



Data Processing Division
112 East Post Road
White Plains, New York 10601

WH 9-1900 (Code 914)

August 11, 1965

International Business Machines Corporation

Memorandum to: Recipients of Drafting System - 1620-CX-04X

Subject: Drafting System
1620-CX-04X
Version 1, Modification Level 0

The subject program is being forwarded to you with this memorandum.
Basic program material consists of:

Application Directory (attached)
Application Description H20-0078-1
Programmer's Manual H20-0183-0
Operator's Manual H20-0184-0
System Manual

Object card decks. Refer to card deck key for further description.

Sample problem card decks. Refer to card deck key for further description.

Optional program material consists of:

Source card decks. Refer to card
deck key for further description.

Any discrepancy between the material received and the material ordered,
or any errors in card reproduction should be reported to the Manager of
DP Program Information, IBM Corporation, 112 East Post Road,
White Plains, New York.

DP PROGRAM INFORMATION DEPARTMENT

Encls.

1620 Drafting System (1620-CX-04X)

Application Directory

This program can be used by any industry to produce a drawing as computer output. The program is designed particularly to produce mechanical detail drawings from language statement input.

The Application Directory contains information concerning all available material associated with the 1620 Drafting System. Its objective is to enable the recipient to understand what he has received, where to locate specific items, and what to do with them.

DOCUMENTATION DIRECTORY

Application Description (H20-0078-1) — contains sufficient information to enable the reader to determine whether the application would be useful to him. The Application Description includes:

- Application Abstract
- The Drafting Language
- General Description of Application
- Machine and Systems Configuration
- General Systems Chart of Application
- List of Input/Output Files
- Sample Problem
- Appendix — Language Summary

Programmer's Manual (H20-0183-0) — contains sufficient information for the reader to understand the language of the 1620 Drafting System. The Programmer's Manual includes:

- Introduction
- Format of the Language
- Geometric Statements
- Arithmetic Statements
- Drawing Statements
- Control Statements
- Programming Examples
- Diagnostics
- Dictionary

Operator's Manual (H20-0184-0) — contains information regarding actual console operations, including setup procedures and control card formats for the 1620 Drafting System. The Operator's Manual includes:

- Program Setup
- Console Operating Instructions
- Halts and Message Listing
- Storage Maps
- Restart Procedures
- Macro Library Procedures
- Console Switch Summary

System Manual — presents a detailed description of the processors of the 1620 Drafting System. Should the user desire to modify the system, he would need this manual. The System Manual includes:

Total System Description
 Phase One — The Compiler
 Phase Two — The Part Processor
 Phase Three — The Drafting Processor
 Flowcharts
 Listings

REFERENCE MATERIAL

IBM 1627 Plotter Manual (A26-5710-0) — explains the operation of the plotter and is a prerequisite for the person who operates the computer for the 1620 Drafting System programs. For the person who writes such programs, information in the manual might also prove useful, though not essential.

IBM 1620 Monitor 1 Reference Manual (C26-5739-2) — explains the operation of the 1620 Monitor and contains information needed by the person who operates the computer for 1620 Drafting System programs. This manual is needed also by the systems analyst who desires to modify the processors of the 1620 Drafting System.

DECK KEY

BASIC PROGRAM MATERIAL — OBJECT DECKS

Sequence numbers appear in card columns 76-80. Control cards do not have sequence numbers.

Each deck is preceded by two 1620 Monitor control cards. The first control card calls the Disk Utility Program; the second is a *DLOAD control card for the object deck. These cards are not included in the counts shown below.

The entire set of cards listed below is preceded by a single JOB control card and is followed by a single-end -of-job control card.

