maximum:** One 5424 per system. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator". #6500 is required on the 5424.

Multifunction Card Unit Attachment 500/120/120 CPM (#1221): To attach a 5424 MFCU mdl A2. **Maximum:** One 5424 per system. **Field Installation:** Yes. **Prerequisites:** Multifunction Card Unit Attachment - 250/60/60 (#1220). See "Processor Unit Expansion Feature Configurator". #6500 is required on the 5424.

Automatic Initial Microprogramming Load (#1300): Auto-IMPL enables the system to automatically initiate a power-on sequence following the restoration of commercial (utility) AC power after a commercial power failure. The primary use is for unattended operations; therefore, manual intervention is not required. A manually controlled toggle switch located on the operator/service panel permits the user to enable or disable the feature. **Maximum:** One. **Field Installation:** Yes.

Note: When Power Keylock (#3210) and Automatic Initial Microprogramming Load (#1300) are jointly installed, the AIMPL (#1300) has priority over the Power Keylock (#3210) setting in the event of a commercial power failure and subsequent return.

Audible Alarm And Attention Indicator (#2100): Provides, in addition to the attention indicator on the display, a backlighted indicator, an audible alarm, and a volume control to alert the operator of an outstanding message requiring attention. **Maximum:** One. **Field Installation:** Yes.

Power Keylock (#3210): A key-controlled switch, in series with the power-on pushbutton, will inhibit the power-on cycle if the keylock switch is off. The keylock cannot power the system down. The keylock is located on the operator/service panel. See "Accessories" for key ordering information. **Limitations:** When Power Keylock (#3210) and Automatic Initial Microprogramming Load (#1300) are jointly installed, the AIMPL (#1300) has priority over the Power Keylock (#3210) setting in the event of a commercial power failure and subsequent return. **Maximum:** One. **Field Installation:** Yes.

Power Warning Feature (#3220): Provides the capability to accept an Uninterruptible Power Supply (UPS) signal when commercial power has failed or has been restored. This feature also provides the capability to log each power failure/restoration occurrence. The System/38 Program System (VMC/CPF) support enables the user to select one of three options to respond to a power outage: (1) handle the power outage on a manual basis, (2) handle the power outage/restoration via a user-written program, or (3) if the user does not select one of the first two options, an immediate power-down command will be initiated. The time required to accomplish a power-down sequence is approximately 60 seconds per megabyte of main storage. **Maximum:** One per 5381 System Unit. **Field Installation:** Yes. **Prerequisites:** A user-provided Uninterruptible Power Supply (UPS) equipped with adequate battery reserve time to support the user's operational environment. **Publication:** *System/38 Uninterruptible Power Supply Planning Guide* (GA21-9421) contains the operating and programming characteristics and specifications for the System/38 Power Warning Feature.

Processor Unit Expansion 1 (#6300): This feature is an I/O board/power supply and is required for attaching either of the following I/O devices: (1) Communication Attachment (#1501) ... (2) Workstation Controller, 2nd (#5302) or Workstation Controller - Extended, 2nd (#5402). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator".

Processor Unit Expansion 2 (#6301): This feature is an I/O board/power supply and is required for attaching any of the following I/O devices: (1) the 5424 Multifunction Card Unit (#1220, #1221) ... (2) attaching the 3411 Magnetic Tape Unit (#7960) and/or the 3430 Magnetic Tape Unit (#7970) ... (3) the 5211/3262 as a second printer (#1110) ... (4) the 3203-5 as a second printer (#1136) when the first printer is a 5211 or 3262. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator".

5381 System Unit (cont'd)

Processor Unit Expansion 3 (#6302): This feature is an air circulating/cable assembly and is required for attaching any of the following I/O devices: (1) Communication Attachment (#1501) ... (2) Workstation Controller, 2nd (#5302) or Workstation Controller - Extended, 2nd (#5402) ... (3) the 5424 Multifunction Card Unit (#1220, #1221) ... (4) the 3411 Magnetic Tape Unit (#7960) and/or the 3430 Magnetic Tape Unit (#7970) ... (5) the 5211/3262 as a second printer (#1110) ... (6) the 3203-5 as a second printer (#1136) when the first printer is a 5211 or 3262. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator".

Processor Unit Expansion 4 (#6303): This feature is a power expansion assembly required to attach: (1) 3411 Magnetic Tape Unit (#7960) and/or the 3430 Magnetic Tape Unit (#7970), ... (2) 3370 Disk Storage (#1130 and #1132 - mdl 8XX only) ... (3) 3203-5 Printer, as first printer (#1135 or #1136). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator".

Processor Unit Expansion 5 (#6304): This feature is a gate/AC power supply and is required for attaching any of the following features: (1) Communication Attachment, 2nd (#1502) ... (2) Workstation Controller, 3rd (#5303) or Workstation Controller - Extended, 3rd (#5403) ... (3) Workstation Controller, 4th (#5304) or Workstation Controller - Extended, 4th (#5404). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator".

Processor Unit Expansion 6 (#6305): This feature is a board/power supply and is required for attaching either of the following features: (1) Communication Attachment, 2nd (#1502) ... (2) Workstation Controller, 3rd (#5303) or Workstation Controller - Extended, 3rd (#5403). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator".

Processor Unit Expansion 7 (#6306): This feature is a board/power supply and is required for attaching Workstation Controller, 4th (#5304) or Workstation Controller - Extended, 4th (#5404). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator".

3411 Magnetic Tape Attachment (#7960): To attach a 3411 Magnetic Tape Unit and Control. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** (1) See "Processor Unit Expansion Feature Configurator" ... (2) the System/3, System/38 Attachment (#7003) is required on the 3411. Can be installed with 3430 Magnetic Tape Attachment (#7970).

3430 Magnetic Tape Attachment (#7970): To attach 3430 mdl A01 Magnetic Tape Unit and Control. **Maximum:** One. **Prerequisites:** See "Processor Unit Expansion Feature Configurator". Can be installed with 3411 Magnetic Tape Attachment (#7960).

Processor Unit Expansion Feature Configurator (maximum required - one each)

I/O Function Required	Required Processor Unit Expansion						
	#1 #6300	#2 #6301	#3 #6302	#4 #6303	#5 #6304	#6 #6305	#7 #6306
2nd 5211/3262 Printer Attachment (#1110)		X	X				
3370 Disk Storage (#1130/#1132)				X			
3203-5 as 1st printer (#1135) (Two 3203-5s may be attached via this feature)				X			
3203-5 as 2nd printer (#1136) (Required only when 5211 or 3262 is attached as 1st printer)		X	X	X			
5424 MFCU (#1220/#1221)		X	X				
Communication Attachment, 1st (#1501)	X		X				
Communication Attachment, 2nd (#1502) *					X	X	
Workstation Controller, 2nd (#5302) or Workstation Controller - Extended, 2nd (#5402)	X		X				
Workstation Controller, 3rd (#5303) * or Workstation Controller - Extended, 3rd (#5403)					X	X	
Workstation Controller, 4th (#5304) * or Workstation Controller - Extended, 4th (#5404)					X		X
3411 Magnetic Tape (#7960) and/or 3430 Magnetic Tape (#7970)		X	X	X			

* Requires mdls XX3 through XX6, XXA and XXB (includes expansion enclosure)

LOCAL WORKSTATION CONTROLLER

Workstation Controller: Provides direct local attachment of supported workstation devices to System/38. One Workstation Controller is standard on System/38 mdls 3XX, 5XX, and 7XX. It provides eight ports for attaching workstations (keyboard displays and/or printers) directly to the system in any combination. These eight ports permit attachment of up to 12 devices with twinaxial cabling using the Cable-Thru feature on the 5250 devices. With the selection of an appropriate expansion feature, the Workstation Controller will support a maximum of 20 devices. The System/38 can be featured with three additional Workstation Controllers. With a total of four Workstation Controllers and the appropriate expansion features, a maximum of 80 devices can be attached.

Devices supported via the Workstation Controller are:

Displays:
- 5251 Display Station, mdl 1 (960 character) (no longer available but still supported)
- 5251 Display Station, mdl 11 (1,920 characters)
- 5251 Display Station, mdl 999 (1,920 characters)
- 5252 Display Station, mdl 1 (960 character) (no longer available but still supported)
- 5291 Display Station, mdl 1 (1,920 characters)
- 5292 Color Display Station, mdl 1 or 2 (1,920 characters)
- 5150 Personal Computer (with Display Station Emulation Adapter and the 5250 Emulation program)

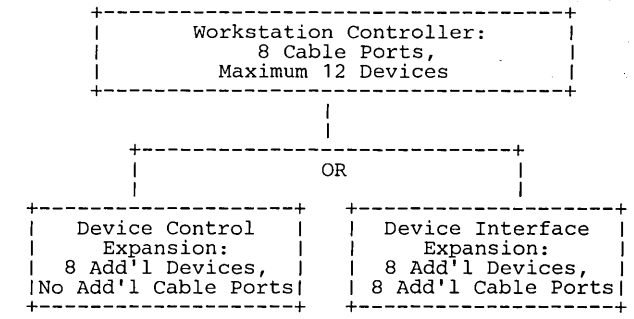
Printers:
- 5219 Printer, mdl D01 (40 cps)
- 5219 Printer, mdl D02 (60 cps)
- 5224 Printer, mdls 1 and 2 (matrix line printer)
- 5225 Printer, mdls 1, 2, 3, and 4 (matrix line printer)
- 5256 Printer, mdl 1 (40 cps)
- 5256 Printer, mdl 2 (80 cps)
- 5256 Printer, mdl 3 (120 cps)

The Workstation Controller contains translation tables that map a keyboard configuration to data that is passed to the host system and/or workstation. Each Workstation Controller can support any two combinations (keyboard/character sets) from the following list:

Character Set	Keyboard Type
Standard 96-Character Set	83-Key
Standard 96-Character Set	66-Key (both styles)
Multinational 188-Character Set	83-Key
Multinational 188-Character Set	66-Key (both styles)

The Workstation Controller provides support for device attachment cabling via 5250 twinaxial cable. Twinaxial cable provides for multipoint cable connections at distances up to 1,524 meters (5,000 feet). Up to seven devices may be attached to a single port via twinaxial cable. The Right-to-Left Display RPQ (8T0358) provides the capability of scanning characters in the right-to-left sequence for those countries where this support is a language requirement. This RPQ is not available on the Workstation Controller - Extended at this time. For attachment of additional devices, see Device Interface Expansion (#5321, #5322, #5323, #5324), Device Control Expansion (#5331, #5332, #5333, #5334), Workstation Controller, 2nd (#5302), Workstation Controller, 3rd (#5303), and Workstation Controller, 4th (#5304).

Workstation Controller Configuration



- Maximum of 20 devices per controller
- Maximum of four Workstation Controllers
- Maximum of 80 devices per system
- Up to seven devices may be attached to a single cable port via twinaxial cabling using device Cable-Thru feature

Note: The 5252 mdl 1 is counted as two devices.

Workstation Controller, 2nd (#5302): Provides direct local attachment of additional devices [5219 mdls D01 and D02, 5224 mdls 1 and 2, 5225 mdls 1, 2, 3, and 4, 5251 mdls 1 (No longer available ,but still supported), 11, and 999, 5252 mdl 1 (No longer available, but still supported), 5256 mdls 1, 2, and 3, 5291 mdl 1, 5292 mdl 1 or 2, and 5150 Personal Computer], in any combination. This feature (#5302), with expansion features described below, extends the system maximum of locally attached devices to 40. #5302 includes basic control and eight cable interfaces for attaching additional workstations. Up to 12 workstations can be attached using the Cable-Thru features on the devices.

Cabling provisions are the same as the basic Workstation Controller described above. For further expansion of devices (maximum of 20 for this controller), see Device Interface Expansion (#5322), or Device

5381 System Unit (cont'd)

Control Expansion (#5332). Programming support for the attached devices is provided by the Control Program Facility Licensed Program. **(Note:** The 5252 represents two devices.) **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator".

Workstation Controller, 3rd (#5303): Provides the same function as Workstation Controller, 2nd (#5302). This feature (#5303), with Device Interface Expansion (#5323) or Device Control Expansion (#5333), extends the system maximum of locally attached devices to 60. This feature is installed in the System Unit Expansion Enclosure, therefore, it can only be installed on System/38 mdls XX3 through XX6, XXA, and XXB. **Limitations:** Cannot be installed on System/38 mdls XX1 and XX2. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5302. Also see "Processor Unit Expansion Feature Configurator".

Workstation Controller, 4th (#5304): Provides the same function as Workstation Controller, 2nd (#5302). This feature (#5304), with Device Interface Expansion (#5324) or Device Control Expansion (#5334), extends the system maximum of locally attached devices to 80. This feature is installed in the System Unit Expansion Enclosure; therefore, it can only be installed on System/38 mdls XX3 through XX6, XXA, and XXB. **Limitations:** Cannot be installed on System/38 mdls XX1 and XX2. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5303. Also see "Processor Unit Expansion Feature Configurator".

Device Interface Expansion (#5321, #5322, #5323, #5324): Provides the necessary control and eight twinaxial cable connectors for attachment of eight additional devices (5219 mdls D01 and D02; 5224 mdls 1 and 2; 5225 mdls 1, 2, 3, and 4; 5251 mdls 1 [No longer available, but still supported], 11, and 999; 5252 mdl 1 [No longer available, but still supported]; 5256 mdls 1, 2, and 3; 5291 mdl 1; and 5292 mdl 1 or 2) in any combination. This feature is always installed in conjunction with a Workstation Controller.

#5321 - for 1st Workstation Controller (component of base system)
#5322 - for Workstation Controller, 2nd (#5302)
#5323 - for Workstation Controller, 3rd (#5303)
#5324 - for Workstation Controller, 4th (#5304)

Refer to sales pages for information pertaining to device features, accessories, and cabling requirements. (**Note:** The 5252 represents two devices.) **Limitations:** Cannot be installed with Device Control Expansion (#5331, #5332, #5333, #5334) on the same Workstation Controller. #5321 cannot be installed on a mdl 8. **Maximum:** One per Workstation Controller. **Field Installation:** Yes. **Prerequisites:** #5302 for #5322, etc.

Device Control Expansion (#5331, #5332, #5333, #5334): Permits Workstation Controllers to support up to eight additional devices (5219 mdls D01 and D02; 5224 mdls 1 and 2; 5225 mdls 1, 2, 3, and 4; 5251 mdls 1 [No longer available, but still supported], 11, and 999; 5252 mdl 1 [No longer available, but still supported]; 5256 mdls 1, 2, and 3; 5291 mdl 1; and 5292 mdl 1 or 2). This feature does not provide any additional cable connectors, but provides the necessary control storage to support additional devices attached via the cable connectors provided by Workstation Controllers.

#5331 - for 1st Workstation Controller (component of base system)
#5332 - for Workstation Controller, 2nd (#5302)
#5333 - for Workstation Controller, 3rd (#5303)
#5334 - for Workstation Controller, 4th (#5304)

See M5219, 5224, 5225, 5251, 5252, 5256, 5291, or 5292 pages for selection of appropriate features which permit multidropping of devices on twinaxial cable facilities. (**Note:** The 5252 represents two devices.) **Limitations:** Cannot be installed with Device Interface Expansion (#5321, #5322, #5323, #5324) on the same Workstation Controller. #5331 cannot be installed on a mdl 8. **Maximum:** One per Workstation Controller. **Field Installation:** Yes. **Prerequisites:** #5302 for #5332, etc.

LOCAL WORKSTATION CONTROLLER - EXTENDED

Workstation Controller - Extended: Provides direct local attachment of 5250 Information Display System devices and the 5219 Printer (see below for list of supported devices and mdls) to System/38. A standard feature in controller position 1 of all mdls 4XX (shipped on or after February 10, 1984), 6XX, and 8XX (note that mdls 4XX shipped before February 10, 1984 will have the workstation controller as standard in controller position 1). Each controller provides eight ports for attaching workstations (keyboard displays and/or printers) directly to the system in any combination.these eight ports permit attachment of up to 32 devices with twinaxial cabling using the Cable-Thru feature on 5250 devices. The System/38 with mdls 3XX, 5XX, and 7XX, can be featured with three Workstation Controller - Extended features, along with the standard Workstation Controller in the base (position 1), providing up to a maximum attachment of 116 local devices. The System/38 mdls 4XX, 6XX, and 8XX can be featured with four Workstation Controller - Extended features, including the standard Workstation Controller -Extended in the base (position 1), providing up to a maximum of 128 local devices.

Devices supported via the Workstation Controller - Extended are:

Displays:
- 5251 Display Station, mdl 11 (1,920 characters)
- 5251 Display Station, mdl 999 (1,920 characters)
- 5291 Display Station, mdl 1 (1,920 characters)
- 5292 Color Display Station, mdl 1 or 2 (1,920 characters)
- 5150 Personal Computer and 5160 Personal Computer XT (with Display Station Emulation Adapter and the 5250 Emulation program)

Printers:
- 5219 Printer, mdl D01 (40 cps)
- 5219 Printer, mdl D02 (60 cps)
- 5224 Printer, mdl 1 (140 lpm)
- 5224 Printer, mdl 2 (240 lpm)
- 5225 Printer, mdl 1 (280 lpm)
- 5225 Printer, mdl 2 (400 lpm)
- 5225 Printer, mdl 3 (490 lpm)
- 5225 Printer, mdl 4 (560 lpm)
- 5256 Printer, mdl 1 (40 cps)
- 5256 Printer, mdl 2 (80 cps)
- 5256 Printer, mdl 3 (120 cps)

The Workstation Controller - Extended supports the same devices and has the same translate capabilities as the base Workstation Controller, with the exception of the 960-character displays which the Workstation Controller - Extended does not support. Each Workstation Controller - Extended can support any two combinations (keyboard/character sets) from the following list:

Character Set	Keyboard Type
Standard 96-Character Set	83-Key
Standard 96-Character Set	66-Key (both styles)
Multinational 188-Character Set	83-Key
Multinational 188-Character Set	66-Key (both styles)

The Workstation Controller - Extended provides for device attachment cabling via 5250 twinaxial cable. Twinaxial cable provides for multipoint cable connections at distances up to 1,524 meters (5,000 feet). Up to seven devices may be attached to a single port via twinaxial cable, however the total number of devices per adapter must not exceed 32.

Workstation Controller - Extended, 2nd (#5402): Provides local attachment of an additional 32 devices for a possible maximum total of 64 devices. The maximum number is dependent on the mdl and workstation controller/workstation controller - extended features presently installed. **Limitations:** Mutually exclusive with base Workstation Controller, Second. **Maximum:** One. **Prerequisites:** Base Workstation Controller or base Workstation Controller - Extended.

Workstation Controller - Extended, 3rd (#5403): Provides local attachment of an additional 32 devices and extends the possible system maximum of locally attached devices to 96. The maximum number is dependent on the mdl and workstation controller/workstation controller - extended features presently installed. This feature is installed in the System Unit Expansion Enclosure, therefore it can only be installed on System/38 mdls having the Processor Unit Expansion Feature (mdls XX3 through XX6, XXA, and XXB). **Limitations:** Cannot be installed on System/38 mdls XX1 and XX2. Mutually exclusive with base Workstation Controller, Third. **Maximum:** One. **Prerequisites:** #5402 or #5302 (if presently installed). See also "Processor Unit Expansion Feature Configurator".

Workstation Controller - Extended, 4th (#5404): Provides local attachment of an additional 32 devices and extends the possible system maximum of locally attached devices to 128. The maximum number is dependent on the mdl and workstation controller/workstation controller - extended features presently installed. This feature is installed in the System Unit Expansion Enclosure, therefore it can only be installed on System/38 mdls having the System Unit Expansion Enclosure (mdls XX3 through XX6, XXA, and XXB). These system mdls are identified in the 5381 System Unit description with an asterisk(*) by the mdl numbers. **Limitations:** Cannot be installed on System/38 mdls not having the System Unit Expansion Enclosure (mdls XX1 and XX2). Mutually exclusive with base Workstation Controller, Fourth. **Maximum:** One. **Prerequisites:** #5403 or #5303. See "Processor Unit Expansion Feature Configurator".

COMMUNICATIONS

Communications capability is provided by a multi-line facility integrated in the 5381 System Unit. It is made up of several features to allow flexibility to best satisfy various communication application requirements. There are four basic building blocks (features), each being one or more features which can be selected to provide the function desired (see Communications Configurator diagram below). These are:

- Communication Attachments (#1501, #1502)
- Communication Controls (#2000, #2001, #2002, #2003)
- Line Base(s) (#3200)
- Line Interfaces (#3701, etc.; see below)

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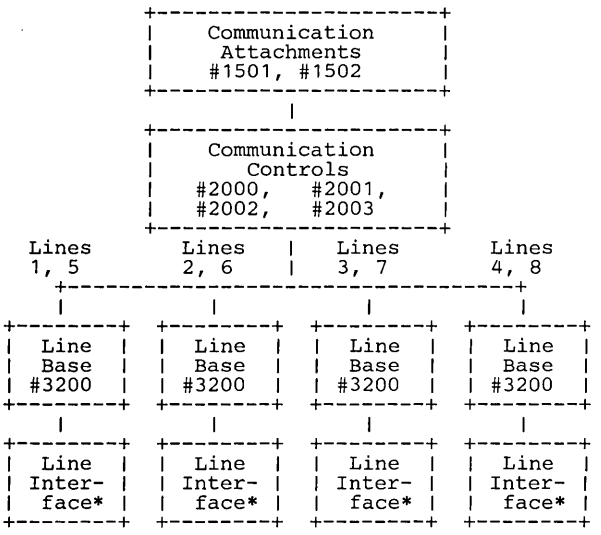
Communications Configurator



* See Table A

Following is a discussion of the communications hardware support: (1) common to both BSC and SDLC, (2) specific to BSC support, (3) specific to SDLC support, and (4) for local communications connections.

1. Support Common To Both BSC And SDLC: Communication Attachments 1st (#1501) and 2nd (#1502), when featured with appropriate sub-features, will allow the System/38 to communicate on nonswitched lines up to 56K bps and on switched lines at speeds up to 9600 bps. A maximum of eight lines can be featured and each line operates independently under System/38 CPF program control. The System/38 operates as a control station on a multipoint line for the 5251 mdl 2 or 12 and as a secondary SDLC station to a host S/370. For BSC, the System/38 operates on a point-to-point line (switched or nonswitched) and as a tributary (secondary) on a multipoint network.

Each communications line will operate in half-duplex mode over dial (switched network) facilities, and half-duplex mode over nonswitched (or equivalent private) communications lines which may be duplex or half-duplex facilities. Units at each termination, or drop point, of a communications line to which the System/38 is attached must use the same clocking source (modem or business machine) and must be set to operate at the same transmission rate and to use the same transmission code. (No special features required for: clocking, transmission code, or line speed.) Compatible modems must be used at all terminations on a network.

System/38 supports, as a basic capability, manual dial, manual, or auto-answer (where the attached modem supports this capability) operation.

2. Support Specific To BSC Operations: The Communication Attachment features, when appropriately featured, allow operation (by line) in BSC mode as requested by the System/38 CPF program.

In conjunction with stored program control, these features permit the System/38 to function on switched or nonswitched point-to-point and multipoint lines communicating in binary synchronous mode. System/38 can function as a tributary when connected to a multipoint network controlled by a Series/1, System/370, 30XX, or 43XX, and System/3 with CCP. In BSC mode, communications attachment can be with:

- A System/3 equipped with #2074, #2084, or #2094.
- A System/23 equipped with #2550.
- A System/32 equipped with #2074.
- A System/34 equipped with #2500, #3500, or #4500.
- A System/36 equipped with #2500 or #4500.
- Another System/38 equipped with #1501 or #1502.
- A S/370 via an integrated communications adapter, a 4331 Communications Adapter, a 2701 Data Adapter Unit, or a 3704/3705 Communications Controller with the Network Control Program (NCP) or the Partitioned Emulation Program (PEP), any of which are equipped with a binary synchronous adapter and appropriate sub-features.
- A Series/1 equipped with BSCA (#2074, #2075, #2093, or #2094) (as a System/3).
- A 3741 Data Station mdl 2 or 4.
- A 5110/5120 Computer equipped with BSCA #2074 (as a 3741 mdl 2 or 4).
- A 5231 mdl 2 equipped with BSCA (#2074) (as a 3741 mdl 2 or 4 in transmit mode only).
- A 5265 communicating mdl (point-to-point, batch transmission only).
- A 5280 Distributed Data System equipped with #2500.
- A 5520 Administrative System.
- An OS/6 Office System/6.
- A 6670 Information Distributor.
- A 6640 Document Printer.
- A 6580 Displaywriter System.
- A 6240 Communicating Magnetic Card Typewriter.
- A CMCII Communicating Magnetic Card Typewriter II.

See the System/38 programming pages for more description of program support provided for this feature.

ASCII, EBCDIC, or EBCDIC Text Transparency are standard support. Transmission codes are selectable via System/38 CPF command parameters.

Note: 3270 emulation requires Workstation Controller EC 841441 on System/38s shipped prior to Jan. 1983.

3. Support Specific To SDLC Operation: The Communication Attachment features, when featured with appropriate sub-features, will allow operation in SDLC mode as requested via System/38 CPF command parameters.

The System/38 provides SDLC communication support for multipoint line control when the 5251 mdl 2 or 12 display stations are attached. With these features, the System/38 can operate as an SDLC secondary, switched or nonswitched, attached to a host S/370 with IMS/VS and CICS/VS applications. See the System/38 programming pages for more detail of the program support provided for SNA/SDLC operations.

4. Local Communications Attachments:

- Local DDS Attachment Feature (#5650):

  Utilizing the local DDS Adapter cable described in "Accessories", a System/38 with a DDSA interface can be connected locally to another System/38 or to a System/34 with a DDSA interface. Using this connection, the systems can communicate at nominal line speeds of 2400, 4800, 9600, or 56K bps. Connection is point-to-point only.

  Restrictions:

  - When operating at 56K bps, only one high-speed line may be active per Communication Attachment (#1501 or #1502). The three remaining lines can be connected (at 9600 bps or less), but cannot run concurrently with the high-speed line.
  - A maximum of two high-speed lines are permitted per system (one per each Communication Attachment). This feature cannot be installed on a Communication Attachment with any other high-speed line feature (#5650 at 56K bps, #5660 or #5680) already installed.
  - Maximum distance between systems is approximately 24 meters (80 feet with 40-foot cable on each system).
  - Maximum block size for System/38 is 8K bytes; for System/34, 4K bytes.

- Local High-Speed Attachment Feature (#5680):

  This feature permits System/38 with CPF to be locally connected to a Series/1 which has EDX or RPS and RPQ D02349 (Direct BSC Attachment) and RPQ D02492 (Direct BSC Attachment Cable) installed. Using the BSC support, data can be transferred between the systems at a nominal line speed of 56K bps. Connection is point-to-point only and requires two cables (System/38 Cable Group #3422 and the Series/1 RPQ cable listed above).

  Restrictions:

  - When operating at 56K bps, only one line may be active per Communication Attachment (#1501 or #1502). The three remaining lines can be connected (at 9600 bps or less), but cannot be run concurrently with the high-speed line.
  - A maximum of two high-speed lines are permitted per system (one per each Communication Attachment). This feature cannot be installed on a Communication Attachment with any other high-speed line feature (#5650 at 56K bps, #5660 or #5680) already installed.

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- Maximum cabling distance with this feature is approximately 122 meters (400 feet), including Series/1 cable length.
- Maximum block size is 8K bytes.

5. Remote Communications Attachments:

- High-Speed Line Remote Attachment (#5660):

  This feature allows System/38 with CPF to communicate locally or remotely with a 3705 Communications Controller at nominal speeds of 57.6K bps (locally) or 56K bps (remotely), communicate remotely with a 4331 Communications Adapter or another System/38 at nominal speed up to 56K bps using either Binary Synchronous Communications (BSC) or Synchronous Data Link Control (SDLC) protocol. For the local attachment, two cables are required, the System/38 V.35 cable (Cable Group #3423) and the 3705 Local Attach Cable. The attachment provides local half-duplex, point-to-point communication to a host system (S/370, 30XX, and 434X), and requires #5660 on System/38 and 3705 Line Set, Type 1W (#4727) and 3705 Business Machine Clock (#4651) at 57.6K bps ... specify **#9622**. For the remote connection, the System/38 V.35 cable attaches to a compatible modem and can communicate with the host system at rates up to 56K bps with the clocking provided by the modem. The 3705 requires Line Set, Type 1S (#4720). The 4331 Communications Adapter requires High-Speed Modem Adapter (#4720), specify **#9501**. System/38 requires #5660.

  Restrictions:

  - When operating at line speeds greater than 9600 bps, only one line may be active per Communication Attachment (#1501 or #1502). The three remaining lines can be connected (at 9600 bps or less), but cannot be run concurrently with the high-speed line.
  - A maximum of two high-speed lines are permitted per system (one per each communications attachment). This feature cannot be installed on a communications attachment with any other high-speed line feature (#5650 at 56K bps, #5660 or #5680) already installed.
  - Maximum cabling distance with this feature to a local 3705 attachment is approximately 58 meters (190 feet, 150 feet for 3705 cable and 40 feet for System/38 V.35 cable).
  - Maximum block size is 8K bytes for BSC and 32K bytes for SNA/SDLC.

Limitations: Use discretion when proposing high-speed lines. Depending upon the system mdl, high-speed lines (when operating at 56K bps) can require a significant portion of the CPU resources. A dedicated mdl 3 operating two high-speed lines concurrently, using 512-byte blocks and including all data base operations, could require nearly 100% of the CPU resources (depending upon the partner system and transmission parameters). A mdl 5 doing the same job might only require 60% of its CPU resources. A mdl 7 would use less than 30% of its CPU. Increasing the block size to 2K bytes in each case will further reduce CPU utilization (by as much as 35% in some instances). As with any added application, high-speed lines operating concurrently with other applications can result in degradation of data throughput or response times.

Recommendations:

- When operating these features at 56K bps, it is recommended that the user transmit in large blocks (e.g., 2K bytes) of uncompressed EBCDIC data to optimize CPU utilization and line throughput.

Communication Attachment, 1st (#1501): Provides the basic control and common circuits for direct attachment of up to four communication lines. This feature, in conjunction with the appropriate sub-features, allows System/38 to communicate on four lines concurrently, each operating at data rates up to 9600 bps utilizing either SDLC or BSC data link control or operating one line at 56K bps (nominal). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processor Unit Expansion Feature Configurator".

Communication Attachment, 2nd (#1502): Provides the basic control and common circuits for a second group of four communication lines. This feature, in conjunction with the appropriate sub-features, allows System/38 to communicate on four lines concurrently, using the SDLC or BSC data link control. Each line can operate at data rates of 600 to 9600 bps or operate one line at 56K bps (nominal). This feature is installed in the System Unit Expansion Enclosure; therefore, it can only be installed on System/38 mdls XX3 through XX6, XXA, and XXB. **Limitations:** Cannot be installed on System/38 mdls XX1 and XX2. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1501. See "Processor Unit Expansion Feature Configurator".

Communication Control, SDLC (#2000, #2002): Provides the basic control storage and common circuits for SDLC data link control. When Communication Attachment, 1st (#1501) is featured with Communication Control, SDLC (#2000) all four attachable lines will support SDLC data link control. Communication Control, SDLC (#2002) provides the same SDLC data link control function for Communication Attachment, 2nd (#1502). **Limitations:** Supports SDLC only. **Maximum:** One per Communication Attachment. **Field Installation:** Yes. **Prerequisites:** #1501 for #2000 and #1502 for #2002.

Communication Control, SDLC/BSC (#2001, #2003): Provides the basic control storage and common circuits for both SDLC and BSC data link control. When Communication Attachment, 1st (#1501) or Communication Attachment, 2nd (#1502) is featured with Communication Control, SDLC/BSC (#2001 or #2003), any line interface can be optioned via CPF parameter for either SDLC or BSC. This feature provides SDLC support for point-to-point switched or nonswitched and also multipoint control. The BSC support is for point-to-point switched or nonswitched and multipoint tributary attachment. BSC multipoint control is not supported. **Maximum:** One per Communication Attachment feature. **Field Installation:** Yes. **Prerequisites:** #1501 for #2001 and #1502 for #2003.

Line Base (#3200): This feature provides the interface and control between the line interface features and the Communication Control features. This feature is required for each line appearance and provides the necessary control required for each of the unique line interface types. Line interfaces supported via this feature are: EIA (#3701), DDSA (#5650, #5651,) 1200 bps Integrated Modems (#5500, #5501, #5502, #5508), 2400 bps Integrated Modems (#5640, #5641), 4800 bps Integrated Modems (#5740, #5741), High-Speed Line Remote Attachment (#5660), Local High-Speed Attachment (#5680), and Auto-Call Adapter (#5760). **Limitations:** None. **Maximum:** One per line position. **Field Installation:** Yes. **Prerequisites:** #2000, #2001, #2002 or #2003. Line Position 1 (**#9001**) must be occupied for Communication Attachment, 1st (#1501), and Line Position 5 (**#9005**) must be occupied for Communication Attachment, 2nd (#1502) if installed. **Specify:** Line position code for installation (see Table A).

LINE INTERFACES

One of the following line interface features must be ordered for each Line Base depending on the type of communication facility and modem to be used.

EIA Interface (#3701): Provides an interface for attachment of an IBM modem or non-IBM modem meeting RS-232-C characteristics. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. **Limitations:** Cannot be installed on same line position with any other line interface type. **Maximum:** One per line position. **Field Installation:** Yes. **Prerequisites:** #3200. Requires appropriate cable order. See *IBM System/38 Installation Manual - Physical Planning* (GA21-9293). **Specify:** It is required that one code be specified from each of the following tables: Line Bases and Line Interface Codes (Table A), Line Speed Codes (Table B), Device Attachment Codes (Table C), Line Protocol (Table D), and Host Application (Table E).

1200 bps Integrated Modem (#5500, #5501, #5502, #5508): A modem for data transmission at 1200 bps over switched or nonswitched facilities. Half-speed operation at 600 bps is optional via a Control Program Facility command. Available in four different versions: #5500 - nonswitched, #5501 - switched with auto-answer, #5502 - switched with manual answer, and #5508 - nonswitched (primary mode) with switched network backup auto-answer capability. The nonswitched version (#5500) provides for a cable attachment directly to a non-switched facility, Type 3002. The switched with auto-answer versions (#5501 and #5508) provide for a cable attachment to FCC-registered protective circuitry of the CBS Type (or equivalent) provided by the user. The switched network manual answer version (#5502) provides for a cable attachment to FCC-registered protective circuitry of the CDT Type (or equivalent) provided by the user. The devices communicating with System/38 must also be equipped with a 1200 bps Integrated Modem. **Limitations:** Cannot be installed on the same line position with any other line interface feature. **Maximum:** One per line position. **Field Installation:** Yes. **Prerequisites:** #3200. Requires appropriate cable order. See *IBM System/38 Installation Manual - Physical Planning* (GA21-9293). **Specify:** It is required that one code be specified from each of the following tables: Line Bases and Line Interface Codes (Table A), Line Speed Codes (Table B), Device Attachment Codes (Table C), Line Protocol (Table D), and Host Application (Table E).

2400 bps Integrated Modem, Nonswitched (#5640): This integrated modem operates in half-duplex mode over normal quality 4-wire, nonswitched duplex communications facilities at speeds of 2400/1200 bps. The following operational modes are selectable by specify codes in Table A. These codes determine the network operational mode of the modem and also determine how the speed selection in the modem will function. These modes are: (1) Multipoint Control -- Operates as control station in a multipoint network and also provides for "local speed control" via a Control Program Facility command. Equalization to the line is automatic and adaptive to the received signal. (2) Multipoint Tributary -- Operates as a tributary station in a multipoint network and provides for "remote speed control" that will automatically adjust its data rate to the rate it is receiving. Equalization to the line is adaptive to its received signal. (3) Point-to-Point -- For point-to-point operation and provides "local speed control" via a Control Program Facility command. Point-to-point can also be configured for "remote speed

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control" by the CE at time of installation. Equalization to the line is adaptive to its received signal. **Limitations:** Cannot be installed on the same line position with any other line interface feature. **Maximum:** One per line position. **Field Installation:** Yes. **Prerequisites:** #3200. Requires appropriate cable order. See *IBM System/38 Installation Manual - Physical Planning* (GA21-9293). **Specify:** It is required that one code be specified from each of the following tables: Line Bases and Line Interface Codes (Table A), Line Speed Codes (Table B), Device Attachment Codes (Table C), Line Protocol (Table D), and Host Application (Table E). **Related Equipment:** This feature (#5640) will operate with System/38-supported communication products equipped with the 3863, mdl 1 or the 3868 mdl 1 modem or products featured with integrated modems compatible with the 3863, mdl 1 or 3868 mdl 1 modem.

2400 bps Integrated Modem, Switched (#5641): This integrated modem operates in half-duplex mode over 2-wire, switched communications facilities at speeds of 2400/1200 bps. Speed selection is under local or remote operator control. Manual originate, manual answer, and auto-answer procedures are used to establish connections. Equalization to the line is automatic and is performed each time a switched connection is established. An external cable 6.3 meters (21 feet) in length for attaching to the public switched network is supplied with this feature. No cable order required. **Limitations:** Cannot be installed on the same line position with any other line interface feature. **Maximum:** One per line position. **Field Installation:** Yes. **Prerequisites:** #3200. **Specify:** It is required that one code be specified from each of the following tables: Line Bases and Line Interface Codes (Table A), Line Speed Codes (Table B), Device Attachment Codes (Table C), Line Protocol (Table D), and Host Application (Table E). **Related Equipment:** This feature (#5641) will operate with System/38-supported communication products equipped with the 3863, mdl 2 modem or products featured with integrated modem compatible with 3863, mdl 2.

The Integrated Protective Coupler (FCC registration requirement for direct connection to the public switched network) is included with this feature.

Digital Data Service Adapter (DDSA) (#5650, #5651): An integrated data link adapter for data transmission over the AT&T nonswitched Data-Phone® Digital Service network and for local connections between System/38 and another System/38 or a System/34. #5650 provides local (point-to-point only) and remote (point-to-point and multipoint control) support and operates at nominal speeds of 2400 bps, 4800 bps, 9600 bps or 56K bps (multipoint control is not supported at 56K bps). For remote connections, the DDSA interfaces via a DDS adapter cable to a DDS Channel Service Unit (not a DDS Data Service Unit). For local connections, the DDS Adapter Connector accessory cable provides the interface between the DDS Adapter cables on the two systems. #5651 provides remote multipoint tributary support at speeds of 2400 bps, 4800 bps, and 9600 bps. **Limitations:** Cannot be installed on same line position with any other line interface type. Cannot be installed on same attachment with #5660 or #5680. **Maximum:** One per line position; one per attachment at 56K bps. **Field Installation:** Yes. **Prerequisites:** #3200. Requires appropriate cable order. See *IBM System/38 Installation Manual - Physical Planning* (GA21-9293). **Specify:** It is required that one code be specified from each of the following tables: Line Bases and Line Interface Codes (Table A), Line Speed Codes (Table B), Device Attachment Codes (Table C), Line Protocol (Table D), and Host Application (Table E). **Recommendations:** When operating this feature locally at 56K bps, it is recommended that the user transmit in large blocks (2K bytes BSC, 1792 bytes SDLC) of uncompressed EBCDIC data to optimize CPU utilization and line throughput.

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High-Speed Line Remote Attachment (#5660): This feature allows System/38 with CPF to communicate locally or remotely with a 3705 Communications Controller at nominal speeds of 57.6K bps (locally) or 56K bps (remotely), communicate remotely with a 4331 Communications Adapter or another System/38 at nominal speeds up to 56K bps . **Limitations:** Cannot be installed on same line position with any other interface type. Cannot be installed on same attachment with another high-speed line feature (#5650 at 56K bps or #5660 or #5680). **Maximum:** One per communications attachment, two per system. **Field Installation:** Yes. **Prerequisites:** System/38 requires #3200, #2001 or #2003, and CPF at Release 5.0 or later. The 3705-II or 3705-80 must have #4727, and #4651 at 57.6K bps, specify **#9622** for local connection or Line Set, Type 1S (#4720) for remote connection. The 4331 Communications Adapter requires High-Speed Modem Adapter (#4720) and **#9501**. The System/38 requires #5660. For local connections two cables are required, the System/38 cable and the 3705 local attachment cable. For remote connections, the System/38 and the 3705 must be connected to compatible modems. See *IBM System/38 Installation Manual - Physical Planning* (GA21-9293) for cabling information. **Specify:** One code must be specified from each of the following tables: Line Bases and Line Interfaces Codes (Table A), Line Speed Codes (Table B), Device Attachment Codes (Table C), and Line Protocol (Table D). **Recommendations:** When operating #5660 at 56K bps (57.6K bps locally), it is recommended that the user transmit in large blocks of uncompressed EBCDIC data to optimize CPU utilization and line throughput. For SDLC protocol, the maximum pacing count allowed by the 3705 NCP should be specified.

Local High-Speed Attachment (#5680): Permits a Series/1 to be locally attached to a System/38 at a nominal line speed of 56K bps. Communications is point-to-point BSC and program-to-program. **Limitations:** Cannot be installed on same line position with any other interface type. Cannot be installed on same attachment with another high-speed line feature (#5650 at 56K bps or #5660 or #5680). **Maximum:** One per Communication Attachment, two per system. **Field Installation:** Yes. **Prerequisites:** System/38 requires Line Base (#3200), SDLC/BSC controller feature (#2001 or #2003) and their prerequisites, and CPF at Release 4.0 or later. Series/1 must have EDX or RPS and RPQ D02349 (Direct BSC Attachment) and RPQ D02492 (Direct BSC Attachment Cable) installed. Requires appropriate cable order. See *IBM System/38 Installation Manual - Physical Planning* (GA21-9293). **Specify:** It is required that one code be specified from each of the following tables: Line Bases and Line Interface Codes (Table A), Line Speed Codes (Table B), Device Attachment Codes (Table C), and Line Protocol (Table D). **Recommendations:** When operating this feature at 56K bps, it is recommended that the user transmit in large blocks (e.g., 2K bytes) of uncompressed EBCDIC data to optimize CPU utilization and line throughput.

4800 bps Integrated Modem, Nonswitched (#5740): This integrated modem operates in half-duplex mode over normal quality 4-wire, nonswitched duplex communications facilities at speeds of 4800/2400 bps. The following operational modes are selectable by specify codes in Table A. These codes determine the network operational mode of the modem and also determine how the speed selection in the modem will function. These modes are: (1) Multipoint Control -- Operates as control station in a multipoint network and also provides for "local speed control" via a Control Program Facility command. Equalization to the line is automatic and adaptive to the received signal. (2) Multipoint Tributary -- Operates as a tributary station in a multipoint network and provides for "remote speed control" that will automatically adjust its data rate to the rate it is receiving. Equalization to the line is adaptive to its received signal. (3) Point-to-Point -- For point-to-point operation and provides "local speed control" via a Control Program Facility command. Point-to-point can also be configured for "remote speed control" by the CE at the time of installation. Equalization to the line is adaptive to its received signal. **Limitations:** Cannot be installed on the same line position with any other line interface feature. **Maximum:** One per line position. **Field Installation:** Yes. **Prerequisites:** #3200. Requires appropriate cable order. See *IBM System/38 Installation Manual - Physical Planning* (GA21-9293). **Specify:** It is required that one code be specified from each of the following tables: Line Bases and Line Interface Codes (Table A), Line Speed Codes (Table B), Device Attachment Codes (Table C), Line Protocol (Table D), and Host Application (Table E). **Related Equipment:** This feature (#5740) will operate with System/38-supported communication products equipped with the 3864, mdl 1 modem or products featured with integrated modem compatible with 3864, mdl 1.

