



**CDC[®] 790 ICEM WORKSTATION
COMMUNICATIONS INTERFACES**

INSTALLATION AND MAINTENANCE MANUAL

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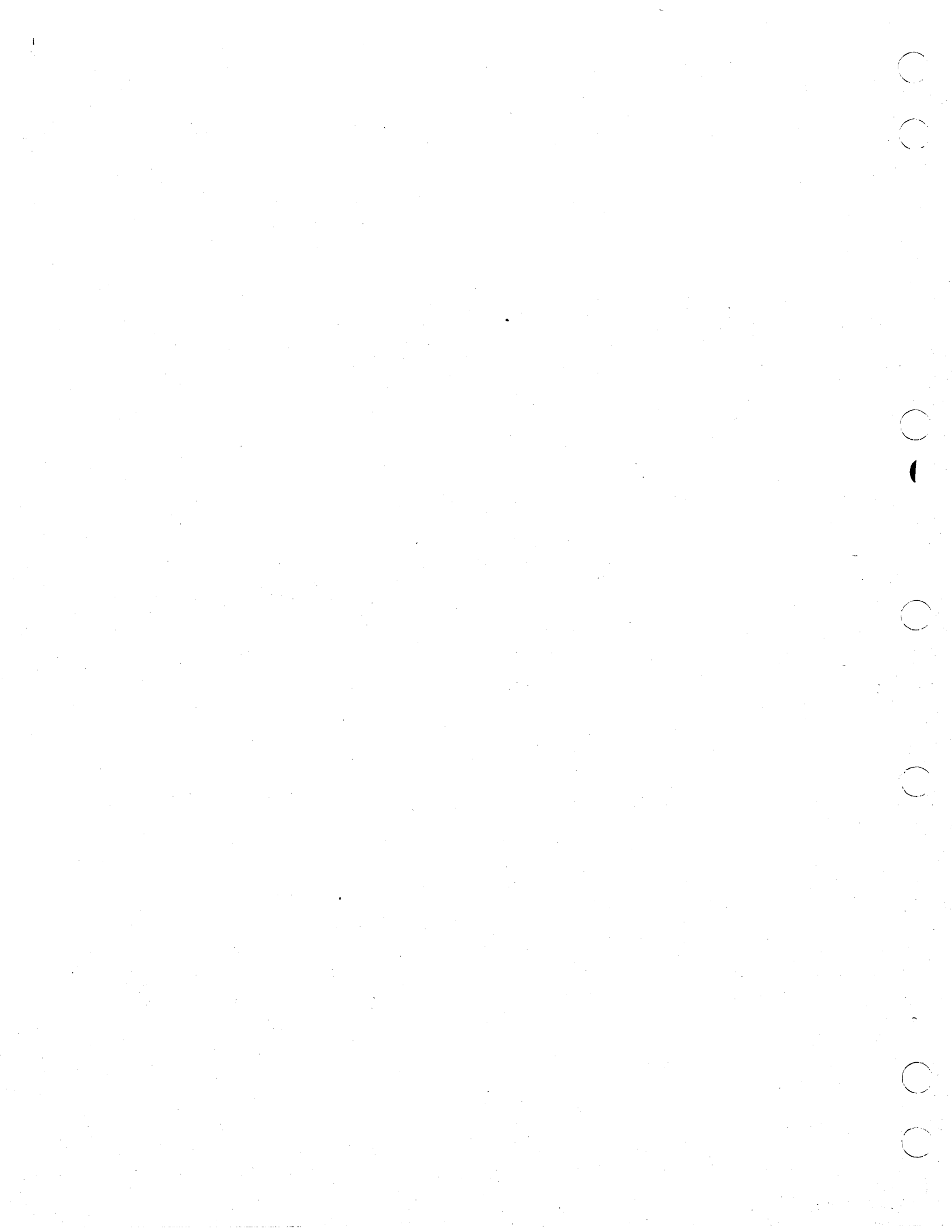
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PREFACE

This manual provides installation and maintenance information on the communication interfaces of the CDC® 790-20 Integrated Computer-Aided Engineering and Manufacturing (ICEM) Ergonomic Workstation. This manual is a companion to the CDC ICEM Ergonomic Workstation Hardware Maintenance Manual (publication number 62950149), which covers the installation and performance of self-tests for the workstation. This manual covers the items needed to connect the workstation to its host computer, which may be a CDC CYBER 120, CYBER 170, or CYBER 180 Computer. Essentially, this information picks up where the other manual leaves off and should be used after completing the installation procedures provided in that manual.

This manual is addressed to the CDC customer engineer and systems analyst who will install the communication interfaces to the host computer. A Data General customer engineer may also participate in an installation involving a CYBER 120 computer. Some material is covered in a broad, rather than specific, way because of the unique requirements of every installation.

Where specific information is not given and software support or help determining whether you have a software problem is required, call ACS (Applications Central Support) at:

1-800-227-9999

or

In Minnesota, 1-612-639-4040

or

CONTROLNET 239-4040

MANUAL ORGANIZATION

The material in this manual is arranged in a logical sequence that anticipates your needs. If you go directly to desired information, you may find that you need additional information previously given. This manual is a single volume containing the following chapters and appendices:

- Section 1. Introduction - Safety notices; 790 TEKEM software; changing parameters; other parameters; and network maps.

- Section 2. RS-232-C Interface - General description; tools; CYBER 170/CYBER 180 interface; CYBER 120 interface; and maintenance.
- Section 3. DCSL Interface - General description; tools; unpacking; installation; operations; and maintenance.
- Section 4. Diagnostic Procedures - How to use SAMs; and the SAMs themselves.
- Appendix A. Cable Pin Assignments - Pin assignment diagrams for RS-232-C interface cables.
- Appendix B. Part Numbers - Part numbers of field-replacable units of the RS-232-C interface and the DCSL interface; and suggested vendors and part numbers for customer-supplied DCSL main trunk cable parts.

COMMENT SHEET

Enter any comments, suggestions, or complaints about this manual on the Comment Sheet provided on the last page of the manual. Please include page, paragraph, figure, or table number as applicable. If you are submitting a technical comment, also submit a Technical Action Request (TAR). Mail in the form using the preprinted address and postage on the back side of the Comment Sheet.

RELATED DOCUMENTS

The CDC ICEM Ergonomic Workstation Hardware Maintenance Manual (publication number 62950149) provides a list of CDC maintenance manuals associated with the workstation. A listing of user manuals associated with the 790 workstation is provided in the 790 Workstation Owner's Manual (publication number 62950150).

References are made to ICEM DDN (Design, Drafting, and Numerical Control) Software Release Bulletin (SMD document number 170315) and Installation Instructions (SMD document number 170317) that accompany CYBER 120 operating system software; to Tektronix Emulation manual (62950166) that is shipped with the workstation; and to Network Access Method, Network Definition Language (publication number 60480000). Mainframe computer manuals may have additional documentation of the RS-232-C interface.

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This manual provides installation and maintenance information on the communication interfaces of the 790 workstation. These interfaces are listed in table 1-1.

TABLE 1-1. 790 WORKSTATION COMMUNICATIONS

INTERFACE	DESCRIPTION	MAINFRAME
RS-232-C	Asynchronous serial	CYBER 120 CYBER 170 CYBER 180
RS-232-C with DCSL option	High-speed serial and RS-232-C serial	CYBER 170 CYBER 180

A DIAGNOSTIC disk and a TEKEM disk are supplied with the workstation. The DIAGNOSTIC disk is for troubleshooting the workstation. The TEKEM disk supports both RS-232-C and DCSL communications. The DIAGNOSTICS disk does not support communications.

This section provides:

- Safety notices that are to be observed throughout the manual
- Description of the 790 TEKEM parameters
- Procedure for changing TEKEM parameters
- Description of other communications parameters
- Description of making and using network maps

SAFETY NOTICES

This manual contains the following types of notices:

- **WARNING** indicates conditions that could result in personal injury or loss of life.
- **CAUTION** indicates conditions that could result in damage to equipment.
- **NOTE** indicates an important consideration that you should observe.

You should read and understand the following important safety information before installing, operating, or servicing any components of the communications interfaces.

WARNING

High voltage capable of causing death or serious injury exists when power is applied to the workstation and internal components are exposed. Be extremely cautious when servicing equipment with power applied. Never reach into the equipment unless someone who can render aid is present.

CAUTION

Only qualified maintenance technicians should service or adjust internal components.

NOTE

You must observe all cautions and warnings given in the ICEM Ergonomic Workstation Hardware Maintenance Manual when servicing the communications network.

Installation of all components in this manual must conform to local building codes to ensure fire safety.

790 TEKEM SOFTWARE

The TEKEM (Tektronix 4115 Emulator) disk causes the workstation to appear to the host as though it is a Tektronix 4115 terminal. This allows the user to run application programs that are written for the Tektronix 4115. These applications include CDC's ICEM DDN (Design, Drafting, and Numerical Control) applications, ANSYS, and PATRAN-G. (Differences between the TEKEM software and Tektronix 4115 software are explained in detail in Tektronix 4115 Emulator Notes.)

The factory-set parameters of the TEKEM disk are shown in figure 1-1. The functions of these parameters and their eligible

TERMINAL STATUS	
GENERAL	

ECHO	YES
LOCKKEYBOARD	NO
DAENABLE	YES
IGNOREDEL	NO
LFCR	NO
CRLF	NO
SAVECONFIG	NO
SCROLLING	YES
SNOOPY	NO
TABLETECHO	NO
ERRORLEVEL	2
COMMUNICATIONS	

BAUDRATE	9600 *
STOPBITS	2
PARITY	NONE
PROMPTSTRING	'? '
PROMPTMODE	NO
QUEUE SIZE	8100
FLAGGING	NONE
BYPASSCANCEL	(NL)
LOCAL/REMOTE	REMOTE **

*Applies to the RS-232-C line only

**Must be REMOTE to communicate with the host computer

Figure 1-1. Factory-Set TEKEM Parameters

parameter definitions are described in the following paragraphs. The GENERAL parameters define conventions used by the workstation. The COMMUNICATIONS parameters must conform to conventions used by the host computer for transmission to the workstation.