<u>Deck Number</u>	<u>Program Dim Number</u>	<u>Number of Cards</u>
1	0810	150
2	0811	70
3	0812	74
4	0813	20
5	0814	24
6	0818	2

<u>Deck Number</u>	<u>Program Dim Number</u>	<u>Number of Cards</u>
7	0819	10
8	0838	13
9	0839	9
10	0820	16
11	0821	10
12	0822	149
13	0823	20
14	0824	37
15	0825	34
16	0826	30
17	0827	11
18	0828	36
19	0829	30
20	0830	16
21	0831	32
22	0832	35
23	0833	38
24	0834	13
25	0835	40
26	0848	37
27	0849	24
28	0840	74
29	0841	8
30	0850	180
31	0860	188
32	0861	42
33	0870	65
34	0871	23
35	0872	53
36	0873	64

CONTROL CARD DECKS FOR CONVERSION TO CORE IMAGE

The three control card decks listed below contain the necessary data to convert the three subprograms which use floating-point subroutines into core image format. None of the cards have sequence numbers.

<u>Deck Number</u>	<u>Associated Dim Number</u>	<u>Number of Cards</u>
37	0841	8
38	0821	9
39	0820	9

SAMPLE PROBLEM DECK

Deck number 40 is the sample problem deck. It contains two unnumbered control cards followed by 73 source statement cards numbered from 01 to 73 in card columns 79 and 80.

OPTIONAL PROGRAM MATERIAL — SOURCE DECKS

The source decks have sequence numbers in card columns 1-5. Card columns 77-80 contain the four-digit dim number for the program.

<u>Deck Number</u>	<u>Dim Number</u>	<u>Card Count*</u>
1	0810	1455
2	0811	559
3	0812	576
4	0813	147
5	0814	166
6	0818	7
7	0819	57
8	0838	97
9	0839	57
10	0820	80
11	0821	30
12	0822	1078
13	0823	154
14	0824	209
15	0825	235
16	0826	193
17	0827	95
18	0828	298
19	0829	218
20	0830	121
21	0831	297
22	0832	225
23	0833	278

* Approximate

<u>Deck Number</u>	<u>Dim Number</u>	<u>Card Count*</u>
24	0834	112
25	0835	245
26	0848	226
27	0849	167
28	0840	568
29	0841	13
30	8050	1469
31	8060	1117
32	0861	272
33	0870	400
34	0871	204
35	0872	352
36	0873	375

PREPARATORY SYSTEMS PROCEDURES

LOADING THE PROGRAM DECKS

The entire set of object cards comprising the 1620 Drafting System can be loaded onto a disk pack in one 1620 Monitor job. Each object deck has two control cards preceding it — a DUP card and a DLOAD control card. The operator who loads this system onto a disk pack should be familiar with the operating procedures for the 1620 Monitor System (see Monitor I System Reference Manual, C26-5739-2).

The 1620 Drafting System uses dim numbers 0810 through 0879. These numbers, to be used for the drafting programs, must be unassigned in the 1620 Monitor System.

To load the object decks, execute the following two steps:

1. Mount a disk pack with a 1620 Monitor System on it, and load the monitor into core; ready the system for the reading of a JOB card.
2. Place the complete set of object decks into the card reader, and push READER START.

The first card is a JOB card. After this card are all of the program decks listed in the section titled "Basic Program Material — Object Decks". Each object program deck is preceded by a DUP and a DLOAD card. As each deck is loaded onto the disk, the 1620 Monitor types out a message indicating the

* Approximate

the loading of that program. The final card in the deck is an end-of-job card. When this card has been read, the 1620 Monitor types out an end-of-job message; the loading process is complete.

The object program deck do not have to be loaded all at once. They can be loaded independently, in any sequence, as long as the control cards for each deck are kept in front of the deck when it is loaded.

CONVERTING SUBROUTINES TO CORE IMAGE

The 1620 Monitor normally does not store floating-point subroutines with a program. The subroutines are stored in a separate disk storage area and brought from there into core when needed by a program. The system design of the 1620 Drafting System makes it necessary to alter that procedure and to store the subroutines with the programs, in core image format. All of the floating-point subroutines used by the 1620 Drafting System are contained in three programs — dim numbers 0820, 0821, and 0841. Each of these three programs has a separate procedure for conversion to core image. In general, the procedure for each is (1) execute the program, so that it will be put into core storage along with its needed subroutines, (2) write the program out onto the 1620 Monitor's work cylinders, and (3) execute a Disk Utility Program procedure to reload the program in core image.