4800 bps Integrated Modem, Switched (#5741): This integrated modem operates in half-duplex mode over 2-wire switched communications facilities at speeds of 4800/2400 bps. Speed selection is under local or remote operator control. Manual originate, manual answer, and auto-answer procedures are used to establish connections. Equalization is automatic and is performed each time a switched connection is established. An external cable 6.3 meters (21 feet) in length for attaching to the public switched network is supplied with this feature. No cable order required. **Limitations:** Cannot be installed on the same line position with any other line interface feature. **Maximum:** One per line position. **Field Installation:** Yes. **Prerequisites:** #3200. **Specify:** It is required that one code be specified from each of the following tables: Line Bases and Line Interface Codes (Table A), Line Speed Codes (Table B), Device Attachment Codes (Table C), Line Protocol (Table D), and Host Application (Table E). **Related Equipment:** This feature (#5741) will operate with System/38-supported communication products equipped with the 3864, mdl 2 modem or products featured with integrated modems compatible with 3864, mdl 2. The Integrated Protective Coupler (FCC requirement for direct connection to the public switched network) is included with this feature.

Auto-Call Adapter (#5760): Permits the System/38, when attached to a switched network facility via an appropriate modem and auto-call unit, to initiate a data link connection to a remote station. Provides automatic dialing under program control. An Auto-Call Adapter (#5760) must always be installed in conjunction with an EIA Interface (#3701) for each line to automatically originate calls on switched network facilities. Each line featured with Auto-Call Adapter (#5760) takes two line positions, thereby reducing the maximum number of lines which can be supported. **Limitations:** Cannot be installed on same line position with any other line interface type. Installable in Line Position 2, 3, 4, 6, 7, or 8 only. **Maximum:** Two per Communication Attachment feature (#1501 or #1502). Maximum of four per system. **Field Installation:** Yes. **Prerequisites:** #3200. Requires appropriate cable order. See *IBM System/38 Installation Manual - Physical Planning* (GA21-9293). **Specify:** It is required that one code be specified from each of the following tables: Line Bases and Line Interface Codes

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(Table A), Line Speed Codes (Table B), and Device Attachment Codes (Table C). The line position code specified must be the next higher order position relative to the modem it is associated with.

Table A: Line Bases and Line Interface Codes

Line Position	1	2	3	4	5	6	7	8
Line Base (#3200)	#9001	#9002	#9003	#9004	#9005	#9006	#9007	#9008
Line Interface Type:								
EIA (#3701)	#9101	#9102	#9103	#9104	#9105	#9106	#9107	#9108
1200 bps Integrated Modems:								
Nonswitched (#5500)	#9111	#9112	#9113	#9114	#9115	#9116	#9117	#9118
Switched - Auto-Answer (#5501)	#9121	#9122	#9123	#9124	#9125	#9126	#9127	#9128
Switched - Manual Answer (#5502)	#9131	#9132	#9133	#9134	#9135	#9136	#9137	#9138
Sw Net Backup - Auto-Ans (#5508)	#9141	#9142	#9143	#9144	#9145	#9146	#9147	#9148
2400 bps Integrated Modems:								
Nonswitched (#5640)								
Multipoint Control	#9601	#9602	#9603	#9604	#9605	#9606	#9607	#9608
Multipoint Tributary	#9611	#9612	#9613	#9614	#9615	#9616	#9617	#9618
Point-to-Point	#9621	#9622	#9623	#9624	#9625	#9626	#9627	#9628
Switched (#5641)	#9631	#9632	#9633	#9634	#9635	#9636	#9637	#9638
4800 bps Integrated Modems:								
Nonswitched (#5740)								
Multipoint Control	#9641	#9642	#9643	#9644	#9645	#9646	#9647	#9648
Multipoint Tributary	#9651	#9652	#9653	#9654	#9655	#9656	#9657	#9658
Point-to-Point	#9661	#9662	#9663	#9664	#9665	#9666	#9667	#9668
Switched (#5741)	#9671	#9672	#9673	#9674	#9675	#9676	#9677	#9678
DDSA - Pt-to-Pt & Multpt Ctrl (#5650)	#9151	#9152	#9153	#9154	#9155	#9156	#9157	#9158
DDSA - Multipoint Tributary (#5651)	#9161	#9162	#9163	#9164	#9165	#9166	#9167	#9168
Auto-Call Adapter (#5760)	N/A	#9172	#9173	#9174	N/A	#9176	#9177	#9178
Local High-Speed Attachment (#5680)	#9181	#9182	#9183	#9184	#9185	#9186	#9187	#9188
High-Speed Line Remote Attachment (#5660)	#9191	#9192	#9193	#9194	#9195	#9196	#9197	#9198

Table B: Line Speed Codes

Line Position	1	2	3	4	5	6	7	8
Line Speed:								
1200 bps	#9201	#9202	#9203	#9204	#9205	#9206	#9207	#9208
2000 bps	#9211	#9212	#9213	#9214	#9215	#9216	#9217	#9218
2400 bps	#9221	#9222	#9223	#9224	#9225	#9226	#9227	#9228
4800 bps	#9231	#9232	#9233	#9234	#9235	#9236	#9237	#9238
7200 bps	#9241	#9242	#9243	#9244	#9245	#9246	#9247	#9248
9600 bps	#9251	#9252	#9253	#9254	#9255	#9256	#9257	#9258
48K bps	#9271	#9272	#9273	#9274	#9275	#9276	#9277	#9278
56K bps	#9281	#9282	#9283	#9284	#9285	#9286	#9287	#9288

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Table C: Device Attachment Codes

Line Position	1	2	3	4	5	6	7	8
Series/1	#9351	#9352	#9353	#9354	#9355	#9356	#9357	#9358
System/3	#9311	#9312	#9313	#9314	#9315	#9316	#9317	#9318
System/23	#9441	#9442	#9443	#9444	#9445	#9446	#9447	#9448
System/32	#9321	#9322	#9323	#9324	#9325	#9326	#9327	#9328
System/34	#9331	#9332	#9333	#9334	#9335	#9336	#9337	#9338
System/36	#9331	#9332	#9333	#9334	#9335	#9336	#9337	#9338
System/38	#9341	#9342	#9343	#9344	#9345	#9346	#9347	#9348
System/370	#9301	#9302	#9303	#9304	#9305	#9306	#9307	#9308
3741	#9361	#9362	#9363	#9364	#9365	#9366	#9367	#9368
3776/3777	#9501	#9502	#9503	#9504	#9505	#9506	#9507	#9508
5110/5120	#9421	#9422	#9423	#9424	#9425	#9426	#9427	#9428
5230	#9371	#9372	#9373	#9374	#9375	#9376	#9377	#9378
5250	#9381	#9382	#9383	#9384	#9385	#9386	#9387	#9388
5260	#9391	#9392	#9393	#9394	#9395	#9396	#9397	#9398
5280	#9431	#9432	#9433	#9434	#9435	#9436	#9437	#9438
5520	#9451	#9452	#9453	#9454	#9455	#9456	#9457	#9458
6240	#9491	#9492	#9493	#9494	#9495	#9496	#9497	#9498
6580	#9481	#9482	#9483	#9484	#9485	#9486	#9487	#9488
6670	#9461	#9462	#9463	#9464	#9465	#9466	#9467	#9468
OS/6	#9471	#9472	#9473	#9474	#9475	#9476	#9477	#9478
Other IBM	#9401	#9402	#9403	#9404	#9405	#9406	#9407	#9408
Other Non-IBM	#9411	#9412	#9413	#9414	#9415	#9416	#9417	#9418

Table D: Line Protocol

Line Position	1	2	3	4	5	6	7	8
BSC	#9701	#9702	#9703	#9704	#9705	#9706	#9707	#9708
SDLC	#9711	#9712	#9713	#9714	#9715	#9716	#9717	#9718
Both (BSC and SDLC)	#9721	#9722	#9723	#9724	#9725	#9726	#9727	#9728

Table E: Host Application

Line Position	1	2	3	4	5	6	7	8
CICS/VS	#9741	#9742	#9743	#9744	#9745	#9746	#9747	#9748
IMS/VS	#9751	#9752	#9753	#9754	#9755	#9756	#9757	#9758
Other	#9761	#9762	#9763	#9764	#9765	#9766	#9767	#9768

Communications Facilities: See M2700 pages for communications facility requirements for these features.

IBM Data Encryption Devices: A 3845 or 3846 Data Encryption Device may be attached between the System/38 communication attachment line interface and the external modem. **Prerequisites:** #3701.

IBM Modems: Each line position featured with EIA Interface (#3701) requires an external modem which meets the requirements desired. IBM modems which can be attached to System/38 via EIA Interface (#3701) are as follows:

Data Rate (bps)	Modem
2400	3863 or 3868 mdl 1
4800	3864 or 3868 mdl 2
9600	3865 or 3868 mdl 3/4
2400/1200	3872

See M2700, 3863, 3864, 3865, and 3872 pages for information on modem features, communication capabilities, and product utilization.

MODEL CONVERSIONS

The upgrade purchase prices for model changes may be greater than purchase price differentials. The customer should carefully evaluate his future requirements when purchasing a system.

Replaced parts from any model upgrade become the property of IBM.

Note: Refer to *IBM System/38 Installation Manual - Physical Planning* (GA21-9293) for physical installation requirements.

ACCESSORIES

Keylock Keys: The 5381 with Power Keylock (#3210) is shipped with two keys. Additional keys (P/N **2546418**) may be purchased from IBM. (Vendor will supply additional keys only to the original purchaser.) Key identification number must accompany each order. Allow 6-8 weeks for delivery.

Cables: To order cables see *IBM System/38 Installation Manual - Physical Planning* (GA21-9293) for cable order requirements.

DDS Adapter Connector: A specially designed connector which allows the cables from a System/38 DDS Adapter to be connected to the cables from another DDS Adapter. This provides for the local connection of two devices without the use of modems or channel

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service units. This is a purchase-only item. Allow 6-8 weeks for delivery. **Note:** Only one of these connectors is required per local connection. If already ordered with the mating adapter, do not order a second one. **Maximum:** One per DDS Adapter. **Specify:** P/N **4236967**.

SUPPLIES

Diskettes And Diskette Magazines: For diskettes and diskette magazines, contact IBM. Two diskette magazines are required for installation of the Control Program Facility Licensed Program. 2D diskettes are required for Control Program Facility (CPF) save/restore operations. Diskette magazines and 2D diskettes are not included with the system. They may be ordered from IBM. 2D Diskette - P/N **1669045**, Diskette magazine - P/N **2462521**.

5412 PROCESSING UNIT

[NO LONGER AVAILABLE]

PURPOSE

The 5412 contains main storage and facilities for addressing main storage, arithmetic and logical processing of data, and controlling I/O units for System/3 model 12. Also includes the attachment for 3340 Direct Access Storage Facility model C2.

MODELS

Model	Processor Storage (Bytes)
B16	32,768
B17	49,152
B18	65,536
C19	81,920
C20	98,304

Maximum: Only one 5412 can be attached to a System/3 mdl 12.

Prerequisites: IBM Programming Systems support for the 5412 mdl C19 and mdl C20 requires the Dual Program (#3500). IBM's ability to service a mdl C19 or mdl C20 without the Dual Program feature will be impaired with an effect on systems availability.

When the mdl 12 SCP option of print spooling is used, either Dual Program (#3500) or the 5471 Printer-Keyboard (#4110) must be ordered.

Minimum Configuration: In addition to the 5412, a System/3 mdl 12 requires:

- 5203 or 1403 Printer
- 3340 Direct Access Storage Facility mdl C2
- Two 3348 mdl 70 Data Modules
- One of the following:
  - 1424 Multifunction Card Unit
  - 1442 Card Read Punch
  - 3741 Data Station directly attached

HIGHLIGHTS

CPU uses highly integrated Monolithic Systems Technology (MST) for logical circuitry. Memory is Metal Oxide Semiconductor Field Effect Transistor (MOSFET). Data and instructions are stored as EBCDIC characters. Each EBCDIC character is stored in an 8-bit byte, and a ninth bit is added for parity checking. Main storage cycle time is 1.52 microseconds. Instruction execution and I/O handling utilizes the "Cycle-Steal" technique, providing overlap of I/O and processing.

The direct attachment of the 3741 Data Station or 3741 Programmable Workstation provides input and output via magnetic media. This feature may reside with or without card I/O.

The Local Display Adapter provides local attachment of any mix of up to twelve 3277 mdl 1 or 2, 3284 mdl 1 or 2, 3286 mdl 1 or 2, 3287 mdl 1 or 2, and 3288 mdl 2. The 3271 Control Unit is not required if the devices are attached via the Local Display Adapter.

Communication with remotely located systems or terminals may be performed through the use of the Integrated Communications Adapter (ICA) or the Binary Synchronous Communications Adapter (BSCA) over data communications transmission facilities.

The system console uses a message display unit for simplified direct operator/system communication.

Customer Responsibilities: Customers must be advised that:

- They are responsible for making arrangements for installation, pricing, charges of the data communications facility, and attachment of selected data sets (modems).
- Toll charges, if required for installation and/or maintenance of the BSCA or ICA, are to be paid by the customer.
- The marketing representative must have from the customer a firm installation date for transmission services (including modems) before the order can be confirmed. For further information, see "Teleprocessing" in the GI section and the M2700 pages.

Publications: *System/3 Bibliography* (GC20-8080).

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): Specify **#9903** for 208V or **#9905** for 230V.
- Color: Specify **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Print Position Attachment: Specify **#9495** for a 5203 with 120 print positions or **#9496** for a 5203 with 132 print positions.
- I/O Unit Attachments: Appropriate special features are required to attach most I/O units. See "Special Features".
- System Control Programming: 5705-SC1 should be ordered at equipment order entry time. See the System/3 programming for additional information.
- System Attachment Adapter: Specify **#9180** for a 5203 mdl 1 or **#9181** for a 5203 mdl 2.
- 3741 Direct Attachment: Specify **#9500** if either a 5424 or a 1442 is present or **#9501** if neither is present.
- Upending Kit: Specify **#9840**. This kit is furnished only as necessary and remains the property of IBM.
- 5412/5415 Frame Separation Kit: Specify **#9190**. Frame separation may be required at installation time at those locations where building dimensions (doorways, hallways, stairways, etc.) do not allow movement of the central processor as one unit. The local IBM Installation Planning Representative can determine if this kit is required. The Frame Separation Kit is not to be ordered when the Upending Kit (**#9840**) will suffice.
- 5410 to 5412 Conversion: For 5410 to 5412 conversion where an installed 5424 is to be moved to the new system, an MES must be submitted to remove the 5444(s) from the 5424. This MES must also delete **#9400**, and if a second 5444 is installed, **#9401** or **#9402** (all from the 5424).

SPECIAL FEATURES

Non-Communications Features

Dual Feed Carriage Control (#3480): Required for Dual Feed Carriage (#3475) on a 5203 Printer. **Field Installation:** Yes. **Prerequisites:** #3960, and #3970 or #3972.

Dual Program (#3500): Provides the capability to independently load and process two programs concurrently. Independent operator control of each program is provided so that either program may be initiated, restarted after a program halt, run to completion, or terminated without regard to the other program other than availability of main storage and I/O units. **Field Installation:** Yes.

5203 Printer Base Attachment (#3960): Required to attach a 5203 Printer mdl 1, 2, or 3. **Limitations:** Cannot be installed with 1403 Printer Base Attachment (#4160). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #9224 on the 5203.

5203 Printer Attachment, 100/200 lpm (#3970): To attach a 5203 Printer mdl 1 or 2. **Limitations:** Cannot be installed with 5203 Printer Attachment, 300 lpm (#3972). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3960.

5203 Printer Attachment, 300 lpm (#3972): To attach a 5203 Printer mdl 3. **Limitations:** Cannot be installed with 5203 Printer Attachment, 100/200 lpm (#3970). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3960.

Multifunction Card Unit Attachment, 250/60/60 cpm (#4100): To attach a 5424 Multifunction Card Unit mdl A1. **Limitations:** Cannot be installed with 1442 Mdl 6/7 Card Read Punch Attachment (#4130). **Maximum:** One. **Field Installation:** Yes.

Multifunction Card Unit Attachment, 500/120/120 cpm (#4101): To attach a 5424 Multifunction Card Unit mdl A2. **Limitations:** Cannot be installed with 1442 Mdl 6/7 Card Read Punch Attachment (#4130). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4100.

5471 Printer-Keyboard Attachment (#4110): To attach a 5471 Printer-Keyboard. **Maximum:** One. **Field Installation:** Yes.

1442 Mdl 6/7 Card Read Punch Attachment (#4130): To attach a 1442 mdl 6 or 7. **Limitations:** Cannot be installed with Multifunction Card Unit Attachments (#4100, #4101). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3950 on the 1442 and #5502 on the 5412.

1403 Mdl 5 Printer Attachment, 465 lpm (#4135): To attach a 1403 Printer mdl 5. **Limitations:** Cannot be installed with other 1403 printer attachments (#4140, #4150). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4160 on the 5412 and **#9185** on the 5421.

1403 Mdl 2 Printer Attachment, 600 lpm (#4140): To attach a 1403 Printer mdl 2. **Limitations:** Cannot be installed with other 1403 printer attachments (#4135, #4150). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4160 on the 5412.

1403 Mdl N1 Printer Attachment, 1,100 lpm (#4150): To attach a 1403 Printer mdl N1. **Limitations:** Cannot be installed with other 1403 printer attachments (#4135, #4140). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4160.

1403 Printer Base Attachment (#4160): To attach a 1403 Printer mdl 2, 5, or N1 (#4135, #4140, or #4150 must be specified). **Maximum:** One. **Field Installation:** Yes. **Limitations:** Cannot be installed with 5203 Printer Base Attachment (#3960). **Prerequisites:** A 5421 Printer Control Unit.

Basic Attachment (#4701): To attach either the Local Display Adapter (#4702) or 3411 Magnetic Tape Attachment (#7960) or both (#4702

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and #7960 must be specified). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5732. See "Processing Unit Expansion Configurator" for possible requirements for additional expansion features.

Local Display Adapter (#4702): Permits direct local attachment (up to 2,000 feet) of up to three 3277 mdl 1 Display Stations, 3284 mdl 1 Printers, 3286 mdl 1 Printers, or 3287 mdl 1 and 2 Printers (with 480-character buffer) in any combination. A 3271 Control Unit is not required. The 3270 device cables will be attached directly to the Local Display Adapter. For attachment of additional 3270 devices (maximum of 12), see Display Increment (#4704). For attachment of the 3270 mdl 2 (1,920-character buffer) devices, see Mdl 2 Attachment (#4705). **Limitations:** Cannot be installed with the Integrated Communications Adapter (#4645) or with the Binary Synchronous Communications Adapter, Second (#2084). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4701.

Display Increment (#4704): Permits attachment of up to three more devices to the Local Display Adapter. **Maximum:** Three. **Field Installation:** Yes. **Prerequisites:** #4702.

Mdl 2 Attachment (#4705): Required if any 3277 mdl 2 Display Stations and/or any 3284/3286/3288 mdl 2 Printers and/or 3287 mdl 1 or 2 Printers (with 1,920-character buffer) are to be attached to the Local Display Adapter. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4702.

Power Supply Expansion I (#5501): Provides additional processing unit 6V power. Required when an MLTA RPQ is desired. **Maximum:** One. **Field Installation:** Yes.

Power Supply Expansion II (#5502): Provides additional processing unit 24V power. Required when 5424 is not attached. **Maximum:** One. **Field Installation:** Yes.

Processing Unit Expansion A (#5732): Provides additional processing unit power supply, connectors, and mounting space when required. May be required when certain RPQs are ordered. Contact IBM for details. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Refer to "Processing Unit Expansion Configurator" to determine requirements.

Processing Unit Expansion B (#5733): Provides additional processing unit power supply and connections. May be required when certain RPQs are ordered. Contact IBM for details. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5732. Refer to "Processing Unit Expansion Configurator" to determine requirements.

Processing Unit Expansion C (#5734): Provides additional processing unit power supply and connections. May be required when certain RPQs are ordered. Contact IBM for details. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5732 and #5733. Refer to "Processing Unit Expansion Configurator" to determine requirements.

Processing Unit Expansion D (#5735): Provides additional processing unit power supply and connections. May be required when certain RPQs are ordered. Contact IBM for details. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5732, #5733, and #5734. Refer to "Processing Unit Expansion Configurator" to determine requirements.

Serial I/O Channel (#7081): To attach a 1255 Magnetic Character Reader or a 3881 Optical Mark Reader. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5732. See "Processing Unit Expansion Configurator" for possible requirement for additional expansion features.

3411 Magnetic Tape Attachment (#7960): To attach a 3411 Tape Unit and Control. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4701. See "Processing Unit Expansion Configurator" for possible requirement for additional expansion features.

3741 Attachment (#8220): To attach a 3741 mdl 1, 2, 3, or 4. **Limitations:** For 3741 mdl 3 or 4, System/3 does not support the Application Control Language (ACL). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5502 is required if the 5424 is not installed on the system. If attached with the 5424 Multifunction Card Unit or the 1442 Card Read Punch, #5732 is required. See "Processing Unit Expansion Configurator" for possible requirements for additional expansion features. **Specify:** **#9500** if either a 5424 or a 1442 is present or **#9501** if neither is present.

Universal Character Set Control (#8642): Required if any Interchangeable Train Cartridge with more than 48 different characters is to be used on the 5203 Printer. Note: This feature is not required if a 1403 mdl 2, 5, or N1 with UCS feature is attached to the 5412 through a 5421 Control Unit. **Prerequisites:** #8639 on the 5203.

Communications Features

Auto-Call (#1315, #1325): Permits the System/3 mdl 12, when attached to a switched network (**#9483** or **#9583**) via an appropriate modem and auto-call unit, to initiate (dial) through stored program control a data link connection to a remote BSC station (#1315 for #2074 and #1325 for #2084). Available with medium-speed adapters only. **Limitations:** Cannot be installed with Station Selection (#7477, #7487) or 1200 bps Integrated Modem (#4781, #4782). **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** Appropriate BSCA (#2074 or #2084), one Voice Grade Transmission Rate from 600 to 4800 bps, and **#9483** or **#9583**. Requires appropriate cable order. See *Installation Planning Manual* (GA21-9084).

Binary Synchronous Communications Adapter (BSCA 1) (#2074): This feature, in conjunction with program control, permits System/3 mdl 12 to communicate in binary synchronous mode with other IBM systems and terminals. System/3 mdl 12 can operate on a multipoint line as either a control station or a tributary station, or on a point-to-point switched or leased communications line. Transmission rates are available from 600 to 50,000 bps. Auto-answer capability is standard in switched network version. To be effective, the modem must also have this capability. Any version can be selected to operate in EBCDIC or ASCII transmission code, but not both. A 1200 bps Integrated Modem is available as a special feature. Also see "IBM Modems". See the System/3 programming section for devices supported by IBM programming.

The BSCA 1 is designed to operate on transmission facilities such as:

- Common carrier leased telephone services (voice grade):

  AT&T or Western Union Class 3002 - 600 bps (1200 bps with 1200 bps Integrated Modem).

  AT&T or Western Union Class 3002 with C1 conditioning to 4800 bps.

  AT&T or Western Union Class 3002 with C2 conditioning to 7200 bps.

- Private (customer-owned) communications facilities equivalent to the above common carrier facilities.
- Common carrier switched network telephone (voice grade) service at 600 to 4800 bps.
- Common carrier wideband communications services at 19,200 bps, 40,800 bps, or 50,000 bps.
- Private carrier organizations providing equivalent to above data transmission services.

Maximum: One per 5412. **Field Installation:** Yes. **Prerequisites:** #5732. See "Processing Unit Expansion Configurator" for possible requirement for additional expansion features. **Specify:** See "Optional Specifications" for device attachment codes.

Binary Synchronous Communications Adapter, Second (BSCA 2) (#2084): Permits operation of two BSCAs simultaneously on System/3 mdl 12 and/or in two different configurations (speed, network attachments, line facility attachments, codes, etc.). This second adapter (#2084) is functionally identical to the first adapter (#2074). It will support the same sub-features, which require the same prerequisites as BSCA 1. The same options and limitations also apply to BSCA 2, with the following exception: #2084 is provided only in the medium-speed version (600 to 9600 bps) and does not support attachment to a wideband data link (**#9755**). Provision of a second adapter does not limit in any way the options on the first adapter.

The BSCA 2 is designed to operate on transmission facilities such as:

- Common carrier leased telephone services (voice grade):

  AT&T or Western Union Class 3002 - 600 bps (1200 bps with 1200 bps Integrated Modem).

  AT&T or Western Union Class 3002 with C1 conditioning to 4800 bps.

  AT&T or Western Union Class 3002 with C2 conditioning to 7200 bps.

- Private (customer-owned) communications facilities equivalent to the above common carrier facilities.
- Common carrier switched network telephone (voice grade) service at 600 to 4800 bps.
- Common carrier wideband communications services at 19,200 bps, 40,800 bps, or 50,000 bps.
- Private carrier organizations providing equivalent to above data transmission services.

Limitations: Cannot be installed with Local Display Adapter (#4702) or ICA (#4645). There is no wideband attachment capability. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2074. See "Processing Unit Expansion Configurator" for possible requirement for additional expansion features. **Specify:** See "Optional Specifications" for device attachment codes.

EIA Local Attachment (#3601, #3602): Permits attachment of one binary synchronous IBM control unit or terminal (EIA RS-232-C Type Interface) to System/3 mdl 12 without the use of a data communications line and modems at either device. This attachment may be used where the device is located within a distance to the 5412 that is reached by the device's EIA attachment cable (i.e., the cable normally used to attach to an external modem). This feature provides the

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clocking signals for the System/3 mdl 12's BSCA and for the attached control unit's adapter; therefore, the System/3's Internal Clock (#4703, #4723) cannot be installed on the same adapter with this feature. Data transfer rates of 2400, 4800, and 8000 bps are supported by this feature. #3601 is for #2074, and #3602 is for #2084. Available with medium-speed adapters only. **Limitations:** Cannot be installed with Internal Clock (#4703, #4723) or Auto-Call (#1315, #1325). Specification of Transfer Rates (**#9750, #9751, #9752, #9757, #9851, #9853, #9857**) is not permitted. **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** Appropriate BSCA (#2074 or #2084); **#9753, #9754, #9758, #9853, #9854,** or **#9858; #9484** or **#9584;** and **#9391** or **#9381.** See appropriate machine pages for attached device prerequisites.

Integrated Communications Adapter (ICA) (#4645): This feature, in conjunction with its sub-features, provides up to three communications interfaces, two local and one remote. When more than one interface is present, only one can be active at a time as selected by the operator through a manual switch control.

The ICA is designed to operate on transmission facilities such as:

- Common carrier leased telephone services (voice grade):

  AT&T or Western Union Class 3002 - 600 bps (1200 bps with 1200 bps Integrated Modem).

  AT&T or Western Union Class 3002 with C1 conditioning to 4800 bps.

  AT&T or Western Union Class 3002 with C2 conditioning to 7200 bps.
- Private (customer-owned) communications facilities equivalent to the above common carrier facilities.
- Common carrier switched network telephone (voice grade) service at 600 to 4800 bps.
- Common carrier wideband communications services at 19,200 bps, 40,800 bps, or 50,000 bps.
- Private carrier organizations providing equivalent to above data transmission services.

Limitations: Cannot be installed with Local Display Adapter (#4702) or BSCA 2 (#2084). **Maximum:** One per 5412. **Field Installation:** Yes. **Prerequisites:** #5732. See "Processing Unit Expansion Configurator" for possible requirement for additional expansion features. **Specify: #9070** for EBCDIC transmission code or **#9071** for ASCII. See description of interface features (#4801, #4802, and #6202) below. At least one must be specified.

Internal Clock (#4703, #4723): Generates synchronizing and timing signals for BSCA operation when they are not provided by the attached modem. When this feature is installed on System/3 mdl 12, all other BSC stations attached to the same data link must also be equipped with a similar Internal Clock feature. Contact IBM for determination of this feature's requirement with planned modems. #4703 is for #2074, and #4723 is for #2084. Will service rates 600, 1200, 2000, or 2400 bps. Available with medium-speed adapters only. **Limitations:** Cannot be installed with Transfer Rates (**#9754, #9757**). **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** Appropriate BSCA (#2074 or #2084) and one of the above-serviced transmission rate options.

1200 bps Integrated Modem (#4781, #4782): A modem for BSC data transmission at 1200 bps over nonswitched facilities or switched network. Available in two different versions: #4781 - nonswitched and #4782 - switched with auto-answer. Attachment to nonswitched (2- or 4-wire) facilities is via an IBM-provided cable directly to the line, Type 3002 facility. Attachment to the switched network is via an IBM-provided cable to FCC-registered protective circuitry of the CBS type (or equivalent) provided by the user. The device communicating with System/3 mdl 12 must also be equipped with a 1200 bps integrated modem/line adapter. Available with medium-speed adapters only. **Limitations:** Cannot be installed with sub-features Auto-Call (#1315, #1325) or EIA Local Attachment (#3601, #3602). #4781 and #4782 cannot be installed together on the same BSCA. **Maximum:** Two; one per BSCA. **Field Installation:** Yes. **Prerequisites:** Appropriate BSCA (#2074 or #2084); #5201 or #5202; #4703 or #4723; and **#9751** or **#9851.**

8000 bps Local Interface (#4801): Permits local attachment of one binary synchronous IBM control unit or terminal (EIA RS-232-C Type Interface) to the 5412 without use of communications line or modems. The external modem cable of the attached terminal connects directly to the 5412 when this feature is installed. The feature provides clocking for the 8000 bps data transfer rate. **Limitations:** Data transfer rate is 8000 bps only. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4645. See appropriate machine pages for attached device prerequisites. **Specify:** See "Optional Specifications" for device attachment codes.

2400 bps Local Interface (#4802): Permits local attachment of one binary synchronous IBM terminal (EIA RS-232-C Type Interface) to the 5412 without the use of communications line or modems. The external modem cable of the attached terminal connects directly to the 5412 when this feature is installed. The feature provides clocking for the 2400 bps data transfer rate. **Limitations:** Data transfer rate is 2400 bps only. See the System/3 programming section for devices supported by IBM programming. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4645. See appropriate machine pages for attached device prerequisites. **Specify:** See "Optional Specifications" for device attachment codes.

Modem Base (#5201, #5202): Provides for mounting of one 1200 bps Integrated Modem (#4781, #4782). #5201 is for #2074, and #5202 is for #2084. **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** Appropriate BSCA (#2074 or #2084).

Synchronous Line, Medium-Speed (#6202): Provides one medium-speed BSC line interface to an external modem. The communications network attachment may be point-to-point (switched), point-to-point (nonswitched), or multipoint (control station). Maximum transmission rate is 4800 bps for switched operation and 9600 bps for nonswitched operation. The attached modem must provide the necessary data clocking. See "IBM Modems". Devices attached to the Synchronous Line, Medium-Speed have the same requirements as when attached to System/3 via BSCA 1 (#2074) with equivalent communications facilities and line speeds. **Limitations:** Half-duplex only. Cannot function as a multipoint tributary station. Modem clocking only. See the System/3 programming section for devices supported by IBM programming. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4645. See appropriate machine pages for device prerequisites. **Specify:** See "Optional Specifications" for device attachment codes.

Station Selection (#7477, #7487): Permits the System/3 mdl 12 to operate as a compatible member of the IBM family of BSC terminals on a multipoint communications line as a tributary station. #7477 is for #2074, and #7487 is for #2084. Control station operation on a System/3 mdl 12 BSCA with Station Selection installed is possible, but such operation cannot be performed concurrently with tributary station operation on that adapter. Additionally, a change in modems or in modem operation may be required to utilize the same adapter (at different periods of time) as a tributary station and as a control station adapter. Also, the network attachment option (**#9484** or **#9584**) must be specified when control station operation is to be performed whether Station Selection (#7477, #7487) is installed or not. Available with medium-speed adapters only. **Limitations:** Cannot be installed with Auto-Call (#1315, #1325) or Line Facility Attachment (**#9391**). **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** Appropriate BSCA (#2074 or #2084), **#9382** or **#9392,** and one of the Voice Grade Transmission Rates 600 to 9600 bps.

Text Transparency (#7850, #7851): Permits the System/3 mdl 12 to transmit or receive 8-bit binary data and EBCDIC-coded data. #7850 is for #2074, and #7851 is for #2084 or #4645. Available with medium-speed (600 to 9600 bps) and with wideband attachments (19,200 to 50,000 bps). **Limitations:** Cannot be installed with ASCII Transmission Code (**#9061, #9071**). Other limitations on the use of this facility exist and are described in *General Information - Binary Synchronous Communication* (GA27-3004). **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** Appropriate BSCA (#2074 or #2084) or ICA (#4645) and **#9060** or **#9070.**

IBM Modems: One IBM modem can be attached to BSCA 1 (#2074) and/or one to BSCA 2 (#2084) or ICA (#4645) with Synchronous Line, Medium-Speed (#6202) as follows:

Modem	Nominal Speed (bps)
3872	2400/1200
3863 mdl 1 or 2	2400
3868 mdl 1	2400
3864 mdl 1 or 2	4800
3868 mdl 2	4800
3865 mdl 1 or 2	9600
3868 mdl 3 or 4	9600

See M2700, 3863, 3864, 3865, and 3872 pages for information on modem features, communications capabilities, and product utilization.

Note: Configuration requirements for IBM programming support must satisfy the minimum machine requirements. See the System/3 programming section.

See M2700 pages for additional information concerning communications facilities, machine attachment requirements, terminal intermix, and operating capabilities.

5412 Processing Unit (cont'd)

Processing Unit Expansion Configurator

Table A: To be used when either the 5424 MFCU or 1442 is attached.

		Communications										
I/O Unit Attachments	None	MLTA	BSCA 1	#4702 *	ICA	MLTA and BSCA 1	MLTA and #4702 *	MLTA and ICA	BSCA 1 and #4702 *	BSCA 1 and BSCA 2 or ICA	MLTA, BSCA 1 and #4702 *	MLTA, BSCA 1 and BSCA 2 or ICA
No additional above base **	N/A	#5732	#5732	#5732	#5732	#5733	#5733	#5733	#5732	#5732	#5733	#5733
3741	#5732	#5733	#5732	#5732	#5732	#5733	#5733	#5733	#5733	#5733	#5733	#5733
3411	#5732	#5733	#5732	#5732	#5732	#5733	#5733	#5733	#5733	#5732	#5733	#5733
3741 and 3411	#5732	#5733	#5732	#5732	#5732	#5733	#5733	#5733	#5733	#5733	#5735	#5733
SIOC	#5732	#5733	#5732	#5732	#5732	#5733	#5733	#5733	#5733	#5733	#5733	#5733
3741 and SIOC	#5732	#5733	#5732	#5732	#5732	#5733	#5733	#5733	#5733	#5733	#5735	#5734
3411 and SIOC	#5732	#5733	#5732	#5732	#5732	#5733	#5733	#5733	#5733	#5733	#5734	#5733
3741, 3411 and SIOC	#5732	#5733	#5733	#5733	#5733	#5733	#5733	#5733	#5733	#5733	#5735	#5734

* Local Display Adapter

** Base system includes CPU, printer, disk file, and a card reader (5424 or 1442).

Table B: To be used with cardless system (3741 directly attached and no card I/O).

		Communications										
I/O Unit Attachments	None	MLTA	BSCA 1	#4702 *	ICA	MLTA and BSCA 1	MLTA and #4702 *	MLTA and ICA	BSCA 1 and #4702 *	BSCA 1 and BSCA 2 or ICA	MLTA, BSCA 1 and #4702 *	MLTA, BSCA 1 and BSCA 2 or ICA
No additional above base **	N/A	#5732	#5732	#5732	#5732	#5733	#5733	#5733	#5732	#5732	#5733	#5733
3411	#5732	#5733	#5732	#5732	#5732	#5733	#5733	#5733	#5733	#5732	#5733	#5733
SIOC	#5732	#5733	#5732	#5732	#5732	#5733	#5733	#5733	#5733	#5733	#5733	#5733
3411 and SIOC	#5732	#5733	#5732	#5732	#5732	#5733	#5733	#5733	#5733	#5733	#5734	#5733

* Local Display Adapter

** Base system includes CPU, printer, disk file, and the 3741 directly attached (no card I/O).

Optional Specifications: One selection must be specified for each of the following five categories for either BSCA 1 (#2074) or BSCA 2 (#2084). For ICA (#4645), categories 1 and 5 apply to all configurations; categories 2 through 4 do not apply unless #6202 is installed.

	#2074	#2084	#4645
1. Transmission Code			
EBCDIC	#9060	#9070	#9070
ASCII	#9061	#9071	#9071
2. Transfer Rate *			
600 bps	#9750	#9850	#9850
1200 bps	#9751	#9851	#9851
2000 bps	#9752	#9852	#9852
2400 bps **	#9753	#9853	#9853
4800 bps	#9754	#9854	#9854
7200/3600 bps	#9757	#9857	#9857
8000 bps	#9758	#9858	N/A
9600 bps	#9759	#9859	#9859
High-speed (19,200 to 50,000 bps)	#9755	N/A	N/A

* Contact IBM for information concerning modems attachable to the System/3 BSCA. Refer to M2700 pages for data on communication facilities.

**See *General Information - Binary Synchronous Communication* (GA27-3004) for potential problem areas and possible restrictions to application data when using certain modems at this or higher speeds.

3. Network Attachment			
Point-to-point (nonswitched)	#9481	#9581	#9581
Point-to-point (switched)	#9483	#9583	#9583
Multipoint tributary	#9482	#9582	N/A
Multipoint control station *	#9484	#9584	#9584

* If multipoint tributary station use (with #7477/#7487) is to be implemented alternately with multipoint control station use on the same adapter, specify code #9484/#9584 must be used.

4. Line Facility Attachment *			
Duplex (4-wire only)	#9391	#9381	#9381
Half-duplex	#9392	#9382	#9382

* Where BSCA is used as a control station adapter, or when attached to a point-to-point (nonswitched) data link, the facility may be duplex (4-wire only) or half-duplex. Half-duplex facility must be specified for switched network attachments and for adapters implementing multipoint tributary station only operation.

5412 Processing Unit (cont'd)

5. One (or more if necessary) optional selection code must be specified from the following list, contingent upon planned device attachments:

	#2074	#2084	#4645
1130 System	#9572	#9672	#9672
2770 System	#9573	#9673	#9673
2780	#9574	#9674	#9674
2980	#9576	#9676	#9676
3270 System	#9577	#9677	#9677
3735	#9578	#9678	#9678
3741 mdl 2, mdl 4	#9579	#9679	#9679
5231 mdl 2	#9592	#9692	#9692
5280	#9598	#9698	#9698
6670 (as a 2770) *	#9596	#9696	#9696
* Requires a no-charge RPQ.			
Series/1	#9594	#9694	#9694
System/3	#9580	#9680	#9680
System/7	#9590	#9690	#9690
System/32	#9591	#9691	#9691
System/34	#9593	#9693	#9693
System/38	#9595	#9695	#9695
S/360 mdl 20	#9571	#9671	#9671
S/360 or S/370 (mdl 22 and up)	#9570	#9670	#9670

MODEL CONVERSIONS

Model conversions are field installable.
Replaced parts from any model upgrade become the property of IBM.

ACCESSORIES

Cables: BSCA (#2074, #2084) always requires an appropriate cable order unless EIA Local Attachment (#3601, #3602) is ordered.
ICA (#4645) requires a cable order only when #6202 is also ordered.
See *Installation Manual - Physical Planning* (GA21-9084).

SUPPLIES (None)

5415 PROCESSING UNIT

[No longer Available]

PURPOSE

The 5415 is no longer available. Model changes and special features may still be ordered. All other information is for reference only.

Contains main storage and facilities for addressing main storage, arithmetical and logical processing of data, and controlling I/O units for System/3 model 15.

MODELS

Models	Processor Storage (bytes)
B17	49,152
B18	65,536
B19	98,304
B20	131,072
C21	163,840
C22	196,608
C23	229,376
C24	262,144
D19	98,304
D20	131,072
D21	163,840
D22	196,608
D23	229,376
D24	262,144
D25	393,216
D26	524,288

Minimum Configuration:

System/3 mdl 15 with a 5415 mdl AXX, requires:
- 3277 Display Station mdl 1 with 78-key Operator Console Keyboard (#4632),
- 1403 mdl 2, 5, or N1 Printer,
- 5421 Printer Control Unit,
- A minimum of one 5444 Disk Storage Drive mdl A2,
- Either
  5424 Multi-Function Card Unit, or
  1442 Card Read Punch mdl 6 or 7, or
  2560 Multi-function Card Machine.

System/3 mdl 15s with 5415 mdl BXX through DXX, require:
- 3277 Display Station mdl 1 with 78-key Operator Console Keyboard (#4632),
- 1403 mdl 2, 5, or N1 Printer,
- 3340 Direct Access Storage Facility,
- 5421 Printer Control Unit,
- Either
  5424 Multi-Function Card Unit, or
  1442 Card Read Punch mdl 6 or 7, or
  2560 Multi-Function Card Machine.

Cardless System/3 mdl 15As require:
- 3277 Display Station mdl 1 with 78-key Operator Console Keyboard (#4632),
- 1403 mdl 2, 5, or N1 Printer,
- 5421 Printer Control Unit,
- 5422 Disk Enclosure,
- Maintenance Support Package (**#9440**),
- Channel Terminator (#1601).

Cardless System/3 mdls 15B or 15C require:
- 3277 Display Station mdl 1 with 78-key Operator Console Keyboard (#4632),
- 1403 mdl 2, 5, or N1 Printer,
- 3741 mdl 1, 2, 3, or 4 with #3265 or #3266,
- 3741 Attachment (#8220),
- Power Supply Expansion B (#5502),
- 5421 Printer Control Unit,
- Maintenance Support Package (**#9441**),
- Channel Terminator (#1601).

Cardless System/3 mdl 15Ds require:
- 3277 Display Station mdl 1 with 78-key Operator Console Keyboard (#4632),
- 1403 mdl 2, 5, or N1 Printer,
- 3741 mdl 1, 2, 3, or 4 with #3265 or #3266,
- 3741 Attachment (#8220),
- Power Supply Expansion B (#5502),
- 5421 Printer Control Unit,
- Maintenance Support Package (**#9445**),
- Channel Terminator (#1601).

Note: Configuration requirements for IBM programming support must satisfy the minimum machine requirements. See the System/3 programming pages for additional information.

Maximum Configuration: Only one 5415 can be attached to a System/3 mdl 15.

HIGHLIGHTS

CPU uses Monolithic Systems Technology (MST) for logical circuitry. Memory is Metal Oxide Semiconductor Field Effect Transistor (MOSFET) with error correction and checking. Data and instructions are stored as EBCDIC characters. Each EBCDIC character is stored in an 8-bit byte. A ninth bit is added for parity checking. Main cycle time is 1.52 microseconds (on mdl 15D, instruction cycle time for certain non-I/O instructions is faster). Instruction execution and I/O data handling uses the cycle-steal technique. 5415 mdl A processors support attachment of 5444 Disk Storage Drives. 5415 mdl B or C processors support attachment of the 3340 Direct Access Storage Facility. 5415 mdl D processors support attachment of the 3340 Direct Access Storage Facility and the 3344 Direct Access Storage.