These parameters may be displayed and/or changed using the workstation keyboard and SETUP mode (described in Changing Parameters, later in this section). Some parameters should not be changed by the workstation operator but are changed instead by the host application program.

NOTE

If there are problems with data communications, the correct use and settings of these parameters should be verified by the CDC systems analyst.

ECHO

This parameter applies only when the workstation is in REMOTE mode. (Characters are automatically echoed to the display in LOCAL mode.) ECHO should be set to NO when the host echoes received characters back to the workstation for display (remote echo mode). When the host is in remote echo mode and this parameter is set to YES, all characters will be displayed twice. This parameter should be set to YES when the host does not operate in remote echo mode.

LOCKKEYBOARD

This parameter should be changed by the host application program only. When used, it causes the workstation's keyboard to lock temporarily to prevent data input during data transmission.

DAENABLE

When this parameter is set to NO, text (such as menus) usually displayed on the alphanumeric monitor is displayed on the graphics monitor instead. Nothing will be displayed on the alphanumeric monitor. This parameter must be changed to NO by the workstation operator before running application programs designed for 4014-class terminals.

IGNOREDEL

This parameter, YES or NO, specifies whether the workstation should ignore all delete, or rubout, characters received from the host. YES means it should ignore them.

LFCR

This parameter, when set to YES, causes the terminal to interpret a line-feed character from the host as both a line-feed and a carriage-return character string. This parameter is usually set to NO.

CRLF

This parameter, when set to YES, causes the terminal to interpret a carriage-return character from the host as both a carriage-return and a line-feed character string. This parameter is usually set to NO.

SAVECONFIG

SAVECONFIG is always set to NO except when storing new parameters permanently on the disk. See Changing Parameters, later in this section, for more detailed procedures.

When SAVECONFIG is set to NO, factory-set defaults, or the values stored permanently when SAVECONFIG was YES, are restored each time RESET SYSTEM is pressed or the workstation is powered off and on again.

SCROLLING

With this parameter set to NO, text displayed on the alphanumeric monitor scrolls forward one line at a time when the text reaches the bottom of the screen. With this parameter set to YES, pressing the F11 key scrolls the text one screen forward and pressing the F12 key scrolls the text one screen backward.

SNOOPY

When SNOOPY is set to YES, control characters (pressing CTRL and a key) are displayed as two-character codes, which are defined in the standard ASCII code chart. In SNOOPY mode, control characters are not executed but displayed only, with one exception: the carriage return character will be executed in SNOOPY mode.

When SNOOPY is set to NO, control characters are executed.

TABLETECHO

When this parameter is set to YES, an audio tone is generated each time the stylus is pressed on the tablet. When this parameter is set to NO, an audio tone is not generated.

ERRORLEVEL

This parameter controls the level of error reporting done by the workstation. The selections are 0 (allows all terminal-generated error messages to be displayed), 1 (allows warning error messages to be displayed), 2 (allows invalid parameter messages to be displayed), 3 (allows failure to execute messages to be displayed), or 4 (does not allow any type of terminal-generated error messages to be displayed).

BAUDRATE

The workstation's baud rate must match the baud rate of the communications channel (input/output, or I/O, port) to which the workstation is connected. Modems, if used, must also operate at this baud rate. The baud rate listed applies to the RS-232-C line only.

With a CYBER 170 or CYBER 180 computer, the maximum baud rate for a direct connection (without modems) is 38.4K (requires performance enhancement) and 9600 for a remote connection (with modems). With a CYBER 120 computer, the maximum baud rate is 19 200 for a direct connection and 9600 for a remote connection.

STOPBITS

The workstation attaches one or two stop bits to the end of each data byte (8 bits) to indicate the end of that byte.

PARITY

The PARITY parameter establishes what kind of parity is used by the workstation during communications to the host. PARITY may be defined to be NONE (all 8 bits are used for the data character), EVEN (parity bit is set to 0 or 1 to make the sum of bits in a byte even), or ODD (parity bit is set to 0 or 1 to make the sum of bits in a byte odd). This parameter must agree with the DATABITS parameter.

PROMPTSTRING

This parameter defines the character sequence that the host uses as a prompt string. Up to 10 ASCII characters may be entered.

PROMPTMODE

When this parameter is YES, the workstation transmits only when it receives the Prompt String from the host. When this parameter is NO, the workstation transmits without this software-generated prompt unless FLAGGING is used.

QUEUESIZE

QUEUESIZE defines the size of the workstation's input buffer and is used in conjunction with FLAGGING. The QUEUESIZE parameter is manipulated by the host application program and should not be changed by the workstation operator. During normal operations, this parameter will be significantly smaller than the factory-set default value 30 000 (decimal) and is dependent on the rate of data delivery and processing.

FLAGGING

The FLAGGING parameter defines whether control characters, electrical signals, or no indicators are used to indicate to the other device that transmission should be halted temporarily. When this parameter is INPUT, the workstation sends the host a DC3 (ASCII) when its input buffer cannot store more data; and it sends a DC1 when the input buffer is ready to accept more data.

This parameter should be NONE when the host operating system does not operate in XON/XOFF mode. However, data may be lost when the workstation must operate with a host operating system that does not run in XON/XOFF mode.

The parameters OUTPUT, IN/OUT, and DTR/CTS described in the following paragraphs provide for flagging by the host. Use of these parameters is not recommended since host flagging will likely never be needed and will cause delays in operations.

When the parameter is OUTPUT, the host sends DC3 when it cannot store any more input data and DC1 when it is ready to receive more data. When this parameter is IN/OUT, both the host and the workstation use DC3 and DC1 for ready/not ready indicators.

When this parameter is DTR/CTS (Data Terminal Ready/Clear to Send), electrical signals on the RS-232-C line are used for flagging instead of control characters. (This does not work as well in a remote connection as it does in a direct connection.) When the workstation's input buffer cannot receive more data, the workstation drops its DTR signal, raising it again when it is ready to receive more data. When the host's input buffer is too full for more data, the host drops its CTS signal, raising it again when it is ready to receive more data.

BYPASSCANCEL

This parameter defines the Bypass Mode character that is sent by the host to cause the workstation to begin recognizing characters in the data stream. This parameter is entered as a decimal number but is displayed as the ASCII equivalent enclosed in parentheses [()]. This parameter is entered by the host application program. It should not be manipulated by the workstation operator.

LOCAL/REMOTE

The LOCAL/REMOTE parameter must be set to REMOTE to have any communications with a host computer. Host communications are temporarily interrupted when in LOCAL mode. Information from the host (if any) is stored temporarily in the workstation's input buffer and processed when the workstation is returned to REMOTE mode.

CHANGING PARAMETERS

Changing the TEKEM parameters using SETUP mode is described in the following paragraphs. As described earlier in this section, some parameters should not be changed by the workstation operator, but are changed by the host application program during operations.

SETUP mode is activated by pressing the L C DELETE SETUP key located in the upper-right-hand corner of the workstation's keyboard. The key acts as a toggle switch so that pressing it once puts the workstation in SETUP mode and pressing it again takes it out of SETUP mode. Host communications are temporarily suspended during SETUP mode.

The new parameters are saved temporarily or permanently according to the setting of the SAVECONFIG parameter:

- When SAVECONFIG is NO, new parameters are saved temporarily when exiting SETUP mode. Permanent parameters are restored when RESET SYSTEM is pressed or the workstation is powered off and on again.
- When SAVECONFIG is YES, new parameters are stored permanently on the disk when exiting SETUP mode if the disk is not write-protected. After exiting SETUP mode, enter SETUP again immediately and change SAVECONFIG back to NO. If this is done immediately, SAVECONFIG NO will be written to the disk. Then, write-protect the disk. The disk is write-protected when you can see through the window on the disk.

WARNING

SAVECONFIG must be set to NO except when changing a parameter permanently, such as setting BAUDRATE during installation. Damage to software and equipment may result from failure to change SAVECONFIG back to NO after storing new permanent parameters.

1. Put the TEKEM disk in the workstation's disk drive with the label side up and the metal edge toward the disk drive. Press the RESET SYSTEM switch located to the right of the disk drive. Wait 75 seconds until READY FOR INPUT is displayed.

If READY FOR INPUT is not displayed, try pressing RESET SYSTEM again and waiting for about 75 seconds. If it is still not displayed, try adjusting the BRIGHTNESS control located to the right of the disk drive. Try a different TEKEM disk if you still cannot get READY FOR INPUT.

2. Press the L C DELETE SET UP key located in the upper-right-hand corner of the keyboard.
3. An asterisk (*) is displayed on the text monitor when you enter SETUP mode. When the asterisk appears, enter STA (or sta) and press NEXT to display the parameters.

If the asterisk does not appear, TEKEM is not active. Reload TEKEM by pressing the RESET SYSTEM switch.

4. When the asterisk appears below the parameter display:
 - a. Enter the name of the parameter as listed in figure 1-1. Parameters may be entered in capital or lowercase letters or a combination of both.
 - b. Enter one or more spaces.
 - c. Enter the new parameter. Eligible parameters are described in the parameter descriptions.
 - d. Press NEXT.

If you enter a command incorrectly, simply press NEXT and enter it again.