A set of control cards is provided for each dim number's conversion. These cards are listed in the section titled "Control Card Decks for Conversion to Core Image". The data in these cards is compatible with (1) a 1620 Monitor System which has work cylinders beginning at disk sector 100000, and (2) a 1620 which is not equipped with the automatic floating-point feature. New cards must be created for systems which deviate from these standards; such cards are explained in the sections which follow.

Dim Number 0841

To convert the program numbered 0841 into core image format, execute the following steps:

1. Prepare the two cards shown below. Ready the 1620 Monitor to read a JOB card; place the two cards in the reader; push READER START.

	Cols. 1-6	13-16	31-35
Card 1	## JOB		
Card 2	## XEQS	0841	01008

These two cards cause the execution of dim number 0841, as indicated in columns 13-16 of the second card.

Columns 31 and 32 of the second card contain the SPS subroutine identification number and must be 01, as shown above, unless the machine is equipped with the automatic floating-point feature; columns 31-32 should then contain 03. Column 33 is the noise digit and should always be zero. Columns 34-35 indicate the mantissa length; it must be 08.

2. Execution of dim number 0841 causes that program to write itself out onto Monitor's work cylinders. When that is done, the monitor types out an end-of-job message and attempts to read a card for another job.
3. Prepare the six cards described below; place them in the card reader; depress READER START.

	Cols. 1-6	13-16	17-32	39-50
Card 1	≠≠ JOB			
Card 2	≠≠ DUP			
Card 3	*DELET	0841		
Card 4	≠≠ DUP			
Card 5	*DLOAD		0841100000100026	0230202402DI
Card 6	≠≠≠≠			

These six cards cause the 1620 Monitor to replace the original 0841 program with the one just written out onto the disk file. This new program is in core image format.

Dim Number 0821

Dim Number 0821 can be converted to core image by executing the following procedures:

1. Prepare the two cards shown below. Ready the 1620 Monitor to read a JOB card; place the two cards in the reader; press READER START.

	Cols. 1-6	13-16	31-35
Card 1	≠≠ JOB		
Card 2	≠≠ XEQS	0821	01008

These two cards cause the execution of dim number 0821, as indicated in columns 13-16 of the second card.

Columns 31 and 32 of the second card contain the SPS subroutine identification number and must be 01, as shown above. Column 33 is the noise digit and should always be zero. Columns 34-35 indicate the mantissa length; it must be 08.

2. After the program has been loaded, the computer comes to a halt. When that happens, press computer RESET.
3. Place into the card reader a card punched with the following data; then push the LOAD button.

Data in columns 1-46: 3400032007013800032007024900796010000003902290

This card contains instructions which write 39 sectors of program from core storage onto the disk, beginning at disk address 100000, which is the normal beginning address for the 1620 Monitor's work cylinders. If these cylinders have been reassigned, enter the new address of the first sector into columns 33-38.

4. Prepare the six cards described below; place them in the card reader; push READER START.

	Cols. 1-6	13-16	17-32	39-50
Card 1	## JOB			
Card 2	## DUP			
Card 3	*DELET	0821		
Card 4	## DUP			
Card 5	*DLOAD		0821100000100038	0229002664DI
Card 6	####			

These six cards cause dim number 0821 to be replaced by the core image version of the program that was written onto the work cylinders.

Dim Number 0820

Perform the following steps to convert dim number 0820 to core image:

1. Prepare the two cards shown below. Ready the 1620 Monitor to read a JOB card; place the two cards in the reader; press READER START.

	Cols. 1-6	13-16	31-35
Card 1	≠ ≠ JOB		
Card 2	≠ ≠ XEQS	0820	01008

These two cards cause the execution of dim number 0820, as indicated in columns 13-16 of the second card.

Columns 31 and 32 of the second cards contain the SPS subroutine identification number and must be 01, as shown above, unless the machine is equipped with the automatic floating-point feature; columns 31-32 should then contain 03. Column 33 is the noise digit and should always be zero. Columns 34-35 indicate the mantissa length; it must be 08.