Additional standard features supporting a multiprogramming environment include:

- Three additional instructions.
- 512K memory addressing using Address Translation Table (ATT).
- Write/Fetch CPU storage protection in 2K byte segments.
- Program check Interrupt.
- Interval timer.
- Eight levels of interrupt.
- Mask interrupt capability.
- Privileged mode operation.
- Memory error correction:
  Corrects single bit errors,
  Detects double bit errors.
- Dual-byte data channel for disks.
- Operation-end interrupt for all I/O.
- Complete overlap of I/O operation.
- Additional Field Engineer controls.

The required 3277 Display Station with 78-key Operator Console Keyboard (#4632) provides enhanced operator-machine communications. An optional console printer (3284 mdl 1 or 3287 mdl 1, 2) is also available via 3284 attachment (#7901). The Display Adapter (#4601) provides direct local attachment of up to 30 3270 devices (CRTs and printers). Communications with remotely located systems or terminals may be performed through the use of binary synchronous communications. See BSCA (#2074, #2084) and BSCC (#2094) under "Special Features". On the 5415 mdl A, B, or C, two lines maximum. On the 5415 mdl D, four lines maximum. The Local Communications Adapter provides direct local attachment of one binary synchronous IBM control unit or terminal with EIA RS-232-C type interface.

Customer Responsibilities: The customer must be advised of certain responsibilities related to the installation and maintenance of common carrier facilities/services as well as the IBM equipment. See M2700 pages and "Teleprocessing Systems" in the GI section.

He is responsible for making arrangements for installation, pricing and charges of the data communications facility and attachment of selected modems.

Toll charges, if required for installation and/or maintenance of the BSCA, are to be paid by the customer.

The IBM Marketing Representative must obtain from the customer a firm installation date for transmission services (including modems) before the order can be confirmed. For further information see M2700 pages and "Teleprocessing" in the GI section.

Publications: *System/3 Bibliography* (GC20-8080).

SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): **#9903** for 208V, or **#9905** for 230V.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, or **#9046** for white.
- Disk Configuration: If a second 5444 is ordered, specify **#9207** for 5444 mdl A3, or **#9208** for 5444 mdl A2.
- 3340/3344 Specify Configurator:

5415	Mdls Attached 3340	3344	Total Drives	Storage (MB) Main Data Area	Storage (MB) Simulation Area	Specify Features
B,C,D	A2	--	2	81.59	19.66	**#9781**
B,C	A2 & B1	--	3	122.39	29.49	**#9781** & **#9782**
D	A2 & B1	--	3	122.39	24.58	**#9781** & **#9782**
B,C	A2 & B2	--	4	162.18	39.32	**#9781** & **#9783**
D	A2 & B2	--	4	162.18	29.49	**#9781** & **#9783**
D	A2	B2	4	447.23	58.98	**#9781** & **#9784**

- I/O Attachments: Appropriate special features are required to attach most I/O units. See "Special Features".
- Configuration Codes: Required on the 5422 or 5424 dependent upon the 5444 configuration. See "Specify" in M5424 or 5422 pages.

5415 Processing Unit (cont'd)

- System Control Programming: 5704-SC1 or 5704-SC2, should be ordered at equipment order entry time. See the System/3 programming pages for additional information.
- Upending Kit: Specify **#9840** is furnished only as necessary and remains the property of IBM.
- 5412/5415 Frame Separation Kit: **#9190** if frame separation is required at installation time at those locations where building dimensions (doorways, hallways, stairways, etc.) do not allow movement of the central processor as one unit. The local Installation Planning Representative can determine if this kit is required. The Frame Separation Kit is not to be ordered when the Upending Kit (**#9840**) will suffice.

SPECIAL FEATURES

Auto-Call (#1315, #1325): Permits the System/3 mdl 15 when attached to a switched network (option **#9483** or **#9583**) via an appropriate modem and Auto-Call Unit to initiate (dial) through stored program control, a data link connection to a remote BSC station. #1315 for #2074 and #1325 for #2084. **Limitations:** Cannot be installed with Station Selection (#7477, #7487), or 1200 bps Integrated Modem (#4781, #4782). Available with medium speed adapters only. **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** #2074 or #2084, one voice grade transmission rate from 600 to 4800 bps, and **#9483** or **#9583**. Requires appropriate cable order. See *Installation Manual - Physical Planning* (GA21-9084).

Card Print Control (#1580): Controls necessary for an attached 2560 Multi-Function Card Machine mdl A1 equipped with Card Print (#1575, #1576, #1577). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #8100 on the 5415, plus #1575 on the 2560.

Channel Terminator (#1601): Terminates Channel Bank No. 1 which eliminates the requirement for a 1442, 2560, or 5424. Provides cardless capability for mdl 15. **Limitations:** Cannot be installed with #4100, #4101, #4130, or #8100. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Cardless mdl 15 A, B, C, or D.

Binary Synchronous Communications Adapter (#2074):

This feature in conjunction with program control permits System/3 mdl 15 to communicate in binary synchronous mode with other IBM systems and terminals. System/3 mdl 15 can operate on a multipoint line as either a control station or a tributary station, or on a point-to-point switched or leased communications line. Transmission rates are available from 600 bps to 50,000 bps. Auto-answer capability is standard (to be effective, the modem must also have this capability) in switched network version. Any version can be selected to operate in EBCDIC or ASCII transmission code, but not both. A 1200 bps Integrated Modem is available as a special feature. Also, see "Modems" below. See the System/3 programming pages for devices supported by IBM programming.

The BSCA is designed to operate on transmission facilities such as:

- Common Carrier leased telephone services (voice grade):

  AT&T or Western Union Class 3002-600 bps (1200 bps with 1200 bps Integrated Modem).

  AT&T or Western Union Class 3002 with C1 conditioning to 4800 bps.

  AT&T or Western Union Class 3002 with C2 conditioning to 7200 bps.
- Private (customer-owned) communications facilities equivalent to the above common carrier facilities.
- Common carrier switched network telephone (voice grade) service at 600 to 4800 bps.
- Common carrier wideband communications services at 19,200 bps, 40,800 bps, or 50,000 bps.
- Private carrier organizations providing equivalent to above data transmission services.

Limitations: Cannot be installed with Local Communications Adapter (#4765). **Maximum:** One per 5415. **Cables:** See "Accessories" and *Installation Manual - Physical Planning* (GA21-9084). **Field Installation:** Yes. **Prerequisites:** Refer to "Processing Unit Expansion Features Configurator" for possible requirement for additional Processing Unit Expansion features. **Specify:** See "BSCA-1 and BSCA-2 Optional Specify Codes" below for applicable specify codes.

See M2700 pages for additional information concerning modems, device speeds, communications facilities, machine attachment requirements, terminal intermix, operating capabilities, and customer responsibilities.

Binary Synchronous Communications Adapter, Second (#2084): Permits operation of two BSCAs simultaneously on System/3 mdl 15 and/or in two different configurations (speed, network attachments, line facility attachments, codes, etc.). This second adapter (#2084) is functionally identical to the first adapter (#2074). It will support the same sub-features, which require the same prerequisites as the first BSCA. The same options and limitations also apply to the second BSCA, with the following exception: #2084 is provided only in the medium-speed version (600 to 9600 bps) and does not support attachment to a wideband data link, option **#9755**. Provision of a second adapter does not limit in any way the options on the first adapter. **Limitations:** No wideband attachment capability. Cannot be installed with Display Adapter (#4601). **Maximum:** One per System/3 mdl 15. **Cables:** See "Accessories" and *Installation Manual - Physical Planning* (GA21-9084). **Field Installation:** Yes. **Prerequisites:** #2074 or #4765. See "Processing Unit Expansion Features Configurator" for possible requirement of additional Processing Unit Expansion features. **Specify:** See below and "Specify" section for applicable specify codes.

Modems: One IBM modem can be attached to the BSCA (#2074) and/or one to the BSCA, Second (#2084) as follows:

Modem	Nominal Rate (bps)
3863 mdl 1 or 2	2400
3868 mdl 1	2400
3872	2400/1200
3864 mdl 1 or 2	4800
3868 mdl 2	4800
3865 mdl 1 or 2	9600
3868 mdl 3 or 4	9600

See M2700, 3863, 3864, 3865, and 3872 pages for information on modem features, communications capabilities, and product utilization.

BSCA-1 and BSCA-2 Optional Specify Codes: One selection must be specified from each of the following five categories for each adapter.

	#2074	#2084
1. Transmission Code:		
EBCDIC	**#9060**	**#9070**
ASCII	**#9061**	**#9071**
2. Transfer Rate: *		
600 bps	**#9750**	**#9850**
1200 bps	**#9751**	**#9851**
2000 bps	**#9752**	**#9852**
2400 bps **	**#9753**	**#9853**
4800 bps	**#9754**	**#9854**
7200/3600 bps	**#9757**	**#9857**
8000 bps	**#9758**	**#9858**
High Speed (19,200 to 50,000 bps)	**#9755**	N/A
9600 bps	**#9759**	**#9859**

Notes:
* Refer to M2700 pages for data on communications facilities. For information concerning modems attachable to the System/3 BSCA, contact IBM.

** See SRL (GA27-3004) for potential problem areas and possible restrictions to application data when using certain modems at this or higher speeds.

3. Network Attachment:		
Point-to-point (nonswitched)	**#9481**	**#9581**
Point-to-point (switched)	**#9483**	**#9583**
Multipoint Tributary	**#9482**	**#9582**
Multipoint Control Station *	**#9484**	**#9584**

Note:
* If Multipoint Tributary Station with #7477 or #7487 is to be implemented alternately with Multipoint Control Station use on the same adapter, specify code **#9484** or **#9584** must be used.

4. Line Facility Attachment: *		
Duplex (4-wire only)	**#9391**	**#9381**
Half-Duplex	**#9392**	**#9382**

Note:
* Where BSCA is used as a Control Station adapter or when attached to a point-to-point (nonswitched) data link, the facility may be duplex (4-wire only) or half-duplex. Half-duplex facility must be specified for switched network attachments and for adapters implementing Multipoint Tributary Station only operation.

5. One (or more if necessary) optional selection codes must be specified from the following list, contingent upon planned device attachments:

1130 System	**#9572**	**#9672**
2770 System	**#9573**	**#9673**
2780	**#9574**	**#9674**
2980	**#9576**	**#9676**
3270 System	**#9577**	**#9677**
3600 *	**#9595**	**#9695**
3735	**#9578**	**#9678**
3741 mdl 2, mdl 4	**#9579**	**#9679**
5231 mdl 2	**#9592**	**#9692**
5280	**#9598**	**#9698**
6670 (as a 2770) *	**#9596**	**#9696**
Series/1	**#9594**	**#9694**
System/3	**#9580**	**#9680**
System/7	**#9590**	**#9690**

5415 Processing Unit (cont'd)

System/32	#9591	#9691
System/34	#9593	#9693
System/38	#9599	#9699
S/360 or S/370 (mdl 22 and up)	#9570	#9670
S/360 mdl 20	#9571	#9671

Note:
* Requires a no-charge RPQ.

Binary Synchronous Communications Controller (#2094): [System/3 mdl 15D] Provides the controller base for attachment of two additional binary synchronous communications lines. One or two additional lines are ordered as separate features (see under #4891 and #4892 below). BSCC can also provide the terminal polling function (depending on the terminal type attached) for the 1 or 2 lines and thereby reduce CPU loading. The BSCC can handle polling functions outboard of the mdl 15D CPU. Both lines operate independently in either a point-to-point or multipoint control station mode over nonswitched communication facilities at speeds up to 9600 bps. Point-to-point or multipoint control station mode of operation is selected during CCP generation. See the System/3 programming section for additional information. Text transparency is standard but applicable to EBCDIC coded data only.

BSCC Optional Specify Codes: One selection must be specified for each of the following four categories for each Line Base:

	#4891	#4892
1. Transmission Code:		
EBCDIC	#9080	#9090
ASCII	#9081	#9091
2. Line Speed:		
600 bps	#9300	#9400
1200 bps	#9301	#9401
2000 bps	#9302	#9402
2400 bps	#9303	#9403
4800 bps	#9304	#9404
7200 bps	#9305	#9405
9600 bps	#9306	#9406
3. Line Facility Attachment:		
2-Wire	#9310	#9410
4-Wire	#9311	#9411
4. Device Attachment (1 or more):		
3270	#9320	#9420
3600 *	#9321	#9421
3735	#9322	#9422
3740	#9323	#9423
5230	#9324	#9424
5280	#9332	#9432
5285	#9332	#9432
5288	#9332	#9432
Series/1	#9331	#9431
System/3	#9325	#9425
System/7	#9326	#9426
System/32	#9327	#9427
System/34	#9330	#9430
System/38	#9342	#9442
Other IBM	#9328	#9428
Other Non-IBM	#9329	#9429

Note:
* Requires no-charge RPQ.

Modems: One IBM modem can be attached to each Line Base (#3703 or #3704 required).

Modem	Data Rate (bps)
3863 mdl 1 or 2	2400
3868 mdl 1	2400
3872	2400
3864 mdl 1 or 2	4800, 9600
3868 mdl 2	4800

See M2700, 3863, 3864, 3865, and 3872 pages for information on modem features, communications capabilities and product utilization.

Communication Facility Attachments: The BSCC is designed to operate on communication facilities such as:

- Common carrier leased telephone services (voice grade).
  Class 3002 (600 bps)
  1200 bps with Integrated Modem (#5803, #5804)
  2400 bps with IBM 3863 mdl 1 or 3872
  Class 3002 with C1 conditioning (4800 bps)
  Class 3002 with C2 conditioning (7200 bps)
- Private or private carrier facilities equivalent to the above.
- AT&Ts Private Line Data-Phone® Digital Service (#5813, #5814) to 9600 bps.

Reference: For additional information concerning modems and communications facilities, see M2700 pages. See also machines pages for devices planned for attachment.

Limitations: Cannot be installed with the MLTA RPQ (S40028). Operation on nonswitched facilities only. **Maximum:** One per 5415 mdl D. **Field Installation:** Yes. **Cables:** See "Accessories" and *Installation Manual - Physical Planning* (GA21-9084). **Prerequisites:** See "Processing Unit Expansion Features Configurator" for possible expansion feature requirements.

EIA Local Attachment (#3601, #3602): Permits attachment of one binary synchronous IBM system, control unit, or terminal with EIA RS-232-C type interface to System/3 mdl 15 without the use of a data communications line and modems at either device. This attachment may be used where the device is located within a distance to the 5415 that is reached by the device's EIA attachment cable (i.e., the cable normally used to attach to an external modem). This feature provides the clocking signals for the System/3 mdl 15's BSCA and for the attached device's communications adapter therefore, the System/3's Internal Clock (#4703, #4723) cannot be installed on the same adapter with this feature. Data transfer rates of 2400, 4800, and 8000 bps are supported by this feature. See "Transfer Rate" above. #3601 for #2074 or #3602 for #2084. **Limitations:** Cannot be installed with Internal Clock (#4703, #4723), or Auto-Call (#1315, #1325). **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** #2074 or #2084, **#9753, #9754, #9758** or **#9853, #9854, #9858, #9484** or **#9584**, and **#9391** or **#9381**. See appropriate machines pages for attached device prerequisites.

EIA Local (#3603, #3604): Permits local attachment of one binary synchronous IBM system, control unit, or terminal with EIA RS-232-C type interface to the 5415 without the use of communications line or modem. The external modem cable of the attached device connects directly to the 5415 when this feature is installed. Data clocking for transfer rates of 2400 bps, 4800 bps, 7200 bps and 9600 bps is provided by this feature for both the 5415 and the attached device. The device must be capable of functioning as either a point-to-point or a multipoint tributary station at the transfer rate provided by this feature. **Limitations:** Cannot be installed on the same Line Base with EIA Interface (#3703, #3704) or 1200 bps Integrated Modem (#5803, #5804) or DDS Adapter (#5813, #5814). **Maximum:** One per Line Base. **Prerequisites:** #4891 for #3603, #4892 for #3604. One of four transfer rates: 2400 bps, 4800 bps, 7200 bps, or 9600 bps must be specified on the applicable Line Base.

EIA Interface (#3703, #3704): Provides an interface for attachment of an external modem meeting EIA RS-232-C characteristics. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy.

Modems: One IBM modem can be attached to each Line Base (#3703, #3704 required):

Modem	Data Rate (bps)
3863 mdl 1 or 2	2400
3868 mdl 1	2400
3872	2400
3864 mdl 1 or 2	4800
3868 mdl 2	4800
3865 mdl 1 or 2	9600

Limitations: Cannot be installed on the same Line Base with the 1200 bps Integrated Modem (#5803, #5804) or DDSA (#5813, #5814) or EIA Local (#3603, #3604). **Maximum:** One per Line Base. **Field Installation:** Yes. **Prerequisites:** #4891 for #3703 or #4892 for #3704. See "Cables" under "Accessories".

5415 Processing Unit (cont'd)

Multi-Function Card Unit Attachment 250/60/60 cpm (#4100): To attach a 5424 Multi-Function Card Unit mdl A1. **Limitations:** Cannot be installed with #1601, #4130, or #8100. **Maximum:** One. **Field Installation:** Yes.

Multi-Function Card Unit Attachment 500/120/120 cpm (#4101): To attach a 5424 Multi-Function Card Unit mdl A2. **Limitations:** Cannot be installed with #1601, #4130, or #8100. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4100.

1442 Mdl 6/7 Card Read Punch Attachment (#4130): To attach a 1442 mdl 6 or 7. **Limitations:** Cannot be installed with #1601, #4100, #4101, or #8100. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** A 5422 with 5415 mdls A17 through A20. #3950 on the 1442. #5502 must be ordered with mdl B, C, or D.

1403 Mdl 5 Printer Attachment 465 lpm (#4135): To attach a 1403 Printer mdl 5. **Limitations:** Cannot be installed with #4140 or #4150. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4160 and a 5421 with #9185.

1403 Mdl 2 Printer Attachment 600 lpm (#4140): To attach a 1403 Printer mdl 2. **Limitations:** Cannot be installed with #4135 or #4150. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4160 and a 5421.

1403 Mdl N1 Printer Attachment 1100 lpm (#4150): To attach a 1403 Printer mdl N1. **Limitations:** Cannot be installed with #4135 or #4140. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4160 and a 5421.

1403 Basic Attachment Control (#4160): To attach all mdls of a 1403 Printer. **Maximum:** One. **Field Installation:** Yes.

Display Adapter (#4601): For direct local attachment of 3270 devices (3277 mdls 1, 2, 3284 mdls 1, 2, 3286 mdls 1, 2, 3287 mdls 1, 2, 3288 mdl 2) in any combination. Includes the basic control and interface for three devices. The 3270 device cables, maximum length 600m (2,000 feet) plug directly into the 5415 when this feature is installed. For attachment of additional 3270 devices (maximum of 30), see Device Interface (#4602). Programming support for the attached devices is provided by the Multiline/Multipoint interface and the Communication Control Program feature of the SCP. **Limitations:** Cannot be installed with BSCA-2 (#2084). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5733. See "Processing Unit Expansion Features Configurator" for possible requirements for additional expansion features. #9089 required on attached 3270 devices. See applicable machines pages for 3270 device ordering details.

Device Interface (#4602): Provides for attachment of three additional 3270 devices (3277 mdls 1, 2, 3284 mdls 1, 2, 3286 mdls 1, 2, 3287 mdls 1, 2, 3288 mdl 2) in any combination to the Display Adapter (#4601). **Maximum:** Nine, for a maximum of 30 attached devices. **Field Installation:** Yes. **Prerequisites:** #4601.

Internal Clock (#4703, #4723): Generates synchronizing and timing signals for BSCA operation when they are not provided by the attached modem. When this feature is installed on System/3 mdl 15, all other BSC stations attached to the same data link must also be equipped with a similar Internal Clock feature. See IBM, for determination of requirements with planned modems. #4703 for #2074 and #4723 for #2084. Will service rates 600 bps, 1200 bps, 2000 bps, or 2400 bps. **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** #2074 or #2084, and one of the rate options listed above, see "Transfer Rate".

Internal Clock (#4733, #4734): Provides business machine clocking at 1200 bps for the external or integrated modem operating at that line speed. This feature is always required for the 1200 bps Integrated Modem (#5803, #5804). **Limitations:** 1200 bps only. For use only when modem does not provide clocking. **Maximum:** One per Line Base. **Field Installation:** Yes. **Prerequisites:** #4891 for #4733, #4892 for #4734.

Local Communications Adapter (#4765): Permits local attachment of one binary synchronous IBM control unit or terminal with EIA RS-232-C type interface to a System/3 mdl 15. The external modem cable of the device will attach directly to the 5415 when this feature is installed. Data transfer rate is 2400 bps only. EBCDIC transmission code must be specified when applicable on the attached device. See the System/3 programming pages for devices supported by IBM programming. **Limitations:** Cannot be installed with BSCA-1 (#2074). Data exchange with attached device is non-transparent only. For data-transparent operation contact IBM. **Maximum:** One per 5415. **Field Installation** Yes. **Prerequisites:** Requires the same Processing Unit Expansion Features as BSCA-1 (#2074). See "Processing Unit Expansion Features Configurator" for possible requirements for additional expansion features. See appropriate machines pages for attached device prerequisites. **Specify:** See "BSCA-1 and BSCA-2 Optional Specify Codes" above for applicable device attachment codes.

1200 bps Integrated Modem (#4781, #4782): A modem for BSC data transmission at 1200 bps over nonswitched facilities or switched network. Available in two different versions: #4781 Nonswitched and #4782 Switched with Auto-Answer. Attachment to nonswitched (2- or 4-wire) facilities is via an IBM-provided cable directly to the line, Type 3002 facility. Attachment to the switched network is via an IBM provided cable to FCC registered protective circuitry of the CBS Type (or equivalent) provided by the user. The device communicating with System/3 mdl 15 must also be equipped with a 1200 bps Integrated Modem or line adapter. **Limitations:** Cannot be installed with sub-features Auto-Call (#1315, #1325) or EIA Local Attachment (#3601, #3602). #4781 and #4782 cannot be installed together on the same BSCA. **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** #2074, #5201, #4703 and #9751, or #2084, #5202, #4723 and #9851.

Line Base, 1st (#4891): For attachment of the first communications line to the BSCC (#2094) through one of the line interface features. One of the line interface features #3603, #3604, #3703, #3704, #5803, #5804, #5813, #5814, must be ordered for each Line Base depending on the type of communication facility and modem to be used. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2094. **Specify:** See "BSCC Optional Specify Codes" above for selection of transmission codes, line speeds, etc.

Line Base, 2nd (#4892): For attachment of the second communications line to the BSCC (#2094) through one of the line interface features. One of the line interface features #3603, #3604, #3703, #3704, #5803, #5804, #5813, #5814, must be ordered for each Line Base depending on the type of communication facility and modem to be used. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2094 and #4891. **Specify:** See "BSCC Optional Specify Codes" above for selection of transmission codes, line speeds, etc.

Modem Base (#5201, #5202): Provides for mounting of one 1200 bps Integrated Modem (#4781, #4782). #5201 for #2074 and #5202 for #2084. **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** #2074 for #5201 or #2084 for #5202.

Power Supply Expansion A (#5501): Provides additional processing unit 6 volt power. Required when certain RPQs are attached. Contact IBM for details. **Maximum:** One. **Field Installation:** Yes.

Power Supply Expansion B (#5502): Provides additional processing unit 24 V power. Required on mdls B, C, and D when 5424 is not attached, or if Channel Terminator Feature #1601 is installed. **Maximum:** One. **Field Installation:** Yes.

Processing Unit Expansion 1 (#5733): Provides additional processing unit power supply and connections. Refer to the "Processing Unit Expansion Features Configurator" below to determine requirements. May be required when certain RPQs are ordered. Contact IBM for details. **Maximum:** One. **Field Installation:** Yes.

Processing Unit Expansion 2 (#5734): Provides additional processing unit power supply and connections. May be required when certain RPQs are ordered. Contact IBM for details. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5733.

Processing Unit Expansion 3 (#5735): Provides additional processing unit power supply and connections. May be required when certain RPQs are ordered. Contact IBM for details. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5733 and #5734.

Processing Unit Expansion Features Configurator: [All mdls except D with BSCC]

		Communications					
I/O Unit Attachment	None	#2074 or #4765	#2084 & #2074 or #4765	#7081 & #2074 or #4765	#2084 & #7081 & #2074 or #4765	#7081	#4601 & #7081 & #2074 or #4765
Neither 2501 (#8090) nor 3411 (#7951) nor 3741 (#8220)	-----	-----	#5733	#5733	#5733	-----	#5733
2501 (#8090)	-----	#5733	#5733	#5733	#5733	-----	#5733
2501 & 3411 (#8090 & #7951)	-----	#5733	#5733	#5733	#5733	#5733	#5733
2501 & 3411 & 3741 (#8090 & #7951 & #8220)	#5733	#5733	#5733	#5733	#5733	#5733	#5734
3411 (#7951)	-----	#5733	#5733	#5733	#5733	-----	#5733
3411 & 3741 (#7951 & #8220)	-----	#5733	#5733	#5733	#5733	#5733	#5733
3741 (#8220)	-----	#5733	#5733	#5733	#5733	-----	#5733
3741 & 2501 (#8220 & #8090)	-----	#5733	#5733	#5733	#5733	#5733	#5733

5415 Processing Unit (cont'd)

Processing Unit Expansion Features Configurator: [Mdl D with BSCC]

I/O Unit Attachment	#2094	Communications #2094 & #2074 or #4765	#2094 & #2084 & #2074 or #4765	#2094 & #2084 & #7081 & #2074 or #4765	#2094 & #2084 & #7081 & #2074 or #4765	#2094 & #7081
Neither 2501 (#8090) nor 3411 (#7951) nor 3741 (#8220)	-----	#5733	#5733	#5733	#5733	#5733
2501 (#8090)	#5733	#5733	#5733	#5733	#5733	#5733
2501 & 3411 (#8090 & #7951)	#5733	#5733	#5733	#5733	#5733	#5733
2501 & 3411 & 3741 (#8090 & #7951 & #8220)	#5733	#5733	#5734	#5733	#5734	#5733
3411 (#7951)	#5733	#5733	#5733	#5733	#5733	#5733
3411 & 3741 (#7951 & #8220)	#5733	#5733	#5733	#5733	#5734	#5733
3741 (#8220)	#5733	#5733	#5733	#5733	#5733	#5733
3741 & 2501 (#8220 & #8090)	#5733	#5733	#5733	#5733	#5734	#5733

I/O Unit Attachment	Communications #2094 & #7081 & #4601	#2094 & #2074 or #4765 & #4601	#2094 & #4601 & #7081 & #2074 or #4765
Neither 2501 (#8090) nor 3411 (#7951) nor 3741 (#8220)	#5733	#5733	#5733
2501 (#8090)	#5733	#5733	#5734
2501 & 3411 (#8090 & #7951)	#5733	#5733	#5734
2501 & 3411 & 3741 (#8090 & #7951 & #8220)	#5735	#5735	#5735
3411 (#7951)	#5733	#5733	#5733
3411 & 3741 (#7951 & #8220)	#5733	#5733	#5735
3741 (#8220)	#5733	#5733	#5735
3741 & 2501 (#8220 & #8090)	#5733	#5735	#5735

Note: If RPQs are on the 5415, contact IBM.

1200 bps Integrated Modem (#5803, #5804): A modem for data transmission at 1200 bps over nonswitched (2- or 4-wire) facilities. Attachment to the communication facility is via an IBM-provided cable directly to the common carrier Type 3002 channel or equivalent. All devices communicating with System/3 must be equipped with a compatible IBM 1200 bps Integrated Modem/Line Adapter. **Maximum:** One per Line Base. **Field Installation:** Yes. **Limitations:** Cannot be installed on the same Line Base with the EIAInterface (#3703, #3704) or DDSA (#5813, #5814) or EIA Local (#3603, #3604). Nonswitched facilities only. **Prerequisites:** #4733 for #5803 or #4734 for #5804. #4891 for #5803 or #4892 for #5804. See "Cables" under "Accessories".

DDS Adapter (#5813, #5814): An integrated adapter for attachment to the AT&T nonswitched Data-Phone® Digital Service network. The DDSA interfaces to a DDS channel service unit at the customer-site termination of the DDS network. Line speeds of 2400 bps, 4800 bps, and 9600 bps are available. **Limitations:** Cannot be installed on the same Line Base with Interface (#3703, #3704) or 1200 bps Integrated Modem (#5803, #5804) or EIA Local (#3603, #3604). **Maximum:** One per Line Base. **Field Installation:** Yes. **Prerequisites:** #4891 for #5813 or #4892 for #5814. One of the three line speeds: 2400 bps, 4800 bps, or 9600 bps, must be specified on the applicable Line Base. **#9311** or **#9411.** See "Cables" under "Accessories".

Serial I/O Channel (#7081): To attach a 1255 Magnetic Character Reader or a 3881 Optical Mark Reader. **Maximum:** One. **Field Installation:** Yes.

Station Selection (#7477, #7487): Permits the System/3 mdl 15 to operate as a compatible member of the IBM family of BSC terminals on a multipoint communications line as a tributary station. #7477 is for #2074 and #7487 is for #2084. Will service rates of 600 - 9600 bps. **Limitations:** Cannot be installed with Auto-Call (#1315, #1325). **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** #2074 or #2084, **#9392** or **#9382**, and one of the rate selections, 600 to 9600 bps. Note: Control station operation on a System/3 mdl 15 BSCA with Station Selection installed is possible, but such operation cannot be performed concurrently with tributary station operation on that adapter. Additionally, a change in modems or in modem operation may be required to utilize the same adapter (at different periods of time) as a tributary station and as a control station adapter. **#9484** or **#9584** must be specified when control station operation is to be performed whether or not Station Selection (#7477, #7487) is installed.

Text Transparency (#7850, #7851): Permits the System/3 mdl 15 to transmit or receive 8-bit binary data and EBCDIC coded data. #7850 for #2074 and #7851 for #2084. **Limitations:** Cannot be installed with ASCII Transmission Code (**#9061**, **#9071**). Available with medium-speed (600 to 9600 bps) and with wideband attachments (19,000 to 50,000 bps). Limitations on the use of this facility are described in SRL (GA27-3004). **Maximum:** One per BSCA. **Field Installation:** Yes. **Prerequisites:** #2074 or #2084, and **#9060** or **#9070**.

3284 Attachment (#7901): To attach a 3284 Printer mdl 1 or a 3287 Printer mdl 1 or 2. **Maximum:** One. **Field Installation:** Yes.

3411 Magnetic Tape Attachment (#7951): To attach a 3411 Magnetic Tape Unit and Control. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5733, #5734, or #5735 may be required dependent upon other features. Refer to "Processing Unit Expansion Features Configurator" to determine requirements.

2501 Attachment (#8090): To attach a 2501 Card Reader mdl A1 or A2. **Limitations:** 2501 and 5424, 2560, 1442, or Channel Terminator Feature #1601. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #5733, #5734, or #5735 may be required dependent upon other features. #3630 on the 2501. Refer to "Processing Unit Expansion Features Configurator" to determine requirements.

2560 Multi-Function Card Machine Attachment (#8100): To attach a 2560 Multi-Function Card Machine. **Limitations:** Cannot be installed with #1601, #4100, #4101, or #4130. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** 5422 with 5415 mdls A17 through A20. #5502 must be ordered with mdl B, C, or D. **Specify: #9801** if 2560 mdl A1 is to be attached.

3741 Attachment (#8220): To directly attach a 3741 mdl 1, 2, 3, or 4. **Limitations:** For 3741 mdls 3 and 4, System/3 does not support the Application Control Language (ACL). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** See "Processing Unit Expansion Features Configurator" for possible requirements for additional expansion features. #3265 or #3266 on 3741. #1601 on Cardless mdl B, C, or D.

MODEL CONVERSIONS

All model conversions are field installable. For a 5410 or 5415 mdl A to 5415 mdl B, C, or D conversion where an installed 5424 is to be moved to the new system, an MES must be submitted to remove the 5444(s) from the 5424. This MES must also delete **#9400**, and if a second 5444 is installed, **#9401** or **#9402** (all from the 5424). Replaced parts from any model conversion become the property of IBM.

ACCESSORIES

Cables: BSCA (#2074, #2084) and BSCC (#2094) require an appropriate cable order unless EIA Local Attachment (#3601, #3602) is ordered, see *Installation Manual - Physical Planning* (GA21-9084).

SUPPLIES (None)

5424 MULTI-FUNCTION CARD UNIT
Models A1, A2

PURPOSE

A multi-function card input/output unit for the 4331 Model Group 1 or 2 Processor or System/3 model 10, 12, 15 or System/38 ... uses the 96-column card.

MODELS

	Speed (Read/Punch/Print)
Model A1	250/60/60* cpm
Model A2	500/120/120* cpm

* **Print Speed:** Is at the maximum rate of 60 or 120 cards per minute when printing on any or all of the first three lines. Printing on the fourth (lower) line will cause reduction in throughput regardless of whether or not printing occurs on any or all of the first three lines. Resultant throughput is 48 cpm for a mdl A1 and 96 cpm for a mdl A2. Uses a cassette ribbon replaceable by the customer.

Limitations: Detailed disclosure specifications describing the 96-column card are available from the IBM Corp., Commercial Development Office, Armonk, New York. Card configurations or card stocks which do not conform to these specifications may result in unsatisfactory machine performance.

Cannot be attached to a System/3 Mdl 10 or Mdl 12 when a 1442 Card Read Punch is attached.

Cannot be converted to a System/3 Mdl 15 when a 1442 Card Read Punch or a 2560 MFCM is attached on the System/3 Mdl 15.

OCR type fonts for use with current line IBM Optical Character Reading equipment are not available.

Maximum: One 5424 can be attached to a 4321 or 4331 Processor. or a System/3 mdl 10, 12, 15 or System 38.

Prerequisites: A Multi-Function Card Unit Attachment (#3901) on the 4321 or 4331 Mdl Group 1 or 2 Processor, 4331 Attachment (#6510) on the 5424. A Multi-Function Card Unit Attachment (#4100 or #4101) on the 5410, 5412 or 5415 Processing unit. On System/38 an MFCU Attachment (#1220 or #1221) is required.

HIGHLIGHTS

Provides the combined functions of a card reader, punch, collator and interpreter in one unit. Permits collating, gangpunching, reproducing, summary punching, punching of calculated results, printing, and classifying of cards in a single pass of the cards. Card sorting is also possible using a multiple pass method under program control. In a disk oriented System/3 mdl 10 or mdl 15A, the 5444 Disk Storage Drives are housed in drawers beneath the front of the 5424 ... see "Specify."

Input Section: Separate primary and secondary card hoppers, each with a 2000 card capacity, feed cards independently to a common read station and on into separate wait stations. Depending upon the model, rated serial reading is at 250 or 500 cards/minute from either hopper. The common reading unit is checked for proper functioning on each read cycle. The card code read is 6 rows consisting of B, A, 8, 4, 2, 1 punches representing a 64-character set.

Output Section: From separate wait stations, cards are fed to a common punch station, through the punch and cornering stations to the print station, where up to 4 lines with up to 32 characters per line can be printed on the card. Line designation is determined by the stored program. Characters represented are the standard 64-character set corresponding to the 96-column card code. Printing is by engraved typewheel. Cards are then selected into any one of the 4 stackers, each with a 600-card capacity. Depending upon the model, rated serial punching is at 60 or 120 cards/minute.

Multi-Function: With the ability to move cards from either hopper under independent control to the punching station and with complete stacker selection flexibility, the common card functions of collating, reproducing, gangpunching, summary punching and selective stacking can be accomplished.

Bibliography: GA21-9167

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (AC, 1-phase, 60 Hz): **#9902** for 208V or **#9904** for 230V ... must be consistent with system voltage.
- Color: **#9066** (Pearl White) must be specified.

  For System/3, specify **#9041** for red, **#9042** for yellow, **#9043** for blue **#9045** for gray, or **9046** for white ... must be consistent with 5410, 5412, or 5415 color. For 5424 ordered with System/38, #9066 (Pearl White) must be ordered.
- Lower covers: System/3 mdl 10 or a System/3 mdl 15 only is if a 5444 is to be installed): **#9400** if one 5444 is to be installed ... **#9401** if two 5444s are to be installation ... **#9402** if a second 5444 is to be added to an installed system.

  Note: **#9400** or **#9401** can be plant or field installed ... **#9402** is for field installation only. MES orders for **#9400**, **#9401**, or **#9402** is for field installation only. MES orders for **#9400**, **#9401**, or **#9402** on a System/3 mdl 10 require the serial no. of the 5410 Processing Unit.
- Removal: If two 5444s are installed and one is to be removed from the system, the MES must indicate deletion of **#9401** or **#9402** and installation of **#9400** (one disk drive only). For conversion of a 5415A mdl CPU to a 5415B, 5415C, or 5415D mdl, or for conversion from a 5410 CPU, to a 5412 or 5415 the MES must indicate deletion of **#9400**, and if a second 5444 is installed, deletion of **#9401** or **#9402**.

SPECIAL FEATURE

System/38 Attachment (#6500): To attach a 5424 to System/38, **Field Installation:** No **Prerequisites:** MFCU Attachment (#1220/#1221) is required on System/38.

4331 Attachment (#6510): To attach a 5424 mdl A1 or A2 to a 4331. **Field Installation:** No. **Prerequisites:** #3901 on 4331.

MODEL CONVERSIONS

Model changes are field installable.

ACCESSORIES (None)

SUPPLIES (None)

5525 SYSTEM UNIT

PURPOSE

The 5520 Administrative System is a shared logic system designed to support text processing, file processing, and electronic document distribution services for a wide variety of organizations. Text-oriented hardware and a licensed program have been combined to provide facilities for document (including file) creation, revision, storage, retrieval, and printing as well as optional local and/or remote document distribution.

MODELS

Model 20	020
Model 21	021
Model 30	030
Model 31	031
Model 32	032
Model 40	040
Model 50	050
Model 51	051

Configuration Overview: [Mdls 20, 30, 40, and 50]

	20	30	40	50	Notes
Using Program 5611-SS1					1
# Display Station Lines	1-4	1-4	1-8	1-8	
# Display Stations Attachable	1-6	1-12	1-18	1-18	2, 3
Disk Storage Capacity (MB)	29	29	65	130	4
Online Diskettes	1	1	1	23	5
# Printer/ Communication Lines	0-2	0-4	0-8	0-16	6, 7, 8
# Printers Attachable *	0-3	0-6	0-10	0-12	6, 7, 8, 9
# Mag Card Units	0-1	0-1	0-1	0-1	10

* May include a single (in exceptional cases more than one) 6670.

Notes:

1. Licensed Program 5611-SS1 supports mdls 20, 30, 40, and 50. See 5520 programming pages for details.
2. One 5253 Display Station, to be designated as the primary display station, must be located within 6.1 meters (20 feet) of the System Unit and in the same room.

   Not more than seven 5253 display stationsor 5150 Personal Computers per line. 5254 Dual Display Stations count as two each. May be multidropped up to 1,524 cable-meters (5,000 cable-feet) from the System Unit.A 5150 should not be used as the 5520 primary or alternate display station. The customer service representative must use the 5253 as the master display station to perform diagnostics. See also the "Special Note" following.
3. When attached to the 5525 System Unit under control of licensed program 5611-SS1, the following characteristics apply to the 5150 emulating a 5253 or 5254:

Maximum line length	172 characters
Maximum page length	125 lines
Overall page character count maximum of approximately	7,000 characters

   Double underscore is obtainable under keyboard emulation. Blinking, reverse image, and non-display are under control of the program and not directly available to the operator.
4. Disk storage is used to hold the licensed program, a library of documents available for text processing functions, and transient storage of documents in process of distribution. The total document capacity will be influenced by a number of factors. See "Special Note" following.
5. The diskette drive supports Diskette 2D. Each customer-supplied diskette (2D) holds approximately one million bytes of information. However, since the diskettes are removable, the total offline storage is limited only by the number of diskettes available.
6. Each line must be designated as one of these types:
   - Local Device Control (LDC) (for attachment of 5219, 5257, 5258, 6670, and/or another 5525), no more than eight LDC lines per 5525.
   - Attachment to switched communication lines.
   - Attachment to nonswitched communication lines.

   Note: A dedicated nonswitched SDLC communications line may also be used to attach a 6670 Information Distributor as a remote printer.

   See 5520 programming pages for details of devices supported for remote attachment via communication lines.
7. For multi-line configuration, the lines are controlled by a distribution controller (except on mdl 50, which requires a second controller for optional lines 9 to 16).
8. The distribution controllers operate at specific numbers of bits per second and with specific number of receive buffers per line. The aggregate concurrent bps and concurrent buffer allocation requirements of devices attached to each controller should not exceed its specific capacities; see the "Special Note" below.
9. Printers may be multidropped up to 1,524 cable-meters (5,000 cable-feet) radially from the System Unit on an LDC line. Maximum eight on one line (5525 mdl-dependent). 5219, 5257, 5258, 6670 may be mixed on a single line. A 5525 System Unit may be substituted for a printer on any LDC line where the printer attaches via feature #1702 or #1704. In such a configuration the primary system unit controls the printers. See also the "Special Note" following.
10. The Mag Card Unit may be up to 4.6 meters (15 feet) from the System Unit. It is supported by Release 2 or 3 of Licensed Program 5611-SS1.

Configuration Overview: [Mdls 21, 31, 32, and 51]:

	21	31	32	51	Notes
Using Program 5611-SS2					1
# Display Station Lines	1-4	1-4	1-4	1-8	
# Display Stations Attachable	1-8	1-12	1-15	1-36	2, 3, 12
Disk Storage Capacity (MB)	29	29	58	130	4
Online Diskettes	1	1	1	23	5
# Printer/ Communication Lines	0-2	0-4	0-8	0-16	6, 7, 8, 11
# Printers Attachable *	0-3	0-6	0-8	0-12	6, 7, 8, 9
# Mag Card Units	0-1	0-1	0-1	0-1	10

* May include a single (in exceptional cases more than one) 6670.

Notes:

1. Licensed Program 5611-SS2 supports mdls 21, 31, 32, and 51 with the functions of text processing and system management functions, electronic document distribution, and files processing and stored procedures. Also, document distribution support to a host S/370 (BSC), 3270 emulation and printer support for a 6670 Information Distributor (SDLC). See 5520 programming pages for details.
2. One 5253 Display Station, to be designated as the primary display station, must be located within 6.1 meters (20 feet) of the System Unit and in the same room.

   Not more than seven 5253 Display Stations, 5150 or 5160 Personal Computers per line. 5254 Dual Display Stations count as two each. May be multidropped up to 1,524 cable-meters (5,000 cable-feet) from the System Unit. A 5150 or 5160 should not be used as the 5520 primary or alternate display station. See also the "Special Note" following.
3. When attached to the 5525 System Unit under control of Licensed Program 5611-SS2, the following characteristics apply to the 5150 or 5160 emulating a 5253 or 5254:

Maximum line length	255 characters
Maximum page length	125 lines
Overall page character count maximum of approximately	8,000 characters

5525 System Unit (cont'd)

Double underscore is obtainable under keyboard emulation. Blinking, reverse image, and non-display are under control of the program and not directly available to the operator.

4. Disk storage is used to hold the licensed program, a library of documents available for text processing functions, and transient storage of documents in process of distribution. The total document capacity will be influenced by a number of factors. See "Special Note" following.
5. The diskette drive supports Diskette 2D. Each customer-supplied diskette (2D) holds approximately one million bytes of information. However, since the diskettes are removable, the total offline storage is limited only by the number of diskettes available.
6. Each line must be designated as one of these types:
   - Local Device Control (LDC) (for attachment of 5219, 5229, 5257, 5258, 6670, and another 5525 System Unit), no more than eight LDC lines per 5525 (mdl-dependent).
   - Attachment to switched communication lines.
   - Attachment to nonswitched communication lines.