5. The asterisk appears after executing a command. Enter STA (or sta) and press NEXT to see the new parameter, or enter another parameter command.
6. When you have completed changing and/or looking at the parameters, press the L C DELETE SET UP key. Be sure to write-protect the disk again if you have saved the new parameters permanently.

Exceptions to this procedure are:

- The LOCAL/REMOTE parameter is changed by pressing the LOCAL key once. The key acts as a toggle switch. The workstation does not have to be in SETUP mode to change the LOCAL/REMOTE parameter.

- The PROMPTSTRING parameter must be enclosed by a delimiter character. For example, in the factory-set PROMPTSTRING parameter shown in figure 1-1, the single-apostrophe character (') was used as the delimiter character. The delimiter character marks the beginning and the end of the parameter.

OTHER PARAMETERS

Other definable parameters in the communications system include mainframe parameters, modem parameters, and 721 Display Terminal parameters, which are described in the following paragraphs.

MAINFRAME PARAMETERS

Characteristics of the host communications channel (I/O port) must also be defined. I/O port definition is done by the host system console operator using the system generation procedure according to instructions from the CDC systems analyst based on customer needs.

MODEM PARAMETERS

The baud rate of a modem is either fixed in the hardware or set by means of switches on the modem. If the modem can run at different baud rates, the modem manual lists the possible baud rates and tells how to change them. The modems used must operate asynchronously at the baud rate of the host computer port.

721 DISPLAY TERMINAL PARAMETERS

The alphanumeric display of the 790 workstation is a 721 Display Terminal. The parameters of the terminal are factory set as though the terminal is a peripheral device of the workstation. These parameters affect internal communications between the terminal and the workstation's hardware and software. Changing any of these parameters may affect the internal operation of the workstation. Refer to the Tektronix Emulation Manual (62950166) or the 790 Workstation Owner's Manual (62950150) to display these parameters.

NETWORK MAPS

Network maps of the facility are the most important tools you will use when installing and maintaining communications for the 790 workstation. Create the network maps during installation procedures described in this manual and keep them where you can use them when needed. Examples of network maps are shown in figures 1-2 through 1-6. Network maps include:

- Overall facility map (figure 1-2), which identifies:
 - Computer room
 - Each cluster of workstations (and other peripherals)
 - Number of workstations in each cluster (including the number of people using each cluster, if possible)
 - Physical distances between clusters (if more than one building is involved)
- Master list of equipment (figure 1-3) on the network including lists of on-site spares.
- Separate maps of each cluster of workstations (figures 1-4 through 1-6) identifying by product or part numbers or other appropriate identifiers the following:
 - Workstations (and other peripherals in the cluster)
 - Cables with lengths and supplier (CDC, customer, other)
 - Modems, multiplexers, microwave, and other communications devices on the network lines
 - Circuit numbers/channel identifiers of network lines used by the workstations
 - Communication controller port addresses, both logical and physical

Table 1-2 provides a key to figures 1-4 through 1-6. For example, figure 1-4 has the following notations on it: A, 2, 3, 4, and 11. Table 1-2 shows that 2 is a 50-foot cable that is supplied with each 2561-12; 3 is a special cable supplied by CDC; 4 is a 10-foot cable, product number 799-10; 5 is the 25-foot modem cable supplied with the workstation; and 11 is the port address assigned to each port of the 2550 Network Processing Unit.

<p><u>BUILDING A</u> <u>Computer Room</u></p> <p>Printer</p>	<p><u>CAD/CAM Room</u></p> <p>Five 790 workstations</p> <p>Three 721-21 terminals</p> <p>15 users</p> <p>Plotter (2212/9336)</p>
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<p><u>BUILDING B</u> <u>Product Design</u> Across the street (500 ft)</p> <p>Three 790 workstations</p> <p>Two 721-21 terminals</p> <p>Seven users</p>
--

<p><u>BUILDING C</u> <u>Research and Development</u> Across the street (700 ft)</p> <p>One 790 workstation</p> <p>Five users</p>
--

Figure 1-2. Overall Facility Map

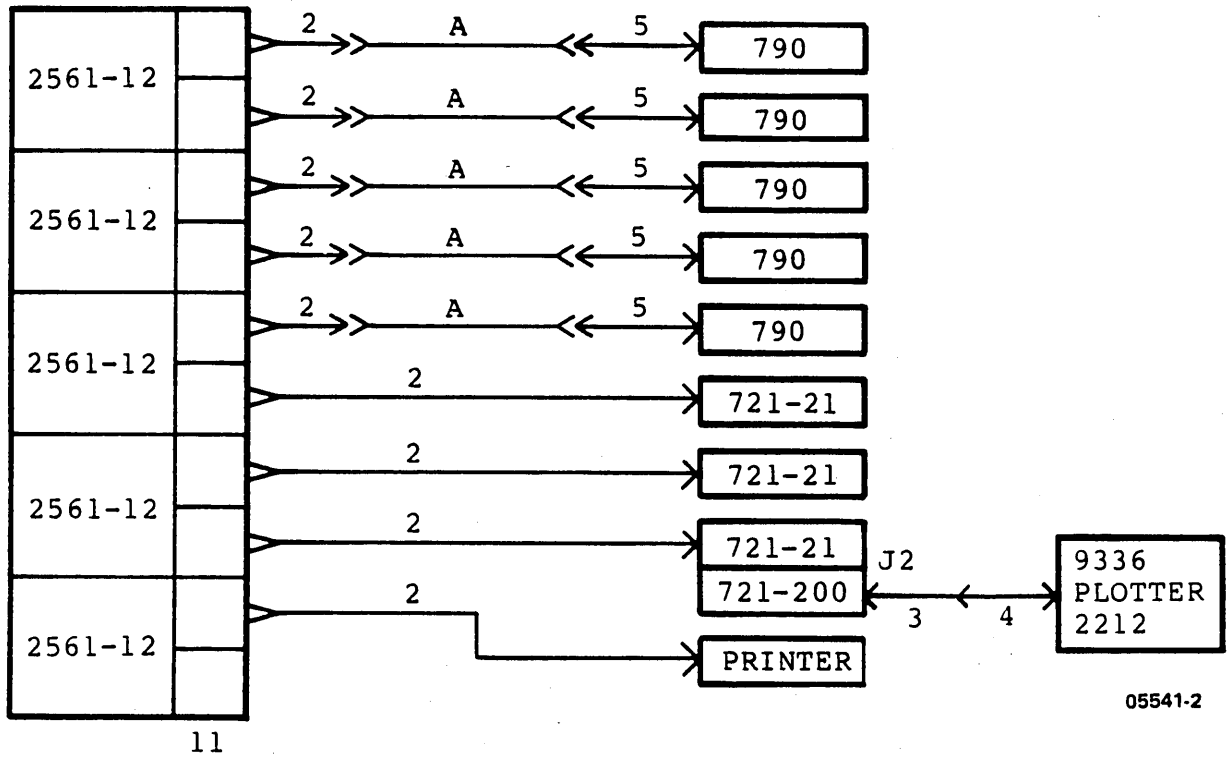
<u>EQUIPMENT</u>	<u>OPERATIONAL</u>	<u>SPARE</u>	<u>TOTAL</u>
2561-11	4	Standard	4
2561-12	5	Standard	5
790-20	9	No	9
721-21	5	Standard	5
721-200	1	Standard	1
2212/9336	1	No	1
65604-1	2	1	3
65605-1	4	1	5
65601-1	2	1	3
65600-1	2	No	2
799-10	3	Standard	3
790 Adapter Cable	5	No	5
Printer	1	Standard	1

Figure 1-3. Master List of Equipment

TABLE 1-2. KEY TO FIGURES 1-4 THROUGH 1-6

A	Gender changer (customer supplied)
1	50-foot cable supplied with each 2561-11
2	50-foot cable supplied with each 2561-12
3	Special cable (PN 53371010) CDC-supplied
4	799-10, 10-foot cable
5	25-foot modem cable supplied with 790
6	Expansion ports
7	65601-1 synchronous short-haul modem (for less than two miles of customer-supplied continuous cable connecting two multiplexers)
8	Customer-supplied continuous cable (requirements for cable are given under Equipment Specifications in section 2)
9	Cable supplied with 65604-1
10	65600-1 short-haul asynchronous modem (for less than two miles of continuous cable, customer-supplied)
11	2550 port addresses

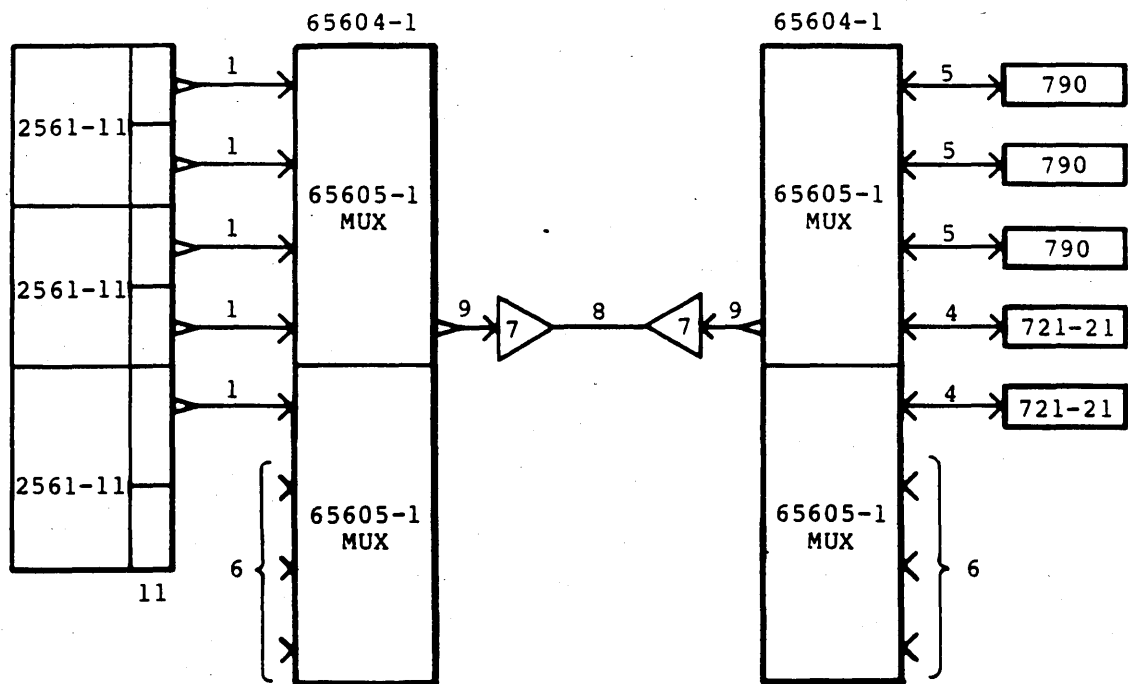
CAD/CAM ROOM



>> FEMALE CONNECTOR
 —> MALE CONNECTOR

Figure 1-4. Workstation Cluster 1
(See Table 1-2 for Key.)