2. After the program has been loaded, the computer comes to a halt. When that happens, press computer RESET.
3. Place into the card reader a card punched with the following data; then push the LOAD button.

Data in columns 1-46: 3400032007013800032007024900796010000003902290

This card contains instructions that write 39 sectors of program from core storage onto the disk, beginning at disk address 100000, which is the normal beginning address for the 1620 Monitor's work cylinders. If these cylinders have been reassigned, enter the new address of the first sector into columns 33-38.

4. Prepare the six cards described below; place them in the card reader; push READER START.

	Cols. 1-6	13-16	17-32	39-50
Card 1	≠ ≠ JOB			
Card 2	≠ ≠ DUP			
Card 3	*DELET	0820		

	Cols. 1-6	13-16	17-32	39-50
Card 4	≠ ≠	DUP		
Card 5	*DLOAD		0820100000100038	0229002938DI
Card 6	≠ ≠ ≠ ≠			

These six cards cause dim number 0820 to be replaced by the core image version of the program that was written onto the work cylinders.

EXECUTING THE SAMPLE PROBLEM

The sample program deck contains a JOB card, an XEQ card, and the set of language statements necessary to perform the drawing. After the 1620 Drafting System has been loaded and the three programs converted to core image, the sample problem can be run. Follow these steps:

1. Mount the disk pack containing the 1620 Drafting System; call the 1620 Monitor into core; ready the system to read a JOB card.
2. Turn all program switches off.
3. Place the pen of the 1627 Plotter at the far right position.
4. Put the sample problem deck into the card reader; push READER START.
5. The 1620 Drafting System reads and processes the cards. To process the last two cards of the deck, it is necessary to depress READER START. After all of the cards have been read, the following two messages are typed:

M0199

M0299

After the second message is typed, the plotter begins to produce the sample drawing. When the drawing is finished, a third message is typed:

M0399

6. Processing is now complete, and the 1620 Monitor is called to end the job. Remove the drawing from the 1627 Plotter.

MACRO LIBRARY INITIALIZATION

Before any macros in the 1620 Drafting System can be defined or used, the macro library for the system must be initialized. The procedures for this initialization are contained in the Operator's Manual (see section titled "Initializing the Macro Library").

PROGRAMMING SYSTEMS

IBM 1620 Monitor I (1620-PR-025), Version I Level 9. Monitor dim numbers 0810 to 0879 are used by the Drafting Processor.

MACHINE CONFIGURATION

IBM 1620 Data Processing System 20K, Model 2
1622 Card Read Punch and Card Read Punch Adapter
1311 Disk Storage Drive, Model 3, and Disk Storage Drive Adapter
Paper Tape Adapter
1627 Plotter with Plotter Control

Or:

IBM 1620 Data Processing System, 20K, Model 1
Additional Instructions (TNS, TNF, MF)
Automatic Divide
Indirect Addressing
1622 Card Read Punch and Card Read Punch Adapter
1311 Disk Storage Drive, Model 3, and Disk Storage Drive Adapter
Paper Tape Adapter
1627 Plotter with Plotter Control

STATEMENT OF MAINTENANCE PROCEDURES

This program will be maintained through the use of serially numbered modification letters. Any unmodified system is considered to be modification level 0. Each subsequent modification raises the modification level by 1. The initial availability of this program is version 1, modification level 0. Should the nature or number of changes make a reassembly necessary, a new version will be distributed. Each reassembly raises the version number by 1; modification letters to a new version begin at 1.

Modification letters will be mailed to all previous recipients of the program. All modification letters will be supplied with the program. The change or alter cards will be included in the appropriate deck(s) to reflect the latest changes.

An Authorized Programming Analysis Report (APAR) should be submitted through your local IBM System Engineer to report any difficulties encountered in the use of this system. The APAR should be addressed to APAR Processing, IBM Application Programming Standards, 112 East Post Road, White Plains, New York.