   Note: A dedicated nonswitched SDLC communications line may also be used to attach a 6670 Information Distributor as a remote printer.

   See 5520 programming pages for details of devices supported for remote attachment via communication lines.
7. For multi-line configuration, the lines are controlled by a distribution controller (except on mdl 51, which requires a second controller for optional lines 9 to 16).
8. The distribution controllers operate at specific numbers of bits per second and with specific number of receive buffers per line. The aggregate concurrent bps and concurrent buffer allocation requirements of devices attached to each controller should not exceed its specific capacities; see the "Special Note" below.
9. Printers may be multidropped up to 1,524 cable-meters (5,000 cable-feet) radially from the System Unit on an LDC line. Maximum eight on one line (5525 mdl-dependent). 5219, 5229, 5257, 5258, and 6670 may be mixed on a single line. See "Special Note" following.
10. The Mag Card Unit may be up to 4.6 meters (15 feet) from the System Unit. It is supported by Licensed Program 5611-SS2.
11. 5525 System Units may be attached to other 5525 System Units on any LDC line via features #1702 and #1704. See following "Special Note".
12. It is strongly recommended that the 5520 Performance Estimator be run whenever more than 18 5253 displays or Personal Computers or a combination thereof are attached to a mdl 51. Out of the 36 display stations that can be attached, 24 can be concurrently active. (18 active if all are performing 3270 functions.) Displays can be designated as "reserved" or "contention". To reduce sign-on contention, displays should not be designated as reserved unless absolutely necessary.

Special Note:

The 5525 System Unit provides a large degree of configuration flexibility as already described, but there are some physical limitations as noted which must be applied, and also some practical limitations which must be respected for optimum performance of the system. System capacity and performance will be influenced by the nature of the work being undertaken, the format and content of documents being processed, and the incidence of concurrent activity.

Use of the Performance Estimator (AN5520) available under DBS is highly recommended for guidance as to the viability of a given configuration in a described workload environment.

Configuration consistency and guidance may be obtained by use of the 5520 Administration System Online Configurator (CF5520), also available under DBS.

Minimum Configuration:

- 5525 System Unit (mdl 20, 21, 30, 31, 32, 40, 50, or 51).
- 5253 Display Station or 5254 Dual Display Station.
- #4610 (92-character) Keyboard or #4611 (96-character) Keyboard.

HIGHLIGHTS

The 5525 System Unit is the heart of the 5520 Administrative System and all other devices are attachable to it. It contains the circuitry for controlling and processing information flowing through the system, and internal storage for holding the licensed program and active documents.

Attachable to the 5525 are:

- Multiple 5150 or 5160 Personal Computers (with the 5520 Administrative System's Personal Computer Attachment). If the 5150s or 5160s are connected to the 5525, the Personal Computer/Display Station Emulation Adapter (#2880) must be provided by the user.
- Multiple 5219s, 5229s (on mdls 21, 31, 32, and 51), 5257s (impact printers), 5258s (ink jet printers), and 6670 Information Distributors.
- Multiple 5253 Display Stations and 5254 Dual Display Stations. (The 5254 Dual Display Station has been withdrawn from marketing.)
- A single 5321 Mag Card Unit.
- A single 6670 Information Distributor (SDLC) used as a printer (may also be remotely located). Note: In exceptional cases multiple 6670s may be attached.
- Other 5525 System Units on an LDC line.

In addition, optional attachments and controls for communication lines are provided and the licensed programs (5611-SS1 for mdls 20, 30, 40, and 50; 5611-SS2 for mdls 21, 31, 32, and 51) are available to support the system.

Highlights include:

- Choice of eight mdls giving wide range of attachment capability, internal storage, and processing power.
- Multiple integrated processors and controllers to enhance performance and facilitate overlap capability.
- Integrated nonremovable disk storage standard on all mdls.
- Configuration flexibility through multiple local attachment lines and optional attachment of remote devices via communications lines for document distribution.
- Diskette read/write capability standard on all mdls to archive/retrieve documents for document distribution.
- Optional attachment for document distribution to switched and/or nonswitched communication lines operating at up to 4800 bps switched or up to 9600 bps nonswitched (with either BSC or SNA/SDLC protocols per line supported by Licensed Program 5611-SS1 for mdls 20, 30, 40, and 50 and by Licensed Program 5611-SS2 for mdls 21, 31, 32, and 51).
- Keylock option.
- Optional attachment of the 5321 Mag Card Unit (see 5520 programming pages for limitations).
- Modem flexibility:
  - Optional 1200 bps integrated modems both switched and nonswitched.
  - Optional EIA RS-232-C or CCITT V.24/V.28 recommended interface.
  - Optional business machine clocks to support modems which do not have clocking facility (1200 bps).
  - Auto-answer standard.
  - Auto-call feature option on all switched communication lines meeting the EIA RS-366 or CCITT V.24-200 series/V.25/V.28 recommended interface (not using the 1200 bps integrated modems).

Problem Determination Procedures: Problem determination and recovery procedures are provided by IBM with the 5525 supported by the 5520 Administrative Processing Programs (5611-SS1 and 5611-SS2), and include the use of the 5219, 5229, 5253, 5254, 5257, and 5258. These procedures help provide increased availability of the System Unit and of the system itself by assisting with problem determination and either recovery or work-around procedures for certain types of device or system problems. The procedures are described in material accompanying the attached units (see relevant sales manual pages for details) and in the HELPs and message facilities of the program as well as the following manuals:

IBM 5219/5229 Printer Operators Guide (GA23-1009)
IBM 5257 Printer Operators Guide (GA23-1004)
IBM 5258 Printer Operators Guide (GA23-1005)
IBM 5520 Administrative System:
- *Messages & Recovery Aids Manual* (SC23-0733) for 5611-SS1
- *Recovery Aids Manual* (SC23-0756) for 5611-SS2
- *Messages Manual* (SC23-0749) for 5611-SS2

IBM 5520/Personal Computer Attachment Program User's Guide (P/N **7033705**)

These procedures are designed to be easy to follow and use by the customer, and it is the customer's responsibility to follow them prior to calling for IBM service.

5525 System Unit (cont'd)

5525 System Unit: The System Unit consists of frames, covers, power supplies, cable, logic circuits, and processors. It is composed of a processing unit, disk storage, memory, a diskette drive, facilities for addressing storage and performing processing, standard I/O control, optional additional I/O control, and optional communications control.

Processing Unit:

- Multiple processors and controllers operate in parallel.
- Data and instructions are stored as EBCDIC characters (8-bit byte plus ninth bit for parity checking) in storage.
- I/O and processing are overlapped except for diskette and disk data transfer with other disk read/write operation.

Disk Storage:

- Integrated, nonremovable disk storage.
- Access time 27 millisecond average, excluding rotational delay.
- Up to 1.031 megabytes/second data transfer rate.

Diskette Drive: The diskette drive supporting Diskette 2D.

- Standard on mdls 20, 21, 30, 31, 32, and 40.
- Facilitates offline transfer of documents between 5525s.
- Archive/retrieve facility for offline storage, backup, or security of document library.
- Diskette affords the use of removable, economical high capacity reusable media.
- Read/write operations are overlapped with processing and other device functions except disk storage data transfer.
- Stores up to one million bytes of data per diskette in double-density recording.

Diskette Magazine Drive: The diskette drive supporting Diskette 2D.

- Standard on mdls 50 and 51.
- Transfers data at speeds up to 125KB per second.
- Accepts two 10-diskette magazines.
- Up to three diskettes may be manually loaded in addition to the magazines.
- Same functional benefits as for diskette drive.

Display Station Control:

- Standard on all mdls.
- Provides for 3270 Emulation for mdls 21, 31, 32, and 51 with Function Extension (#3270) on the 5253 Display Stationor on 5150 or 5160 Personal Computers emulating a 5253. **Note:** The only supported keyboard language group is English US (**#2956**).
- Provides for direct attachment of the 5150 or 5160 to the 5253 and the 5254.
- Up to 36 display stations are attachable (mdl-dependent).
- Four cable ports on mdls 20, 21, 30, 31, and 32 and eight on mdls 40, 50, and 51 are standard for the attachment of the display stations.
- Twinaxial cabling allows up to seven display stations to be connected to a single port (mdl-dependent).
- Maximum allowable cumulative length of each cable is 1,524 meters (5,000 feet).

Printer Attachment:

- Special features allow attachment of up to 12 printers (5525 mdl-dependent).
- 5219 and 5257 Printers providing high-quality impact print wheel printing.
- 5229 Printer provides high-quality impact print wheel printing requiring paper sizes up to 19 inches wide with a 17-inch writing line (mdls 21, 31, 32, and 51 only).
- 5258 Printer providing high-quality non-impact ink jet printing.
- 6670 Information Distributor (SDLC) providing high-quality non-impact laser printing. **Note:** Some means of creating Mag Cards is required to support this attachment.
- Twinaxial cabling allows up to eight intermixed 5219s, 5229s, 5257s, 5258s, and 6670s to be attached to a single port (mdl-dependent). **Note:** It is not recommended to intermix a 6670 with another printer on the same line where printer performance is a key concern.
- Maximum allowable accumulative length of each cable is 1,524 meters (5,000 feet). **Note:** A 5525 System Unit may be substituted for a printer on a line attached via features #1702 or #1704. This is an alternative to attaching a 5525 via communications line for document distribution. In such a configuration, the primary system unit controls any printers on that line. Note also that a 6670 Information Distributor (SDLC) may be remotely located as a printer to the system via a dedicated nonswitched SDLC communications line. Line speed options will normally be 4800 bps for the 6670 mdl 1 and 9600 bps for the 6670 mdl 2.

System Unit Attachment: 5525 System Units may be attached to other 5525 System Units on any LDC line via features 1702 or #1704 by using 5525 Cable-Thru (#2680). These features will also allow attachment of 5525 System Units on LDC lines shared with printers. However, in such a configuration the primary system unit controls any printers on that line.

Mag Card Attachment:

- Special feature allows attachment of a 5321 Mag Card Unit, cable-connected up to 4.6 meters (15 feet) from the 5525.
- Mag cards may be read or recorded (within limits) to assist, for example, with the conversion of existing mag card libraries. See 5520 programming pages for limitations.

Document Distribution: Control for Document Distribution Communications Facilities is provided by optional special features on the 5525 System Unit with Licensed Programs 5611-SS1 and 5611-SS2. Up to 16 communication lines are supported depending upon the mdl of the System Unit and number of lines allocated for printers. BSC and SNA/SDLC line protocols are provided.

- Point-to-point switched or nonswitched.
- Multipoint (nonswitched and SDLC only).
- Transmission rate up to 9600 bps (nonswitched) or 4800 bps (switched).
- 1200 bps integrated modems.
- Auto-answer or manual answer (modem-dependent).
- Optional Auto-Call feature for external modems meeting the EIA RS-366 or CCITT V.24-200 series/V.25/V.28 recommended interface.
- Optional EIA RS-232-C or CCITT V.24/V.28 recommended interface.
- BSC support to a variety of communicating IBM office machines and to a S/370 host.
- SNA/SDLC support to other 5525s or a S/370 host remotely attached (also to 5219s, 5229s, 5257s, 5258s, 6670s, and other 5525s locally attached).

Customer Responsibilities: The customer must be advised in writing of certain responsibilities related to the installation and maintenance of communications facilities/services as well as the IBM equipment. For further information, see M2700 pages.

The marketing representative must have the customer obtain a firm installation date for the start of transmission services (including any required modems) prior to Order Confirmation.

Customers should be reminded that they are responsible for conforming the use of the system to applicable statutes and regulations relating to the distribution of information both within the U.S. and also to, from, or between other countries.

Customers should be advised of their responsibility for problem determination of the 5150 or 5160 when using hardware feature #2887, or software features #2880, #2884, or #2888 for attaching the 5150 or 5160.

Publications: *IBM 5520 Administrative System Introduction* (GC23-0702), *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 for mdls 20, 30, 40, and 50; or GA23-1011 for mdls 21, 31, 32, and 51), *IBM 5520 Administrative System Messages* (SC23-0749), and *IBM 5520 Administrative System Recovery Aids* (SC23-0756 for mdls 21, 31, 32, and 51; or SC23-0733 for mdls 20, 30, 40, and 50).

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): Specify **#9884** for 208V, **#9886** for 230V. A locking plug is provided (requires customer locking type receptacle).
- Power Cord: Standard power cord is 2.4 meters (8 feet), no specify required. Some localities restrict power cord length to 1.8 meters (6 feet). If this length is required, specify **#9986**.
- Color: Pearl White (no specify required).
- Cables: One modem cable is required for attaching the 5525 to each switched or nonswitched communications line when an external modem is used. Specify **#9152** for a 6 meter (19.7 foot)

5525 System Unit (cont'd)

EIA Interface cable, and **#9153** for a 12 meter (39.4 foot) EIA Interface cable.

One auto-call cable is required for each pair of auto-call lines attaching the 5525 with Auto-Call to each communication facility. Specify **#9154** for a 6 meter (19.7 foot) cable, and **#9155** for a 12 meter (39.4 foot) cable.

- Attachment: Attachment of 5219, 5229, 5257, 5258, 5321, 6670, and another 5525 requires special features. See "Special Features".

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES

5321 Mag Card Unit Attachment (#1100): Required to attach the 5321 Mag Card Unit mdl 1 to the 5525. A 4.6 meter (15 foot) attachment cable and connector is included with the 5321. **Maximum:** One. **Field Installation:** Yes.

Local Printer Attachment (#1105): [Mdls 20, 21, 30, 31, 32] Provided to attach 5219, 5229 (mdls 21, 31, and 32 only), 5257, 5258, and/or 6670 through a single port to a 5525 where document distribution is not required. Customer-supplied twinaxial cable and connector is required to attach the printers. **Note:** Due to speed limitations, this attachment is not recommended for the 6670 where printer performance is a key concern. **Limitations:** For mdls 20, 21, 30, 31, and 32 only. On mdls 20 and 21, the rated speed of the feature is 1200 bps and a maximum of three printers can be attached. On mdls 30, 31, and 32 the rated speed of the feature is 2400 bps and a maximum of six (eight on mdl 32) printers can be attached. Requires Local Device Control (#4710) and LDC Attachment (#4715) to attach the printers. **Maximum:** One. **Field Installation:** Yes.

Keylock (#4650): Replaces on/off power switch to help protect against unauthorized use. Two keys are shipped with this feature. Additional keys may be purchased from IBM (vendor will supply additional keys only to original purchaser of the keys). See "Accessories" for order information. **Maximum:** One. **Field Installation:** Yes.

Local Device Control (#4710): [Mdls 20, 21, 30, 31, 32] Required to attach 5219, 5229 (mdls 21, 31, or 32 only), 5257, 5258, and/or 6670 to a 5525 System Unit. Requires LDC Attachment (#4715) and Local Printer Attachment (#1105). **Maximum:** One. **Field Installation:** Yes.

LDC Attachment (#4715): Cable and connector assembly for connecting 5219, 5229, 5257, 5258, and 6670 to the Local Device Control. See "Distribution Controllers" for specifics. **Maximum:** Two. **Field Installation:** Yes.

COMMUNICATIONS FEATURES

The communications features are designed to operate at line speeds up to 9600 bps (nonswitched) or 4800 bps (switched, point-to-point) on a common carrier facility or equivalent privately-owned communication facility.

In conjunction with licensed programs (5611-SS1 and 5611-SS2), optional distribution controllers and features permit the 5520 Administrative System to function for document distribution host communications and/or 3270 emulation on switched or nonswitched, either public or private, communications lines. The 5219, 5229 (for mdls 21, 31, 32, and 51), 5257, 5258, and 6670 or 5525 System Units are also attached via a twinaxial cable to the 5525 through these same controllers. These lines interface to the distribution controllers through line adapters. A single adapter provides both BSC and SDLC capability (each adapter can accommodate two lines and can function in any combination of BSC or SDLC) to a selected set of devices (defined by program control).

Each distribution controller (maximum of one in each of 5525 mdls 20, 21, 30, 31, 32, and 40, and maximum of two in each of 5525 mdls 50 and 51) has an aggregate data rate capability of 19.2K bps. This aggregate data rate allows flexibility in configuring the devices and communications facilities that attach to these controllers.

The distribution controllers will allow the 5520 Administrative System to communicate on nonswitched and/or switched point-to-point lines at speeds up to 4800 bps or 9600 bps if nonswitched. See M2700 pages for information on communication facilities. These distribution controllers will operate in half-duplex mode over dial (switched network) facilities, and in half-duplex mode over nonswitched (or equivalent private) communication lines which may be 2- or 4-wire half- or full-duplex facilities. Operation of the features will be overlapped at all transmission rates with processing and I/O device operations. Units at each termination or drop point of a data link to which the 5520 Administrative System is attached must use the same clocking source (modem or business machine clock) and must operate at the same transmission rate and use the same transmission code. Compatible modems must be used at all terminations. The switched network environment includes support for manual dial or Auto-Call (optional feature) and manual or auto-answer (where the attached modem supports this capability) operations.

The 5525 supports attachment of the following devices in remote environments for the purpose of document distribution only, as supported by Licensed Programs 5611-SS1 and 5611-SS2. See programming pages for more details.

- Another 5525 - SNA/SDLC.
- Office System/6 (6/420, 6/430, 6/440, 6/442, 6/450, 6/452) - BSC. *
- 6580 Displaywriter System - BSC. *
- 6640 Document Printer - BSC. *
- 6670 Information Distributor - BSC. *
- Mag Card II Typewriter - BSC. *
- 6240 Mag Card Typewriter - BSC. *
- Series/1 (suitably programmed) BSC. *
- System/32 with Word Processing (#6002) - BSC.
- System/34 (suitably programmed) BSC. *
- System/38 (suitably programmed) - BSC.
- Host S/370 (suitably programmed) - SNA/SDLC or BSC.

* See 5520 programming pages for limitations.

The 5525 can communicate via the EIA RS-232-C or CCITT V.24/V.28 recommended interface to external modems. The line protocol is BSC or SDLC as provided in the complementary communication feature at the remote device. Transmission speeds of up to 4800 bps (if switched) and up to 9600 bps (if nonswitched) are possible. These communications may be over switched or nonswitched facilities (point-to-point), and the switched lines can be manual or optionally auto-dial, manual, or auto-answer. For 1200 bps communications, 1200 bps Integrated Modems may be utilized in appropriate circumstances. They may attach to nonswitched facilities or the switched network.

Auto-Call (#1315, #1316): Provides for unattended initiation of transmission on the switched network communications lines. Provides functions for four lines. #1316 is for #1702 only. See "Specify" for cable ordering. **Maximum:** See "Feature Configurator". **Field Installation:** Yes.

Distribution Controllers: The Communication/Printer-One (#1704) distribution controller is mutually exclusive with the Local Printer Attachment (#1105). #1702 provides an additional controller and additional ports for mdls 50 and 51 only, and requires Expansion Gate (#3600). These distribution controllers provide a variable number of printer/communication ports as shown in the table below, which also indicates the prerequisite controller features.

5525 System Unit (cont'd)

Distribution Controller Configurator

Feature	Available on 5525 Mdls								Number of Lines per System with Feature (Plus Prereqs.)	
	20	21	30	31	32	40	50	51	Min.	Max.
Local Print Attach (#1105)	X	X	X	X	X				1	1
Power Expansion (#5550) *				X	X	X	X	X		
Comm. Printer-One (#1704)	X	X	X	X	X	X	X **	X **	2	2
Line Adapters, Add'l (#4700)			X	X	X	X	X	X	4	8 ***
Expansion Gate (#3600)							X	X		
Dist. Controller, 2nd (#1702)							X	X	8	12
Line Adapters, Add'l (#4701)							X	X	10	16 ****

Notes:

* #5550 is a prerequisite for #1704 on mdls 31, 32, 50, 51. #5550 is required on mdl 40 for the second #4700.

** These mdls require one #4700 with #1704.

*** Maximum number of lines is mdl dependent. Each #4700 provides for attachment of 2 lines via #1704 (maximum of three #4700).

**** Each #4701 provides for attachment of 2 lines via #1702 (maximum of two #4701).

Those ports not used for printer attachment may be used for communications, except on #1105.

Distribution Controller, 2nd (#1702): Provides four additional printer/communication ports on the 5525 mdls 50 and 51. The number of ports may be expanded in increments of two to a maximum of eight by the inclusion of Line Adapters, Add'l (#4701). For printers (and/or another 5525) line attachment requires Local Device Control (#4712). For communication line attachment requires the EIA Interface (#3702) or a 1200 bps Integrated Modem (#5502, #5503). **Limitations:** A maximum of eight ports per 5525 may be allocated for printer attachment. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1704, #3600.

Communications/Printer-One (#1704): Provides two printer or communications ports on all mdls of the 5525. Used on mdl 50 or 51 as a prerequisite to #4700 only. For printer (and/or another 5525) line attachment requires Local Device Control (#4711). For communication line attachment requires the EIA Interface (#3701) or a 1200 bps Integrated Modem (#5500, #5501). **Maximum:** One. **Field Installation:** Yes.

For features attachable to the distribution controllers, see "Feature Configurator" and the descriptions which follow.

Business Machine Clock (#1750, #1751): Provides communications clocking (timing) for two modems which do not provide the function. #1751 is for #1702 only. **Maximum:** See "Feature Configurator". **Field Installation:** Yes.

5525 Cable-Thru (#2680): Allows one or more 5525 System Units to be connected on an LDC line along with 5219, 5229 (for mdls 21, 31, 32, and 51), 5257, 5258, and 6670. This feature provides for connecting up to eight printers or 5525s in any sequence on a single LDC line. **Maximum:** One. **Field Installation:** Yes. **Note:** If the 5525 System Unit connected via this feature is the last in a line, a Screw-On Terminator is required (see "Accessories").

Expansion Gate (#3600): Required for the installation of the second distribution controller (#1702) on mdls 50 and 51 only. **Maximum:** One. **Field Installation:** Yes.

EIA Interface (#3701, #3702): Provides a cable (see "Specify") and interface for connecting low-/medium-speed modems meeting RS-232-C characteristics. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. #3702 is for #1702 only. **Maximum:** See "Feature Configurator". Maximum number of EIA plus LDCs per controller is mdl-/feature-dependent. **Field Installation:** Yes.

Line Adapters, Add'l (#4700, #4701): Provides for attachment of additional pairs of lines on several 5525 mdls. #4700 provides for #1704 on mdls 30, 31, 32, 40, 50, and 51. #4701 provides for #1702 on mdls 50 and 51. Mdls 50 and 51 require a minimum of one #4700 with #1704. **Maximum:** See "Feature Configurator". **Field Installation:** Yes.

Local Device Control (#4711, #4712): Required to attach 5219, 5229 (mdl 21, 31, 32, or 51), 5257, 5258, 6670, and/or 5525 System Units to a distribution controller (#4712 is for #1702 only). One per line. Requires LDC Attachment (#4715), one per up to four printer lines. **Maximum:** See "Feature Configurator". **Field Installation:** Yes.

LDC Attachment (#4715): Cable and connector assembly required for connecting 5219, 5229 (mdls 21, 31, 32, or 51), 5257, 5258, 6670, and/or 5525 System Units to the Local Device Control (#4711, #4712). One serves up to four printer lines. **Maximum:** See "Feature Configurator". **Field Installation:** Yes.

Modem (#5500, #5501, #5502, #5503): An integrated modem for SDLC or BSC data transmission at 1200 bps over nonswitched facilities or switched networks. Available in two different versions: #5500 and #5502 nonswitched, and #5501 and #5503 switched. #5502 and #5503 are for #1702 only. **Field Installation:** Yes. **Prerequisites:** #1750 or #1751 as appropriate.

Power Expansion (#5550): Provides additional power for communications on mdls 31, 32, 40, 50, 51. This feature is a prerequisite for #1704 on mdls 31, 32, 50, 51. #5550 is required on mdl 40 for the second #4700. **Maximum:** One. **Field Installation:** Yes.

5525 System Unit (cont'd)

Feature Configurator

Feature	Local Printer Attachment (#1105) Feature #	Max.	2nd Distribution Controller (#1702) (1) Feature #	Max.	Comm./Printer-One (#1704) (2) Feature #	Max.
Auto-Call (4 lines)			#1316	2	#1315	2
Business Machine Clock (2 clocks)			#1751	4	#1750	4
EIA Interface (3) (4)			#3702	8	#3701	8
Line Adapters, Add'l (2 lines) (8)			#4701	2	#4700	3
Local Device Control (3) (4) (5)	#4710	1	#4712	8	#4711	8
LDC Attachment (4 lines) (6)	#4715		#4715		#4715	
1200 bps Integrated Modem, Nonswitched (3)			#5502	3	#5500	3
1200 bps Integrated Modem, Switched (3)			#5503	3	#5501	3
EIA 6 meter (19.7 foot) Cable (7)			**#9152**		**#9152**	
EIA 12 meter (39.4 foot) Cable (7)			**#9153**		**#9153**	
Auto-Call 6 meter (19.7 foot) Cable (7)			**#9154**		**#9154**	
Auto-Call 12 meter (39.4 foot) Cable (7)			**#9155**		**#9155**	

Notes:

(1) Requires Expansion Gate (#3600). #1702 is shipped with four lines.

(2) Requires Power Expansion (#5550) as a prerequisite on mdls 31, 32, 50, 51, and on mdl 40 with second #4700. #1704 is shipped with two lines.

(3) Mutually exclusive (per line).

(4) The sum of the Local Device Controls and EIA Interfaces cannot exceed the number of available lines.

(5) Requires LDC Attachment (#4715). No more than eight LDC lines per 5525.

(6) Maximum two per system.

(7) Each line requires one if feature installed.

(8) One #4700 is required with #1704 on mdls 50 and 51.

Licensed Programs: Licensed Program 5611-SS1 (for mdls 20, 30, 40, and 50) and Licensed Program 5611-SS2 (for mdls 21, 31, 32, and 51) should be ordered at equipment order entry time. See Licensed Programs 5611-SS1 or 5611-SS2 for additional information.

The 5520 Administrative Processing Programs (5611-SS1 and 5611-SS2) are used for the selection of certain data communications characteristics such as answer tone control, line type, station address, etc.

References: See M2700 pages for additional information concerning modems, communications facilities, machine attachment requirements, terminal intermix, and operating capabilities. Refer to *IBM 5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011) for physical installation requirements.

MODEL CONVERSIONS

Model conversions are field installable.

When the 5525 model changes, the licensed program must be reordered since it contains mdl-dependent code variations.

Any model upgrade that involves a disk storage capacity change may require replacement of the disk storage mechanism. Adequate provision must be made for retaining the data contained on the replaced disk mechanism and elimination of user proprietary information.

The upgrade purchase prices for model conversions may be greater than the purchase price differentials. The customer should carefully evaluate future requirements when purchasing a system.

Replaced parts from any model conversion that includes disk storage capacity change become the property of IBM. Replaced or purchased parts from any special feature installation or removal remain the property of the customer.

ACCESSORIES

Cables: The cables and/or associated parts to attach a 5525 to a printer line on a primary 5525 may be purchased from IBM or from a customer-selected source. For the description of these cables and parts, see the *5520 Administrative System Installation Manual - Physical Planning* (GA23-1002 or GA23-1011). The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the 5525.

A modem cable is required for modems other than the 1200 bps Integrated Modem (#5500, #5501, #5502, #5503). See "Specify".

Twinaxial Connector Kit (P/N **7362268**): Includes two connectors. Twinaxial Wire and one connector kit are required for each attachment cable. (Individual connectors P/N **7362229** are available for replacement.)

Twinaxial Wire (P/N **7362211**): Order must specify the desired length. Twinaxial Wire and one connector kit are required for each attachment cable. (This is an indoor/outdoor cable.)

Twinaxial Cable Assembly (P/N **7362267**): Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

Twinaxial Adapter (P/N **7362230**): Permits two Twinaxial Cable Assemblies to be joined together.

Twinaxial Station Protector (P/N **6819750**): One is required at each end of each twinaxial attachment cable installed outdoors (either above or below ground level). Note: This station protector is different from that used with the displays.

Screw-On Terminator (P/N **7362188**): One is required on the last 5525 System Unit on a shared LDC line for the last display station on a line if it is a 5150 or 5160.

Twinaxial T-Connector (P/N **6851187**): One is required for each 5150 or 5160 that is to be attached to the 5525. The use of this connector is discussed in the *IBM Personal Computer/Display Station Emulation Adapter Installation and Problem Determination Procedures Manual* (P/N **7033710**). A cable (P/N **7362267**), maximum length 30.5cm (1 foot) and minimum length 20.3cm (8 inches), must be supplied with the T-connector.

Twinaxial Cable is available with Teflon® covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

Twinaxial Connector Kit: Includes two connectors. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362063** for Teflon-covered cable. Individual connectors P/N **7362229** are available for replacement.

Twinaxial Wire: Order must specify the desired length. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N **7362061** for Teflon-covered cable.

5525 System Unit (cont'd)

Twinaxial Cable Assembly: Includes a connector kit (two connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order P/N **7362062** for Teflon-covered cable assembly.

Installation Convenience Kit: May be ordered for connecting 5150 (#2890 P/N **6092541**) or 5160 (#2882 P/N **6109564**) Personal Computers to the 5525. The kit contains:

- Personal Computer/Display Station Emulation Adapter
- 5520/Personal Computer Attachment Program
- Twinaxial T-Connector P/N **6851187**
- Cable P/N **7362267**
- Plus all necessary manuals and 5-1/4 inch diskettes to install, diagnose, and use the 5520/PC attachment program.

These kits may be ordered as stand-alone feature codes or as features associated with personal computer orders. These kits are not to be associated with 5520 orders.

SUPPLIES

For ordering information, contact IBM.

Diskettes: Only diagnostic diskettes are shipped with the 5525. Diskettes for customer uses must be ordered separately.

Diskette Magazines: Diskette magazines may be ordered, P/N **2462521**. Diskettes are not shipped with the magazine.

6126 CORRECTING SELECTRIC® RIGHT-TO-LEFT TYPEWRITER

PURPOSE

Any organization with right-to-left typing requirements can have the proven efficiency of the 6126 typewriter. It tabs and spaces the way Farsi, Hebrew, and Arabic are written.

MODELS

MODEL 856

Dimensions

Width: 520 mm (20.5 in.)
Depth: 396 mm (15.6 in.)
Height: 177 mm (7.0 in.)
Weight: 17 kg (38 lbs.)

HIGHLIGHTS

- Types the way the language is written, from right to left, and corrects errors at the time they are made.

SPECIFY

- Voltage: 115V AC, 60 Hz, 1.2 Amps.
- Keyboard Group:

Language	Code
Arabic	**#K481**
Farsi	**#K441**
Hebrew	**#K480**
Maghreb	**#K551**

- Color: Raven Black **(#C030)**
- Paper Feeds (1, 1-1/2, 2):

48-Tooth **#0083**
51-Tooth **#0085**
54-Tooth **#0070**

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Contact IBM.

6713 ELECTRONIC TYPEWRITER 50/60/75

Orders accepted on ''as available'' basis only.

PURPOSE

The 6713 Electronic Typewriter mdls 50, 60 and 75 combine single-element (but interchangeable element) typing technology, correction capability, and electronic text management with a 393.7mm (15.5 in.) paper capacity.

MODELS

Model A50	Standard 50
Model K50	Custom 50
Model A60	Standard 60, 736-character memory
Model K60	Custom 60, 736-character memory
Model A75	Standard 75, 15,500-character memory
Model K75	Custom 75, 15,500-character memory

Dimensions:

Width: 536.0mm (21.1 in.)
Depth: 447.0mm (17.6 in.)
Height: 165.1mm (6.5 in.)
Weight: 22.7kg (50 lbs.)

HIGHLIGHTS

- Mdl 75 has a standard 15,500-character storage capacity to be shared by document and phrase storage.
- Document storage allows the typist to temporarily store documents for later revision, thus eliminating much retyping.
- Phrase storage allows phrases, sentences, paragraphs and documents to be stored and played out error free. 99 storage areas are available to store up to 15,500 characters.
- Proportional spacing in addition to 10 and 12 pitch.
- Format storage.
- Electronic column layout.
- Ribbon cassette system.

SPECIFY

- Voltage: 115V AC, 60 Hz, 2.3 Amps.
- Keyboard Group:

  US **#K660**

- Color: Specify **#C055** for Autumn Red, **#C052** for Cocoa Brown, **#C054** for Laurel Green, **#C053** for Marlin Blue, **#C043** for Pebble Gray, **#C030** for Raven Black, **#C051** for Sable Brown, **#C038** for Sandstone Beige, and **#C034** for Topaz Bronze.
- Paper Feeds:

  (1,2,3) Mdls A50/K50/A60/K60:

  46-Tooth **#0087**
  51-Tooth **#0089**
  54-Tooth **#0100**

  (1,1.5,2,3) Mdls A75/K75:

  46-Tooth **#0120**
  51-Tooth **#0122**
  54-Tooth **#0123**

SPECIAL FEATURES

Memory Protection (#5931): [Mdl A75, K75] Provides battery backup with approximately 25 minutes protection against power failure.
Field Installation: Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Contact IBM.

6714 ELECTRONIC TYPEWRITER 65/85/95

PURPOSE

The 6714 Electronic Typewriters 65 ,85 and 95 are phrase/document typewriters with 393.7mm (15.5 inch) paper capacity.

MODELS

Model B65	Standard 65, 7,400 characters memory.
Model K65	Custom 65, 7,400 characters memory.
Model B85	Standard 85, 15,500 characters memory.
Model K85	Custom 85, 15,500 characters memory.
Model B95	Standard 95, 31,500 characters memory.
Model K95	Custom 95, 31,500 characters memory.
Model ANN	Standard 85, fiftieth anniversary (available until December 31, 1983)

Dimensions:

Width: 549.4mm (21.6 in.)
Depth: 453.2mm (17.8 in.)
Height: 177.8mm (7.0 in.)
Weight: 21.6kg (47.5 lbs.)

HIGHLIGHTS

- Mdls B65 and K65 contain 7,400 characters of memory, and mdls B85 and K85 contain 15,500 characters of memory which can be stored in 26 alpha and 99 numeric positions on the keyboard.
- Proportional spacing in addition to 10 and 12 pitch.
- Right margin justification on playout in any pitch.
- Electronic keyboard.
- Resident diagnostics.
- Mdls B95 and K95 contains 31,500 characters of memory which can be stored in 26 alpha and 99 numeric positions on the keyboard.
- Mdls B95 and K95 memory is protected for approximately 6 months as a standard feature.
- Mdls B85 and K85 memory is protected for approximately 12 months as a standard feature.
- Field upgradability for protected memory or expanded-protected memory is available (see "Model Conversions" below).
- Mdls B85, K85, B95 and K95 may be upgraded to include removable storage capability by installing Typewriter Modularity Option (#8560) and connecting a 6731 Typewriter Diskette Module. (See M6731 pages)
- Communications:

  The 6714 mdls B85, K85, B95 and K95 may be upgraded to include asynchronous communication capability by installing the Typewriter Modularity Option (#8560) and connecting the 6714 to a 6733 Typewriter Communication Module. See M6733 page for details.

SPECIFY

- Voltage (120V, 60 Hz, 1 phase): **#E001**
- Paper Feeds (1, 1.5, 2, 3):
  46-Tooth **#0120**
  51-Tooth **#0122**
  54-Tooth **#0123**
- Keyboards (96 characters unless otherwise specified):

	Keybutton Engraving	Code
Latin American Abbreviated	Spanish	**#K110**
US Correspondence	English	**#K001** *
US Correspondence	English	**#K443**

* standard 92 character

- Elements: [Mdls K65, K85, K95] choice of two elements, including "Custom Element Program" (additional charge).
- Color: [Mdls K65, K85] Specify **#C026** for pearl white, **#C034** for topaz bronze, **#C043** for pebble gray, **#C053** for marlin blue, or **#C062** for deep charcoal. **#C043** (pebble gray) is standard.

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES

Motor (#E034, #E093): [Federal Government Only] 112.5V 50 Hz Motor **(#E034)**, 220V 50 Hz Motor **(#E093)**. **Field Installation:** Yes.

Memory Protection (#5931): [Mdl K65] Provides battery backup with approximately 25 minutes protection power failure. **Field Installation:** Yes. (All mdls 65 and 85 without extended memory protection).

Typewriter Modularity Option (#8560: [Mdls B85, K85, B95 and K95]. Required in order to attach the the 6731 Typewriter Diskette Module to the typewriter. **Field Installation:** Yes.

Typewriter 65/85 PC Attachment (#8566, #8569, #8570: Allows all mdls of the 6714, except mdls B85 and K85, that have the Modularity Option installed, to be attached to an IBM Personal Computer and used as a printer. The attachment does not allow direct keyboarding from the 6714 to the PC. When not being used as a printer, the 6714 will continue to operate as a standard electronic typewriter. The 65/85 PC attachment device (#8566) consist of a 6.5 foot cable and electronics board installed in the typewriter. **Prerequisites:** A 5150 Personal Computer or a 5160 Personal Computer XT with: a minimum of 64KB of memory; one diskette drive; a 5151 Monochrome Display and Printer Adapter or printer adapter card; a 65/85 PC IPL/Diagnostic Diskette (#8569). The PC must operate under DOS version 1.0, 1.1 or 2.0. **Field Installation:** Only, and must be installed by IBM CSR. **Order Procedure:** Contact IBM.

COMMUNICATIONS FEATURES

Typewriter Modularity Option (#8560) [Mdls B85, K85]: Provides the interface between the 6714 and the 6733 Typewriter Communication Module. **Field Installation:** [Mdl K85] Yes (MES 1305501). Mdl B85 field installable only.

MODEL CONVERSIONS

Field upgradable from model 65 to 85, specify **#8520**, (not available after February 17, 1984). Upgrading includes an additional 8,000 characters of memory, return and advance keybuttons, semi-automatic paper insert lever and lighted carrier position indicator.

- Mdl 65 to 85. Specify **#8531** for US Correspondence Keyboard; specify **#8536** for Latin American Keyboard. Upgrading includes an additional 8,000 characters of 12 month protected memory, return and advanced keybuttons, semi-automatic paper insert lever and lighted carrier position indicator.
- Mdl 85 to 85 (12 month protected memory). Specify **#8532** for US Correspondence Keyboard; specify **#8537** for Latin American Keyboard. Upgrading provides 12 month protection on the 15,500 character memory.
- Mdl 85 with 12 month protected memory to mdl 95. Specify **#8533** for US Correspondence Keyboard; specify **#8533** for Latin American Keyboard. Upgrading provides an additional 16,000 character memory. The total of 31,500 characters of memory is protectd for six months.
- Mdl 65 to 95. Specify **#8534** for US Correspondence Keyboard; specify **#8538** for Latin American Keyboard. Upgrading includes an additional 24,000 characters of 6 month protected memory, return and advanced keybuttons, semi-automatic paper insert lever and lighted carrier position indicator.
- Mdl 85 to 95. Specify **#8535** for US Correspondence Keyboard; specify **#8539** for Latin American Keyboard. Upgrading provides an additional 16,000 characters of 6 month protected memory.

Note: Field upgrades require the removal of certain parts which becomes the property of IBM. Order through normal MES procedure.

ACCESSORIES (None)

SUPPLIES

Each 6714 shipment to the customer will include the following: One Correctable Film Cassette Ribbon, one Lift-off Cassette Tape, for mdls B65 and B85: One Title Element (P/N **1352902**), and one Prestige Elite Element (P/N **1352003**), for mdl K65, K85: two specified elements.

Each 6714 shipment to the customer will include the following:

- Mdl B65: One Correctable Film Cassette Ribbon, one Lift-off Cassette Tape, one Title Element (P/N **1352902**), and one Prestige Elite Element, (P/N **1352003**).
- Mdl K65: One Correctable Film Cassette Ribbon, one Lift-off Cassette Tape, and the two specified elements.
- Mdl B85 and B95: One Correctable Film Cassette Ribbon, one Lift-off Cassette Tape, three memory protection batteries, one Title Element (P/N **1352902**), and one Prestige Elite Element.
- Mdl K85 and K95: One Correctable Film Cassette Ribbon, one Lift-off Cassette Tape, three memory protection batteries, and the two specified elements.

6723 ELECTRONIC TYPEWRITER 50/75

Orders accepted on "as available" basis only.

PURPOSE

The 6723 Electronic Typewriter mdls 50 and 75 combine single-element (but interchangeable element) typing technology, correction capability, and electronic text management with a 485.1mm (19.1 in.) paper capacity.

MODELS

Model A50 Standard 50
Model K50 Custom 50
Model B75 Standard 75, 15,500-character memory
Model K75 Custom 75, 15,500-character memory

Dimensions Mdls 50/75:

Width: 536.0mm (21.1 in.)
Depth: 447.0mm (17.6 in.)
Height: 165.1mm (6.5 in.)
Weight: 22.7kg (50 lbs.)

HIGHLIGHTS

- Mdl 75 has a standard 15,500-character storage capacity to be shared by document and phrase storage.
- Document storage allows the typist to temporarily store documents for later revision, thus eliminating much retyping.
- Phrase storage allows phrases, sentences, paragraphs and documents to be stored and played out error free. 99 storage areas are available to store up to 15,500 characters.
- Proportional spacing in addition to 10 and 12 pitch.
- Format storage.
- Electronic column layout.
- Ribbon cassette system.

SPECIFY

- Voltage: 115V AC, 60 Hz, 2.3 Amps.
- Keyboard Group:

  US **#K660**

- Color: Specify **#C055** for Autumn Red, **#C052** for Cocoa Brown, **#C054** for Laurel Green, **#C053** for Marlin Blue, **#C043** for Pebble Gray, **#C030** for Raven Black, **#C051** for Sable Brown, **#C038** for Sandstone Beige, and **#C034** for Topaz Bronze.
- Paper Feeds:

  (1,2,3) Mdls A50/K50:
  46-Tooth **#0087**
  51-Tooth **#0089**
  54-Tooth **#0100**

  (1,1.5,2,3) Mdls B75/K75:
  46-Tooth **#0120**
  51-Tooth **#0122**
  54-Tooth **#0123**

SPECIAL FEATURES

Memory Protection (#5931): [Mdl B75, K75] Provides battery backup with approximately 25 minutes protection against power failure.
Field Installation: Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Contact IBM.

6724 ELECTRONIC TYPEWRITER 65/85/95

PURPOSE

The 6724 Electronic Typewriters 65, 85 and 95 are phrase/document typewriters with a 485.1mm (19.1 inch) paper capacity.

MODELS

Model K65 Custom 65, 7,400 characters memory.

Model K85 Custom 85, 15,500 characters memory.

Model K95 Custom 95, 31,500 characters memory.

Dimensions:

Width: 641.0mm (25.2 in.)
Depth: 453.2mm (17.8 in.)
Height: 177.5mm (7.0 in.)
Weight: 23.6kg (52.0 lbs.)

HIGHLIGHTS

- Mdl K65 contains 7,400 characters of memory, and mdl K85 contains 15,500 characters of memory which can be stored in 26 alpha and 99 numeric positions on the keyboard.
- Proportional spacing in addition to 10 and 12 pitch.
- Right margin justification on playout in any pitch.
- Electronic keyboard.
- Mdls K95 contains 31,500 characters of memory which can be stored in 26 alpha and 99 numeric positions on the keyboard.
- Mdl K95 memory is protected for approximately 6 months as a standard feature.
- Mdls K85 memory is protected for 12 months as a standard feature.
- Field upgradability for protected memory or expanded-protected memory is available (see "Model Conversion" below).
- Mdls K85 and K95 may be upgraded to include removable storage capability by installing Typewriter Modularity Option (#8560) and connecting a 6731 Typewriter Diskette Module. (See M6731 pages)
- Resident diagnostics.
- Communications:

  Mdl K85 may be upgraded to include asynchronous communication capability by installing the typewriter modularity option and connecting the typewriter to a 6733 Typewriter Communication Module. See M6733 page for details.