PRODUCT DESIGN



05541-1



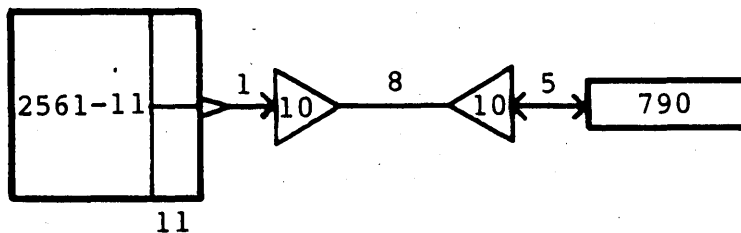
 FEMALE CONNECTOR
 MALE CONNECTOR

Figure 1-5. Workstation Cluster 2
(See Table 1-2 for Key.)

RESEARCH AND DEVELOPMENT



05541-3



 FEMALE CONNECTOR
 MALE CONNECTOR

Figure 1-6. Workstation Cluster 3
(See Table 1-2 for Key.)

The RS-232-C interface provides two-way, asynchronous communications between the 790 workstation and the communications controller of a CYBER 120, CYBER 170, or CYBER 180 computer. This section is presented in five parts:

- General description
- Tools
- CYBER 170/CYBER 180 RS-232-C Interface
- CYBER 120 RS-232-C Interface
- Maintenance

GENERAL DESCRIPTION

The workstation's RS-232-C port is a 9-pin, female connector labelled HOST on the workstation's I/O panel (figure 2-1). The I/O panel is located inside the back of the workstation's right-hand pedestal. A 25-foot modem cable is supplied with the workstation. It has a 9-pin connector at the workstation end and a 25-pin connector with standard RS-232-C pin-outs at the other end. Use of a gender changer (figure 2-2) and standard CDC cables adapts the modem cable for use in a direct host connection.

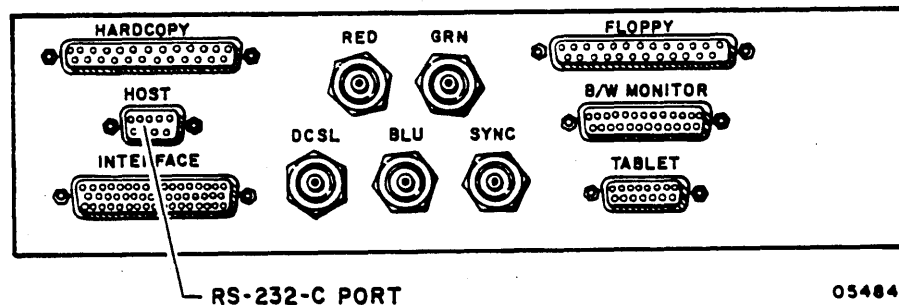


Figure 2-1. RS-232-C Port

When the distance to the host I/O port is greater than 50 feet, the RS-232-C link must be remote using asynchronous modems and a customer-supplied continuous cable (if the distance is less than two miles) or a communications line supplied by the local telephone company (when the distance is greater than two miles).

When a single remote line is to be used by more than one workstation, workstations may be connected to a multiplexer (or mux) that is connected to the modem (as in figure 1-5). In this arrangement, there will also be another multiplexer between the other modem and the communications controller.

When the distance is not greater than 50 feet, the link may be made directly (without modems) using the workstation's modem cable, a gender changer (figure 2-2), and standard CDC cables. The gender changer is not supplied.

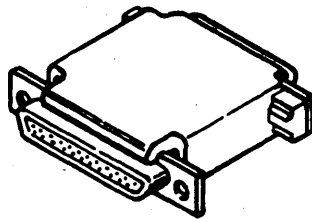


Figure 2-2. Gender Changer

NOTE

The customer is responsible for installation of all network lines and power receptacles.

The following paragraphs describe the internal cables of the 790 workstation for the RS-232-C interface, switch settings on the PC board that supports the RS-232-C interface, and equipment specifications for RS-232-C components.

RS-232-C INTERFACE INTERNAL CABLING

The workstation's display list processor (DLP) board supports the RS-232-C communications of the workstation. The board is color-coded white and is factory-installed in slot A3, also color-coded white, of the workstation's logic rack. Internal cables installed at the factory distribute communications from the DLP board to the I/O panel ports. Figure 2-3 identifies the DLP connectors that are associated with the I/O panel ports.

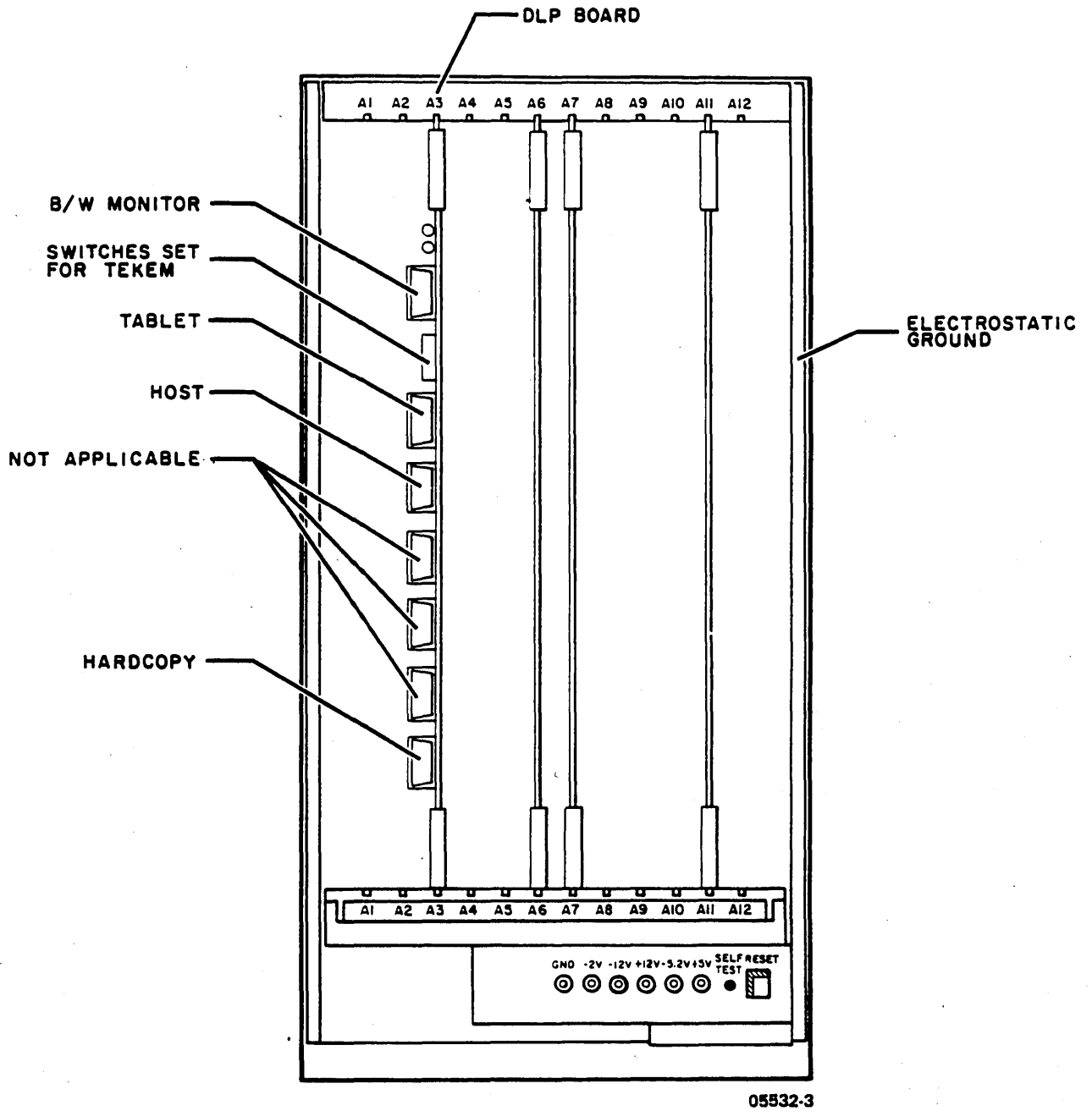


Figure 2-3. DLP Board Internal Cables

DLP SWITCH SETTINGS

Figure 2-4 shows the switch settings on the DLP board (slot A3) when using the TEKEM disk in the 790 workstation. The locations of these switches are shown in figure 2-3.