SPECIFY

- Voltage (120V, 60 Hz, 1-phase): **#E001**
- Paper Feeds (1, 1.5, 2, 3):

  46-Tooth **#0120**
  51-Tooth **#0122**
  54-Tooth **#0123**

- Keyboards (96 characters unless otherwise specified):

	Keybutton Engraving	Code
Latin American Abbreviated	Spanish	**#K110**
US Correspondence	English	**#K001** *
US Correspondence	English	**#K443**

* Standard 92-character

- Elements: Choice of two elements, including "Custom Element Program" (additional charge).
- Color: Specify **#C026** for pearl white, **#C034** for topaz bronze, **#C043** for pebble gray, **#C053** for marlin blue, or **#C062** for deep charcoal. **#C043** (pebble gray) is standard.

SPECIAL FEATURES

NON-COMMUNICATIONS FEATURES

Motor (#E034, #E093): [Federal Government Only] 112.5V 50 Hz Motor (**#E034**), 220V 50 Hz Motor (**#E093**). **Field Installation:** Yes.

Memory Protection (#5931): [Mdl K65] Provides battery backup with approximately 25 minutes protection against power failure. **Field Installation:** Yes, for all mdls 65 and 85 without extended memory protection.

Typewriter Modularity Option (#8560: [Mdls K85 and K95]. Required in order to attach the 6731 Typewriter Diskette Module to the typewriter. **Field Installation:** Yes.

6724 PC Attachment (#8566, #8569, #8570): Allows all mdls of the 6724, except mdl K85, that has the Modularity Option installed, to be attached to an IBM Personal Computer and used as a printer. The Attachment does not allow direct keyboarding from the 6724 to the PC. When not being used as a printer, the 6724 will continue to operate as a standard electronic typewriter. The PC attachment device (#8569) consist of a 6.5 foot cable and electronics board installed in the typewriter. **Prerequisites:** A 5150 Personal Computer or a 5160 Personal Computer XT with: A minimum of 64KB of of memory; one diskette drive; a 5151 Monochrome Display and Printer Adapter or printer adapter card; a 65/85 PC IPL/Diagnostic Diskette (#8569). The PC must operate under DOS version 1.0, 1.1 or 2.0. **Field Installation:** Only, and must be installed by IBM CSR. **Order Procedure:** Contact IBM.

COMMUNICATIONS FEATURES

Typewriter Modularity Option (#8560): [Mdl K85] Provides the interface between the 6724 and the 6733 Communication Module. **Field Installation:** Yes (MES 1305501).

MODEL CONVERSIONS

Field upgradable from model K65 to K85, specify **#8521**, not available after February 17, 1984. Upgrading includes an additional 8,000 characters of memory, return and advance keybuttons, semi-automatic paper insert lever and lighted carrier position indicator. **Note:** Field upgrades require the removal of certain parts which becomes the property of IBM. Order through normal MES procedure.

- Mdl 65 to 85. Specify **#8531** for US Correspondence Keyboard; specify **#8536** for Latin American Keyboard. Upgrading includes an additional 8,000 characters of 12 month protected memory, return and advanced keybuttons, semi-automatic paper insert lever and lighted carrier position indicator.
- Mdl 85 to 85 (12 month protected memory). Specify **#8532** for US Correspondence Keyboard; specify **#8537** for Latin American Keyboard. Upgrading provides 12 month protection on the 15,500 character memory.
- Mdl 85 (with 12 month protected memory) to mdl 95. Specify **#8533** for US Correspondence Keyboard; specify **#8533** for Latin American Keyboard. Upgrading provides an additional 16,000 characters of memory. The total of 31,500 characters of memory is protectd for six months.
- Mdl 65 to 95. Specify **#8534** for US Correspondence Keyboard; specify **#8538** for Latin American Keyboard. Upgrading includes an additional 24,000 characters of 6 month protected memory, return and advanced keybuttons, semi-automatic paper insert lever and lighted carrier position indicator.
- Mdl 85 to 95. Specify **#8535** for US Correspondence Keyboard; specify **#8539** for Latin American Keyboard. Upgrading provides an additional 16,000 characters of 6 month protected memory.

Note: Field upgrades require the removal of certain parts which become the property of IBM. Order through normal MES procedure.

ACCESSORIES (None)

SUPPLIES

Each 6724 shipment to the customer will include the following:

- Mdl K65: One Correctable Film Cassette Ribbon, one Lift-off Cassette Tape, and two specified elements.
- Mdl K85 and K95: One Correctable Film Cassette Ribbon, one Lift-off Cassette Tape, three memory protection batteries, and two specified elements.

6731 TYPEWRITER DISKETTE MODULE

PURPOSE

The 6731 is a desk top unit that attaches to the Electronic Typewriters 6714 (models B85, K85, B95) and 6724 (models K85, and K95) and provides non volatile document storage on 5-1/4 inch diskettes.

MODELS

Model 001

Prerequisites: The 6714 or 6724 requires the installation of the Typewriter Modularity Option (#8560). !One Typewriter Modularity Option can accommodate both the Typewriter Diskette Module and the the Typewriter Communication Module 6733.

Physical Specifications:

Width: 131mm (5.2 in.)
Depth: 336mm (13.2 in.)
Height: 176mm (6.9 in.)
Weight: 5.8kg (12.8 lbs.)

HIGHLIGHTS

The Diskette Module enhances the Electronic Typewriter 85 and 95 so that it can handle the following customer requirements:

- Long term storage.
- Storage of long documents.
- Multiple - principle support.
- Workload distribution.
- Forms applications.
- Document confidentiality.
- The following feature are standard:
  Voltage: 120V, 60 Hz.
  Linecord: 3-wire grounded.
  Color: Pearl white.

SPECIFY (None)

SPECIAL FEATURE (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Each 6731 shipment to the customer will include the following: Two IPL Diskettes, one work diskette **(P/N 6023450)**, an Operator Manual, and a Problem Determination Guide.

6733 TYPEWRITER COMMUNICATION MODULE

PURPOSE

The 6733 adds asynchronous communication function to the Electronic Typewriters 6714 [models B85 and K85] and 6724 [model K85].

MODELS

Model 001 Operates asynchronously in CPT-TWX 33/35 or 128 character ASCII mode. It can use half-duplex or duplex data transmission over switched point-to-point public telephone networks or directly connected systems/terminals using a null modem.

Prerequisites: The 6714 or 6724 requires installation of Modularity Option **(#8560)**.

Dimensions:

Width: 13.1cm (5.2 in.)
Depth: 33.6cm (13.2 in.)
Height: 17.6cm (6.9 in.)
Weight: 4.6kg (10.15 lbs.)

HIGHLIGHTS

- The 6733 Typewriter Communication Module is a desk top unit which links the Electronic Typewriter 6714 or 6724 to a data communication facility via a modem. The 6733 can interface with the following customer-supplied Western Electric (or equivalent) 2-wire, duplex modems:
  - Western Electric Type 103J--dual (answer/originate) mode, with or without auto answer.
  - Western Electric Type 113C--originate mode only.
  - Western Electric Type 113D--answer only, with or without auto answer.
  - Western Electric Type 212A--dual speed (low speed up to 300 bps or high-speed at 1200 bps), with or without auto answer, answer or originate mode.

  The customer must ensure that the modem is compatible with the Communication Module.
- Asynchronous TTY line protocol.
- Full 128 ASCII character set.
- Modem interface: EIA RS-232-C.
- Operator-selectable transmission speed: 110, 150, 300 or 1200 bps.
- Auto answer and unattended document reception.
- Background reception to a 14,000 character buffer.
- Electronic Typewriter 6714/6724 offline operation including all word processing functions and quality printing while the 6733 auto answers and receives documents.
- Pacing by line and standard pacing under remote terminal or system control.
- Transfer documents from 6733 receive buffer directly to 6714/6724 document storage for delayed printing or print (and optionally store) while transferring.
- Transfer documents from the 6714/6724 storage to the communication facility with or without printing.
- Customer setup: Yes.
- Cables included: a link cable to the 6714 or 2724; an EIA RS-232-C modem cable.

Bibliography: *Installation and Operating Instruction*, S544-4011; *Technical Description for host systems and applications programmers*, S544-4013.

SPECIFY

- Voltage: 120V AC, 1-phase, 60 Hz **(#E001)**
- Power Cord: 3-wire grounded. (No specify required).
- Color: Pearl White. (No specify required).

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

6800 COPIER I

[NO LONGER AVAILABLE]

PURPOSE

With one control setting, the 6800 Copier I makes from 1 to 10 copies of a piece of text and/or artwork. The original to be copied may be one side of a loose sheet or one page in a bound document. This machine makes copies on letter-size or legal-size sheets automatically cut from a roll of good quality plain paper.

MODELS

Model 001

Dimensions:

Width: 88.9cm (35 in.)
Depth: 63.5cm (25 in.)
Height: 101.6cm (40 in.)
Weight: 229.3kg (665 lbs.)

HIGHLIGHTS

- Delivery Speed: First copy of an original in 15 seconds. Subsequent copies of same original in 6 seconds. Copies per hour -- 600 (rated speed).
- Reproduces (full size*) an image as large as 215.9 x 330.2mm (8-1/2 x 14 in.), approximately the size of the document glass.
  * No provision for photo-reduction.
- Provision for overhang of material to be copied enables the "copy-board" to accommodate an original measuring 355.6 x 431.8mm (14 x 17 in). Bound-document originals such as manuals or magazines may be as thick as 25.4mm (1 in).
- By simply pressing one of two buttons, the machine operator selects an output page size 215.9 x 279.4mm (8-1/2 x 11 in.) or 215.9 x 355.6mm (8-1/2 x14 in.).
- Document cover door latches down to hold material to be copied. Document cover automatically unlatches and springs up when last copy has been made.
- Has a sliding selector switch to set the machine to make from 1 to 10 copies.
- Exit Pocket Capacity: Approximately 75 copies.
- Copy paper is a roll of plain bond (watermark bond available) that yields approximately 600 letter-size copies.
- Machine warm-up is part of first copy cycle.

Bibliography: *Copier Key Operator Instructions*, S548-0501

SPECIFY

- Voltage: For standard requirement, specify code **#A881** which calls for a dedicated 115V, 60 Hz, 15 amp, with provision for grounding. The required receptacle is a Hubbell 5262 or equivalent, NEMA 5-15R. If the light document feature is installed, specify code **#A883** which calls for a 115V, 60 Hz, 20 amp, with provision for grounding. The required receptacle is a Hubbell 5361 or equivalent, NEMA 5-20R. **Field installation:** No.
- Color: Pearl White top, Charcoal Gray panels. (No specify required).

SPECIAL FEATURES

Light Document Feature: Pressing the light document button turns on, or turns off a mechanism that causes the machine to make darker than ordinary copies, a convenience when a copying task sometimes involves unusually light originals. The light-document button is illuminated when the feature is active. **Prerequsites:** Use special toner (the kind for Copier II), P/N 1162144, green label. **Field installation:** Yes.

Meter System (#A895): The copy meter mounts under the document glass and counts each copy cycle. The meter itself is a plug-in unit (**P/N 1245230**), a number of which could be separately identified with various copier-user groups. A customer's key operator can substitute one meter for another in accordance with which group is making nearly exclusive use of the machine at a particular time. **Maximum:** one system per machine. Any number of meters may be used separately. **Prerequisires:** A meter must be plugged in to enable the copier to run. **Note:** The meter receptacle may or may not accept non-IBM meters that a customer may have on hand. Similarly, IBM meters may or may not be compatible with non-IBM copiers. **Field installation:** Yes.

Radio Frequency Interference Elimination Filter (RFI) (#A120 - #A121): This feature reduce radio frequency static that may be produced by the machine. Specify #A120 for 60 Hz current or #A121 for 50 Hz current. **Field installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

All supplies should be ordered from IBM.

6801 COPIER II

PURPOSE

The 6801 Copier II can handle pages in books of any thickness, and portions of oversized originals that can be rolled up or folded, such as engineering drawings or maps.

MODELS

Model 001

Dimensions:

Width: 107.3cm (41 in.)
Depth: 74.9cm (28 in.)
Height: 118.1cm (43 in.)
Weight: 371.3kg (825 lbs.)

SPECIFY

- Volatage: Dedicated 120/240V, 120/208V, 30 Amps. 60 Hz.
- Paper Group:

Width	Length	Alternate Length	Code
203mm (8 in.)	267mm (10.5 in.)	343mm (13.5 in.)	**#A002**
203mm (8 in.)	254mm (10 in.)	330mm (13 in.)	**#A003**
210mm (8.268 in.)	270mm (10.6 in.)	297mm (11.6 in.)	**#A004**
210mm (8.268 in.)	297mm (11.6 in.)	356mm (14 in.)	**#A005**
216mm (8.5 in.)	279mm (11 in.)	356mm (14 in.)	**#A001**
216mm (8.5 in.)	279mm (11 in.)	330mm (13 in.)	**#A006**

- Language Group: The language group consists of preprinted instructions which appear on the machine such as "Lift Cover", "Remove Copies", "Not Ready", " Add Paper", etc.

  English US **#2265**

SPECIAL FEATURES

Radio Frequency Interference Elimination Filter (#A120, #A121: Specify **#A120** for 60 Hz, **#A121** for 50 Hz. **Field Installation:** Yes.

Carpet Rails (#A138): Field Installation: Yes.

Meter Control System (#A230, #A895, #A995: Specify **#A230** for the meter, **#A895** for 60 HZ receptacle, **#A995** for 50 HZ receptacle. **Field Installation:** Yes.

Convenience Collator (#3154, #3155: Specify **#3154** for 50 Hz, **#3155** for 60 Hz. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

SUPPLIES

Contact IBM.

SERs

Adjustable Copy Number Selector **(SER 472076)**
Coin Meter 60 Hz **(SER 572376)**
Coin Operation Device **(SER 472192)**
Dual Letter Page Size 10 1/2 -11 -14 in. **(SER 472253)**
Dual Legal Page Size 10 1/2 - 13 -14 in. **(SER 972027)**
Dual Legal Page Size 11-13-14 in. **(SER 972026)**
External Keylock **(SER 272001)**
External Billing Meter (60 Hz) **(SER 372035)**
External Keylock Controlled Meter **(SER 572020)**
External Key Controlled Multi/Single Copy **(SER 572447)**
Flexible Document Cover **(SER 572351)**
Foot Control (parallels "B"button) **(SER 272017)**
Line Cord: 11 through 30 feet **(SER 372102)**
Painted Covers:
- Classic Blue **(SER 972019)**
- Emerald Green **(SER 972009)**
- Garnet Rose **(SER 972012)**
- Pearl White **(SER 972017)**
- Raven Black **(SER 972011)**
- Sandstone Beige **(SER 972008)**
- Topaz Bronze **(SER 972014)**
- Willow Green **(SER 972013)**

Paper Length: 12/14 in. **(SER 372119)**

Contact IBM for particulars.

6802 SERIES III Mdl 10

PURPOSE

The 6802 Copier III model 10 is a high-speed plain-paper copier/duplicator that can print on both sides of a piece of paper automatically, and collate the output.

MODELS

Model 004 6802 Copier III

Dimensions:

Width: 106.7cm (42 in.)
Depth: 68.6cm (27 in.)
Height: 116.8cm (46 in.)
Weight: 463.5kg (1,030 lbs.)

HIGHLIGHTS

Single sheets are automatically fed on to the document glass, positioned, and after last copy is made, original is ejected into the original exit tray. No "A" button is required.

Copies are printed on both sides of a piece of paper through the use of a duplexing feature, thus saving on paper and storage cost. Duplexing is entirely automatic and does not require the operator to manually reverse the paper.

Single Original Automatic feed. Maximum size: 215.9mm x 355.6mm (8-1/2 x 14 in.) When Automatic Feed is not used maximum size is: 304.8 x 431.8mm (12 x 17 in.)

Exit Pocket Capacity: Approximately 400 sheets.

Automatic machine misfeed recovery, side one only.

Provides the ability to make copies lighter or darker.

Has a push button copy quantity selector ranging from 1 to 999 copies.

Copy paper is stored in two trays with a total capacity of about 2,700 sheets.

Delivery Speed: First copy 4.5 seconds (varies with special features selected). Subsequent copies at 1.6 second intervals. Copies per hour (rated speed) 4,500.

SPECIFY

- Voltage Dedicated 115 Volt, 30 amp.
  Voltage Dedicated 208-230 Volt, 30 amp.
  Note: When a collator is attached to a 115 volt 30 amp unit, the collator requires a separate additional outlet with 115 volt 15 amp dedicated circuit.

- Paper Group:

  Group 1 **#P876***
  203 x 267mm (8.0 x 10.5 in.)
  216 x 279mm (8.5 x 11.0 in.)
  216 x 330mm (8.5 x 13.0 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 2 **#P877**
  210 x 297mm (8.2 x 11.6 in.)
  216 x 279mm (8.5 x 11.0 in.)
  216 x 330mm (8.5 x 13.0 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 3 **#P878**
  203 x 254mm (8.0 x 10.0 in.)
  203 x 330mm (8.0 x 13.0 in.)
  210 x 297mm (8.2 x 11.6 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 4 **#P879**
  210 x 270mm (8.2 x 10.6 in.)
  210 x 297mm (8.2 x 11.6 in.)
  210 x 310mm (8.2 x 12.2 in.)
  216 x 356mm (8.5 x 14.0 in.)

  * Supplied as standard if no other paper group is specified.

- Language Group: The language group consist of preprinted instructions which appear on the machine such as "Lighter Copy", "Darker Copy", "Reduce"," Alternate Paper", "Duplex", etc.

  English US **#2265**

- Color: Charcoal Gray (no specify required).

SPECIAL FEATURES

Carpet Rails (#A134): Carpet rails for the base machine and the primary collator. Note: If selected, then feature code **#A137** must be chosen on the secondary collator. See M6852 pages for details. **Field Installation:** Yes.

Resetable Billing Meter (#A278): Allows the user to count number of copies. The meter can manually be set to zero. **Field Installation:** Yes.

Meter System and Receptacle (#5989): Enables the customer to allocate usage to various departmental programs or special projects within an organization or location. The meter system consist of a single receptacle mounted in a small cabinet, plus one or more pluggable meters. A meter must be inserted into the receptacle to initiate a copy cycle. Each meter automatically records the number of copies made. Any number of meters may be used. IBM meters are not compatible with competitive copying machines. **Field installation:** An MES must be submitted through Boulder CO, USA.

Radio Frequency Interference Elimination Filter (RFI) Electromagnetic Compatibility (EMC): The RFI and/or EMC may be ordered only for field installation from Boulder CO, USA.

Collator: 20 bin or 40 bin. See M6852 pages for details. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

RPQs

14 Foot Line Cord (RPQ 073002): Allows the customer to locate the 6802 14 feet from the power supply. Ordered through normal MES procedure using RPQ 073002.

17 Foot Line Cord (RPQ 073003): Allows the customer to locate the 6802 17 feet from the power supply. Ordered through normal MES procedure using RPQ 073003.

20 Foot Line Cord (RPQ 073004): Allows the customer to locate the 6802 20 feet from the power supply. Ordered through normal MES procedure using RPQ 073004.

6 Foot Line Cord (RPQ 073005): Allows the customer to locate the 6802 6 feet from the power supply. Ordered through normal MES procedure using RPQ 073005.

A-4 Paper Size (RPQ 174011): Allows the 6802 to feed "A-4" size paper, 210 x 297mm (8.27 x 11.69 in.). Ordered through normal MES procedure using RPQ 174011.

Offset Masters (RPQ 176103): Allows offset masters to be more easily processed. Ordered through normal MES procedure using RPQ 176103.

Third Party Interface (RPQ 673027): Is available for customers who wish to limit copy usage using meter systems not manufactured by IBM. This connector provides a cable interface that connects the meter-system to the 6802. Ordered through normal MES procedure using RPQ 673027.

Front Door Lock (RPQ 773123): This feature provides a front-door lock permitting access to the inside of the 6802 only to those people having the key to the lock. Ordered through normal MES procedure using RPQ 773123.

SUPPLIES

Each 6802 shipment to the customer will include the following: One lens cloth; one cleaning cloth; one drop cloth; one key operator manual; one carton toner; one vacuum cleaner bag; one special cleaning cloth for the fuser hot roll.

6803 SERIES III MDL 20

PURPOSE

The 6803 Copier III model 20 is a high-speed plain-paper copier/duplicator that can print on both sides of a piece of paper automatically, reduce unwiedly documents to letter page size, and collate the output.

MODELS

Model 004 6803 Copier III model 20.

Dimensions:

Width: 116.8cm (46 in.)
Depth: 68.6cm (27 in.)
Height: 116.8cm (46 in.)
Weight: 513.0kg (1,140 lbs.)

HIGHLIGHTS

Single sheets are automatically fed on to the document glass, positioned, and after last copy is made, original is ejected into the original exit tray. No "A" button is required.

Copies are printed on both sides of a piece of paper through the use of a duplexing feature, thus saving on paper and storage cost. Duplexing is entirely automatic and does not require the operator to manually reverse the paper.

Single Original Automatic feed. Maximum size: 304.8mm x 381mm (12 x 15 in.) When Automatic Feed is not used maximum size is: 304.8 x 431.8mm (12 x 17 in.)

Exit Pocket Capacity: Approximately 400 sheets.

Automatic machine misfeed recovery, side one only.

Provides the ability to reduce originals 26% or 35%.

Provides the ability to make copies lighter or darker.

Has a push button copy quantity selector ranging from 1 to 999 copies.

Copy paper is stored in two trays with a total capacity of about 2,700 sheets.

Delivery Speed: First copy 4.5 seconds (varies with special features selected). Subsequent copies at 1.6 second intervals. Copies per hour (rated speed) 4,500.

SPECIFY

- Voltage Dedicated 115 Volt, 30 amp.
  Voltage Dedicated 208-230 Volt, 30 amp.
  Note: When a collator is attached to a 115 volt 30 amp unit, the collator requires a separate additional outlet with 115 volt 15 amp dedicated circuit.

- Paper Group:

  Group 1 **#P876***

  203 x 267mm (8.0 x 10.5 in.)
  216 x 279mm (8.5 x 11.0 in.)
  216 x 330mm (8.5 x 13.0 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 2 **#P877**

  210 x 297mm (8.2 x 11.6 in.)
  216 x 279mm (8.5 x 11.0 in.)
  216 x 330mm (8.5 x 13.0 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 3 **#P878**

  203 x 254mm (8.0 x 10.0 in.)
  203 x 330mm (8.0 x 13.0 in.)
  210 x 297mm (8.2 x 11.6 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 4 **#P879**

  210 x 270mm (8.2 x 10.6 in.)
  210 x 297mm (8.2 x 11.6 in.)
  210 x 310mm (8.2 x 12.2 in.)
  216 x 356mm (8.5 x 14.0 in.)

  * Supplied as standard if no other paper group is specified.

- Language Group: The language group consist of preprinted instructions which appear on the machine such as "Lighter Copy", "Darker Copy", "Reduce"," Alternate Paper", "Duplex", etc.

  English US **#2265**

- Color: Charcoal Gray (no specify required).

SPECIAL FEATURES

Carpet Rails (#A134): Carpet rails for the base machine and the primary collator. Note: If selected, then feature code **#A137** must be chosen on the secondary collator. See M6852 pages for details. **Field Installation:** Yes.

Resetable Billing Meter (#A736): Allows the user to count number of copies. The meter can manually be set to zero. **Field Installation:** Yes.

Meter System and Receptacle (#5989): Enables the customer to allocate usage to various departmental programs or special projects within an organization or location. The meter system consist of a single receptacle mounted in a small cabinet, plus one or more pluggable meters. A meter must be inserted into the receptacle to initiate a copy cycle. Each meter automatically records the number of copies made. Any number of meters may be used. IBM meters are not compatible with competitive copying machines. **Field installation:** An MES must be submitted through Boulder CO, USA.

Radio Frequency Interference Elimination Filter (RFI)
Electromagnetic Compatibility (EMC): The RFI and/or EMC may be ordered only for field installation from Boulder CO, USA.

Collator: 20 bin or 40 bin. See M6852 pages for details. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

RPQs

14 Foot Line Cord (RPQ 073002): Allows the customer to locate the 6803 14 feet from the power supply. Ordered through normal MES procedure using RPQ 073002.

17 Foot Line Cord (RPQ 073003): Allows the customer to locate the 6803 17 feet from the power supply. Ordered through normal MES procedure using RPQ 073003.

20 Foot Line Cord (RPQ 073004): Allows the customer to locate the 6803 20 feet from the power supply. Ordered through normal MES procedure using RPQ 073004.

6 Foot Line Cord (RPQ 073005): Allows the customer to locate the 6803 6 feet from the power supply. Ordered through normal MES procedure using RPQ 073005.

A-4 Paper Size (RPQ 174011): Allows the 6803 to feed "A-4" size paper, 210 x 297mm (8.27 x 11.69 in.). Ordered through normal MES procedure using RPQ 174011.

Offset Masters (RPQ 176103): Allows offset masters to be more easily processed. Ordered through normal MES procedure using RPQ 176103.

Front Door Lock (RPQ 773123): This feature provides a front-door lock permitting access to the inside of the 6803 only to those people having the key to the lock. Ordered through normal MES procedure using RPQ 773123.

Third Party Interface (RPQ 973024): Is available for customers who wish to limit copy usage using meter systems not manufactured by IBM. This connector provides a cable interface that connects the meter-system to the 6803. Ordered through normal MES procedure using RPQ 973024.

SUPPLIES

Each 6803 shipment to the customer will include the following: One lens cloth; one cleaning cloth; one drop cloth; one key operator manual; one carton toner; one vacuum cleaner bag; one special cleaning cloth for the fuser hot roll.

6805 SERIES III MDL 30

PURPOSE

The 6805 Copier III model 30 is a high-speed plain-paper copier/duplicator that can print on both sides of a piece of paper automatically, and collate the output.

MODELS

Model 001 6805 Copier III model 30

Dimensions:

Width: 107.3cm (42-1/4 in.)
Depth: 74.9cm (29-1/2 in.)
Height: 118.1cm (46-1/2 in.)
Weight: 477.0kg (1,050 lbs.)

HIGHLIGHTS

Single sheets are automatically fed on to the document glass, positioned, and after last copy is made, original is ejected into the original exit tray. No "A" Button is required.

Copies are printed on both sides of a piece of paper through the use of a duplexing feature, thus saving on paper and storage cost. Duplexing is entirely automatic and does not require the operator to manually reverse the paper.

The document feed will accept single sheets size of 216mm x 356mm (8-1/2 x 14 in.) maximum.

Exit Pocket Capacity: Approximately 250 copies.

Automatic job recovery.

Provides the ability to make copies lighter or darker.

Has a push button copy quantity selector ranging from 1 to 999 copies.

Copy paper is stored in two trays with a total capacity of about 2,700 sheets.

Delivery Speed: First copy 4.5 seconds (varies with special features selected). Subsequent copies at 1.6 second intervals. Copies per hour (rated speed) 4,200

SPECIFY

- Voltage Dedicated 120/208 Volt, 30 amp.
- Paper Group:

  Group 1 **#P876 ***
  203 x 267mm (8.0 x 10.5 in.)
  216 x 279mm (8.5 x 11.0 in.)
  216 x 330mm (8.5 x 13.0 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 2 **#P877**
  210 x 297mm (8.2 x 11.6 in.)
  216 x 279mm (8.5 x 11.0 in.)
  216 x 330mm (8.5 x 13.0 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 3 **#P878**
  203 x 254mm (8.0 x 10.0 in.)
  203 x 330mm (8.0 x 13.0 in.)
  210 x 297mm (8.2 x 11.6 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 4 **#P879**
  210 x 270mm (8.2 x 10.6 in.)
  210 x 297mm (8.2 x 11.6 in.)
  210 x 310mm (8.2 x 12.2 in.)
  216 x 356mm (8.5 x 14.0 in.)

  * Supplied as standard if no other paper group is specified.
- Language Group: The language group consist of preprinted instructions which appear on the machine such as "Lighter Copy", "Darker Copy", "Reduce"," Alternate Paper", "Duplex", etc.

  English US #2265
- Color: Charcoal Gray (no specify required).

SPECIAL FEATURES

Carpet Rails (#A134): Carpet rails for the base machine and the primary collator. Note: If selected, then feature code **#A137** must be chosen on the secondary collator. See M6852 pages for details. **Field Installation:** Yes.

Copier Control Feature (#A238): Provides the capabilty of controlling copier access and allocating copier usage to the responsible indivdual and/or department. Authorized personnel are assigned an identification code number (a maximum of 5-digit code). This code must be entered through the numerical pad on the control panel to activate the copier. The number of copies for each user is counted and stored electronically in the copier. Periodically the Key Operator can retrieve the total number of copies for each assigned user. This information can be used for internal department billings. **Field Installation:** Yes.

Phase Adapter Plug (#A249): Provides for replacing none IBM plugs used with none IBM copiers. **Field Installation:** Yes.

Third Party Interface (#5988): This feature is available for customers who wish to limit copy usage using meter systems not manufactured by IBM. This connector provides a cable interface that connects the meter-system to the 6805. **Field installation:** Yes.

Meter System and Receptacle (#5989): Enables the customer to allocate usage to various departmental programs or special projects within an organization or location. The meter system consist of a single receptacle mounted in a small cabinet, plus one or more pluggable meters. A meter must be inserted into the receptacle to initiate a copy cycle. Each meter automatically records the number of copies made. Any number of meters may be used. IBM meters are not compatible with competitive copying machines. **Field installation:** An MES must be submitted through Boulder CO, USA.

Radio Frequency Interference Elimination Filter (RFI) Electromagnetic Compatibility (EMC): The RFI and/or EMC may be ordered only for field installation from Boulder CO, USA. **Collator** 20 bin or 40 bin. See M6852 pages for details. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

RPQs

14 Foot Line Cord (RPQ 073002): Allows the customer to locate the 6805 14 feet from the power supply. Ordered through normal MES procedure using RPQ 073002.

17 Foot Line Cord (RPQ 073003): Allows the customer to locate the 6805 17 feet from the power supply. Ordered through normal MES procedure using RPQ 073003.

20 Foot Line Cord (RPQ 073004): Allows the customer to locate the 6805 20 feet from the power supply. Ordered through normal MES procedure using RPQ 073004.

6 Foot Line Cord (RPQ 073005): Allows the customer to locate the 6805 6 feet from the power supply. Ordered through normal MES procedure using RPQ 073005.

A-4 Paper Size (RPQ 174011): Allows the 6805 to feed "A-4" size paper, 210 x 297mm (8.27 x 11.69 in.). Ordered through normal MES procedure using RPQ 174011.

Offset Masters (RPQ 176103): Allows offset masters to be more easily processed. Ordered through normal MES procedure using RPQ 176103.

Resetable Billing Meter (RPQ 600604): Allows the user to count number of copies. The meter can manually be set to zero. Ordered through normal MES procedure using RPQ 600604.

Front Door Lock (RPQ 773123): This feature provides a front-door lock permitting access to the inside of the 6805 only to those people having the key to the lock. Ordered through normal MES procedure using RPQ 773123.

SUPPLIES

Each 6805 shipment to the customer will include the following: One lens cloth; one cleaning cloth; one drop cloth; one key operator manual; one carton toner; one vacuum cleaner bag; one special cleaning cloth for the fuser hot roll.

6806 SERIES III MDL 40

PURPOSE

The 6806 Copier III model 40 is a high-speed plain-paper copier/duplicator that can print on both sides of a piece of paper automatically, reduce unwiedly documents to letter page size, and collate the output.

MODELS

Model 001 6806 Copier III model 40.

Dimensions:

Width: 120.6cm (47-1/2 in.)
Depth: 74.9cm (29-1/2 in.)
Height: 118.1cm (46-1/2 in.)
Weight: 544.0kg (1,200 lbs.)

HIGHLIGHTS

Single sheets are automatically fed on to the document glass, positioned, and after last copy is made, original is ejected into the original exit tray. No "A" Button is required.

Copies are printed on both sides of a piece of paper through the use of a duplexing feature, thus saving on paper and storage cost. Duplexing is entirely automatic and does not require the operator to manually reverse the paper.

Single Original Automatic feed. Maximum size: 304.8mm x 381mm (8-1/2 x 14 in.) When Automatic Feed is not used maximum size is: 304.8 x 431.8mm (12 x 17 in.)

Exit Pocket Capacity: Approximately 250 sheets.

Automatic job recovery.

Provides the ability to reduce originals 26% or 35%.

Provides the ability to make copies lighter or darker.

Has a push button copy quantity selector ranging from 1 to 999 copies.

Copy paper is stored in two trays with a total capacity of about 2,700 sheets.

Delivery Speed: First copy 4.5 seconds (varies with special features selected). Subsequent copies at 1.6 second intervals. Copies per hour (rated speed) 4,200.

SPECIFY

- Voltage Dedicated 120/208 Volt, 30 amp.
- Paper Group:

  Group 1 **#P876***

  203 x 267mm (8.0 x 10.5 in.)
  216 x 279mm (8.5 x 11.0 in.)
  216 x 330mm (8.5 x 13.0 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 2 **#P877**

  210 x 297mm (8.2 x 11.6 in.)
  216 x 279mm (8.5 x 11.0 in.)
  216 x 330mm (8.5 x 13.0 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 3 **#P878**

  203 x 254mm (8.0 x 10.0 in.)
  203 x 330mm (8.0 x 13.0 in.)
  210 x 297mm (8.2 x 11.6 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 4 **#P879**

  210 x 270mm (8.2 x 10.6 in.)
  210 x 297mm (8.2 x 11.6 in.)
  210 x 310mm (8.2 x 12.2 in.)
  216 x 356mm (8.5 x 14.0 in.)

  * Supplied as standard if no other paper group is specified.

- Language Group: The language group consist of preprinted instructions which appear on the machine such as "Lighter Copy", "Darker Copy", "Reduce"," Alternate Paper", "Duplex", etc.

  English US **#2265**

- Color: Charcoal Gray (no specify required).

SPECIAL FEATURES

Carpet Rails (#A134): Carpet rails for the base machine and the primary collator. Note: If selected, then feature code **#A137** must be chosen on the secondary collator. See M6852 pages for details. **Field Installation:** Yes.

Copier Control Feature (#A238): Provides the capabilty of controlling copier access and allocating copier usage to the responsible indivdual and/or department. Authorized personnel are assigned an identification code number (a maximum of 5 digit code). This code must be entered through the numerical pad on the control panel to activate the copier. The number of copies for each user is counted and stored electronically in the copier. Periodically the Key Operator can retrieve the total number of copies for each assigned user. This information can be used for internal department billings. **Field Installation:** Yes.

Phase Adapter Plug (#A249): Provides for replacing none IBM plugs used with none IBM copiers. **Field Installation:** Yes.

Third Party Interface (#5988): This feature is available for customers who wish to limit copy usage using meter systems not manufactured by IBM. This connector provides a cable interface that connects the meter-system to the 6806. **Field installation:** Yes.

Meter System and Receptacle (#5989): Enables the customer to allocate usage to various departmental programs or special projects within an organization or location. The meter system consist of a single receptacle mounted in a small cabinet, plus one or more pluggable meters. A meter must be inserted into the receptacle to initiate a copy cycle. Each meter automatically records the number of copies made. Any number of meters may be used. IBM meters are not compatible with competitive copying machines. **Field installation:** An MES must be submitted through Boulder CO, USA.

Radio Frequency Interference Elimination Filter (RFI) Electromagnetic Compatibility (EMC): The RFI and/or EMC may be ordered only for field installation from Boulder CO, USA.

Collator: 20 bin or 40 bin. See M6852 pages for details. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

RPQs

14 Foot Line Cord (RPQ 073002): Allows the customer to locate the 6806 14 feet from the power supply. Ordered through normal MES procedure using RPQ 073002.

17 Foot Line Cord (RPQ 073003): Allows the customer to locate the 6806 17 feet from the power supply. Ordered through normal MES procedure using RPQ 073003.

20 Foot Line Cord (RPQ 073004): Allows the customer to locate the 6806 20 feet from the power supply. Ordered through normal MES procedure using RPQ 073004.

6 Foot Line Cord (RPQ 073005): Allows the customer to locate the 6806 6 feet from the power supply. Ordered through normal MES procedure using RPQ 073005.

A-4 paper size (RPQ 174011): Allows the 6806 to feed "A-4" size paper, 210 x 297mm (8.27 x 11.69 in.). Ordered through normal MES procedure using RPQ 174011.

Offset Masters (RPQ 176103): Allows offset masters to be more easily processed. Ordered through normal MES procedure using RPQ 176103.

Resetable Billing Meter (RPQ 600604): Allows the user to count number of copies. The meter can manually be set to zero. Ordered through normal MES procedure using RPQ 600604.

Front Door Lock (RPQ 773123): This feature provides a front-door lock permitting access to the inside of the 6806 only to those people having the key to the lock. Ordered through normal MES procedure using RPQ 773123.

SUPPLIES

Each 6806 shipment to the customer will include the following: One lens cloth; one cleaning cloth; one drop cloth; one key operator manual; one carton toner; one vacuum cleaner bag; one special cleaning cloth for the fuser hot roll.

6808 SERIES III MDL 60

PURPOSE

The Copier III is a high-speed plain-paper copier/duplicator that can print on both sides of a piece of paper automatically, reduce unwieldy documents to letter page size, and collate the output.

MODELS

Model 001

Prerequisites: Feature SADF (#A150) or ADF (#A151) and Non-Reduction Feature (#5977) or Reduction Feature (#5978) must be specified. See "Special Features".

Dimensions:

Width: 124.5cm (49 in.)
Depth: 74.9cm (29-1/2 in.)
Height: 120.0cm (47-1/4 in.)
Weight: 544.0kg (1,200 lbs.)

HIGHLIGHTS

- The 6808 represents a modular copier concept that is a significant addition to the Copier III family of copier products. It allows customers to add features to their basic machine, in their office, as they need them or remove features as their needs change.
- Single sheets are automatically fed on the document glass, positioned, and after last copy is made, original is ejected into the original exit tray. No "A" Button is required.
- Copies are printed on both sides of a piece of paper through the use of a duplexing feature, thus saving on paper and storage cost. Duplexing is entirely automatic and does not require the operator to manually reverse the paper.
- Single Original Automatic feed Maximum size: 304.8 x 381mm 8-1/2 x 14 in.) When Automatic Feed is not used maximum size is 304.8 x 431.8mm (12 x 17 in.)
- Exit Pocket Capacity : Approximately 250 sheets.
- Job Interrupt Feature allows the operator the convenience of interrupting a job for priority copies. At the completion of the priority job, machine recalls the instructions of the original job and resumes where it was interrupted.
- Automatic Checkout Capability allows the CE to quickly verify that the machine is working properly at the completion of a service call, which improves machine serviceability.
- Provides the ability to reduce originals 26% or 35%.
- Provides the ability to make copies lighter or darker.

  Has a push button copy quantity selector ranging from 1 to 999 copies.
- Copy paper is stored in two trays with a total capacity of about 2,700 sheets.
- Delivery Speed: First copy 4.5 seconds (varies with special features selected). Subsequent copies 1.6 seconds intervals copies per hour (rated speed) 4,200.

SPECIFY

- Voltage ... 120 Volt AC, 30 amp, grounded dedicated lines; 120/208 Volt AC, 30 amp, grounded; 120/240 Volt AC, 30 amp, grounded.

- Paper Group:

  Group 1 **#P876**
  203 x 267mm (8.0 x 10.5 in.)
  216 x 279mm (8.5 x 11.0 in.)
  216 x 330mm (8.5 x 13.0 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 2 **#P877**
  210 x 297mm (8.2 x 11.6 in.)
  216 x 279mm (8.5 x 11.0 in.)
  216 x 330mm (8.5 x 13.0 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 3 **#P878**
  203 x 254mm (8.0 x 10.0 in.)
  203 x 330mm (8.0 x 13.0 in.)
  210 x 297mm (8.2 x 11.6 in.)
  216 x 356mm (8.5 x 14.0 in.)

  Group 4 **#P879**
  210 x 270mm (8.2 x 10.6 in.)
  210 x 297mm (8.2 x 11.6 in.)
  210 x 310mm (8.2 x 12.2 in.)
  216 x 356mm (8.5 x 14.0 in.)

- Language Group: The language groups consist of preprinted instructions which appear on the machine such as "Lighter Copy", "Darker Copy", "Reduce"," Alternate Paper", "Duplex", etc.

  English US **#2265**

- Color: Pearl White, Charcoal Gray end covers (no specify required).

SPECIAL FEATURES

Carpet Rails (#A134): Carpet rails for the base machine and the primary collator. Note: If selected then feature code **#A137** must be chosen on the secondary collator. See M6852 pages for details. **Field Installation:** Yes.

Semi-Automatic Document Feed (SADF) (#A150): The horizontal SADF entry tray provides enhanced application flexibility and improved reliability. **Field Installation:** Yes.

Automatic Document Feed (ADF) (#A151): The ADF automatically feeds a stack of up to 50 originals ranging in size from 203mm x 254mm (8 x 10 in.) to 297mm x 420mm (11.69 x 16.54 in.), and weight from 60 to 105g/sq.m (16-20 lbs) originals. However, each stack of originals placed in the ADF must be of the same size and weight. **Field Installation:** Yes.

Copier Control Feature (#A238): Provides the capabilty of controlling copier access and allocating copier usage to the responsible indivdual and/or department. Authorized personnel are assigned an identification code number (a maximum of 5 digit code). This code must be entered through the numerical pad on the control panel to activate the copier. The number of copies for each user is counted and stored electronically in the copier. Periodically the Key Operator can retrieve the total number of copies for each assigned user. This information can be used for internal department billings. **Field Installation:** Yes.

Phase Adapter Plug (#A249): Provides for replacing none IBM plugs used with none IBM copiers. **Field Installation:** Yes.

Non-reduction Feature (#5977): Field Installation: Yes.

Reduction Feature (#5978): Provides for reducing originals 26% or 35% in size. **Field Installation:** Yes.

Third Party Interface (#5988): This feature is available for customers who wish to limit copy usage using meter systems not manufactured by IBM. This connector provides a cable interface that connects the meter-system to the 6808. **Field installation:** Yes.

Meter System and Receptacle) (#5989): Enables the customer to allocate usage to various departmental programs or special projects within an organization or location. The Meter system consist of a single receptacle mounted in a small cabinet, plus one or more pluggable meters. A meter must be inserted into the receptacle to initiate a copy cycle. Each meter automatically records the number of copies made. Any number of meters may be used. IBM meters are not compatible with competitive copying machines. **Field installation:** An MES must be submitted through Boulder CO USA.

Radio Frequency Interference Elimination Filter (RFI)
Electromagnetic Compatibility (EMC): The RFI and/or EMC may be ordered only for field installation from Boulder CO USA.

Collator: 20 bin or 40 bin. See M6852 pages for details. **Field Installation:** Yes.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

RPQs

14 Foot Line Cord (RPQ 073002): Allows the customer to locate the 6808 14 feet from the power supply. Ordered through normal MES procedure using RPQ 073002.

17 Foot Line Cord (RPQ 073003): Allows the customer to locate the 6808 17 feet from the power supply. Ordered through normal MES procedure using RPQ 073003.

20 Foot Line Cord (RPQ 073004): Allows the customer to locate the 6808 20 feet from the power supply. Ordered through normal MES procedure using RPQ 073004.

6 Foot Line Cord (RPQ 073005): Allows the customer to locate the 6808 6 feet from the power supply. Ordered through normal MES procedure using RPQ 073005.

6808 Series III mdl 60 (cont'd)

A 4 Paper Size (RPQ 174011): Allows the 6808 to feed "A 4" size paper, 210 x 297mm (8.27 x 11.69 in.). Ordered through normal MES procedure using RPQ 174011.

Offset Masters (RPQ 176103): Allows offset masters to be more easily processed. Ordered through normal MES procedure using RPQ 176103.

Resetable Billing Meter (RPQ 600604): Allows the user to count number of copies. The meter can manually be set to 0. Ordered through normal MES procedure using RPQ 600604.

Front Door Lock (RPQ 773123): This feature provides a front-door lock permitting access to the inside of the 6808 only to those people having the key to the lock. Ordered through normal MES procedure using RPQ 773123.

SUPPLIES

Each 6808 shipment to the customer will include the following: One lens cloth; one cleaning cloth; one drop cloth; one key operator manual; one carton toner; one vacuum cleaner bag; one special cleaning cloth for the fuser hot roll.

6852 COLLATOR

PURPOSE

Collator for the copier III machines.

MODELS

Model 004 20 bin 60 Hz (Primary model)

Model 003 20 bin 60 Hz (Secondary model additional 20 bin)

Model 014 20 bin 50 Hz (Primary model)

Model 013 20 bin 50 Hz (Secondary model additional 20 bin)

Prerequisites: The 6802 or 6803 copiers must be equipped with the Collator Attachment Feature **#A132** to enable it to accept a collator.

Dimensions:

Primary (20 bins)	Secondary (for total of 40 bins)
Width: 46cm (18 in.)	Width: 46cm (18 in.)
Depth: 68cm (27 in.)	Depth: 68cm (27 in)
Height: 105cm (41-1/2 in.)	Height: 96.5cm (38 in.)
Weight: 81kg (180 lbs.)	Weight: 61kg (135 lbs.)

HIGHLIGHTS

The collator is designed to simplify paper handling by automatically assembling sets of copies in sequential order. Each collator bin holds approximately 100 sheets of 20 lb. bond paper.

SPECIFY

- **Collator Attachment Feature (#A132):** The 6802 or 6803 copiers must be equipped with this feature to enable it to accept a collator. This feature is ordered with the 6802 or 6803 collator.
- Color: Charcoal gray (no specify required).

SPECIAL FEATURES

Carpet Rails (#A137): Carpet rails for the secondary collator. Carpet rails (#A134) for base machine and the primery collator is a prerequisite. See appropriate machine pages for the base machine.

MODEL CONVERSIONS

Compatibility Feature (#C056): Allows conversion of a currently installed collator on 6802 or 6803 to be attached to the 6805 or 6806 copier.

Compatibility Feature (#C069): Allows conversion of a currently installed collator on 6805 or 6806 to be attached to the 6808 copier.

ACCESSORIES (None)

SUPPLIES (None)

7361 GRAPHICS PROCESSOR UNIT

PURPOSE

Provides the logic, memory, disk storage, and I/O control capabilities for the 7361 Fastdraft System. When loaded with the 7361 Fastdraft licensed program, enables and controls user's interaction with the 3251 model 2 Display Station and the 7374 or 7375 Color Plotter. As the key element, with the Fastdraft licensed program, of the 7361 Fastdraft System, offers graphics functions for use by drafting personnel untrained and inexperienced in computer or programming disciplines.

MODELS

Model 1 001

Prerequisites: There are no prerequisites for the 7361 GPU. The following elements are, however, required when using the 7361 as part of the 7361 Fastdraft System:

- The 7361 Fastdraft licensed program (5719-GP1).
- A 3251 mdl 2 Display Station with Alphameric Keyboard (#4621) and Light Pen (#4750).
- A 3101 mdl 100 or 23A Display Terminal, as a console [without 3m (10 foot) modem cable].

Customer Setup: No.

HIGHLIGHTS

A floor-standing unit mounted on casters for easy installation and service access.

Contains:

The processor.

256K bytes of storage.

A 13.9 megabyte disk file.

A diskette drive ... can accommodate up to 1.2 megabytes, dependent upon format.

Workstation controller

Power supplies.

A processor control panel.

Interfaces to one or two 3251 mdl 2 Display Stations, a 3101 mdl 100 or 23A Display Terminal console (without modem cable), and a 7374 or 7375 Color Plotter. Provides the logic, storage and I/O control capabilities to handle graphics application functions for drafting personnel.

Description: The 7361 Graphics Processor Unit (GPU), with the Fastdraft licensed program Version 1, Mod 1 installed, offers complete "menus" of functions to the drafter.

Some of these features/functions are:

Isometric drawing and assembly capabilities.

Circle/arc intersect and tangent.

Ability to draw lines tangent to circle/arc.

User-defined units of measure (millimeters and inches).

Scalable views.

Spline.

Dimensions in decimal inches and angles in degrees, minutes and seconds. Also decimal millimeters and degrees.

Addressability of eight pen positions.

Coordinate selection by light-pen and key entry.

Dynamic read-out of coordinates as the tracking-cross moves.

Feet/inch/fraction units to 1/64th inch.

Drawing construction at user defined scales.

Plot merge by view.

Plotting concurrently with graphic creation at both 3251 mdl 2s.

Chamfer

Cross-Hatch option for Pouche .

See *IBM 7361 Fastdraft Workstation Reference* (SC34-0516), and related publications for a full explanation of the functions and features.

Usability: The 7361 user does not need computer or programming background. Users rapidly learn to use the system. Interaction with the logic and controlling application in the 7361 is via a 3251 mdl 2 Display Station equipped with a special keyboard and a light-pen. A training guide steps the user through the functions offered. The screen is analogous to the drafting table. The light-pen acts like a drafting pencil. Disk storage capability in the 7361 permits storage of the drawing in process for rapid access. Diskettes are the loading media for the program product and for drawings written in a previous work session or from other 7361 systems. The user selects the "Options" or functions required from a list of options displayed in menu form on the screen. Prompts direct the user to the next action required. No computer jargon is used. The 7361 has no dependency on host systems attachments or host systems programming support.

Customer Responsibilities: The customer is responsible for site preparation, for the provision of the required electrical service and facilities, and for installation of the 7361 Fastdraft licensed program (5791-GP1).

Installation: The 7361 will be installed by a Customer Engineer.

Physical Specifications:

Width	760 mm (29.92 inches)
Depth	722 mm (28.43 inches)
Height	1,525 mm (60.04 inches)
Weight	250 kg (550 pounds)

Operating Environment:

Temperature	15 to 32.2 degrees C (60 to 90 degrees F)
Relative Humidity	8% to 80%
Wet Bulb	22.8 degrees C (73 degrees F) max.
Altitude	0 to 2,135 meters (7,000 feet)

Publications: *IBM Fastdraft System Guide* (SC34-0514), *IBM Fastdraft Training Guide* (SC34-0515), *IBM 7361 Fastdraft Workstation Reference* (SC34-0516).

SPECIFY

- Voltage (AC, 1-phase, 60 Hz): **#9902** for 208V, **#9914** for 240V.
- Power Cord Length: 1.8 meters (6 feet).
- Power Plug: Standard "Eagle", or equivalent.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Diskettes: [Available December, 1983] Available from IBM.

7374 COLOR PLOTTER

PURPOSE

Provides large format, multicolor, high-resolution vector plotting capabilities. Can plot drawings created on the 7361 Fastdraft System on paper, vellum, or polyester sheets with highly accurate registration and repeatability.

MODELS

Model 1 001

Prerequisites: A 7361 Fastdraft System, 3255 Display Control (with RPQ 7J0071 or RPQ 7J0072), or 3277 Graphics Attachment (with RPQ 7H0284). The plotter attaches to an EIA standard RS-232-C port.

HIGHLIGHTS

Multicolor Graphics Printing Capability:

- By programmed or manual selection of up to eight pens from one of three (each with pens of a specific type ... fiber tip, roller ball, or liquid ink drafting) manually interchangeable pen carousels.
- Each pen carousel type is electronically sensed to set default values for pen speed and writing force whenever the carousel is changed.
- User may plot working drawings and follow quickly with final liquid ink finished quality drawings by simply changing carousel type and final drawing media (e.g., paper to vellum, or to double matte polyester sheets).
- Pen types handled are:

  Fiber Tip (inexpensive, choice of widths, wear quality, etc.)

  Roller Ball (fine lines, fast drawing, hard wearing)

  Liquid ink drafting pens (highest quality for final work)
- Plotter senses which "stables", of the eight in a carousel, contain a pen. Subsequent checking whenever a pen-select command is received determines whether a pen was/was-not in that stable at carousel loading time, whether pen holder already has a pen and has been commanded to return it to the appropriate stable, whether the holder is empty and the selected pen is actually in position to be picked, and, finally, whether the newly selected pen has been picked and is in the holder.
- Automatic capping of pens unused for a predetermined time retards pen drying problems and increases the life of the pen.

Paper, Vellum, Polyester Media Control:

- Media is gripped between pressure wheel and aluminum oxide coated grit wheel (at back of media) for precise X-axis media motion.
- Thousands of minute grit impressions are made on the back of the media on the first pass of the drawing. As the drawing moves along the X-axis, each impression tends to realign itself with its originating grit particle. The effect is that of an ultra-precise, built-in miniature sprocket drive system.
- Media drapes over, and is vacuum drawn against, a platen to maintain resolution not only at the grit wheel pinched edges, but all along the media surface.
- Expensive sprocket hole media is not required.
- Plots on media sizes from 203.2mm x 266.7mm (8 inches x 10.5 inches) to 622.3mm x 1231.9mm (24.5 inches x 48.5 inches).

Controls: A front panel on the 7374 provides local, manual control facilities. A joystick controls pen movement at slow, medium, and fast speeds according to the pressure and inclination selected by the operator. Of the 22 keys on the panel, 13 control pen selection, up/down conditions, speed, and force. The pen selected, its speed, and its force values are displayed on a 3-digit display on the panel. Other indicators show the current operating mode of the plotter, I/O or graphics error indications, whether 90 degree rotation is in effect, etc. Refer to *IBM 7361 Fastdraft System Guide* (SC34-0514), for further information.

Programming: The 7374 plotter accepts an instruction set that is simple, yet powerful. The two-letter mnemonic of the instruction set is suggestive of the function performed. For example, the instruction SP selects a pen, LT sets the line type and PA plots absolute. There are 60 IBM-Graphics Language (IBM-GL) instructions for pen control, absolute and relative vector plotting, arc and circle generation, output of pen position, and plotter status and labeling. These IBM-GL instructions also control label direction, size, slant, and spacing of characters as well as character set choice and labeling positions.

System Attachments: The 7374 attaches to the following systems:

- The 7361 Fastdraft System via The RS-232-C interface. Attaches to the 7361 Graphics Processor Unit through a 6.1 meter (20 foot) cable shipped with the 7361.
- The 3255 Display Control via the RS-232-C plotter attachment port provided by RPQ 7J0071 or RPQ 7J0072. A 3.0 meter (10 foot) cable is provided with the plotter.
- The 3277 Graphics Attachment (RPQ 7H0284) which provides a RS-232-C port. A 3.0 meter (10 foot) cable is provided with the plotter.

Programming Support: The 7374 is supported on the following systems with the following programming:

- 7361 Fastdraft System
  - 7361 Fastdraft Licensed Program (5719-GP1)
- 3255 Display Control
  - Industry Standard Plotting Commands (5796-BDZ)
- 3277 Graphics Attachment
  - Industry Standard Plotting Commands (5796-BDZ)
  - Interactive Presentation Graphics (57898-DJT)

Customer Responsibilities: The customer is responsible for site preparation and for the provision of appropriate power facilities ... see *IBM 7361 Fastdraft System Guide* (SC34-0514), for installation and physical planning information.

Installation: The 7374 will be installed by the IBM Customer Service Division when attached to the 7361 Fastdraft System. The Field Engineering Division will install plotters attached to the 3255 and 3277GA.

Physical Specifications:

Width	1,087mm (42.8 inches)
Depth	557mm (21.9 inches)
Height	1,188mm (46.8 inches)
Weight	59kg (130 pounds)

Environmental Specifications:

Operating:	
Temperature	10 to 40.6 degrees C (50 to 105 degrees F)
Relative Humidity	8% to 80%
Wet Bulb	26.7 degrees C (80 degrees F) maximum
Altitude	Sea-level to 2,135m (7,000 feet)
Nonoperating:	
Temperature	10 to 51.7 degrees C (50 to 125 degrees F)
Relative Humidity	8% to 80%
Wet Bulb	26.7degrees C (80 degrees F) maximum
Shipping:	
Temperature:	-40 to 60 degrees C (-40 to 140 degrees F)
Relative Humidity	5% to 100%
Wet Bulb	29.4 degrees C (85 degrees F) maximum (No Condensation)

Publications: Available from Mechanicsburg.

1. Three publications will be shipped with the plotter:
   SY34-0315 *IBM 7374 Color Plotter Maintenance Information Manual*
   SI34-0106 *IBM 7374 Color Plotter Parts Catalog*
   GA23-0160 *IBM 7374 Color Plotter Operations and Problem Determination Guide*
2. Other publications will be available:
   GA23-0161 *IBM 7374 Color Plotter Programming Manual*
   GA33-3120 *IBM 3250 Graphics Display System Attachment for Cursor Control Tablet and Plotter Custom Feature Description*
   GA33-3039 *IBM 3277 Display Station Model 2 with Graphics Attachment RPQ 7H0284 Custom Feature Description*
3. General Fastdraft Information:
   SC34-0514 *IBM Fastdraft System Guide* (includes site preparation and installation)
   SC34-5015 *IBM Fastdraft Training Guide*
   SC34-0516 *IBM Fastdraft Workstation Reference*

SPECIFY

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): No specify required.
- Cable: Specify **#5010** for 7361 Fastdraft attachment [6.1m (20 foot) cable shipped with 7361].

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Supplies will be available from IBM.

7375 COLOR PLOTTER

PURPOSE

The 7375 is a floor-standing, multicolor, multimedia, high-resolution vector plotter. It provides the capability to plot up to E/AO size drawings on paper, vellum, or polyester sheets with highly accurate registration and repeatability. The 7375 connects via cable to the S/370, 43XX and 30XX via the 3255 Display Control Unit (with RPQ 7J0071 or RPQ 7J0072), 3277 Graphics Attachment (with RPQ 7H0284), 5085 Graphics Processor Unit, Personal Computer, Series/1, and the 7361 Fastdraft System. Attachment is via cable supplied by IBM with the base unit as defined by specify codes except for the Fastdraft System which supplies the cable as part of the 7361 Fastdraft Controller. This plotter features a switchable RS-232-C/Parallel Interface Adapter.

MODELS

Model 1 001

Prerequisite Operating Environment: The 7375 attaches to an EIA RS-232-C port or an IEEE488 standard port in the 7361 via a 3.0 meter (10 foot) cable. Variations in connectors and shipping vehicles are determined by specify codes.

The IBM color plotters are supported on the following systems with programs listed:

- 3255 Display Control:
  - Industry Standard Plotting Commands (5796-BDZ) running under:

    MVS Release 3.8 (5752-VS2),

    VS1 Release 7.0 (5652-VS1),

    VM/SP Release 1.2 (5665-167) with GAM/SP1 (5668-978).
- 3277 Graphics Attachment:
  - Industry Standard Plotting Commands (ISPC) 5796-BDZ): ISPC requires PRPQ P0913 (5799-AAX) and one of the following operating systems;

    MVS Release 3.8 (5752-VS2),

    VS1 Release 7.0 (5652-VS1),

    VM/SP Release 1.2 (5665-167).
  - Interactive Presentation Graphics (IPG) Release 1.2 (5798-DJT) running under VM/SP Release 1.2 (5665-167):

    IBM Color Plotter support for GDDM.
- 5085 Graphics Processor:
  - Industry Standard Plotting Commands (ISPC) (5796-BDZ):

    MVS Release 3.8 (5752-VS2),

    VS1 Release 7.0 (5652-VS1),

    VM/SP Release 1.2 (5665-167) with GAM/SP1 (5668-978).
- 7361 Fastdraft System:
  - IBM 7361 Fastdraft Licensed Program (5719-GP1)
- IBM Personal Computer: The following are typical IBM Licensed Programs that support the 7375 under DOS 1.1:
  - Industry Standard Plotting Commands (5796-BDZ)
  - BPS Business Graphics® (**6871286 #9044**)
  - Lotus 1-2-3® (**6871289 #9047**)
  - IBM Color Plotter support for GDDM (5798-DPQ)
- Series/1 System:
  - Business Graphics Package (TBD)

For further information on the use of the 7375 plotter with the Fastdraft System, see the *IBM Fastdraft System Guide* (SC34-0514-1).

HIGHLIGHTS

- Provides ability to plot up to E/AO size drawings 841mm x 1,189mm (34 inches x 44 inches). Other standard size drawings that can be accommodated are:

A 8-1/2 x 11 inches	A4	210 x 297mm
B 11 x 17 inches	A3	297 x 420mm
C 17 x 22 inches	A2	420 x 594mm
D 22 x 34 inches	A1	594 x 841mm

- The 7375 is an 8-pen plotter that allows the drafter to choose pens, colors and line widths to match application requirements.
- Three pen types are handled:

  Fiber Tip (inexpensive, choice of widths, wear quality, etc.)

  Roller Ball (fine lines, fast drawing, long wearing)

  Liquid ink drafting pens (highest quality for final work)
- Each pen type has its own 8-pen carousel and the three carousels are manually interchangeable.
- Pen speeds and force will automatically be set to default values appropriate for "just loaded" pen types whenever the carousel is changed.
- Automatic pen-capping is provided.
- Paper, vellum, or double-matte polyester sheets can be selected as the drawing media as application requires.
- Media size ranges are:

  Width 267mm (10.5 inches) to 298mm (11.75 inches), that include standard sizes A4/A and A3/B; and 546mm (21.5 inches) to 927mm (36.5 inches), which includes standard sizes A2/C, A1/D, A0/E, and architectural size E.

  Length 203mm (8 inches) to 1,231.9mm (48.5 inches)

  Paper size is electronically sensed to establish plot limits.
- Ultra-precise media control yields superior repeatability and accuracy.
- Simple and convenient pushbutton control is designed into the plotter.

Installation: The 7375 will be installed by an IBM Customer Service Representative when attached to the 7361 Fastdraft System. All other installations will be done by the IBM Field Engineering Division.

Physical Specifications:

Width	1,392mm (54.8 inches)
Depth	557mm (21.9 inches)
Height	1,188mm (46.8 inches)
Weight	70.4kg (155 pounds)

Environmental Specifications:

Operating:

Temperature	10 to 40.6 degrees C (50 to 105 degrees F)
Relative Humidity	8% to 80%
Max Wet Bulb	26.7 degrees C (80 degrees F)]
Altitude	2,135 meters (7,000 feet) Maximum

Non-Operating:

Temperature	10 to 51.7 degrees C (50 to 125 degrees F)
Relative Humidity	8% to 80%
Max Wet Bulb	26.7 degrees C (80 degrees F)]

Shipping:

Temperature	-40 to 60 degrees C (-40 to 140 degrees F)
Relative Humidity	5% to 100%
Max Wet Bulb	29.4 degrees C (85 degrees F) No Condensation

Publications:

1. Three publications will be shipped with the 7375:
   - *IBM 7375 Color Plotter Maintenance Information* (SY34-0339)
   - *IBM 7375 Color Plotter Parts Catalog* (S134-0069)
   - *IBM 7374 and 7375 Color Plotter Operations and Problem Determination* (GA23-0160)

   One publication will be available for purchase:

   - *IBM 7374 and 7375 Color Plotter Programming* (GA23-0161)
2. General Fastdraft information:
   - *IBM Fastdraft System Guide* (SC34-0514)
   - *IBM Fastdraft Training Guide* (SC34-0515)
   - *IBM Fastdraft Workstation Reference* (SC34-0516)
3. Education: (Self Study Guide)
   - *IBM 7361 Fastdraft Training Guide* (SC34-0515)

SPECIFY

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): No specify required.

SPECIAL FEATURES

Cable (#5010): For Fastdraft attachment (cable shipped with the machine).

Cable (#5020): RS-232-C for 5085, 3277GA, or 3255.

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES

Supplies will be available from IBM.

8140 PROCESSOR MDLS C72, C82, C92

PURPOSE

The 8140 Processor provides control, storage, processing capability, disk and diskette storage, and device or communication attachment capabilities for the 8100 Information System.

MODELS

Model	Base Processor Storage (bytes)	Non-Removable Disk Capacity (bytes)	Fixed Head Capacity (bytes)
C72	1024K (1,048,576)	123MB (123,174,192)	131,072
C82	1536K (1,572,864)	123MB (123,174,192)	131,072
C92	2048K (2,097,152)	123MB (123,174,192)	131,072

Maximum: One per 8100 Information System.

Customer Setup (CSU): Machine only.

HIGHLIGHTS

The 8140 Processor is a multi-level, interrupt-driven processor which provides control, processing capability, processor storage, disk and diskette storage and communication features for the 8100 Information System. The flexibility offered by the 8140 allows the user to configure a system for initial requirements, while retaining the ability to modify the system to meet future needs.

System control and processing is provided by machine program instructions. Optional instructions are available for floating point arithmetic. Eight I/O interrupt levels provide for interrupt processing. The 8140 C mdls offer three processor storage sizes. Depending on the mdl of the processor selected, processor storage can be up to a maximum of 2048K (2,097,152) bytes. Capability for dynamic addressing and storage protection for up to 16 million bytes of logical storage is available. The 8140 Processor mdls C72, C82 and C92 storage makes use of the Error Correction Code (ECC) to provide single-error and double-error detection capability.

The 8140 mdls C72, C82 and C92 allow for the attachment of up to four 8101 Storage and Input/Output Units, or three 8101 Storage and Input/Output Units and one 8809 Magnetic Tape Unit mdl 1B. One 8101 I/O unit may be configured with Communications and Display/Printer features. An alternate configuration can consist of an 8140, four 8101 Storage and Input/Output Units, and one 8809 Magnetic Tape Unit mdl 1A. Up to three additional 8809 Magnetic Tape Units can be attached to the 8809 Magnetic Tape Unit mdl 1A or 1B.

The 8140 C mdls Processor is provided with fixed high-speed direct access disk storage of 123 million bytes (consisting of two volumes) with movable and fixed heads. The disk storage operates at a data rate of 1.031 million bytes per second. The average access time is 27 milliseconds with an average rotational delay of 9.6 milliseconds. Removable diskette storage is provided with up to 1MB (985,088 bytes) of storage operating at up to 62K bytes per second data rate. The diskette drive can read/write in basic data exchange format on either the Diskette 2D or the Diskette Type 1.

The 8100 System can attach to any S/370, 4341 or 4381 Processor via the 3704, 3705, or 3725 for SNA/SDLC or BSC line control. The 8100 System can attach to the communications adapter of the 4321 or 4331 or 4361 Processor for SDLC or BSC line control. For specific attachment, see M2700 pages.

The capability of the 8100 Information System is further extended by providing for the attachment of a variety of input/output devices. These devices may be attached to the 8140 via communication port features which include data link, direct connect, and loops that are direct-attached or data link-attached. Up to ten communication and loop ports can be configured in the 8140 mdls C72, C82 and C92.

Physical security is provided through the use of keylocks on the operator panel, diskette drive and machine covers. Additional or replacement keys are not available from IBM. They may be purchased from a local locksmith.

Customer Setup: The 8140 Processor is designated as a customer setup unit, thereby offering the customer early availability and relocation flexibility. Aids and configurators are provided to facilitate the configuration and ordering of the 8140. Customer setup instructions will be shipped with each machine. An 8140 installation verification program will be shipped with each machine on a diskette. A clear indication that the machine is operational will be given.

Loop Installation: The customer is responsible for procurement, installation, and maintenance of the loop network. In order for the cable and required accessories to be properly installed, certain preparatory steps must be followed. See *IBM Multiuse Communications Loop Planning and Installation Guide,* GA27-3341, for information necessary to plan and install the loop. The loop should be installed and checked out prior to attaching processors or devices.

Performance: The maximum number of communication and loop ports configured and capable of concurrent operation is a function of the speed of the line, communication facilities, the operating system installed and the application work load. The maximum number of communications and loop ports which can be physically installed can exceed the operational capability.

Multiple High-Speed Adapters: The 8140 C mdls have the physical capability for four (high-speed) communication ports in excess of 9600 bps. The maximum number of high-speed ports activated concurrently is limited to two.

- Two loops at 38,400 bps, or
- One loop at 38,400 bps and one SDLC data link at a speed greater than 9600 bps.

Diagnostics: The 8100 System hardware and feature operation, diagnostic support and maintenance support described in 8100 System publications require DPPX or DPCX. Customers ordering 8100 System hardware without DPPX or DPCX should provide the functional support as contained and described in the *Functional Definition Manual 8100* which will be available from Mechanicsburg at FCS.

Communications And Loops: The communication and loop attachments are available in line sets which occupy pre-defined ports. There are five sets of which one can occupy Ports 1-4, four sets of which one can occupy Ports 5-8 and one set for Ports 9 and 10. A maximum of ten ports are available. If a line set is selected for Ports 1-4, there can be no high-speed (greater than 9600 bps) ports in an attached 8101 storage and I/O unit. Conversely, if there are no line sets selected for Ports 1-4, then the 8101 may contain high-speed ports (maximum two).

The speed of the loops in communication ports features #1610-#1614 are manually switch-selectable at customer setup time at either 9600 bps or 38,400 bps. The limitation on the total number of active ports at greater than 9600 bps is two. In an 8100 System, only ten Loop or SDLC communication ports may be active at one time.

Note: With a given Communication Ports Feature the selected option LPDA can be changed in the field by the CE. All such changes are chargeable at the applicable CE hourly rate. Do not submit an MES. However, the MES for removal of a Communication Ports Feature and its associated specify code must identify the original codes ordered from the factory.

Bibliography: GC20-8100.

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (AC, 1-phase, 3-wire, 60 Hz): Specify **#9884** for 208V, **#9894** for 240V. For conversion between 208V AC and 240V AC, contact your local CE representative. If standard 4.3 meter (14 foot) cable is not required, also specify **#9986** for 1.8 meter (6 foot) cable.
- Color: Pebble gray is the only available color.
- Relocation: If the user relocates and/or interchanges an attaching 8101 from one 8100 System to another, the user must consider address compatibility of the processor and its attachments. For further information, see *IBM 8100 Information System Site Planning Guide,* GA27-2884. For relocation/replace Kit Ordering, see "Relocate/Replace: 8100 System" under Accessories.
- Upending: In the event the 8140 must be placed on end to maneuver to the installation site, specify **#9840.** For additional ordering information associated with **#9840,** see Accessories "Upending Feature, 8140". **Field Installation:** Yes.
- Cabling: For loop cabling information, see "Accessories" and the *IBM Multiuse Communication Loop Planning and Installation Guide,* GA27-3341. For communication cable information, see the *IBM 8100 Information System Site Planning Guide,* GA27-2884. Communication cables must be ordered separately from the communication adapter features.
- Terminal Requirements: Specify **#9800** (offline 3640 terminal exerciser) when ordering any of the following terminals: 3641, 3642, 3643, 3644, 3645, 3646 or 3647.
  1) On the initial order.
  2) When the first terminal is ordered to attach via an 8101 and none are attached to the processor.
  3) Via MES when the first terminal is field installed on an 8100 system.

  Maximum: One per 8100 System. **Field Installation:** Yes.
- Programming Configuration: Specify **#9700** for Distributed Processing Programming Executive (DPPX), **#9710** for Distributed Processing Control Executive (DPCX), **#9720** for DPPX and DPCX or **#9730** for all other configurations. **Field Installation:** Yes.

8140 Processor Mdls C72, C82, C92 (cont'd)

SPECIAL FEATURES

Display and Printer, Add'l (#1506): Provides for the attachment of additional 3277 Displays, 3284, 3286, 3287 and 3288 Printers in any combination up to four. **Maximum:** Five. **Field Installation:** Yes. **Prerequisites:** #3220.

Display and Printer Attachment (#3220): Provides for the attachment of 3277 Displays, 3284, 3286, 3287 and 3288 Printers in any combination up to four. Can be expanded to a maximum of 24 devices with Display and Printer, Add'l (#1506). **Limitations:** Not available with #4901 or #1630 (see Table 1 for further information). **Maximum:** One per 8100 System. **Field Installation:** Yes. **Prerequisites:** #3901 when ordered without #1620, #1621, #1622 or #1623.

Floating Point Feature (#3750): Provides for execution of 30 floating point instructions and 32 floating point registers to improve performance of floating point operations. The instructions provide for loading, adding, subtracting, comparing, multiplying, dividing, storing and controlling the sign of short (4-byte) operands and long (8-byte) operands. **Maximum:** One. **Field Installation:** Yes.

Feature Expansion Prerequisite (#3901): Required for communication ports feature #1620, #1621, #1622 or #1623 or Display and Printer Attachment (#3220) without communication ports feature #1620, #1621, #1622 or #1623 or Magnetic Tape Attachment (#4901) without communication ports feature #1620, #1621 #1622 or #1623. See Table 1. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1620, #1621, #1622 or #1623 ... #3220 or #4901 without #1620, #1621, #1622 or #1623.

Magnetic Tape Attachment (#4901): Provides for the attachment of up to four 8809 Magnetic Tape Units, consisting of one 8809 mdl 1A plus two mdl 2s and one mdl 3. **Limitations:** Not available if the 8101 Storage and Input/Output Unit has the 8809 Magnetic Tape Unit mdl 1A attached (#4521) or if 8809 mdl 1B is attached to the 8140 mdl C72, C82 or C92 Processor. Also not available with Communication Ports Feature (#1630) or Display and Printer Attachment (#3220). See Table 1 for further information. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3901 when ordered without #1620, #1621, #1622 or #1623.

Table 1

When configuring the 8140 C mdls for communication port features for Ports 5-10, Display and Printer Attachment, and Magnetic Tape Attachment, the table below shows the combination of these features that may be configured.

#3901 plus (#1620, #1621, #1622 or #1623, or #3220 or #4901)
or
#3901 plus (#1620, #1621, #1622 or #1623)
plus (#1630, #3220 or #4901)

Communication Ports Feature (#1610): Two directly attached loops and two SDLC/EIA RS-232-C interfaces. Provides for loop attachment in Ports 1 and 2 with the speed selectable by switch at 9600 bps or 38,400 bps. Port 2 may be a two-lobe loop with the addition of #4835 and specify code **#9873.** Ports 3 and 4 provide a communication interface without clock to an external modem with clock up to 9600 bps -- point-to-point switched with auto answer to 4800 bps -- point-to-point nonswitched 2- or 4-wire or multipoint 4-wire. If LPDA is required, specify **#9803** for port 3 and **#9804** for port 4. **Limitations:** Not available with #1611, #1612, #1613 or #1614. Not available if high-speed (greater than 9600 bps) ports in an attached 8101. **Maximum:** One. **Field Installation:** Yes.

Special Feature	Port Position			
	1	2	3	4
#1610	Direct-Attach Loop	Direct-Attach Loop	SDLC/EIA/CCITT	SDLC/EIA/CCITT

Communication Ports Feature (#1611): Three directly-attached loops and one SDLC/EIA RS-232-C interfaces. Provides for loop attachment in Ports 1-3 with the speed selectable by switch at 9600 bps or 38,400 bps. Port 2 may be a two-lobe loop with the addition of #4835 and specify code **#9873.** Port 4 provides communication interface without clock to an external modem with clock up to 9600 bps -- point-to-point switched with auto answer to 4800 bps -- point-to-point nonswitched 2- or 4-wire or multipoint 4-wire. If LPDA is required, specify **#9804** for port 4. **Limitations:** Not available with #1610, #1612, #1613 or #1614. Not available if high-speed (greater than 9600 bps) ports in an attached 8101. Only two loops may be activated concurrently at 38,400 bps. **Maximum:** One. **Field Installation:** Yes.

Special Feature	Port Position			
	1	2	3	4
#1611	Direct-Attach Loop	Direct-Attach Loop	Direct-Attach Loop	SDLC/EIA/CCITT

Communication Ports Feature (#1612): Three Loops and one SDLC/CCITT X.21 Switched interfaces. Provides for loop attachment in Ports 1-3 with the speed selectable by switch at 9600 bps or 38,400 bps. Port 2 may be a two-lobe loop with the addition of #4835 and specify code **#9873.** Port 4 provides SDLC/CCITT X.21 switched interface without clock up to 48,000 bps ... with auto answer and auto call ... via a Data Circuit-Terminating Equipment (DCE) which complies with CCITT Recommendation X.21 as it is delineated in GA27-3287. **Limitations:** Not available with #1610, #1611, #1613 or #1614. Not available if high-speed (greater than 9600 bps) ports in an attached 8101. Either two loops at 38,400 bps, or one loop at 38,400 bps and the X.21 port at greater than 9600 bps may be activated concurrently. **Maximum:** One. **Field Installation:** Yes.

Special Feature	Port Position			
	1	2	3	4
#1612	Direct-Attach Loop	Direct-Attach Loop	Direct-Attach Loop	SDLC/X.21 Non-switched

Communication Ports Feature (#1613): Three Loops and one SDLC/CCITT X.21 nonswitched interfaces. Provides for loop attachment in Ports 1-3 with the speed selectable by switch at 9600 bps or 38,400 bps. Port 2 may be a two-lobe loop with the addition of #4835 and specify code **#9873.** Port 4 provides SDLC/CCITT X.21 nonswitched interface without clock up to 48,000 bps—point-to-point or multipoint—via a Data Circuit-Terminating Equipment (DCE) which complies with CCITT Recommendation X.21 as it is delineated in GA27-3287. **Limitations:** Not available with #1610, #1611, #1612 or #1614. Not available if high-speed (greater than 9600 bps) ports in an attached 8101. Either two loops at 38,400 bps, or one loop at 38,400 bps and the X.21 port at greater than 9600 bps may be activated concurrently. **Maximum:** One. **Field Installation:** Yes.

Special Feature	Port Position			
	1	2	3	4
#1613	Direct-Attach Loop	Direct-Attach Loop	Direct-Attach Loop	SDLC/X.21 Non-switched

Communication Ports Feature (#1614): Three Loops and one SDLC/CCITT V.35 interfaces. Provides for loop attachment in Ports 1-3 with the speed selectable by switch at 9600 bps or 38,400 bps. Port 2 may be a two-lobe loop with the addition of #4835 and specify code **#9873.** Port 4 provides SDLC/CCITT V.35 interface without clock up to 56,000 bps to external modem with clock, or direct-connect with or without clock at 56,000 bps up to 1,000 feet or up to a total cable length of 200 feet to a 3705. Specify code **#9684** for external modem, **#9683** for direct-connect without clock, or **#9682** with prerequisite multi-speed clock (#5200), for direct-connect with clock at 56,000 bps. **Limitations:** Not available with #1610, #1611, #1612 or #1613. Not available if high-speed (greater than 9600 bps) ports in an attached 8101. Either two loops at 38,400 bps, or one loop at 38,400 bps and the CCITT V.35 port at greater than 9600 bps may be activated concurrently. **Maximum:** One. **Field Installation:** Yes.

Special Feature	Port Position			
	1	2	3	4
#1614	Direct-Attach Loop	Direct-Attach Loop	Direct-Attach Loop	SDLC/V.35

Communication Ports Feature (#1620): One Low-Speed Loop and three SDLC/EIA RS-232-C interfaces. Provides for loop attachment in Port 7 operating at 9600 bps. Port 7 may be a two-lobe loop with the addition of #4835 and specify code **#9874.** Ports 5, 6 and 8 provide a communication interface without clock to an external modem with clock up to 9600 bps -- point-to-point switched with auto answer to 4800 bps -- point-to-point nonswitched 2- or 4-wire or multipoint 4-wire. If LPDA is required, specify **#9805** for port 5, **#9806** for port 6 and **#9808** for port 8. **Limitations:** Not available with #1621. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3901.

8140 Processor Mdls C72, C82, C92 (cont'd)

Special Feature	Port Position			
	5	6	7	8
#1620	SDLC/ EIA/ CCITT	SDLC/ EIA/ CCITT	Direct-Attach Loop	SDLC/ EIA/ CCITT

Communication Ports Feature (#1621): Four SDLC/EIA RS-232-C interfaces. Provides communication interfaces in Ports 5-8. Ports 6, 7 and 8 are unclocked and attach to external modems with clock up to 9600 bps -- point-to-point switched with auto answer to 4800 bps -- point-to-point nonswitched 2- or 4-wire or multipoint 4-wire. Port 5 provides the same interface as Ports 6, 7 and 8, or direct connect at 4800 bps up to 40 feet for Port 5. Specify code **#9689** for external modem, **#9688** for direct connect without clock, or **#9686** with prerequisite multi-speed clock (#5200), for direct-connect with clock at 4800 bps. If LPDA is required, specify **#9805** for port 5, **#9806** for port 6, **#9807** for port 7 and **#9808** for port 8. **Limitations:** Not available with #1620. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3901.

Special Feature	Port Position			
	5	6	7	8
#1621	SDLC/ EIA/ CCITT	SDLC/ EIA/ CCITT	SDLC/ EIA/ CCITT	SDLC/ EIA/ CCITT

Communication Ports Feature (#1622): One SDLC and three BSC EIA RS-232-C interfaces. Provides IBM microcode control for BSC communication interfaces in ports 5, 6, and 8 from 1200 to 9600 bps without clock or 600 and 1200 bps with clock to external DCE point-to-point nonswitched 2- or 4-wire or multipoint 4-wire. Port 5 also provides for direct-connect up to 40 feet. User parameter-selectable business machine clock options and speed at 1200, 1800, 3600, 4800, 7200 and 9600 bps are available. The attached terminal must not provide business machine clocking. Specify code **#9690** for direct-connect with clock. The SDLC port 7 provides a communication interface without clock to an external DCE with clock to 9600 bps point-to-point switched with auto answer to 4800 bps ... point-to-point nonswitched 2- or 4-wire or multipoint 4-wire. If LPDA is required, specify **#9807** for port 7. **Limitations:** Not available with #1620, #1621, or #1623. Mutually exclusive with 8101 BSC FAC codes 40, 41, 44, 45 or 47 on an 8100 system. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3901.

Special Feature	Port Position			
	5	6	7	8
#1622	BSC/ EIA/ CCITT	BSC/ EIA/ CCITT	SDLC/ EIA/ CCITT	BSC/ EIA/ CCITT

Communication Port Feature (#1623): Two BSC EIA RS-232-C interfaces. Provides IBM microcode control for BSC communication interfaces in ports 5 and 6 from 1200 to 9600 bps without clock or 600 and 1200 bps with clock to an external DCE point-to-point non-switched 2- or 4-wire or multipoint nonswitched 4-wire. **Limitations:** Not available with #1620, #1621, or #1622. Mutually exclusive with 8101 BSC FAC codes 40, 41, 44, 45 or 47 on an 8100 system. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3901.

Special Feature	Port Position	
	5	6
#1623	BSC/ EIA/ CCITT	BSC/ EIA/ CCITT

Communication Ports Feature (#1630): Two SDLC/EIA interfaces. Provides for SDLC/EIA RS-232-C interface without clock to external modem, with clock up to 9600 bps -- point-to-point switched with auto answer to 4800 bps -- point-to-point nonswitched 2- or 4-wire or multipoint 4-wire in Ports 9 and 10. If LPDA is required, specify **#8801** for port 9, and **#8802** for port 10. **Limitations:** Not available with #3220 or #4901. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1620, #1621, #1622 or #1623.

Special Feature	Port Position	
	9	10
#1630	SDLC/ EIA/ CCITT	SDLC/ EIA/ CCITT

Loop Adapter Second Lobe (#4835): Provides for the attachment of a separate physical loop cable to extend the coverage and availability of the directly attached loop. **Maximum:** Two. One for Port 2 and one for Port 7. Maximum is four per 8100 System. **Field Installation:** Yes. **Prerequisites:** #1610, #1611, #1612, #1613, #1614 or #1620.

Specify: Code **#9873** for Port 2 in Communication Ports Features #1610 through #1614 and **#9874** for Port 7 in Communication Ports Feature #1620.

Multi-Speed Clock (#5200): Provides business machine clocking at 56,000 bps for direct-connect in Port 4 of Communication Ports Feature #1614 or business machine clocking at 4800 bps for Port 5 of Communication Ports Feature #1621. One must be ordered for each clocked port. **Maximum:** Two per 8140 mdl C72, C82 or C92. **Field Installation:** Yes. **Prerequisites:** #1614 or #1621.

MODEL CONVERSIONS

The following model changes can be field installed:

From	To	C72	C82	C92
B52*		X	X	X
B62*		X	X	X
B72*		X	X	X
C72			X	X
C82				X

* For 8140 B mdl upgrades, order a preparation MES for steps 1 to 3 if required, and then order the upgrade MES for all items in step 4.

1. 8140 mdl BX1 without #4545 expanded function panel, order MES for: Mdl change to 8140 mdl BX2.
2. 8140 mdl BX1 with #4545 expanded function panel, order MES for: Remove #4545, and mdl change to 8140 mdl BX2.
3. 8140 mdl BX2 with #4545 expanded function panel, order MES for: Remove #4545.
4. 8140 mdl BX2, order MES for: Mdl change to 8140 C mdl ... removing all 8140 B mdl communication- and loop-associated feature codes and specify codes ... adding 8140 C mdl communication port and loop features as required.

Only the 8140 mdl B72 to C72 upgrade has a purchase price. All other upgrades are configuration-dependent and require that the purchase customer submit an RPQ.

If the 8140-B72 to C72 upgrade customer requires communication ports or loop feature changes, an RPQ for such must accompany the upgrade MES.

Additional communications cables may be required when converting 8140 mdl B to mdl C. For communication cable information, see the *8100 Information System Site Planning Guide,* GA27-2884.

BSC, Start/Stop, integrated modems, digital data service adapter, communications features are not available in the 8140 mdls C72, C82, C92.

ACCESSORIES

CABLES - LOOP

Loop Cables may be purchased from IBM or a customer-selected source. See *IBM Multiuse Communication Loop Planning and Installation Guide,* GA27-3341, for part numbers, specifications and usage which is necessary for preplanning and ordering.

- **Indoor Cable P/N 1657265:** UL-approved (style 2919) for interconnection of low voltage electronic equipment. Maximum allowable cable temperature range is -34°C to +80°C.
- **Indoor Cable P/N 7838694:** UL-approved for cable tray installation (NEC Art. 725-40b3). Maximum allowable cable temperature range is -34°C to +90°C.
- **Indoor Cable P/N 7838695:** UL-approved for duct and plenum installation (NEC Art. 725-2b). Maximum allowable cable temperature range is -34°C to +105°C.
- **Outdoor Cable P/N 1657267:** For above ground installation. Maximum allowable cable temperature range is -34°C to +80°C.
- **Outdoor Cable P/N 1657268:** For below ground installation. Maximum allowable cable temperature range is -34°C to +80°C.

Ordering Instructions: Interior cable (P/N **1657265, 7838694** and **7838695**) should be ordered in lengths of 304.8m to 609.6m (1,000 to 2,000 ft.). Additional lengths up to 609.6m (2,000 ft.) can be ordered by specifying the length wanted. Indoor cable splices can be accomplished via P/N **1657300.** A minimum order quantity is 304.8m (1,000 ft.).