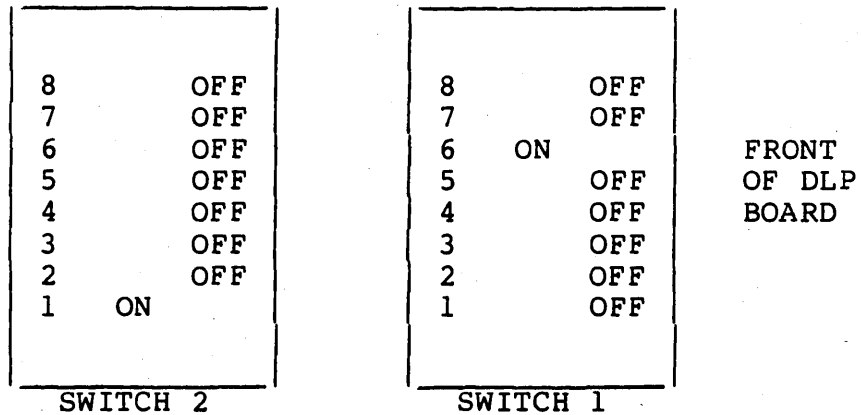


Figure 2-4. DLP Switch Settings

EQUIPMENT SPECIFICATIONS

In a remote RS-232-C connection using short-haul modems, the customer-supplied cable running between the modems must be a two-twisted-pair, 22-gauge Alpha 1302 or Belden 8741 cable (or equivalent). Physical, electrical, and environmental specifications of modems and multiplexers are provided in the manuals that accompany them.

TOOLS

A standard tool kit contains the tools needed to service the link between a workstation and host.

CYBER 170/CYBER 180 RS-232-C INTERFACE

In the CYBER 170 or CYBER 180 environment, the 790 workstation must be connected to the host via an RS-232-C interface. The optional DCSL interface, if used, works in conjunction with the RS-232-C interface. This section describes the RS-232-C interface to the CYBER 170 or CYBER 180 computer and provides the procedure for installing it. The DCSL interface is described in section 3.

DESCRIPTION

The RS-232-C link to the CYBER 170 or CYBER 180 computer is made via a communications link adapter (CLA) of the 2550 communications controller, or its equivalent. The cables supplied with the 2561-12 CLA are for local RS-232-C connection. The cables supplied with the 2561-11 are for a modem connection. The cables used are shown in figure 2-5. The gender changer is not supplied. See appendix A for more detailed cable information.

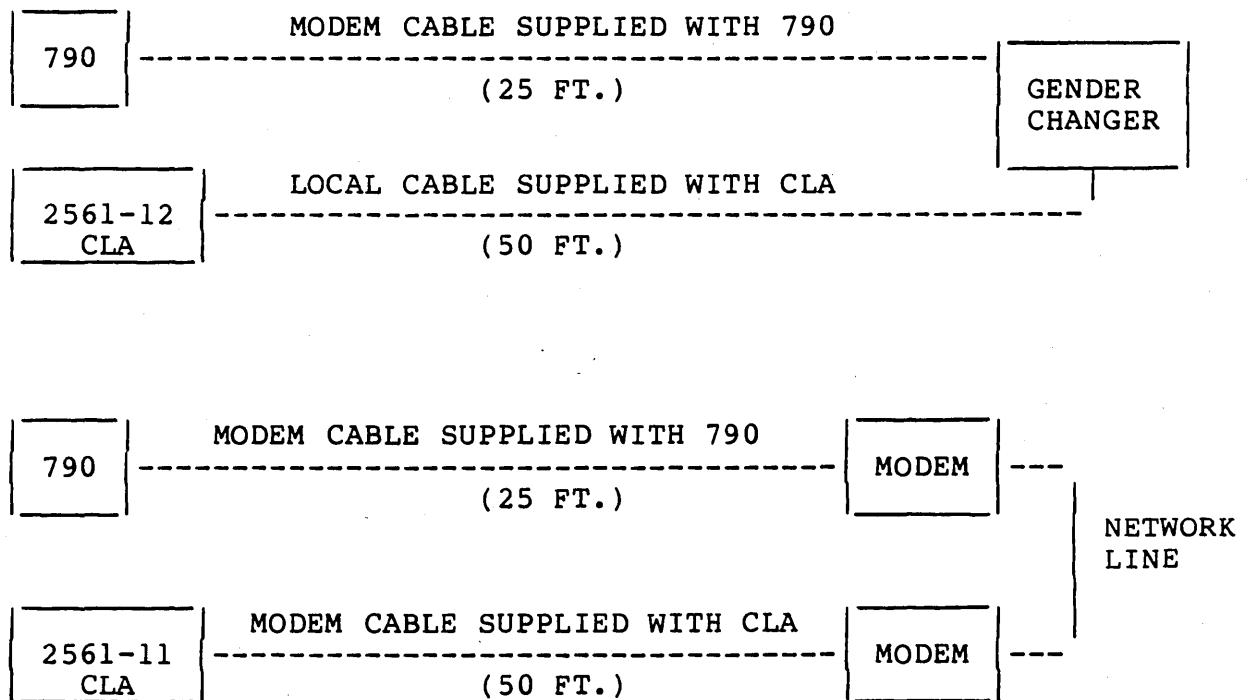


Figure 2-5. CYBER 170/180 RS-232-C Cables

INSTALLATION

NOTE

The 790 workstation must be installed and tested before performing the following procedure.

1. Ensure that the DLP board switch settings are correct (figure 2-4).
2. Ensure that workstation characteristics (discussed in section 1) have been defined to conform to host requirements.
3. Ensure that system generation (host I/O port definition) for the designated CLA port has been completed by the CDC systems analyst. When the TEKEM disk is used, the file entries for the NOS 2.3 operating system are as follows:

NETWORK CONFIGURATION FILE ENTRY:

LXX: LINE, PORT=XX, LTYPE=A2, TIPTYPE=ASync, LSPEED=9600.

TXX: TERMDEV, TC=T4014, CSET=ASCII, AUTOLOG=YES, CP=YES, PW=0, OC=YES.

LINE CONFIGURATION FILE ENTRY:

TXX: USER, MFAM=0, PAPPL=IAF.

In the file entries, the XX should be replaced by the number of the CLA port.

For details of the parameter entries, refer to Network Access Method, Network Definition Language.

4. Make all RS-232-C cable connections to connect the 790 to the CLA port designated by the CDC Systems Analyst. The power switch on the CLA must be off during cable connection. Refer to figure 2-5 for cable requirements. Refer to the modem manuals for installation of modems and multiplexers (if used).
5. Ensure that the required software has been installed by the CDC systems analyst. (NOS or NOS/VE and CCP are the only required software products. However, one of the ICEM products, such as ICEM DDN, is necessary to utilize the graphics terminal.)

6. Have the customer log on to the mainframe from the 790 workstation. Receiving a sign on message on the alpha-numeric display of the 790 and being able to sign on indicate that the connecting cables have been installed successfully.
7. Create the network facility maps.
8. Call up an application program that sends prepared graphics to the workstation.

NOTE

If the graphics image is elongated along the Y axis, the graphics monitor may be in 30-Hz mode. Correct this by resetting the monitor circuit breaker located on the modesty panel below the tabletop.

NOTE

The workstation has no transmit or receive indicators. Monitoring the display for updates from the host is the only active indication of receiving data from the host unless a modem with indicators is connected.

NOTE

If support is needed, call ACS. See preface.

CYBER 120 RS-232-C INTERFACE

The 790 workstation communications with a CYBER 120 host are via an asynchronous serial RS-232-C interface. The following paragraphs describe the interface and the installation procedure.

DESCRIPTION

The RS-232-C link to the CYBER 120 is made via a designated I/O port on the CYBER 120 intelligent asynchronous controller (IAC 8 or IAC 16). An I/O port of an IAC 8 is required for a remote RS-232-C connection. The cables used are shown in figure 2-6. See appendix A for more detailed cable information.