Exterior cable (P/Ns **1657267** and **1657268**) should be ordered in one continuous length, up to a maximum of 914.4m (3000 feet), by specifying the length wanted.) Outdoor splices with aerial and burial cable should be avoided. Order from IBM. Specify cable part number and number of feet desired.

Warranty: Loop cable is warranted free from defects of workmanship and materials for 90 days.

8140 Processor Mdls C72, C82, C92 (cont'd)

LOOP - ACCESSORIES

A group of accessory products are offered to permit plant electricians or contract personnel to install the loops. Refer to *IBM Multiuse Communications Loop Planning and Installation Guide,* GA23-3341, for information necessary to plan the layout and for selection of the loop hardware, for installation and testing information.

Loop Splice Plate (LSP): The LSP splices together two segments of indoor cable or provides a connecting point for future expansion of the loop. The LSP consists of a single connector strip, to which the incoming loop cable and the outgoing loop cable can be attached; it is installed in a standard outlet box for business office environments, or weatherproof outlet box for industrial environments.

Loop Station Connector (LSC): The LSC is available as two unique types: Wrap and radial. The wrap LSC attaches an I/O unit or controller directly to the main loop cable; the radial LSC attaches an I/O unit only through an LWC to the loop. The wrap LSC attaches an incoming and outgoing loop cable; the radial LSC attaches at the end of one loop cable from the LWC.

2 X 4 Adapter Plate (2AP): The 2" x 4" Adapter Plate is used with the Loop Station Connector and accommodates the use of standard outlet boxes that have dimensions smaller than the outlet boxes defined in the *Loop Installation and Planning Guide.* It is not to be used with the environmental outlet boxes.

The wrap LSC also offers the isolation feature of wrapping, which allows the customer to wrap the loop away from a loop wiring failure or to reconfigure the loop during alterations. Both wrap and radial LSCs contain bypass relays that bypass the I/O unit when the I/O unit is powered-off or disconnected. These accessories are installed in a standard or weatherproof outlet box.

Loop Wiring Concentrator (LWC): The LWC provides the facility to attach a cluster of I/O units without a large number of drops on the loop cable. It attaches up to eight radial LSCs at the end of loop cables called 'radials'. The point where a radial line terminates at the LWC is called an LWC 'port'. Not all ports have to be used; unused ports can be reserved for future expansion.

The LWC has the same wrapping capability as the wrap LSC. In addition, the LWC allows the customer to bypass one or more of the radials by setting a corresponding switch located inside the LWC.

The LWC has its own enclosure or can be mounted in a NEMA-4X environmental equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in.).

Loop Surge Suppressor (LSS): The LSS allows the loop to be run across an outdoor space to another building. It attaches two outdoor cables and two indoor cables, allowing the proper termination and grounding for each type of cable. In addition, the LSS contains four surge protectors, one for each twisted pair in the two outdoor cables, to protect from voltage surges caused by near strikes of lightning. There is no protection in the LSS from a direct lightning strike.

The LSS has its own enclosure or can be mounted in an electrical equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in).

Continuity And Relay Tester: The Continuity and Relay Tester is used with a customer-supplied volt-ohm meter, capable of reading 0.5 ohms and rated at least 5,000 ohms/volt, to verify the loop installation, including loop cabling and accessories, after completion. By plugging the tester into any loop station connector and connecting the volt-ohm meter to the tester, the condition of the wire segment being tested can be determined as to conductor and shield continuity (opens or shorts), wrap switch operation, and total lobe resistance.

The loop station connector relays are also activated and their operation verified with this tester.

System Loop Accessories	Part Number
Loop Splice Plate (LSP) (indoor)	1657300
Loop Station Connector (Radial LSC)	1657310
Loop Station Connector (Wrap LSC)	1657320
Loop Station Connector Gasket	1657260
Loop Wiring Concentrator (LWC)	1657330
LWC Circuit Board Assy (order instead of LWC-1657330) *	1657332
Loop Surge Suppressor (LSS)	1657350
LSS Circuit Board Assy (order instead of LSS-1657350) *	1657354
Continuity and Relay Tester	1657420
Wrap Switch Access Cover	1657325
Loop Accessory Keys (10 spares) **	1657379
2 x 4 Adapter Plate (2AP)	7838771
Conventional Box (indoor) 5 x 10cm - (2 x 4 inches)	2102151
Clamp (for cable to indoor box)	2100264
Electrical Box (outdoor) 7 x 11.5cm - (2.75 x 4.5 inches) (For industrial use)	1657280
Clamp - small (for indoor cable to environmental box)	2114285
Clamp - large (for outdoor cable to environmental box)	1657377
Single Device Attachment Cable, 12.1m (40 ft.)	8269543

* For use with NEMA-4X enclosure and associated parts (used when installing in harsh environments) or as a replacement part for the LWC or LSS.

** One package (10 keys) shipped with each 8101 or 8140. One key shipped with each LWC and wrap LSC.

Ordering Instructions: Order from IBM. When ordering, use Machine Type 8101 or 8140. Allow lead time of 120 days.

Warranty: All loop accessories are warranted free from defects of workmanship and materials for 90 days.

Customer Responsibilities: The customer is responsible to provide (purchase, install, test, and maintain) the loop cables and accessories for terminal attachments.

The customer is also responsible for procuring and stocking spare cable and spare parts for loop accessories.

See *IBM Multiuse Communications Loop Planning and Installation Guide* (GA27-3341) for a suggested schedule to allow the customer to plan, install, and test the loop cable and accessories prior to delivery of the system.

It is recommended that the customer order additional loop components for spares with the initial order, as spares will not be stocked in the Branch Office.

To enable a customer to test his installed loops, it is recommended that the customer order a Continuity and Relay Tester. Testing the loop wiring will require the tester or its equivalent.

SYSTEM ACCESSORIES

Relocate/Replace Kits:

The material required to perform machine relocation or processor replacement has been grouped into machine type dependent kits. Kits are available with or without truck-move packaging material.

For 8100 Information Systems with 8101 Storage and Input/Output units attached:

- Use Figure 1 below to order appropriate kit B/M
- 8140 kits apply to processor relocate or replace.
- Each 8101 to be relocated requires a kit. Current CSU Diskette provided with each kit.

Figure 1 - Kits For Systems With 8101 Attached

Machine	Kit Without Packaging Material	Kit With Packaging Material	Relocate Package*
8101	4448550	4448551	N/A
8140	4448556	4448557	4448558

* With packing material for units with upending feature **(#9840)** previously installed.

For 8100 Information Systems without 8101 storage and input/output units attached:

- Use Figure 2 below to order appropriate kit B/M.
- Kit is used for processor relocate or replace.

Figure 2 - Kits For Systems Without 8101 Attached

Machine	Kit Without Packaging Material	Kit With Packaging Material	Relocate Package*
8140	4448579	4448580	4448549

* With packing material for units with upending feature **(#9840)** previously installed.

– Check for missing/damaged wrap plugs. If required, see "Wrap Plugs" below.

– If up-ending is required to position the 8140, see "Upending Feature 8140" below.

– **Ordering Information:** Order from IBM.

WRAP PLUGS

The communication cables listed below will require their respective wrap plugs to be re-installed for machine relocations.

If wrap plugs are lost or damaged, you may order replacements by the part numbers specified in Figure 3.

8140 Processor Mdls C72, C82, C92 (cont'd)

Figure 3

Communication Feature	Communication Cable Group Number	Wrap Plug Part Number
Loop Station Adapter (Single Lobe)	#3709	**7389282**
DDSA	#3717	**6835350**
V.35 Modem	#3718	**6835348**
V.35 Direct Connect	#3719	**6835349**
V.35 Direct-Connect Pt to Pt	#3720	**6835642**
EIA Direct Connect	#3721	**6835642**
EIA Modem	#3724	**6835346**
Loop Station Adapter (Double Lobe)	#3726	**7389282**
	#3726	**7389282**
EIA Direct-Connect Pt to Pt	#3727	**6835347**
X.21	#3728	**6835379**

Ordering Information: Via Branch Office, Code 'S' from Mechanicsburg.

UPENDING FEATURE 8140

Plant/Field feature **#9840** is required to upend the 8140. It consists of a reinforced left end cover, a removable wooden pallet and mounting straps and buckles. The wooden pallet, mounting straps and buckles should be removed during installation and stored for future use.

Ordering Instructions: See "Specify" for ordering **#9840.**

Replacement parts which may be ordered are: Pallet -- P/N **4448587** ... Mounting Reference Drawing -- P/N **4448548.**

SUPPLIES (None)

DEVICE ATTACHMENT

Direct-Attached Devices: The following devices can attach directly to the processor:

3277 Display Station mdls 1, 2
3284 Printer mdls 1, 2
3286 Printer mdls 1, 2
3287 Printer mdls 1, 2
3288 Line Printer mdl 2
3732 Text Display Station
3736 Printer
8101 Storage and I/O Unit
8809 Magnetic Tape Unit

Loop-Attached Devices: The following devices can attach to a direct-attached loop or to a data link-attached (via the 3842 or 3843 Loop Control Unit) loop. Refer to the *IBM 8100 Information System Configurator,* GA27-2876, for selection of the 8140 communication ports features.

Device and Mdl	Loop Attachment Direct-At 9600 bps	38400 bps	Data Link at 2400,4800 4800,9600 bps
3104 Display Terminal mdl B1,B2	X	X	X
3230 Printer mdl 1	X	X	X
3232 Printer mdl 11	X	X	X
3262 Printer mdls 2,12	(1)	X	(1)
3268 Printer mdl 1	X	X	X
3274 Control Unit mdl 51C,61C:	X	X	X
- 3178 Display Station			
- 3230 Printer mdl 2			
- 3262 Printer mdls 3,13			
- 3262 Printer mdl 2			
- 3268 Printer mdl 1			
- 3278 Display Station mdls 1,2,3, 4,5			
- 3279 Color Display Unit mdls 2A, 2B,3A,3B			
- 3287 Printer mdls 1,2,1C,2C			
- 3289 Printer mdls 1,2			
3276 Control Unit Display Station mdls 11,12,13,14 with:	X		X
- 3178 Display Station			
- 3230 Printer mdl 2			
- 3262 Printer mdl 13			
- 3268 Printer mdl 2			
- 3278 Display Station mdls 1,2,3,4			
- 3279 Color Display mdls 2A,2B, 3A,3B			
- 3287 Printer mdls 1,2,1C,2C			
- 3289 Printer mdls 1,2			
3287 Printer mdls 11,12	X	X	X
3289 Printer mdl 3 with:	(1)		(1)
- 2502 Card Reader mdl A1*			
- 3501 Card Reader			
- 3521 Card Punch* (*Requires 3782 Attachment Unit)			
3641 Reporting Terminal mdls 1,2	X		X
3642 Encoder Printer mdls 1,2	X		X
3643 Keyboard Display mdls 2,3,4	X		X
3644 Automatic Data Unit	X		X
3645 Printer	X		X
3646 Scanner Control Unit	X		X
3647 Time and Attendance Terminal	X		X
5210 Printer E1,E2	X		
7426 Terminal Interface Unit 1, with associated terminals	X	X	X
8775 Display Terminal mdls 1,2	X	X	X

Note 1: Dedication of a 9600 bps single-lobe loop to the attachment of the 3289 mdl 3, 3262 mdl 2 or 3262 mdl 12 printer should be considered in cases where the printer will be heavily utilized.

Communication-Attached Devices: The following devices can attach to the communication ports. For communication facilities and modem attachment data, see the M2700 pages and appropriate machine pages for additional information. Refer to the *IBM 8100 Information System Configurator,* GA27-2876, for selection of 8140 communication ports features.

Terminals conforming to 2780/3780 line protocol
3232 Printer mdl 1
3274 Control Unit mdl 51C,61C with:
- 3178 Display Station

3230 Printer mdl 2
- 3262 Printer mdls 3,13
- 3268 Printer mdl 2
- 3278 Display Station mdls 1,2,3,4,5
- 3279 Color Display Station mdls 2A,2B,3A,3B
- 3287 Printer mdls 1,2,1C,2C
- 3289 Line Printer mdls 1,2

3276 Control Unit Display Station mdls 1*,2*,3*,4*,11,12, 13,14 with: (* These mdls are supported in SDLC mode)
- 3178 Display Station

3230 Printer mdl 2
- 3262 Printer mdl 13
- 3268 Printer mdl 2
- 3278 Display Station mdls 1,2,3,4 (See M3276 for configuration details)
- 3279 Color Display Station mdls 2A,2B,3A,3B (Not supported on 3276 mdls 1,2,3,4)
- 3287 Printer mdls 1,2,1C,2C
- 3289 Line Printer mdls 1,2

3601 Finance Communication Controller mdls 1,2A,2B,3A,3B
3602 Finance Communication Controller mdls 1A,1B
3631 Plant Communication Controller mdls 1A,1B
3632 Plant Communication Controller mdls 1A,1B
3651 Store Controller mdls 25,75
3684 Point of Sale Control Unit mdls 1,2
3767 Communication Terminal mdls 1,2,3
3843 Loop Control Unit
4701 Finance Communication Controller mdl 1
4952 Processor
4954 Processor
4955 Processor
4959 Processor
5150 IBM Personal Computer
5285, 5288 Programmable Data Stations
6360, 6580 Display Writer (3270 DSC Mode only)
6670 Information Distributor
7426 Terminal Interface Unit mdl 2, with associated terminals
8101 Storage and Input/Output Unit
8130 Processor
8140 Processor
8150 Processor
8775 Display Terminal mdls 11,12

Direct-Connection Attachment: In addition to terminal attachment to the 8100 System through common carrier facilities (see M2700 pages), attachment can be made by direct-connect. The direct-connect is made by using Communication Ports Feature #1614 with specify **#9682** or **#9683,** or #1621 with **#9686** or **#9688,** or #1622 and **#9690.** Shown below are the direct-connect attachable devices and required device feature numbers. The *8100 Information System Site Planning Guide,* GA27-2884, will assist in the selection of direct-connect cables.

8140 Processor Mdls C72, C82, C92 (cont'd)

Attaching Device	Speed (bps)	Attaching Device Feature No.	8140 CXX Comm. Feature No.
Devices Conforming to 2780/3780 Line Protocol	1200 1800 2400 3600 4800 7200 9600	Refer to specific device	#1622, **#9690**
3232-1	4800	None	#1621, #5200 and **#9686**
3274-51C,61C	4800	#3701 and #6302	#1621, #5200 and **#9686**
	56,000	#1550 and #6303	#1614, #5200 and **#9682**
3276	4800	#3701 w **#9491** and #6302	#1621, #5200 and **#9686**
3651* 25/75	4800	**#9126**	#1621, 5200 and **#9686**
3705-II	4800	#4714	#1621, #5200 and **#9686**
	56,000	#4720	#1614, #5200 and **#9682**
3705-80	4800	None	#1621, #5200 and **#9686**
	56,000	#6712	#1614, #5200 and **#9682**
3725	4800	#4911	#1621, #5200 and **#9696**
	56,000	#4931	#1614, #5200 and **#9682**
4701-1	4800	None	#1621, #5200 and **#9686**
4952, 4954,4955,4959	4800	#2090	#1621, #5200 and **#9686**
6360	4800	#3707	#1621,#5200 and **#9686**
6580-A04, B04	4800	#3705	#1621,#5200 and **#9686**
6670	4800	#3701	#1621, #5200 and **#9686**
7426-2	4800	None	#1621,#5200 and **#9686**
8101,8130 8140-AXX,BXX	4800	FAC 17 (see Note)	#1621, #5200 and **#9686**
8140-CXX	4800	#1621 and **#9688** (see Note)	#1621, #5200 and **#9686**
8101, 8140-BXX	56,000	FAC 28 (see Note)	#1614, #5200 and **#9682**
8140-CXX	56,000	#1614 and **#9683** (see Note)	#1614, #5200 and **#9682**
8150	4800	#1733 and **#9688** or #1734 and**#9698**	#1621, #5200 and **#9686**
	9600	#1733 and **#9688** or #1734 and**#9698**	#1621, #5200 and **#9687**
	56,000	#1742 and **#9683** or #1745 and**#9693**	#1614, #5200 and **#9682**
8775	4800	#3701	#1621, #5200 and **#9686**

Note: FAC 17, 28, #1614 and **#9683**, or #1621 and **#9688** in the attaching 8101, 8130, 8140 without business machine clock, or 8150 with #1733, #1734, #1742 or #1745.

Specify code **#9770** is available to facilitate problem determination.

8150 PROCESSOR MDLS B20, B40, B60

PURPOSE

The 8150 Processor provides higher performance and availability for the 8100 Information System. The 8150 has two Processing and Control Elements (PCEs) with the capability of operating in dual mode or in single mode with either PCE. Each processor also includes processor storage, diskette storage, communications attachment, and 8101 I/O attachment capabilities.

MODELS

Models	Storage
B20	2MB (2,097,152)
B40	4MB (4,194,304)
B60	6MB (6,291,456)

Prerequisites: 8101 Storage and I/O Unit mdl A13, A23, or A25.

Customer Setup (CSU): Yes. Machine only.

HIGHLIGHTS

The 8150 Processor is a multi-level, interrupt-driven processor which provides control, processing capability, processor storage, diskette storage, and communication features for the 8100 Information System. The flexibility offered by the 8150 Processor allows the user to configure a system for initial requirements, while retaining the ability to modify the system to meet future needs, with minimum disruption.

The 8150 Processor offers storage up to a maximum of 6MB (6,291,456 bytes). This storage makes use of Error Correction Code (ECC) to provide correction of all single and most double-bit main storage errors. Capability for dynamic address translation and storage protection for up to 16 million bytes of logical storage is provided. Utilization of this logical storage is enhanced by a facility called "Keys and Locks". It allows much larger Common Address Space Section (CASS) and a significantly larger number of address spaces.

The 8150 has two PCEs and two I/O buses with the capability of operating in dual mode or in single mode with either PCE. The Diskette and Ports 1 through 6, as a group, may be enabled by the Operating System on either PCE. Ports 7 through 12 as a group may also be enabled on either PCE. Attached 8101-A2X mdls with Manual/File Tape Switch RPQ may be attached to both I/O buses (active on only one at a time). This dual bus and switching capability permits reconfiguring for higher availability.

A minimum of one 8101 Storage and Input/Output Unit is required for use as the primary IPL device. Specify codes are required at the time of order so that the Primary IPL device address will be set in the 8150 Processor at the time of manufacture.

The 8150 Processor allows for the attachment of up to four 8101 Storage and Input/Output Units, or three 8101 Storage and I/O Units and one 8809 Magnetic Unit mdl 1B. An alternate configuration can consist of a 8150 Processor, four 8101 Storage and I/O Units, and one 8809 Magnetic Tape Unit mdl 1A. Up to three additional 8809 Magnetic Tape Units may be attached to the 8809 mdl 1A or 1B. A maximum of one 8101 may be configured with Communications and/or Display and Printer features.

Removable diskette storage is provided with up to 1MB (985,088) bytes) of storage operating at up to 62K bytes per second data rate. The diskette drive can read/write in basic data exchange format on either the Diskette 2D or the Diskette Type 1.

The 8100 system can attach to any S/370 or 4300 processor via the 3704, 3705 or 3725 for SNA/SDLC or BSC line control. The 8100 system can attach to the communications adapter of the 4321 or 4331 Processor for SDLC or BSC line control. See M2700 pages for specific attachment. **Note:** The 8150 can operate in dual mode using BSC Communications Features (#1763 and #1764).

The 8150 Processor provides for the attachment of a variety of input/output devices. These devices may be attached to the 8150 Processor via communication features which include data link, direct-connect, and loops that are direct-attached or data link attached. Up to 12 communication and loop ports may be configured in an 8150 Processor.

Physical security is provided through the use of key locks on the operator panel, diskette drive and machine covers. Additional or replacement keys are not available from IBM. They may be purchased from a local locksmith.

Customer Setup: The 8150 Processor is designated as a customer setup unit, thereby offering the customer early availability and relocation flexibility. Customer Setup instructions will be shipped with each machine. An 8150 Processor installation verification program will be shipped with each machine on a diskette. A clear indication that the machine is operational will be given.

Relocation/Replacement: If the user relocates the processor from one system to another or replaces the processor on an existing system the following conditions must be met:

1. Each 8101 on the system must have a unique address code -- **#9921, #9922, #9923** or **#9924.** There cannot be duplicate address codes on the same system.
2. The processor must have the correct address of the 8101 which will be its primary IPL device. Refer to "Primary IPL Device Address" under specify below. For further information, see *IBM 8100 Information System Site Planning Guide,* GA27-2884.

For relocation/replace kit ordering, see "Relocate/Replace: 8100 System" under "Accessories".

Loop Installation: The customer is responsible for procurement, installation, and maintenance of the loop network. In order for the cable and required accessories to be properly installed, certain preparatory steps must be followed. See *IBM Multiuse Communication Loop Planning and Installation Guide,* GA27-3341, for information necessary to plan and install the loop. The loop should be installed and checked out prior to attaching processors.

Cabling: For loop cabling information, see *Accessories and the IBM Multiuse Communications Loop Planning and Installation Guide,* GA23-3341. For communication cable information, see the *IBM 8100 Information System Site Planning Guide,* GA27-2884. Communications cables must be ordered separately from the Communications Features.

Bibliography: GC20-8100

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (200V to 240V AC, 1-phase, 3-wire 60 Hz): If standard 4.3 meter (14 foot) cable is not required specify **#9986** for 1.8 meter (6 foot) cable.
- Color: Pebble gray is the only available color.
- Programming Configuration: Specify **#9700** for Distributed Processing Programming Executive (DPPX), **#9710** for Distributed Processing Control Executive (DPCX), **#9720** for DPPX and DPCX, or **#9730** for all other configurations. **Maximum:** One. **Field Installation:** Yes.
- Primary IPL Device Address: The primary IPL device must be an 8101 Storage and I/O Unit. You must specify **#9935** for an 8101 mdl A13, A23, A25 and, in addition, specify **#9921, #9922, #9923** or **#9924** using the same number as used on the 8101 that will be the primary IPL device. **Field Installation:** The IPL Device Address can be changed by a CE. All such changes are chargeable at the applicable CE hourly rate. Do not submit an MES.
- Terminal Requirements: Specify **#9800** (offline 3640 terminal exerciser) when ordering any of the following terminals: 3641, 3642, 3643, 3644, 3645, 3646 or 3647. 1) On the initial order. 2) When the first terminal is ordered to attach via an 8101 and none are attached to the processor. 3) Via MES when the first terminal is field installed on an 8100 system. **Maximum:** One per system. **Field Installation:** Yes.
- 8101, 8809 mdl 1B Attachment: If any installed 8101 will be attached to an 8150 Processor, an MES to remove specify code **#9931** (8130 Attachment) or **#9932** (8140 Attachment) and add **#9933** (8150 Attachment) must be ordered for the 8101 to ensure the correct level of adapters and maintenance capability. If an 8809-1B will be attached to an 8150 Processor, an MES to add **#9933** must be ordered for the 8809.

SPECIAL FEATURES

Performance: Higher performance is achievable if the communication ports in a system are configured in the 8150 Processor and not in an 8101 I/O Unit and ports 1 through 6 are utilized first. **Note:** The maximum number of communication and loop ports configured and capable of concurrent operation in an 8100 System is a function of the speed of the lines, communication facilities, the operating system installed and the application work load. The maximum number of communications and loop ports which can be physically installed can exceed the operational capability. The aid ANDPPX can be used to determine the operational capability of the system (processor utilization, storage requirements, and response times).

Multiple High-Speed Adapters: An 8150 Processor has the physical capability for eight high-speed communication ports in excess of 9600 bps. The maximum number of high-speed ports activated concurrently is limited to four on each PCE.

Diagnostics: The 8100 system hardware and feature operation, diagnostic support and maintenance support described in 8100 Information System publications are dependent on the presence of functional support modules provided by DPPX or DPCX. Customers ordering 8100 Information System hardware without these programs should provide the functional support as contained and described in the *Functional Definition Manual 8100* which will be available from Mechanicsburg at FCS.

8150 Processor Mdls B20, B40, B60 (cont'd)

Floating Point Feature (#3750): Provides for execution of 30 floating point instructions and 32 floating point registers to improve performance of floating point operations (operates with only PCE 0). The instructions provide for loading, adding, subtracting, comparing, multiplying, dividing, storing and controlling the sign of short (4-byte) operands and long (8-byte) operands. **Maximum:** One. **Field Installation:** Yes.

Feature Expansion Prerequisite (#3901): Required for communications ports 7 through 12. This is a prerequisite for communication features #1716, #1726, #1734, #1735, #1745, #1755, and #1764. **Maximum:** One. **Field Installation:** Yes.

Multi-Speed clock (#5200): Provides business machine clocking at 4800, 9600 and 56,000 bps for SDLC direct-connection facilities. Can provide multiple speeds simultaneously. One multi-speed clock can provide clocking for features #1733, port 5, and #1742, port 4, and another multi-speed clock can provide clocking for features #1734, port 8, and #1745, port 9. **Maximum:** Two. One for ports 4 and 5 and one for ports 8 and 9. **Field Installation:** Yes. **Prerequisites:** #1733, #1734, #1742, or #1745.

COMMUNICATIONS and LOOPS

The communication and loop attachments are available in line sets which occupy predefined ports. A maximum of 12 ports are available, however only 10 loops and SDLC lines may be activated at any one time on each PCE. If line sets are selected in ports 1 to 4 or 9 to 12, there can be no high-speed ports in an attached 8101. The speed of the loops in communication ports 1 to 4 and ports 11 and 12 is manually switch selectable at either 9600 bps or 38,400 bps. The limitation on the total number of active ports at greater than 9600 bps is four on each PCE.

Note: Within a given Communications Feature the selected option Link Problem Determination Aid (LPDA) or line speed can be changed in the field by the CE. All such changes are chargeable at the applicable CE hourly rate. Do not submit an MES. However, the MES for removal of a Communications Feature and its associated specify codes must identify the original codes ordered from the factory.

For communication cable information, see the *IBM 8100 Information System Site Planning Guide,* GA27-2884.

COMMUNICATION FEATURES

Ports					
1	2	3	4	5	6
#1711		#1712		#1733	
Loop	Loop	Loop	Loop	SDLC EIA *DC	SDLC EIA
or		or		or	
#1721		#1732		#1763	
Loop 2-Lobe	Loop 2-Lobe	SDLC EIA	SDLC EIA	BSC EIA *DC	BSC EIA
or					
#1742					
SDLC V.35	SDLC V.35 *DC				
or					
#1752					
SDLC X.21 Sw	SDLC X.21 Non-Sw				

#3901 Prerequisites

Ports					
7	8	9	10	11	12
#1734		#1735		#1716	
SDLC EIA	SDLC EIA *DC	SDLC EIA	SDLC EIA	Loop	Loop
or		or		or	
#1764		#1745		#1726	
BSC EIA	BSC EIA *DC	SDLC V.35 *DC	SDLC V.35	Loop 2-Lobe	Loop 2-Lobe
or					
#1755					
SDLC X.21 Non-Sw	SDLC X.21 Sw				

* DC = Direct Connect

Communications Feature (#1711): Provides for directly-attached loops with single lobes in ports 1 and 2 with the speed selectable by switch at 9600 bps or 38,400 bps. **Limitations:** Not available with #1721. Not available if high-speed (greater than 9600 bps) ports are in an attached 8101. **Maximum:** One. **Field Installation:** Yes.

Communications Feature (#1712): Provides for directly-attached loops with single lobes in ports 3 and 4 with the speed selectable by switch at 9600 bps or 38,400 bps. **Limitations:** Not available with #1732, #1742 or #1752. Not available if high-speed (greater than 9600 bps) ports are in an attached 8101. **Maximum:** One. **Field Installation:** Yes.

Communications Feature (#1716): Provides for directly-attached loops with single lobes in ports 11 and 12 with the speed selectable by switch at 9600 bps or 38,400 bps. **Limitations:** Not available with #1726. Not available if high-speed (greater than 9600 bps) ports are in an attached 8101. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3901.

Communications Feature (#1721): Provides for directly-attached loops with double lobes in ports 1 and 2 with the speed selectable by switch at 9600 bps or 38,400 bps. **Limitations:** Not available with #1711. Not available if high-speed (greater than 9600 bps) ports are in an attached 8101. **Maximum:** One. **Field Installation:** Yes.

Communications Feature (#1726): Provides for directly-attached loops with double lobes in ports 11 and 12 with the speed selectable by switch at 9600 bps or 38,400 bps. **Limitations:** Not available with #1716. Not available if high-speed (greater than 9600 bps) ports are in an attached 8101. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3901.

Communications Feature (#1732): Provides for two SDLC EIA RS-232-C interfaces in ports 3 and 4. Both interfaces are unclocked and attach to external modems with clock up to 9600 bps -- point-to-point switched with auto answer to 4800 bps -- point-to-point nonswitched 2- or 4-wire or multipoint 4-wire. **Limitations:** Not available with #1712, #1742, or #1752. Not available if high-speed (greater than 9600 bps) ports are in an attached 8101. **Maximum:** One. **Field Installation:** Yes. **Specify: #9803** for port 3 with LPDA, **#9804** for port 4 with LPDA.

Communications Feature (#1733): Provides for two SDLC EIA RS-232-C interfaces in ports 5 and 6. Port 6 is unclocked and attaches to an external modem with clock up to 9600 bps -- point-to-point switched with auto answer to 4800 bps -- point-to-point nonswitched 2- or 4-wire or multipoint 4-wire. Port 5 provides the same interface as Port 6 or direct-connect at 4800 bps or 9600 bps up to 40 feet. **Limitations:** Not available with #1763. **Maximum:** One. **Field Installation:** Yes. **Specify: #9689** for external modem, **#9688** for direct connect without clock, **#9686** with prerequisite multi-speed clock (#5200) for direct-connect with clock at 4800 bps or **#9687** with prerequisite multi-speed clock (#5200) for direct-connect at 9600 bps. Specify **#9805** for port 5 with LPDA, **#9806** for port 6 with LPDA.

Communications Feature (#1734): Provides for two SDLC EIA RS-232-C interfaces in ports 7 and 8. Port 7 is unclocked and attaches to an external modem with clock up to 9600 bps -- point-to-point switched with auto answer to 4800 bps -- point-to-point nonswitched 2- or 4-wire or multipoint 4-wire. Port 8 provides the same interface as Port 7 or direct-connect at 4800 bps or 9600 bps up to 40 feet. **Limitations:** Not available with #1764. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3901. **Specify: #9699** for external modem, **#9698** for direct-connect without clock, **#9696** with prerequisite multi-speed clock (#5200) for direct-connect with clock at 4800 bps or **#9697** with prerequisite multi-speed clock (#5200) for

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direct-connect at 9600 bps. Specify **#9807** for port 7 with LPDA, **#9808** for port 8 with LPDA.

Communications Feature (#1735): Provides for two SDLC EIA RS-232-C interfaces in ports 9 and 10. Both interfaces are unclocked and attach to external modems with clock up to 9600 bps -- point-to-point switched with auto answer to 4800 bps -- point-to-point nonswitched 2- or 4-wire or multipoint 4-wire. **Limitations:** Not available with #1745 or #1755. Not available if high-speed (greater than 9600 bps) ports are in an attached 8101. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3901. **Specify: #8801** for port 9 with LPDA, **#8802** for port 10 with LPDA.

Communications Feature (#1742): Provides for two SDLC/CCITT V.35 interfaces in ports 3 and 4. Port 3 is unclocked and attaches to an external modem with clock up to 56,000 bps. Port 4 provides the same interface as Port 3 or direct-connect with or without clock at 56,000 bps for a total cable length of up to 1,000 feet or up to 200 feet to a 3705 or up to 492 feet to a 3725. **Limitations:** Not available with #1712, #1732 or #1752. Not available if high-speed (greater than 9600 bps) ports are in an attached 8101. **Maximum:** One. **Field Installation:** Yes. **Specify: #9684** for external modem, **#9683** for direct-connect without clock, **#9682** with prerequisite multi-speed clock (#5200) for direct-connect with clock at 56,000 bps.

Communications Feature (#1745): Provides for two SDLC/CCITT V.35 interfaces in ports 9 and 10. Port 10 is unclocked and attaches to an external modem with clock up to 56,000 bps. Port 9 provides the same interface as Port 10 or direct-connect with or without clock at 56,000 bps for a total cable length of up to 1,000 feet or up to 200 feet to a 3705 or up to 492 feet to a 3725. **Limitations:** Not available with #1735 or #1755. Not available if high-speed (greater than 9600 bps) ports are in an attached 8101. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3901. **Specify: #9694** for external modem, **#9693** for direct-connect without clock, **#9692** with prerequisite multi-speed clock (#5200) for direct-connect with clock at 56,000 bps.

Communications Feature (#1752): Provides one SDLC/CCITT X.21 Switched interface with auto answer and auto call in port 3 and one SDLC/CCITT X.21 nonswitched interface point-to-point or multipoint in port 4, without clock up to 48,000 bps via a Data Circuit-Terminating Equipment (DCE) which complies with CCITT Recommendation X.21 as it is delineated in GA27-3287. **Limitations:** Not available with #1712, #1732 or #1742. Not available if high-speed (greater than 9600 bps) ports are in an attached 8101. **Maximum:** One. **Field Installation:** Yes.

Communications Feature (#1755): Provides one SDLC/CCITT X.21 Switched interface with auto answer and auto call in port 10 and one SDLC/CCITT X.21 nonswitched interface point-to-point or multipoint in port 9, without clock up to 48,000 bps via a Data Circuit-Terminating Equipment (DCE) which complies with CCITT Recommendation X.21 as it is delineated in GA27-3287. **Limitations:** Not available with #1735 or #1745. Not available if high-speed (greater than 9600 bps) ports are in an attached 8101. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3901.

Communications Feature (#1763): Provides two BSC EIA RS-232-C interfaces in ports 5 and 6. Port 6 provides an IBM microcode-programmed BSC communication interface from 1200 to 9600 bps without clock or 600 and 1200 bps with clock to external Data Circuit-Terminating Equipment (DCE) point-to-point nonswitched 2- or 4-wire or multipoint nonswitched 4-wire. Port 5 provides the same interface as port 6 or direct-connect up to 40 feet. **Limitations:** Not available with #1733. Not available if BSC FAC Codes 40, 41, 44, 45 or 47 are in an attached 8101. **Field Installation:** Yes. **Specify: #9690** for direct-connect. User parameter selectable business machine clock options and speed are available at 1200, 1800, 2400, 3600, 4800, 7200, or 9600 bps. The attached terminal must not provide business machine clocking.

Communications Feature (#1764): Provides two BSC EIA RS-232-C interfaces in ports 7 and 8. Port 7 provides an IBM microcode-programmed BSC communication interface from 1200 to 9600 bps without clock or 600 and 1200 bps with clock to external Data Circuit-Terminating Equipment (DCE) point-to-point nonswitched 2- or 4-wire or multipoint nonswitched 4-wire. Port 8 provides the same interface as port 7 or direct-connect up to 40 feet. User parameter selectable business machine clock options and speed are available at 1200, 1800, 2400, 3600, 4800, 7200, or 9600 bps. The attached terminal must not provide business clocking. **Limitations:** Not available with #1734. Not available if BSC FAC Codes 40, 41, 44, 45 or 47 are in an attached 8101. **Field Installation:** Yes. **Specify: #9680** for direct-connect.

MODEL CONVERSIONS

The following model changes can be field installed:

From	To	B40	B60
B20		X	X
B40			X

ACCESSORIES

CABLES - LOOP

Loop Cables may be purchased from IBM or a customer selected source. See *IBM Multiuse Communication Loop Planning and Installation Guide,* GA27-3341, for part numbers, specifications and usage which is necessary for preplanning and ordering.

- Indoor Cable **P/N 1657265:** UL approved (style 2919 for interconnection of low voltage electronic equipment. Maximum allowable cable temperature range is -34°C to 80°C.
- Indoor Cable **P/N 7838694:** UL approved for cable tray installation (NEC Art. 725-40b3). Maximum allowable cable temperature range is -34°C to 90°C.
- Indoor Cable **P/N 7838695:** UL approved for duct and plenum installation (NEC Art. 725-2b). Maximum allowable cable temperature range is -34°C to 105°C.
- Outdoor Cable **P/N 1657267:** For above ground installation. Maximum allowable cable temperature range is -34°C to 80°C.
- Outdoor Cable **P/N 1657268:** For below ground installation. Maximum allowable cable temperature range is -34°C to 80°C.

Ordering Instructions: Indoor cable (**P/N 1657265, 7838694** and **7838695**) should be ordered in lengths of 304.8m to 609.6m (1,000 to 2,000 feet). Additional lengths up to 609.6m (2,000 ft.) can be ordered by specifying the length wanted. Indoor cable splices can be accomplished via **P/N 1657300.** A minimum order quantity is 304.8m (1,000 feet). Outdoor cable (**P/Ns 1657267** and **1657268**) should be ordered in one continuous length, up to a maximum of 914.4m (3,000 feet), by specifying the length wanted. Outdoor splices with aerial and burial cable should be avoided.

Warranty: Loop cable is warranted free from defects of workmanship and materials for 90 days.

LOOP - ACCESSORIES

A group of accessory products are offered to permit plant electricians or contract personnel to install the loops. Refer to *IBM Multiuse Communications Loop Planning and Installation Guide,* GA23-3341, for information necessary to plan the layout and for selection of the loop hardware, and for installation and testing information.

Loop Splice Plate (LSP): The LSP splices together two segments of indoor cable or provides a connecting point for future expansion of the loop. The LSP consists of a single connector strip, to which the incoming loop cable and the outgoing loop cable can be attached; it is installed in a standard outlet box for business office environments, or weatherproof outlet box for industrial environments.

Loop Station Connector (LSC): The LSC is available as two unique types: Wrap and Radial. The wrap LSC attaches an I/O unit or controller directly to the main loop cable; the radial LSC attaches an I/O unit only through a Loop Wiring Concentrator (LWC) to the loop. The wrap LSC attaches an incoming and outgoing loop cable; the radial LSC attaches at the end of one loop cable from the LWC.

The wrap LSC also offers the isolation feature of wrapping, which allows the customer to wrap the loop away from a loop wiring failure or to reconfigure the loop during alterations. Both wrap and radial LSCs contain bypass relays that bypass the I/O unit when the I/O unit is powered off or disconnected. These accessories are installed in a standard or weatherproof outlet box.

2 x 4 Adapter Plate (2AP): The 2" x 4" Adapter Plate is used with the Loop Station Connector and accommodates the use of standard outlet boxes that have dimensions smaller than the outlet boxes defined in the *Loop Installation and Planning Guide.* It is not to be used with the environmental outlet boxes.

Loop Wiring Concentrator (LWC): The LWC provides the facility to attach a cluster of I/O units without a large number of drops on the loop cable. It attaches up to eight radial LSCs at the end of loop cables called radials. The point where a radial line terminates at the LWC is called an LWC port. Not all ports have to be used; unused ports can be reserved for future expansion.

The LWC has the same wrapping capability as the wrap LSC. In addition, the LWC allows the customer to bypass one or more of the radials by setting a switch located inside the LWC.

The LWC has its own enclosure or can be mounted in a NEMA-4X environmental equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in.).

Loop Surge Suppressor (LSS): The LSS allows the loop to be run across an outdoor space to another building. It attaches two outdoor cables and two indoor cables, allowing the proper termination and grounding for each type of cable. In addition, the LSS contains four surge protectors, one for each twisted pair in the two outdoor cables, to protect from voltage surges caused by near strikes of lightning. There is no protection in the LSS from a direct lightning strike.

The LSS has its own enclosure or can be mounted in an electrical equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in).

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Continuity And Relay Tester: The Continuity and Relay Tester is used with a customer-supplied volt-ohm meter, capable of reading 0.5 ohms and rated at least 5,000 ohms/volt, to verify the loop installation, including loop cabling and accessories after completion. By plugging the tester into any loop station connector and connecting the volt-ohm meter to the tester, the condition of the wire segment being tested can be determined as to conductor and shield continuity (opens or shorts), wrap switch operation, and total lobe resistance.

The loop station connector relays are also activated and their operation verified with this tester.

System Loop Accessories	P/N
Loop Slice Plate (LSP) (indoor)	1657300
Loop Station Connector (Radial LSC)	1657310
Loop Station Connector (Wrap LSC)	1657320
Loop Station Connector Gasket	1657260
Loop Wiring Concentrator (LWC)	1657330
LWC Circuit Board Assy (order instead of LWC - 1657330)*	1657332
Loop Surge Suppressor (LSS)	1657350
LSS Circuit Board Assy (order instead of LSS - 1657350)*	1657354
Continuity and Relay Tester	1657420
Wrap Switch Access Cover	1657325
Loop Accessory Keys (10 spares)**	1657379
2 x 4 Adapter Plate (2AP)	7838771
Conventional Box (indoor) 5 x 10cm - (2 x 4 inches)	2102151
Clamp (for cable to indoor box)	2100264
Electrical box (outdoor) 7 x 11.5cm - (2.75 x 4.5 inches) (For industrial use)	1657280
Clamp - small (for indoor cable to environmental box)	2114285
Clamp - large (for indoor cable to environmental box)	1657377
Single Device Attach. Cable, 12.1m (40 ft)	8269543

* For use with NEMA-4X enclosure and associated parts (used when installing in harsh environments or as a replacement part for the LWC or LSS.

** 1 package (10 keys) shipped with each 8101 or 8140. 1 key shipped with each LWC and wrap LSC.

Ordering Instructions: When ordering, use Machine type 8101 or 8150. Allow lead time of 120 days.

Warranty: All loop accessories are warranted free from defects of workmanship and materials for 90 days.

Customer Responsibilities: The customer is responsible to provide (purchase, install, test, and maintain) the loop cables and accessories. However, see IBM for contracts available to assist the customer with installation.

The customer is also responsible for procuring and stocking spare cable and spare parts for loop accessories.

See *IBM Multiuse Communications Loop Planning and Installation Guide* (GA27-3341) for a suggested schedule to allow the customer to plan, install, and test the loop cable and accessories prior to delivery of the system.

It is recommended that the customer order additional loop components for spares with the initial order, as spares will not be stocked in the branch office.

To enable a customer to test his installed loops it is recommended that the customer order a Continuity and Relay Tester. Testing the loop wiring will require the tester or its equivalent.

SYSTEM ACCESSORIES

Relocate/Replace Kits: The material required to perform machine relocation or processor replacement has been grouped into machine type dependent kits. Kits are available with or without truck-move packaging material.

For 8100 Information Systems with 8101 Storage and Input/Output units attached:

- Use Figure 1 below to order appropriate kit.
- 8150 kits apply to processor relocation or replace.
- Each 8101 to be relocated requires a kit. Current CSU Diskette provided with each kit.

Figure 1
Kits For Systems With 8101 Attached

Machine	Kit Without Packaging Material	Kit With Packaging Material
8101	4448550	4448551
8150	4719031	4719032

- Check for missing/damaged wrap plugs. If required, see the wrap plug entry below.

WRAP PLUGS

The communication cables listed below will require their respective wrap plugs to be re-installed for machine relocations.

If wrap plugs are lost or damaged, you may order replacements by the part numbers specified in Figure 2.

Figure 2

Communication Feature	Communication Cable Group Number	Wrap Plug Part Number
Loop Station Adapter (Single Lobe)	#3709, #4838	7389282
DDSA	#3717	6835350
V.35 Modem	#3718, #4840	6835348
V.35 Direct Connect	#3719, #4841	6835349
V.35 Direct Connect PTP	#3720, #4830	6835353
EIA Direct Connect	#3721, #4833	6835642
EIA Modem	#3724,	6835346
Loop Station Adapter (Double Lobe)	#3726, #4839	7389282 (2 Req'd)
EIA Direct Connect PTP	#3727, #4835	6835347
X.21 Nonswitched	#3728,	6835379
X.21 Switched	#3733, #4836	6226830
V.35 Direct Connect PTP	#4829	4718959
EIA Direct Connect PTP	#4834	4718958

SUPPLIES

None required with machine order.

DEVICE ATTACHMENT

Direct Attached Devices: The following devices can be directly attached to the processor:

8101 Storage and I/O Unit
8809 mdl 1B Magnetic Tape Unit

Loop Attached Devices: The following devices can attach to a direct-attached loop or a data link attached loop via the 3842 or 3843 Loop Control Unit.

Device and Mdl	Loop Attachment: Direct-Attach 9600 bps	Direct-Attach 38,400 bps	Data Link At 2400,4800, 9600 bps
3104 Display Terminal B1,B2	X	X	X
3262 Printer mdls 2,12	(1)	X	(1)
3268 Printer mdl 1	X	X	X
3274 Control Unit mdls 51C,61C with: - 3178 Display Station - 3262 Printer mdls 3,13 - 3268 Printer mdl 2 - 3278 Display Station mdls 1,2,3,4,5 - 3278 PC Attach - 3279 Color Display mdls 2A,2B,3A,3B - 3287 Printer mdls 1,2,1C,2C - 3289 Printer mdls 1,2 - 3290 Information Panel - 5210 Printer mdls G1,G2 - 6580 Displaywriter w/3270 AW	X	X	X
3276 Control Unit Display Station mdls 11,12,13,14 with: - 3178 Display Station - 3262 Printer mdl 13 - 3268 Printer mdl 2 - 3278 Display Station mdls 1,2,3,4 - 3278 PC Attach - 3279 Color Display mdls 2A,2B,3A,3B - 3287 Printer mdls 1,2,1C,2C - 3289 Line Printer mdls 1,2 - 5210 Printer mdls G1,G2 - 6580 Displaywriter w/3270 AW	X		X
3287 Printer mdls 11,12	X	X	X
3289 Printer mdl 3 with: - 2502 Card Reader mdl A1* - 3501 Card Reader - 3521 Card Punch* (* Requires 3728 Attachment Unit)	(1)		(1)
3641 Reporting Terminal mdls 1,2	X		X
3642 Encoder Printer mdls 1,2	X		X
3643 Keyboard Display mdls 2,3,4	X		X
3644 Automatic Data Unit	X		X
3645 Printer	X		X
3646 Scanner Control Unit	X		X
3647 Time and Attendance Terminal	X		X
5210 Printer mdls E1,E2	X		

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7426 Terminal Interface Unit mdl 1, with associated terminals	X	X	X
8775 Display Terminal 1,2	X	X	X

Note 1: Dedication of a 9600 bps single-lobe loop to the attachment of the 3289 mdl 3, 3262 mdl 2 or 3262 mdl 12 printer (when attached to a 9600 bps loop) should be considered in cases where the printer will be heavily utilized.

Communication Attached Devices: The following devices can attach to the communication ports. For communication facilities and modem attachment data, see the M2700 pages and appropriate machine pages for additional information.

Terminals Conforming to 2780/3780 line protocol
3274 Control Unit mdl 41C, 51C, 61C with
- 3178 Display Station
- 3262 Printer mdls 3, 13
- 3268 Printer mdl 2
- 3278 Display Station mdls 1, 2, 3, 4, 5
- 3278 PC Attach
- 3279 Color Display mdls 2A, 2B, 3A, 3B
- 3287 Printer mdls 1, 2, 1C, 2C
- 3289 Printer mdls 1, 2
- 3290 Information Panel
- 5210 Printer mdls G1,G2
- 6580 Displaywriter w/3270 AW

3276 Control Unit Display Station mdls 1*, 2*, 3*, 4*, 11, 12, 13, 14 with: (*These mdls are supported in SDLC mode.)
- 3178 Display Station
- 3262 Printer mdl 13
- 3268 Printer mdl 2
- 3278 Display Station mdls 1, 2, 3, 4
  (See M3276 for configuration details)
- 3279 Color Display mdls 2A, 2B, 3A, 3B
  (Not supported on 3276 mdls mdls 1, 2, 3, 4)
- 3287 Printer mdls 1, 2, 1C, 2C
- 3289 Line Printer mdls 1, 2
- 5210 Printer mdls G1, G2
- 6580 Displaywriter w/3270 AW

3601 Finance Communication Controller mdls 1, 2A, 2B, 3A, 3B
3602 Finance Communication Controller mdls 1A, 1B
3631 Plant Communication Controller mdls 1A, 1B
3632 Plant Communication Controller mdls 1A, 1B
3651 Store Controller mdls 25, 75
3684 Point of Sale Control Unit mdls 1, 2
3705-II, 80 Communications Controller
3725 Communication Controller
3767 Communication Terminal mdls 1, 2, 3
3842 Loop Control Unit
3843 Loop Control Unit
4701 Finance Communication Controller mdl 1
4952, 4954, 4955, 4959 Processor (Series/1)
5150 Personal Computer
5285,5288 Programmable Data Stations
6580 Displaywriter (3270 DSC load only)
6670 Information Distributor
7426 Terminal Interface Unit mdl 2, with associated terminals
8101 Storage and Input/Output Unit
8130 Processor
8140 Processor
8150 Processor
8775 Display Terminal mdls 11, 12

Direct-Connection Attachment: In addition to device attachment to the 8100 System through common carrier facilities (see M2700 pages), attachment can be made by direct-connect. Shown below are the direct-connect attachable devices and required device feature numbers. The *8100 Information System Site Planning Guide,* GA27-2884, will assist in the selection of cables.

Attaching Device	Speeds (bps)	Attaching Device Feature Number	8150 Comm. Feature Number
Devices Conforming to 2780/3780 Line Protocol	9600	Refer to Device	#1763 and **#9690** #1764 and **#9680**
3274-41C,51C, 61C	4800	#3701 and #6302	#1733,#5200,and **#9686** #1734,#5200,and **#9696**
	9600	#3701 and #6302	#1733,#5200,and **#9687** #1734,#5200,and **#9697**
	56,000	#1550 and #6303	#1742,#5200,and **#9682** #1745,#5200,and **#9692**
3276	4800	#3701 w **#9491** and #6302	#1733,#5200,and **#9686** #1734,#5200,and **#9696**
	9600	#3701 w **#9491** and #6302	#1733,#5200,and **#9687** #1734,#5200,and **#9697**
3651-25/75 *	4800	**#9126**	#1733,#5200,and **#9686** #1734,#5200,and **#9696**
3705-II	4800	#4714	#1733,#5200,and **#9686** #1734,#5200,and **#9696**
	9600	#4714	#1733,#5200,and **#9687** #1734,#5200,and **#9697**
	56,000	#4720	#1742,#5200,and **#9682** #1745,#5200,and **#9692**
3705-80	4800	None	#1733,#5200,and **#9686** #1734,#5200,and **#9696**
	9600	None	#1733,#5200,and **#9687** #1734,#5200,and **#9697**
	56,000	#6712	#1742,#5200,and **#9682** #1745,#5200,and **#9692**
3725-1,2	4800	#4666 and #4911	#1733 w **#9688** or #1734 w **#9698**
	9600	#4666 and #4911	#1733 w **#9688** or #1734 w **#9698**
	56,000	#4666 and #4931	#1742 w **#9683** or #1745 w **#9693**
4701-1	4800	None	#1733,#5200,and **#9686** #1734,#5200,and **#9696**
	9600	None	#1733,#5200,and **#9687** #1734,#5200,and **#9697**
4952,4954, 4955,4959	4800	**#2090**	#1733,#5200,and **#9686** #1734,#5200,and **#9696**
	9600	**#2090**	#1733,#5200,and **#9687** #1734,#5200,and **#9697**
6360	4800	#3707	#1733,#5200,and **#9686** #1734,#5200,and **#9696**
	9600	#3707	#1733,#5200,and **#9687** #1734,#5200,and **#9697**
6580-A04,A10, B04,B10	4800	#3705	#1733,#5200,and **#9686** #1734,#5200,and **#9696**
	9600	#3705	#1733,#5200,and **#9687** #1734,#5200,and **#9697**
6670	4800	#3701	#1733,#5200,and **#9686** #1734,#5200,and **#9696**
	9600	#3701	#1733,#5200,and **#9687** #1734,#5200,and **#9697**
7426-2	4800	None	#1733,#5200,and **#9686** #1734,#5200,and

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	9600	None	#9696 #1733,#5200,and #9687 #1734,#5200,and #9697
8101, 8130 8140-AXX/BXX	4800	FAC17(see Note)	#1733,#5200,and #9686 #1734,#5200,and #9696
	9600	FAC 17(see Note)	#1733,#5200,and #9687 #1734,#5200,and #9697
8140-CXX	4800	#1621 and #9688 (see Note)	#1733,#5200,and #9686 #1734,#5200,and #9696
	56,000	#1614 and #9683 (see Note)	#1742,#5200,and #9682 #1745,#5200,and #9692
8101,8140-BXX	56,000	FAC 28 (see Note)	#1742,#5200,and #9682 #1745,#5200,and #9692
8775	4800	#3701	#1733,#5200,and #9686 #1734,#5200,and #9696
	9600	#3701	#1733,#5200,and #9687 #1734,#5200,and #9697

Note: FAC 17, 28, #1614 with #9683, or #1621 and #9688 in the attaching 8101, 8130, 8140 without business machine clock.

* Specify code #9770 is available on the 3651-25/75 to facilitate problem determination.

8775 DISPLAY TERMINAL

PURPOSE

A high function cathode ray tube display terminal provides a means of entering data to or receiving data from the 4300, S/370 Processor or the 8100 Information System.

APL, field and character highlighting, field validation, multiple partitions, scrolling, programmed symbols, extended data entry capabilities and facilities for entry and edit of text are available. A Keyboard or a Selector Light-Pen permit an operator to display and manipulate data on the screen in a flexible and efficient manner. Other functions include Audible Alarm, Security Keylock, Printer Adapter and Magnetic Slot Reader or Magnetic Hand Scanner. The 8775 meets both general and unique display requirements with its set of basic and optional features.

MODELS

Loop Attach on the 4331 Processor Mdl Group 1 and 2 or 8100 System.

Model 1 001 Displays 960, 1,920 or 2,560 characters in the 9x16 character matrix size.

Model 2 002 Displays 960, 1,920, 2,560 in the 9x16 character matrix size or 3,440 characters in the 9x12 character matrix size.

SNA/SDLC data link attach over communication facilities to a 4300, S/370 or 8100.

Model 11 011 Displays 960, 1,920 or 2,560 characters in the 9x16 character matrix size.

Model 12 012 Displays 960, 1,920 or 2,560 characters in the 9x16 character matrix size or 3,440 characters in the 9x12 character matrix size.

Customer Setup (CSU): Machine only.

HIGHLIGHTS

Displays 960, 1,920 or 2,560 characters in a 9x16 character matrix, or 3,440 characters in a 9x12 character matrix. (Mdl 2 and 12 only.)

The number of characters displayed is determined under operator control. All configurations include 62 alphameric and 32 special characters, the Space, and Null characters. Use of 3270 Field Formatting capability permits individual fields of data on the screen to be program defined with various attributes such as protected/unprotected, alphameric/numeric, normal/highlighted intensity, displayable/non-displayable, and selector light-pen detection allowed/disallowed.

The 8775 Display Terminal communicates with a 4321, 4331, 8130, 8140 or 8150 using Synchronous Data Link Control (SDLC) over either direct or data link attach loops or with an 8130, 8140, 8150, 4300 or S/370 processor via data link attach over communication facilities. The basic 8775 offers equivalent function and is upward data stream compatible with the 3276/3278.

Downstream loadable function which includes APL, field and character highlighting, field validation, enhanced function with magnetics, multiple partitions, scrolling, and text entry and edit is optionally available. The Enhanced Function, Enhanced Function with Magnetics, and Multiple Partitions and Scrolling features, and the Interactive Display Text Facility (IDTF) licensed program consist of four sets of data contained on magnetic media. Only one set can be loaded into an 8775 at a given time. The Interactive Display Text Facility (IDTF) licensed program is on separate magnetic media supplied by IBM program libraries.

The Printer Adapter provides the capability to print either the screen contents or bulk data from the host. This feature is mutually exclusive with any of the downstream loadable function. One of the following printers may be attached 3230 mdl 2, 3262 mdl 13, 3268 mdl 2, 3287 mdl 1, 2, 1C, or 2C, 5210 mdl G01, G02 or 7436 mdl 1.

Operator Factors: 8775 has an anti-reflective screen. Indicators are displayed on the bottom row of the screen, outside the data display area, and provide useful operator information. Updating the screen from the host is accomplished without refresh interrupt (i.e., no blinking). The keyboard, which is low in profile, provides a palm rest area and has separators to help prevent accidental striking of control keys. The operator may select one of several cursor modes.

Editing Facilities: Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen) and cursor select keys are all basic. All alphanumeric, special symbol, and cursor move keys have typematic capability. Double speed cursor typematic is attained with a simultaneous depressing of the ALT key and a horizontal cursor positioning key. The cursor select function provides an alternative to the Selector Light-Pen function. Fields of data may be selected by positioning the cursor then using the Cursor Select Key.

Input Flexibility: A choice of keyboards or the Selector Light-Pen provide input flexibility ... see "Special Features" below. Fields of data can be selected by positioning the cursor and operating the cursor select key, instead of using the Selector Light-Pen. Twelve Program Function (PF) keys are basic with all typewriter keyboards; seven or more PF keys are available on all Data Entry Keyboards.

Security Facilities: A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock (optional) prevents modification or display of data in the display buffer unless the key is turned to the "on" position. The Setup Keylock (optional) controls access via the keyboard to change the terminal address. Those capabilities and the terminal's ability to identify itself to the host program, allow customer-supplied security program routines to control access to data and to record an audit of actions. A Magnetic Slot Reader or Magnetic Hand Scanner is available to enter system user identification.

Communications: The 8775 mdl 1, 2 display terminals are attached to customer-owned loops. A direct loop to a 4331 Mdl Group 1 and 2 or 8100 processor may operate at 38.4K bps, or 9600 bps, this operating speed being determined by the customer at order time. A data link-attached loop may be connected to an 4331 or an 8100 System via a 3843 Loop Control Unit. The 3843 provides an interface to a synchronous modem transmitting at 2400, 4800 or 9600 bps. The Loop Control Units support point-to-point or multipoint telecommunication links. Half-speed operation of the 8775 can be selected by the operator. Refer to the M3843 pages for more information.

The 8775 mdls 11, 12 may communicate to an 8100 Information System over data link nonswitched communication facilities or to a 4331 Processor via its Integrated Communications Adapter or to a 4300 and S/370 Processors via 3704, 3705 or 3725 Communication Controller over data link nonswitched, nonswitched with switched network back-up or public switched network communication facilities using Synchronous Data Link Control (SDLC).

Modems: A 1200 bps Integrated Modem feature (#5500) or an external IBM modem may be attached to an 8775 mdl 11, 12. External modems require the external modem interface (#3701).

3863 mdl 1/2	2400/1200
3864 mdl 1/2	4800/2400
3865 mdl 1/2	9600/4800
3868 mdl 1	2400/1200
3868 mdl 2	4800/2400
3868 mdl 3/4	9600/4800
3872 mdl 1	2400/1200

Switched Network back-up operation with Manual Call and Manual or Auto Answer is available on the 3872 mdl 1.

For communication capabilities, product utilization and special features, see the M2700 pages and appropriate modem pages for additional information.

Problem Determination Procedures: Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of the problem determination and recovery routines and procedures that are easily understood and used by the operator. See "Customer Responsibilities" below.

Communication network management problem determination support for 4331 Mdl Group 1 and 2 loop attached 8775s is provided via NCCF/NPDA.

Customer Setup (CSU): 8775 is designated Customer Setup, thereby offering customers ease of set up and relocation flexibility. For additional information on CSU, refer to the General Information section.

One copy of the CSU instructions, Problem Determination Guide, and Trouble Report form are shipped with each 8775 .

Customer Responsibilities: The customer is responsible for:

- Adequate site, system and other vendor preparation.
- Receipt at customer's receiving dock, unpacking and placement of 8775 display terminal.
- Physical setup, connection of cables incorporating protected customer access areas, and check-out.
- Contact Field Engineering to make cable connections of IBM CSU units to non-CSU units where customer access area is not provided.
- Notify IBM of intent to relocate and follow IBM instructions for relocation.
- Use and follow the problem determination procedures and fill out trouble report prior to calling for IBM service.
- Disconnecting, packing and removal to the customer's shipping dock at the time of discontinuance; appropriate instructions will be provided by IBM.
- Procurement, installation and maintenance of the loop network, see Accessories.
- Performing 8775 Customization if required in accordance with IBM supplied procedures.

8775 Display Terminal (cont'd)

– For initial setup.
– Updating of the 8775 diskettes (at customer option).

Bibliography: Refer to *An Introduction to the IBM 8775 Display Terminal,* GC33-3040.

SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (120V, AC, 1-phase, 3-wire, 60 Hz): **#9890** for locking plug, or **#9891** for non-locking plug. If standard 2.8 meter (9 foot) power cable is not desired, specify **#9511** for 1.8 meter (6 foot) cable, **#9512** for 3.7 meter (12 foot) cable, or **#9513** for 4.5 meter (15 foot) cable.

- Attachment: Specify the following: **#9221** for attachment to the 8130 Information System, **#9222** for attachment to the 8140 Information System, **#9226** for attachment to the 8150 Information System, **#9227** for attachment to a 4321 Processor, **#9223** for attachment to a 4331 or 4361 Processor, **#9224** for attachment to a 4341 and 4381 Processor or **#9225** for attachment to a S/370 processor.

- Distribution of Magnetic Media for Enhanced Function (#3624), Enhanced Function with Magnetics (#3626) or Multiple Partitions and Scrolling (#5110).

  If Enhanced Function Feature (#3624), Enhanced Function with Magnetics (#3626) or Multiple Partitions and Scrolling (#5110) is ordered, one copy of magnetic media is needed per System, therefore, specify:

  #9491 - For one 8775 on each system

  #9492 - For all other 8775s on each system

  Note: For each system with one or more 8775s (with #3624, #3626 or #5110) attached, one and only one 8775 should specify **#9491**. Care should be exercised when relocating 8775s, that this relationship is maintained.

  If **#9491** is specified, also select **#9425** Diskette 2D for the 8100 System, **#9412** for 9/800 magnetic tape, **#9413** for 9/1600 magnetic tape or **#9414** for 9/6250 for magnetic tape for 4300 or S/370 Processor to identify the type of magnetic media. Additional shipping instructions are also required.

- Licensed Programming: Specify **#9600** if the Interactive Display Text Facility (IDTF) licensed program is to be used on this machine. **Prerequisites:** #3623, #3905, #4670,

  #5781, #3624, #3626 and #5110. These provide the necessary configuration to enable the IDTF licensed program to be loaded into the terminal.

  Note: The feature codes #3624, #3626, #5110 and #5781 are necessary to enable correct order processing. However, the functions provided by these features cannot be operational when the IDTF licensed program is loaded into the terminal. The IDTF licensed program is distributed on a separate diskette. If required, it must be ordered separately (see Program Product pages).

  If Enhanced Function Feature #3624, Enhanced Function with Magnetics (#3626) or Multiple Partitions and Scrolling (#5110) is ordered, additional shipping information is required.

  Supplemental specification (via AAS entry) is to be entered exactly as follows to indicate the shipping address to which the initial copy of magnetic media is sent. This may be either a S/370 or 4300 Processor or 8100 System or any address desired by the customer.

  For 8100 System:

  Line 1 - Name of Customer
  Line 2 - Street Address (or P.O. Box)
  Line 3 - City, State, Zip Code
  Line 4 - Attn: Data Processing Manager

  For 4300 or S/370 Processor:

  Line 1 - IBM Programming Support Representative
  Line 2 - C/O (Name of Customer)
  Line 3 - Street Address (or P.O. Box)
  Line 4 - City, State, Zip Code

  Whenever the Enhanced Function feature (#3624), Enhanced Function with Magnetics (#3626) or Multiple Partition and Scrolling (#5110) is updated by an EC, the magnetic media will be sent to the address associated with the MC for each Display Terminal designated by specify **#9491**.

  All 8775s with #3624, #3626 or #5110 are attached to a system which is assigned a MC (Microcode Control Number). This MC identifies a network associated with a 4331 or 8100 System or a Central Site Facility.

  The MC, controlled and supplied by the Field Engineering Branch Office, is a 6-character code. The MC is assigned subsequent to delivery of the 8775 when the machine serial number is known.

  Note: To ensure proper delivery of ECs, the MC should be submitted as soon as the serial number of the 8775 is known.

- Communication Cable: A 1.8 meter (6 foot) communication cable is provided for attachment to a direct or data link attached loop. If 1.8 meter cable is not desired, specify **#9405** for 4.3 meter (14 foot) cable.

  A 6.1 meter (20 foot) communication cable is provided as standard for attachment to stand-alone modems or to the communication facility when an integrated modem is used or to a communication facility when a X21 adapter is used or to the Communication facility when a DDS adapter is used. If the standard communication cable is not desired, specify **#9061** for 3.0 meter (10 foot) cable, **#9062** for 9.1 meter (30 foot) cable or **#9063** for 12.2 meter (40 foot) cable.

- Character Set:

  #9082 for EBCDIC Character Set - used in conjunction with 75-key Typewriter Keyboard or Data Entry Keyboard or 87-key EBCDIC Typewriter Keyboard.

SPECIAL FEATURES

Set Up Keylock (#1009): Controls access to change the unit address of the terminal. **Maximum:** One. **Field Installation:** Not recommended.

Audible Alarm (#1090): An alarm sounded under program control, to alert the operator to a special condition. This alarm during keyboard operation is also sounded when a character is entered into the next-to-last position on the screen. The operator may adjust the volume of the tone. **Maximum:** One. **Field Installation:** Yes.

Business Machine Clocking (#1488): Required for attachment of IBM 1200 bps Integrated Modem (#5500) or any external modem that does not provide its own clocking and operates at 1200/600 bps. **Maximum:** One. **Field Installation:** Yes.

Extended Feature Storage (#3623): Provides the storage capacity required for Enhanced Function (#3624), Enhanced Function with Magnetics (#3626), Multiple Partitions and Scrolling (#5110) or the IDTF licensed program. **Limitation:** Cannot be installed with #5580. **Maximum:** One. Refer to Specify for information on the shipment of the magnetic media to the proper location. **Field Installation:** Yes.

Note: The Enhanced Function, Enhanced Function with Magnetics, and Multiple Partitions and Scrolling features, and the IDTF licensed program, consist of four sets of data contained on magnetic media. Only one set can be loaded into the 8775 at a given time. If Enhanced Function with Magnetics (#3626) is installed then Enhanced Function Feature (#3624) or Multiple Partitions and Scrolling (#5110) may be loaded by the operator if required. If Enhanced Function (#3624) is installed then Enhanced Function with Magnetics (#3626) or Multiple Partitions and Scrolling (#5110) may be loaded by the operator if required.

Enhanced Function (#3624): Provides the ability to display APL characters, to highlight data, display data in user-defined partitions and to validate data fields as they are entered into the display terminal from the operator keyboard. Highlight is on a per character basis in one of three user selectable modes, blink, reverse video or underscore, and, additionally, on a field basis for intensify. Partitioning provides the ability to display data in up to eight user defined rectangular partitions and for the host or user to interact individually with the data within each partition. APL provides the ability to display the space (blank), and the unique characters consisting of 94 EBCDIC, 81 APL specific, 37 characters unique to 3270 text and 10 new graphic characters.

Validation provides:

Mandatory Enter -	Data must be entered into this field to permit entry to the host.
Mandatory Fill -	All positions in this field must be filled to permit entry to the host.
Trigger Field -	Causes the contents of the field to be sent from the display when data has been entered into the field and the cursor leaves the field.

Maximum: One. **Field Installation:** Yes. **Prerequisites:** #3623, #3905 and either **#9491** or **#9492**. If APL is used, 87-key APL Typewriter Keyboard (#4626), is required. If keyboard selectable highlighting is desired, 87-key keyboards (#4626, #4627, #4640 or #4670) are required.

Enhanced Function With Magnetics (#3626): Provides the function of the Enhanced Function Feature (#3624) with the addition of the ability to read via a magnetic slot reader, dual entry magnetic slot reader or magnetic hand scanner, magnetically encoded information from alphameric character set. **Maximum:** One. **Field Installation:** Yes.

8775 Display Terminal (cont'd)

Prerequisites: #3905, #3623 and either **#9491** or **#9492**. If APL is used, 87-key APL typewriter keyboard (#4626) is required. If Keyboard selectable highlighting is desired 87-key keyboards (#4626, #4627, #4640 or #4670) is required.

Feature Adapter (#3905): Provides the logic necessary to perform Enhanced Function, Enhanced Function with Magnetics, or to execute IDTF. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3624 and/or #3626 and/or **#9600**.

Monocase Switch (#4944): Provides the choice to display either uppercase characters only or both uppercase and lowercase characters. **Maximum:** One. **Field Installation:** Yes.

Magnetic Reader Control (#4999): Provides the capability of attaching a Magnetic Slot Reader, Dual Entry Magnetic Slot Reader or Magnetic Hand Scanner, which reads encoded information from a magnetic stripe. **Maximum:** One. **Field Installation:** Yes.

Multiple Partitions And Scrolling (#5110): Multiple partitions provides the ability to display data in up to eight user defined rectangular partitions and for the host or user to interact individually with data within each partition. Scrolling provides the ability with any designated partition for user interaction with data record longer than provided for by the physical size of the visible portion of that partition. The operator controls the movement of data either up or down through the use of Scrolling control keys located on the keyboard. An additional scrolling buffer of a maximum of 58 lines of 80 characters wide (4640 characters) is provided. The actual scrolling capability is dependent upon screen/partition configuration. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3623 and either **#9491** or **#9492**.

Printer Adapter (#5580): This adapter provides an interface which enables one of the following printers to be attached: 5210 mdls G01, G02 and 3230 mdl 2, 3262 mdl 13, 3268 mdl 2, 3287 mdls 1, 2, 1C and 2C, 7436 mdl 1. The user has the following print facilities. Local Copy printing in which a copy of the screen contents is printed on the attached printer, this can be initiated either by the operator or the host. Bulk printing controlled by the host processor or the use of both local copy and bulk printing in shared mode. **Limitations:** Cannot be installed with #3624, #3626, #5110 or **#9600**. **Maximum:** One. **Field Installation:** No.

Programmed Symbols (PS) (#5781, #5782): When used with Enhanced Function (#3624), or Enhanced Function with Magnetics (#3626), these features provide the storage and accessing of up to six 190 symbol sets whose shapes and codes are customer definable. Symbol sets are loaded under program control and accessed for display through programming or by an operator from the display keyboard. The number of symbols in any one set that can be accessed from the display keyboard is equal to the number of characters in the base character set which is 94 plus space.

PS-2 (#5781) provides PS control and two 190 symbol sets. **Prerequisites:** #3624 and/or #3626.

PS-4 (#5782) provides PS control and four 190 symbol sets. **Prerequisites:** #5781.

When used with **#9600** it provides the additional storage required by IDTF licensed program for text characters and control symbols. **Maximum:** One of each. **Field Installation:** Yes. **Prerequisites:** If display operator access to PS is required, select one of the following keyboards: 87-key EBCDIC typewriter overlay (#4640) .

Security Keylock (#6340): A lock and key which prevents modification or display of data in the display terminal when in the "off" position. **Maximum:** One. **Field Installation:** Not recommended.

Selector Light-Pen (#6350): A hand-held, pen-like device which permits the operator to select fields of data from a display for input into the host system. The Selector Light-Pen, while not being used, can be placed in a recess of the keyboard which is used for user's incidental items. Selector Pen (and Cursor Select) operations include a new designator character "&". When this designator is used, the Read Modified operation results in the return of both the addresses and the data of all modified fields on the screen. **Maximum:** One. **Field Installation:** Yes.

Keyboards:

Refer to Type Catalog, for a picture of the keyboard layouts.

Contact IBM for RPQ keyboard descriptions.

75-Key Typewriter Keyboard (#4621): Typewriter-like layout, movable, with 49 data keys and 26 control keys. 12 PF keys are included in the top row of data keys through use of an alternate shift key. **Prerequisites: #9082.**

75-Key Data Entry Keyboard (#4622): Movable with 35 data keys, 10 PF keys and 30 control keys. **Prerequisites: #9082.**

75-Key Data Entry Keyboard (#4623): Keypunch layout, movable, with 35 data keys, 10 PF keys and 30 control keys. This is the recommended keyboard for high volume data entry. **Prerequisites: #9082.**

87-Key EBCDIC Typewriter/APL Keyboard (#4626): 87-key EBCDIC typewriter keyboard (ref #4627) with modified keytops to allow entry of 81 APL specific characters in addition to the 94-character EBCDIC set. An APL On/Off key controls whether the keyboard is in basic EBCDIC typewriter or APL mode. In contrast to the 87-key EBCDIC typewriter keyboard without APL (see #4627), this keyboard has only 12 PF keys (PF1 through PF12) which are the group of twelve keys to the right of the main keyboard area. **Prerequisites:** #3624, #3626 **#9082.**

87-Key EBCDIC Typewriter Keyboard (#4627): Typewriter-like layout, movable, with 49 alphameric data keys, 26 control keys and 12 PF keys (24 total PF keys). 12 of the PF keys are included in the top row of the data keys through the use of an alternate shift key. **Prerequisites: #9082.**

87-Key EBCDIC Typewriter Overlay Keyboard (#4640): This keyboard without an overlay has the same layout and can be used in the same way as the 87-key EBCDIC Typewriter Keyboard (#4627) with the 94-character EBCDIC character set. This keyboard, however, has special narrow keytops which permit the use of customer annotated overlays. These overlays are used to show the symbols associated with the keys when one of the Programmed Symbols (PS-A through PS-F) is selected. The desired PS can be selected by the operator through use of the appropriate PF keys in upper case and alternate shift on this keyboard. **Prerequisite: #9082 .**

Note: Two keyboard overlays are supplied with each keyboard. Additional overlays may be obtained via MES, see "Accessories".

87-Key EBCDIC Typewriter/Text Entry And Edit Keyboard (#4670): Provides all the character and function keys of an 87-key EBCDIC Typewriter Keyboard with additions for entry and edit of text. The group of 12 PF keys to the right of the main keyboard area has special narrow keytops to accommodate an IBM supplied reversible annotated overlay. One side of the overlay indicates the function key assignments when an 8775 is being used for text applications. The other side of the overlay indicates the function key assignments for data applications. These data assignments are the same as those of the 87-key EBCDIC Typewriter Keyboard (#4627). The keyboard also allows entry of additional graphics and text control characters including the characters available on the IBM 3732 Text Display Station. A different color keytop marking is used to highlight those graphics, symbols, and controls that are only active when the IDTF licensed program is downstream-loaded and the display terminal is in text state. The keyboard does not provide the ability to enter APL characters. **Prerequisites: #9082 Note:** One keyboard overlay is supplied with each keyboard. Additional overlays can be obtained via MES, see Accessories.

All Keyboards, Limitations: Keyboards used on 3275, 3276, 3277, 3278 or 3279 machines are not interchangeable with keyboards used on 8775 machines. **Maximum:** One of each of the above. **Field Installation:** Yes. A 0.9 meter (3 foot) keyboard cable is standard. Specify **#9399** if 1.8 meter (6 foot) cable is required. **Prerequisites: #9082.**

Keyboard Numeric Lock (#4690): Provides the ability to lock the keyboard, if a non-numeric key (other than 0-9, minus, decimal sign, or dup) is depressed in a pre-defined numeric-only field. **Maximum:** One. **Field Installation:** Yes.

Attachment Features:

Each 8775 mdl 1 or 2 must be equipped with a loop adapter which provides the capability to attach to a direct or data link attached loop of the 4331 Processor or the 8100 System.

Loop Adapter (#4850): Provides the capability to attach to a direct-or data link-attached loop of a 4331 Processor or the 8100 System. Direct loop may operate at a data rate of 38.4K bps or 9600 bps. The data link-attached loop operates at a data rate of 2400, 4800 or 9600 bps. The Loop Adapter operating data rate of 2400, 4800, 9600 or 38.4K bps is specified by the customer at order time. Half-speed operation of the 8775 can be selected by the operator. Data link attached loops are connected to a 4331 Processor and to an 8100 processor via a 3843 Loop Control Unit. **Specify:** On initial order or by change by service representative.

#9829 for 38.4K bps
#9825 for 9600 bps
#9823 for 4800 bps
#9822 for 2400 bps

The data rate of a loop cannot be higher than that of the slowest device attached to the loop. Consideration should be given to attaching devices slower than the 8775 on a separate loop when the maximum data rate of the 8775 is required. **Maximum:** One.

Telecommunications

Each 8775 mdl 11 or 12 must be equipped with one of the following communication features. External modem interface (#3701), CCITT V35 interface (#1550), DDS Adapter (#5650 or #5651), X.21 Adapter (#5655) or 1200 bps integrated modem (#5500).

8775 Display Terminal (cont'd)

CCITT V35 Interface (#1550): (8100 attached only) Provides a CCITT V35 interface for direct connection up to 1000 feet operating without a modem. Speeds of 600, 1200, 2400, 4800 and 9600 bps are supported. Business Machine Clocking (#1488) is not required. **Limitations:** Cannot be installed with #4850, #3701, #5500, #5650, #5651 or #5655. **Maximum:** One. **Field Installation:** Yes on mdls 11 and 12.

External Modem Interface (#3701): Provides EIA RS-232C interface and appropriate code to attach either an external IBM modem or PTT mandatory modem. Refer to M2700 pages. Other external non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Bulletin. Provides interface to Data Service Unit for attachment to AT&T Dataphone* Digital Service. Supports speeds of 600, 1200, 2000, 2400, 4800, 7200 and 9600 bps over nonswitched and switched facilities. Also supports direct connection to 8100 Information System or 4331 Processor. **Limitations:** Cannot be installed with: #4850, #1550, #5650, #5651, #5500 or #5655. Business Machine Clocking (#1488) required for those modems which do not provide their own clocking. **Maximum:** One. **Field Installation:** Yes on mdls 11 and 12. **Specify: #9493** for operation on public switched network (not available with **#9221, #9222**) or **#9494** for operation on nonswitched communication facilities.

IBM 1200 bps Integrated Modem (#5500): Provides an integrated modem at speeds of 1200/600 bps for operation over nonswitched communication facilities. No external modem is required. **Limitations:** Cannot be installed with #3701, #4850, #1550, #5650, #5651 or #5655. **Maximum:** One. **Field Installation:** Yes on mdls 11 and 12. **Prerequisites:** #1488. **Specify: #9651** for use with 4-wire facility or **#9652** for use with 2-wire facility.

DDS Adapter (#5650, #5651): [#5650 for point-to-point operation, #5651 for multipoint tributary operation] An adapter for SDLC data transmission at speeds of 2400, 4800 or 9600 bps over the AT&T nonswitched Dataphone* Digital Service network. The DDS Adapter interfaces to a DDS channel service unit, the customer site termination of the DDS network. Specify **#9822** for 2400 bps, **#9823** for 4800 bps or **#9825** for 9600 bps. **Limitations:** Cannot be installed with #4850, #3701, #5500, #5655 or #1550. **Maximum:** One #5650 or #5651. **Field Installation:** Yes on mdls 11 and 12.

* Trade Mark of American Telephone & Telegraph.

X.21 Adapter For Nonswitched Networks (#5655): Provides an interface and cable for attachment to the X.21 non switched Data Circuit-Terminating Equipment (DCE) complying with CCITT recommendation X.21. See specify for length of communication cable supplied. SDLC transmission at speeds of 2400 bps **#9822**, 4800 bps **#9823** and 9600 bps **#9825** are supported. **Limitation:** Cannot be installed with #1550, #3701, #4850, #5500, #5650 or #5651. **Maximum:** One. **Field installation:** Yes on Mdls 11 and 12.

MODEL CONVERSIONS

Model changes from 1 to 2 and 11 to 12 are field installable.

ACCESSORIES

The following items are available on a purchase-only basis. Order the feature number as shown below .

BATTERY, MERCURY:

Provides power to maintain the customer set up information while the terminal is powered off.

A 4.14 volt mercury battery: This supply item has a shelf life of one year under normal conditions, and can be expected to provide 3.5 years of normal service. Additional or replacement batteries can be ordered from IBM.

Discharged batteries should be returned to IBM for disposal. Return information is printed on the label of the battery.

Mercury Battery: P/N 1743456.

DISPLAY STATION KEYBOARD ACCESSORIES

The following keyboard accessories allow customers to define and change the messages on single position keytops of the 8775 Display Station keyboard. These accessories supply keytops only and do not change any characters or functions of the display station. The accessories consist of legendable keytops, blank keytops for customer engraving and a keytop extractor.

These accessories may be ordered from IBM.

Legendable Keytop: The legendable keytop consists of two parts: a molded key base and a clear plastic cover. The user may define unique keytop messages by writing on a piece of paper, affixing the paper to the keytop base and sliding on the clear plastic cover. The keytop is available in three colors and with top keyboard row contour only. (Example: Clear Key)

Legendable Keytops	Part No.
White	**5188775**
Charcoal Gray	**8627192**
Light Gray	**8542831**

Blank Keytop: The blank keytop is for a customer to engrave with desired nomenclature. The keytop comes in three colors and is available with top keyboard row contour only. (Example: Clear Key)

Blank Keytops:	Part No.
White	**1853775**
Charcoal Gray	**1853567**
Light Gray	**1853563**

Keytop Extractor: The keytop extractor is a small tweezer-like device which fits between the keytops. With a firm squeezing grip on a keytop, the keytop can be pulled of its stem. The customers should use the extractor whenever a keytop is to be removed from a keyboard.

Keytop Extractor: P/N 9900373.

Keyboard Overlay: A keyboard overlay is available on which customer-defined Programmed Symbols can be annotated. An annotated overlay can be placed over the narrow keytops of Overlay keyboards to associate specific keytops with specific symbols.

Keyboard Overlay: P/N 1742762.

A Keyboard overlay is available for the 87-key EBCDIC Typewriter/Text Entry and Edit Keyboard #4670. The overlay is reversible and is annotated on both sides. Additional overlays are available by ordering P/N 4422226.

DISPLAY STATION TILT/ROTATE ACCESSORY

An accessory which fits under the display station and provides a ball and socket type movement to allow the angle of the screen face to be adjusted for comfort of viewing position. The screen angle is normally 20 degrees from the vertical but with this device it can be adjusted between 25 degrees to the vertical and the vertical position. A locking device is provided to maintain the selected position.

This accessory also allows the display station to be rotated plus or minus 90 degrees from the central position and this movement is independent of the tilt movement.

Interested customers may order from IBM directly. Call toll free at 800-631-5582; in Alaska and Hawaii, call 800-526-2484. For further information, contact an SSD sales representative.

Warranty: The Tilt Rotate accessory is warranted free from defects in workmanship and materials for 90 days.

Maintenance: There is no regularly scheduled preventive maintenance recommended by IBM, and IBM Maintenance Agreements are not available.

Customer Responsibility: The customer is responsible for mounting the Display Station on this accessory.

Tilt/Rotary Accessory: P/N 4422265.

KEYS

Keys P/N (4420756): The 8775 with the Setup Keylock (#1009) special feature is shipped with two keys. Additional keys may be purchased only from IBM. Vendor will supply additional keys only to original purchaser.

The 8775 Security Keylock (#6340) special feature is shipped with two keys. Additional keys may be purchased only from IBM, (**P/N 4420756**). Vendor will supply additional keys only to original purchaser.

MAGNETIC HAND SCANNER

The Magnetic Hand Scanner (MHS) attaches by a 1.5 meter coiled cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. It allows the user to read magnetic stripe labels that are attached to shelves, cartons, machines, etc. It can also be used to read magnetic stripe tags which are hand-held or placed on a flat surface. See appropriate unit for prerequisites and possible limitations.

The MHS has three lights and an audible buzzer which provide feedback to the user on the status of the scanned data. With proper encoding the MHS can read a stripe in either direction. **Field Installation:** Yes. **Prerequisites:** #4999.

Ordering Instructions: See IBM.

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Scanners will be done by the customer following the problem determination and part replacement procedures.

8775 Display Terminal (cont'd)

The following are a recommended number of spare scanners which the customer may want to consider stocking ... for 50 scanners, 2 spares ... for 100, 3 ... for 150, 4 ... for 200, 5.

Warranty: The Magnetic Scanner Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service will be performed at the FE Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form (GZ27-2981), pack, and mail it and the defective Magnetic Hand Scanner to:

IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance will be done by the customer, following the problem determination and parts replacement procedures.

Optionally, the customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

Magnetic Hand Scanner: P/N 4123495 or feature **#9440**

MAGNETIC SLOT READER
MAGNETIC SLOT READER, DUAL ENTRY

The Magnetic Slot Reader (MSR) and Dual Entry Magnetic Slot Reader (DEMSR) attach by a 1.5 meter cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. These slot readers accommodate a wide range (height and length) of magnetic striped card stock and plastic badges including: Magnetic striped 80-column cards, operator identification badges, large and small credit cards, etc.

The MSR and DEMSR have three lights and an audible buzzer which provide feedback to the user on the status of scanned data. Holes in the bottom of the MSR allow optional attachment to an appropriate flat surface. The MSR has a wide opening on one end to facilitate reading of badges or documents. The DEMSR has wide openings on both ends to facilitate reading in either direction. **Field Installation:** Yes. **Prerequisites:** #4999.

Ordering Instructions: See IBM.

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking ... for 50 readers, 2 spares ... for 100, 3 ... for 150, 4 ... for 200, 5.

Warranty: The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service will be performed at the FE Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form (GZ27-2981), pack, and mail it and the defective Magnetic Hand Scanner to:

IBM Corporation
Repair Center
321 Route 17
Paramus, NJ 07652

There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance will be done by the customer, following the problem determination and parts replacement procedures.

Optionally, the customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

Magnetic Slot Reader: P/N 4123500 or feature code **#9441.**

Dual Entry Magnetic Slot Reader: P/N 4123520 or feature code **#9442.**

Note: The MHS, DEMSR and the MSR read magnetically encoded information from an alphanumeric character set. The MSR also reads the same 10 character numeric only set as the 3277 operator identification card reader which is not a subset of the alphanumeric character set. For further description of both character sets, see *IBM 8775 Display Terminal Character Set*, GA33-3041. The alphanumeric character set can only be read if the Enhanced Function (#3626) is installed. **Limitation:** The 3277 like character set numeric only magnetic cards coded with alternate end of message character (hexadecimal "C") cannot be read by MSR, DEMSR or MHS. The MSR, DEMSR or MHS cannot be used to logon to a SNA network.

A variety of magnetic documents, tags and labels which the MSR, DEMSR and MHS can read, may be optained from IRD. Some, depending on length, can be encoded by devices such as the 3642 Encoder Printer. For complete information on the availability of pre-encoded striped plastic cards contact an IRD sales representative.

The following cable assemblies can be used to extend the Magnetic Slot Reader or Magnetic Hand Scanner distances. **Limitation:** Extension cables cannot be plugged into other extension cables. **Prerequisites:** Feature #4999.

Description	Feature/P/N
6 meter (19.7 ft.)	**#9106, P/N 4832986**
12 meter (39.4 ft.)	**#9107, P/N 4832987**

The *MSR Customer Service Manual*, GA24-3663, should be ordered.

SUPPLIES (None)