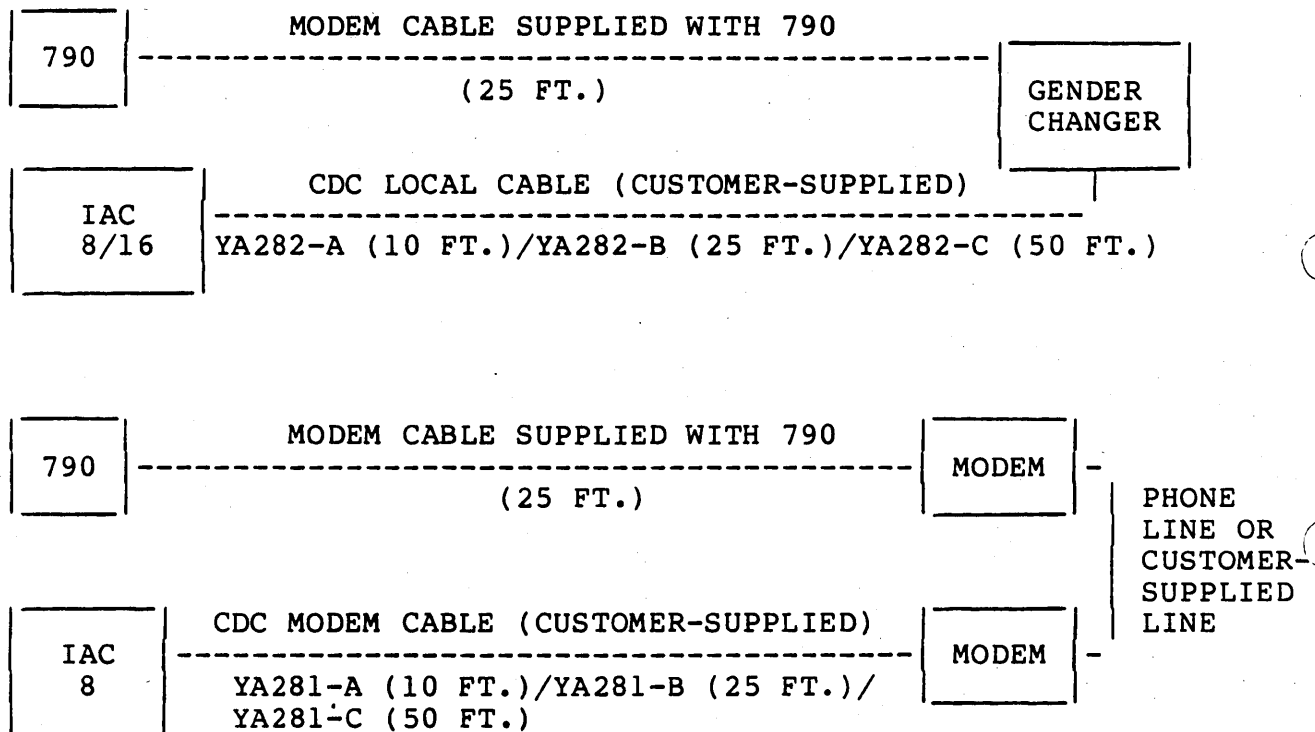


Figure 2-6. CYBER 120 RS-232-C Cables

INSTALLATION

NOTE

Parts of this installation procedure may be performed by a Data General customer engineer in accordance with the maintenance management plan.

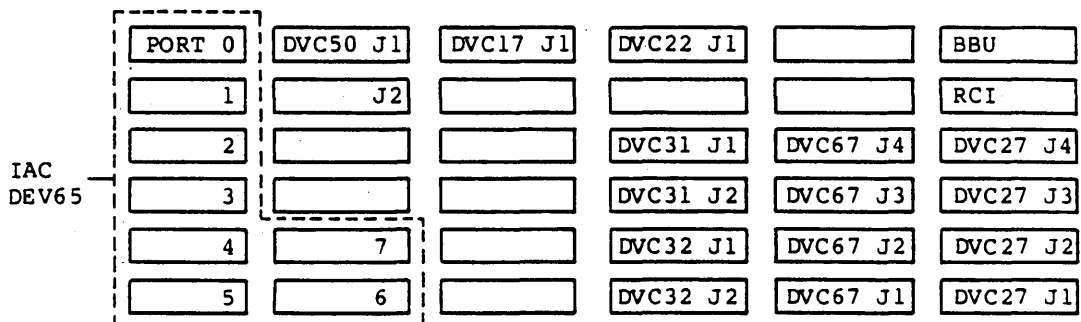
NOTE

The 790 workstation must be installed and tested before performing the following procedure.

1. Ensure that the DLP board switch settings are correct (figure 2-4).
2. Ensure that workstation characteristics (discussed in section 1) have been defined to conform to host requirements.
3. Make all RS-232-C cable connections to connect the 790 to the designated I/O port. The port may be designated by the CDC systems analyst and/or Data General customer engineer. Refer to figure 2-6 for cable requirements. Refer to the modem manuals for installation of modems and multiplexers if used.

NOTE

The IAC port number is two less than the @CON number. For example, IAC PORT1 equals @CON3. Typical bulkhead connector assignments of a CYBER 120-70 are shown in figure 2-7.



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Figure 2-7. CYBER 120-70 Bulkhead Connectors

4. Ensure that system generation (host I/O port definition) for the designated IAC port has been completed by the CDC systems analyst. (Refer to Installation Instructions for ICEM DDN Basic V1.47.1 or later, Appendix A, for sample VSGEN session.)
5. Ensure that ICEM DDN software, Version 1.47.1 or later, or comparable software has been installed by the CDC systems analyst.
6. Tube X, a Data General diagnostic, may be run to verify that the connection to the host has been made successfully. (Refer to Software Release Bulletin to verify execution of ICEM DDN software.)
7. Create the network facility maps.

NOTE

If the graphics image is elongated along the Y axis, the graphics monitor may be in 30-Hz mode. Correct this by resetting the monitor circuit breaker located on the modesty panel below the tabletop.

NOTE

The workstation has no transmit or receive indicators. Monitoring the display for updates from the host is the only active indication of receiving data from the host unless a modem with indicators is connected.

NOTE

If support is needed, call ACS. See preface.

MAINTENANCE

The following paragraphs describe preventive maintenance, corrective maintenance, and diagnostic tools for the RS-232-C interface. This discussion applies to the CYBER 120, CYBER 170, and CYBER 180 computers.

PREVENTIVE MAINTENANCE

Preventive maintenance consists of placing all cables in a protected location where they cannot be stepped on, jostled, or pinched.

CORRECTIVE MAINTENANCE

As described in section 1, network maps of the facility are the best tools you have for diagnosing a problem on the network line. In section 4, SAM 1 describes isolating problems on a direct RS-232-C line between the computer and the workstation. SAM 2 describes general steps for isolating a problem in a remote network where modems, multiplexers, and phone lines are part of the link between the computer and the workstation.

DIAGNOSTIC TOOLS

Diagnostics available for troubleshooting host computer communications is beyond the scope of this manual.

The diagnostics on the DIAGNOSTIC disk are for troubleshooting the workstation and their use is covered in the ICEM Ergonomic Workstation Hardware Maintenance Manual (publication number 62950149).



The optional direct-coupled serial link (DCSL) network interface between the 790 workstation and a CYBER 170 or CYBER 180 computer works in conjunction with the RS-232-C interface described in section 2. This section is presented in six parts: general description, tools, unpacking, installation, operations, and maintenance.

GENERAL DESCRIPTION

The DCSL network provides high-speed (up to 500K baud) serial output from the CYBER 170 or CYBER 180 host computer to a network of 790 workstations. Each workstation is also connected to the computer via an RS-232-C communications channel for input to the host and for exchange of control messages between the host and the workstation. (The RS-232-C link is also used for output from the computer.)

The components of the DCSL network are illustrated in figure 3-1. Data is sent out from the computer via a dedicated channel of a peripheral processing unit (PPU) to the DCSL channel interface. One or two dedicated main trunks connect the channel interface to DCSL boards in the workstations via DCSL repeaters.

The repeaters, installed at 730-meter (2400-foot) intervals (maximum) along the main trunk(s), have two functions: to extend the range of the network and to connect clusters of workstations to the network. Up to six workstations may be connected to one repeater.

A maximum number of three repeaters may be along each trunk cable. This provides for as many as 18 workstations on each trunk of the network, providing a network maximum of 36 workstations when two main trunks are used. The effective speed of data delivery decreases with each additional active workstation on the network.

MAINFRAME REQUIREMENTS

DCSL is supported by all models of the CYBER 170 and CYBER 180 families. To use the DCSL, a software modification must be installed in NOS. The modification applies to NOS 2.3, level 617 or higher. (The modification does not apply to NOS/VE.) The DCSL channel interface requires a dedicated channel of the PPU of the computer.

790 SOFTWARE REQUIREMENTS

The TEKEM operating disk of the 790 workstation supports DCSL. Workstation parameters described in section 1 apply.

NETWORK CABLES

Network cables are divided into two categories: those supplied with the DCSL interface option and those supplied by the customer.

Cables Supplied with DCSL Interface

Two 65-foot, standard PPU cables (CDC part number 19191600) are supplied with the DCSL channel interface. These two cables connect the channel interface to a dedicated channel of the PPU. They are 62-ohm, multi-coaxial cables, one for the IN port and one for the OUT port.

One 75-ohm coaxial cable is supplied with each DCSL board for connection between the workstation and repeater. This cable is 50 feet long with male BNC connectors.

Customer-Supplied Cables

The DCSL customer is responsible for purchasing and installing the main trunk cable(s). The main trunk cable connects the DCSL channel interface to a repeater and connects each repeater to the next repeater. There may be one or two main trunks from the channel interface. The main trunk cable is Ethernet-compatible,

50-ohm coaxial cable. The maximum recommended length of cable between two repeaters or between a repeater and the channel interface is 730 meters (2400 feet).

Because it is not very flexible, the cable may be spliced in several locations. For example, use of an elbow (L-shaped) splice near the connector to the DCSL channel interface would allow the cable to be run directly into the ceiling (without having to slope it across the room). Every section of the main trunk cable must have type N threaded connectors at each end. The splice must be a type N splice and must be encased completely by an insulated covering.

A certified electrician should be employed by the customer to install the main trunk cables to ensure that all building, electrical, and safety codes are met. The electrician or other qualified personnel should be employed to install all connectors and splices. (CDC Computer Network Services, a division of Engineering Services, can be employed by the customer to perform these services.)

INTERNAL HARDWARE CONFIGURATION

DCSL communications is possible in the 790 workstation when RS-232-C is enabled (section 2) and the internal cable labeled DCSL is connected to the BNC connector on the front edge of the DCSL board. The DCSL board, color-coded black, is installed in slot A4, also color-coded black. The other end of the DCSL cable is connected at the factory to the inside of the I/O panel at the DCSL port. The I/O panel is located inside the back of the right-hand pedestal.

EQUIPMENT SPECIFICATIONS

The following paragraphs describe the physical, electrical, and environmental specifications for the DCSL channel interface and DCSL repeaters (figures 3-2 and 3-3, respectively).

Physical Specifications

The channel interface and repeaters are 30.5 cm (12 in) wide, 14.6 cm (5.75 in) high, and 20.4 cm (8 in) deep. Every port

has a cap for protection from static, foreign matter, corrosion, etc. The cap is to be attached when the port is not in use.

Electrical Specifications

Both the DCSL channel interface and the DCSL repeaters have an 8-foot, 115-V ac power cord with a grounded (three-pronged) plug. Each unit draws 15 Watts of power. Power is on when the unit is plugged in to a power receptacle.

Both the channel interface and the repeater may be adapted for 220/240-V ac power by changing the setting of a power-select switch and installing the appropriate plug on the power cord. Both units are equipped with a circuit breaker.

Environmental Specifications

The temperature and humidity requirements for the channel interface are:

Operating temperature: 15°C to 32°C (60°F to 90°F)
Storage temperature: 5°C to 50°C (40°F to 122°F)
Operating relative humidity: 20% to 80% (no condensation)
Storage relative humidity: 5% to 95% (no condensation)
Heat dissipation: 51 Btu/h (15 W)

The temperature and humidity requirements for the repeater are:

Operating temperature: 5°C to 50°C (40°F to 122°F)
Storage temperature: 5°C to 50°C (40°F to 122°F)
Operating relative humidity: 10% to 90% (no condensation)
Storage relative humidity: 5% to 95% (no condensation)
Heat dissipation: 51 Btu/h (15 W)

EXTERNAL SWITCHES

The channel interface and the repeater have no internal switches and no power on/off switches. A power-select switch on each unit conditions the unit for either 115-V ac or 220/240-V ac input power. Both units have a circuit breaker that is reset when pressed.

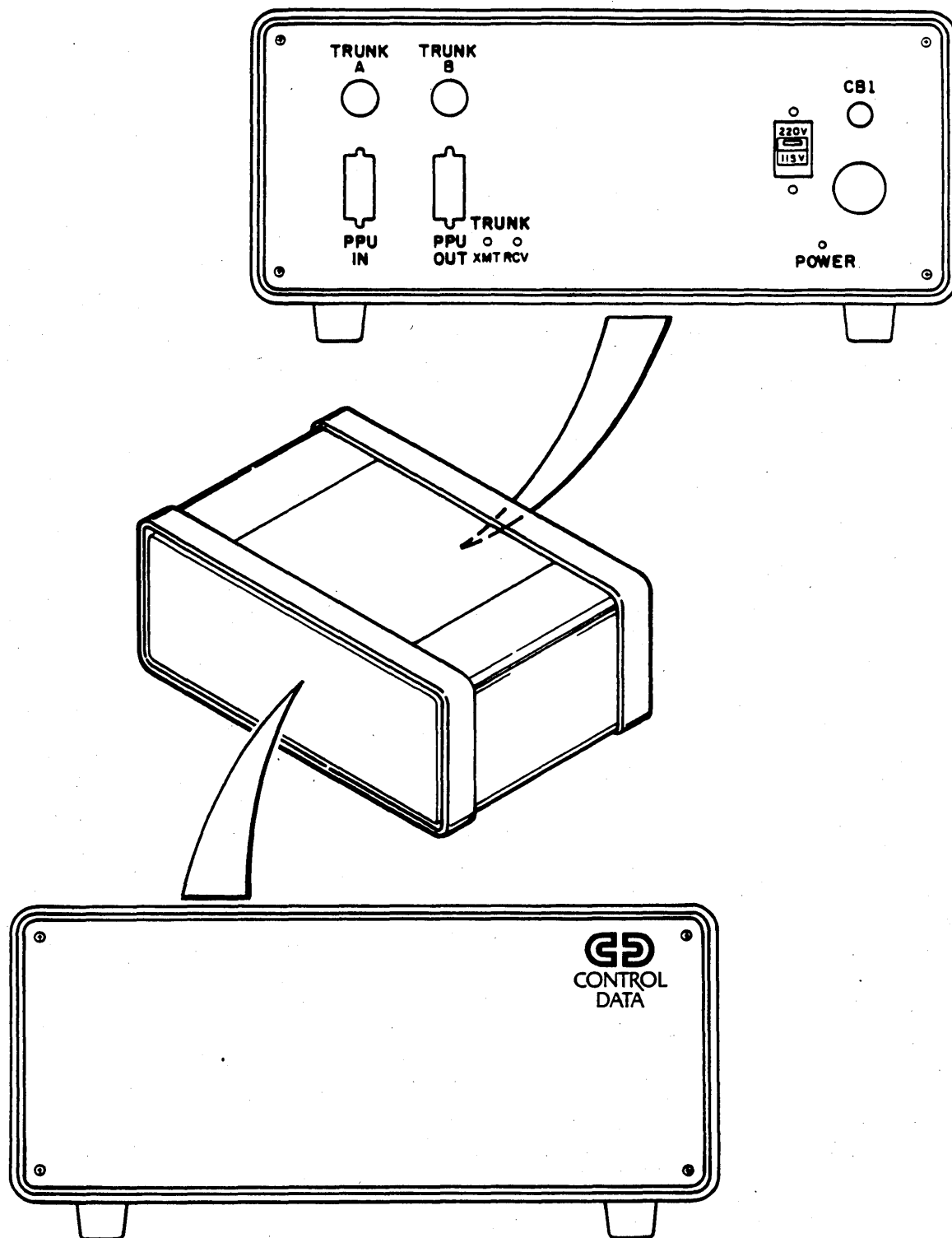


Figure 3-2. DCSL Channel Interface

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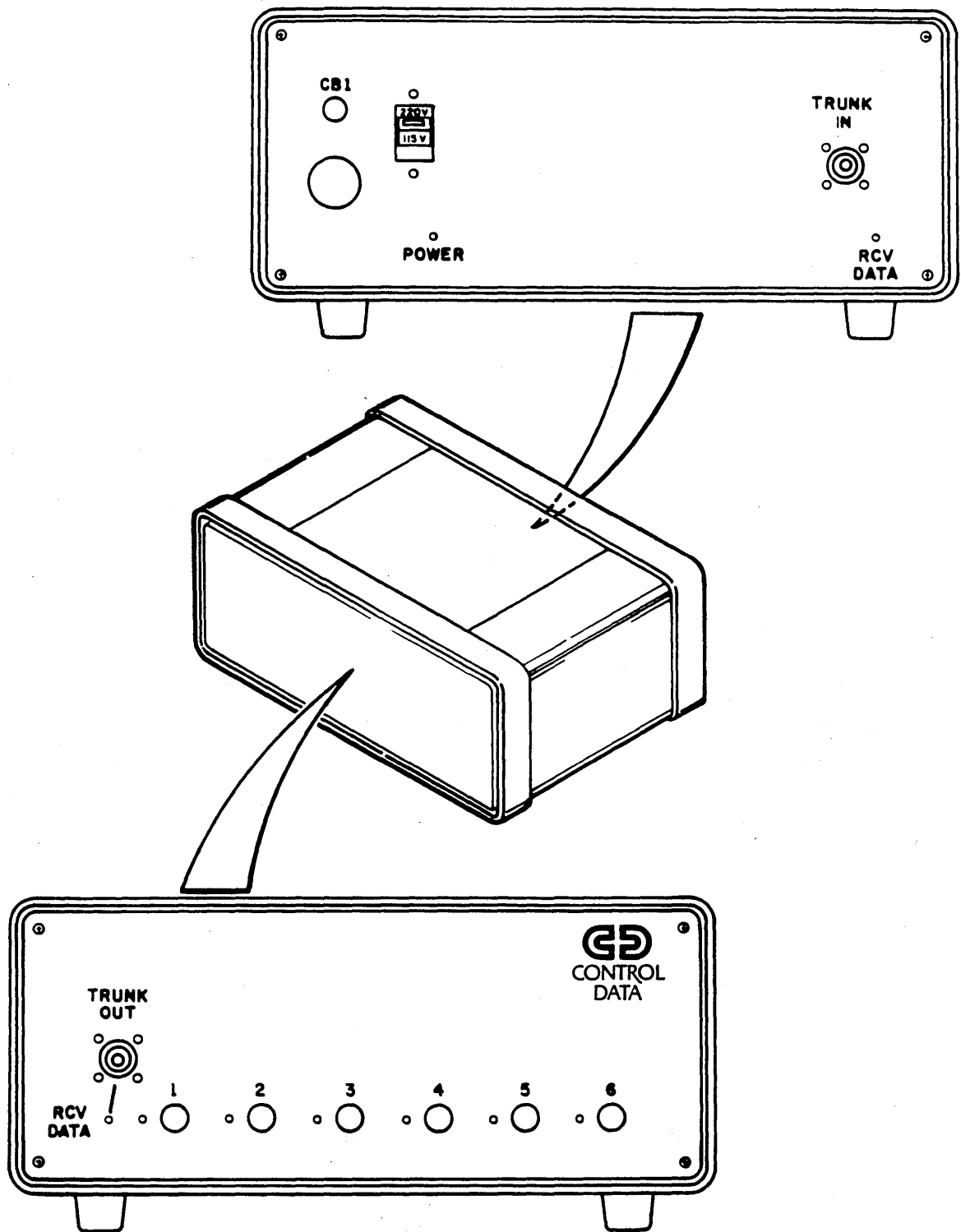


Figure 3-3. DCSL Repeater

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INTERNAL SWITCHES

The DCSL board (figure 3-4) has two sets of priority switches and one set of mode switches. The correct settings of these switches are shown in figure 3-6 later in this section. Once these switches are set, there should be no reason to change their settings. The only exception to this is when mode switches 6 and 7 are used to change the DCSL board alphanumeric display, which is described later in this section under Diagnostic Tools.

A set of priority jumpers are located on the workstation's card cage backplane. The correct positions for these jumpers is covered in section 2 of the ICEM Ergonomic Workstation Hardware Maintenance Manual, publication number 62950149.

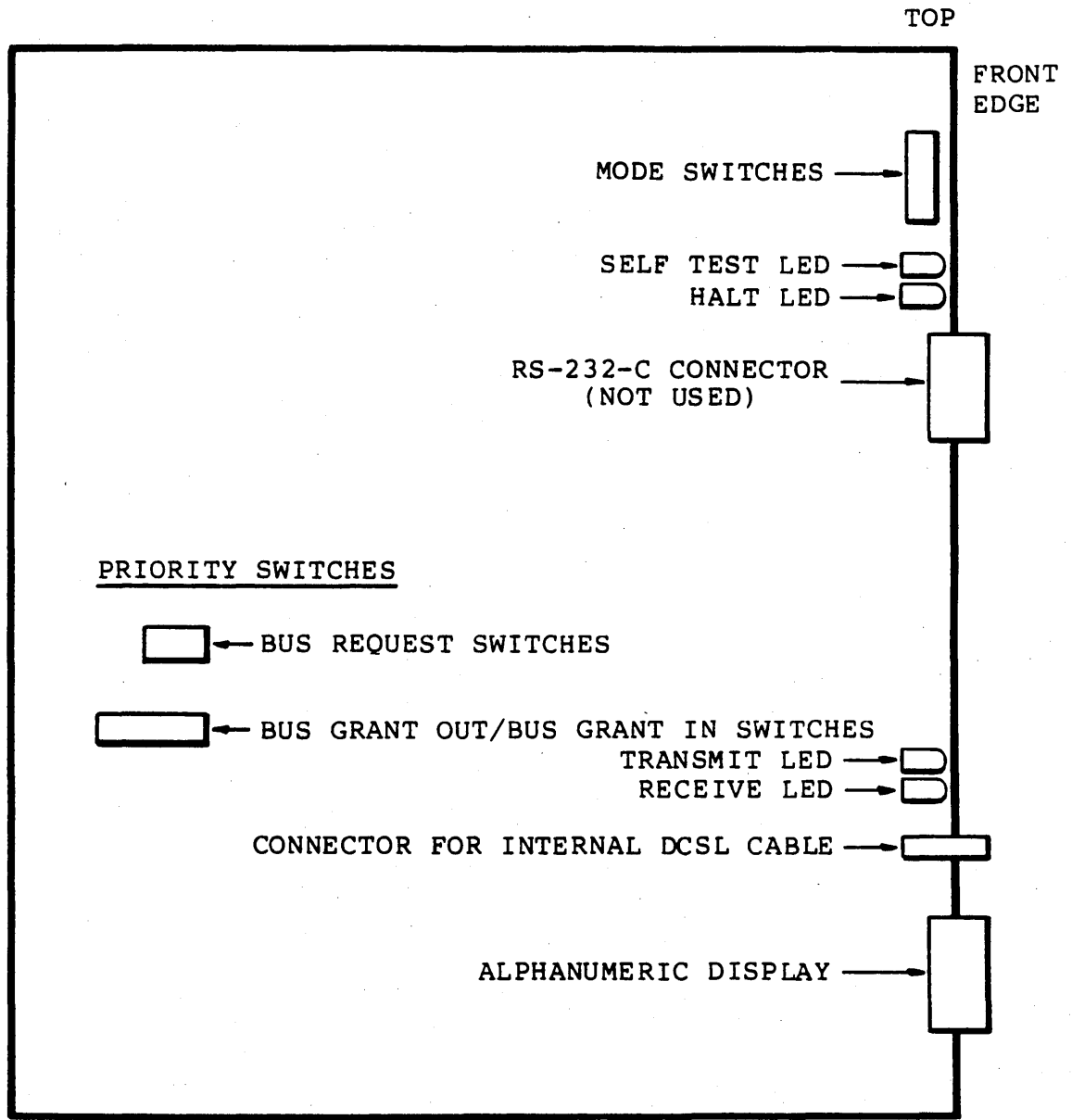


Figure 3-4. DCSL Board Layout

EXTERNAL INDICATORS

Both the channel interface and the repeater have POWER light-emitting diodes (LEDs) that remain lit when power is on.

The other LEDs on the channel interface and the repeater indicate activity at a port. When one of these LEDs light up, it remains lit for approximately one second. The RECEIVE LED on the DCSL board may appear to flutter as data is received.

When data is traveling to a workstation from the host, the following LEDs light:

- TRUNK XMT on the channel interface
- TRUNK IN on all repeaters on both trunks
- RECEIVE (see figure 3-4) on every DCSL board

When a workstation sends a ready or busy indication to the host (the only transmission from the workstation to the host via the DCSL), the following LEDs light:

- TRANSMIT on the DCSL board sending the indication (may not remain lit long enough to be seen)
- The LED associated with the repeater port to which the workstation is connected (that is, port 1, 2, 3, etc.)
- TRUNK OUT on every repeater located between the originating repeater and the channel interface
- TRUNK RCV on the channel interface

INTERNAL INDICATORS

The DCSL board has two LEDs: SELF TEST and HALT. When the 790 is powered on (or RESET SYSTEM is pressed), the board begins its self-test and the SELF TEST LED comes on. It goes out when the self-test is passed. If the self-test is not passed, the light remains lit.

The LED below the SELF-TEST LED is HALT, which is green, unlike the other LEDs on the board, which are red. It will light if the DCSL processor on the board halts. Data may be lost. A RESET SYSTEM or power down may correct the situation.

The last visual indicator on the DCSL board is an 8-position alphanumeric display that is controlled by mode switches 6 and 7. Four messages can be displayed by changing the settings of switches 6 and 7 as described under Diagnostic Tools, later in this section.

TOOLS

No special tools are needed for installation of a DCSL network. A standard tool kit contains the tools needed.

UNPACKING

Table 3-1 lists the CDC-supplied equipment for a DCSL network and their equipment numbers. When unpacking equipment:

- Wear the electrostatic wrist-wrap to remove the DCSL board from its static-protected wrapping.
- Inspect all hardware for any signs of physical damage. Bring any damage to the customer's attention so they may notify the carrier who delivered the equipment.

TABLE 3-1. DCSL EQUIPMENT

EQUIPMENT	EQUIPMENT NUMBER*
DCSL channel interface with two 65-foot PPU cables	DK144-A
DCSL repeater	DF101-A
DCSL board with 50-foot coaxial cable	TN235-A

*Part numbers are given in appendix B.

INSTALLATION

The following guidelines define a systematic approach to installation of the DCSL network components:

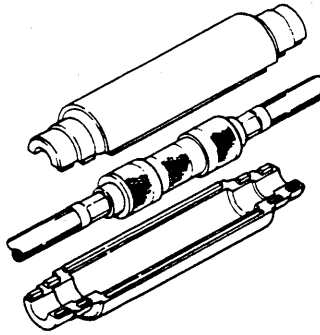
- Examine the condition of the main trunk cable(s).
- Connect the channel interface to the computer when the system is idled down.
- Install one entire branch of the network before beginning installation of the second branch.
- Check out every workstation port on each repeater before installing the next repeater.
- Check both main trunk ports before completing installation of the first network branch.
- Create network maps as you perform installation (See Network Maps in section 1.)
- Make every cable connection tight.
- Install the cap on all unused ports.

Using these guidelines, install the network using the following procedure.

NOTE

RS-232-C installation (section 2) must be completed and checked out successfully before installing the DCSL network.

1. Before installation begins, you should examine the main trunk cable:
 - Inspect all cable splices on the main trunk cable if possible. Every splice must be covered by an insulated splice cover (figure 3-5).
 - All connections must be as tight as possible.
 - Ensure that the main trunk cable is not exposed to any major sources of electrical noise. It should be removed from such sources to eliminate noise as a possible cause of intermittent data degradation.



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Figure 3-5. Insulated Splice Cover

2. Ensure that the DCSL software has been installed by the CDC systems analyst.
3. Ensure that the EST (equipment status table) entry for DCSL has been made:

EQ110=**,W0=200000(ch)000024300003,W1=0

where (ch) is the channel to which the DCSL channel interface is connected.

4. Install the DCSL channel interface during system idle-down:
 - a. If necessary, replace the power plug with a plug appropriate for the site.
 - b. If necessary, reset the power-select switch to the correct setting (115V or 220V) by sliding it entirely to one side using a screwdriver or similar device until the desired voltage is displayed.
 - c. Ensure that the circuit breaker is set. When properly set, the button should stick out 1/8 inch only.
 - d. Connect the channel interface to the designated channel. Two 65-foot cables (CDC part number 19191600) labeled PPU IN and PPU OUT are attached to the ports with the corresponding labels on the peripheral processor and on the channel interface. (Refer to figure 3-2.)
 - e. Connect one trunk cable to the port labeled TRUNK A.

- f. Plug the power cord into the designated socket. Power is on when the channel interface is plugged in. The POWER LED will light.

5.

CAUTION

Before handling the DCSL board, attach an ES electrostatic wrist-wrap to your wrist. Clip the other end to the metal piece on the right-hand side of the inside of the display generator cabinet. This will prevent damage to the board from static electricity. (Refer to figure 3-7 for the location of the electrostatic ground.)

Verify that the switch settings on the DCSL board match those shown in figure 3-6.

PRIORITY SWITCHES*

Location A3

4	3	2	1	
O	O	O	O	Bus Request
N	F	F	F	
F	F	F		

Location A2

8	7	6	5	4	3	2	1
O	O	O	O	O	O	O	O
N	F	F	F	N	F	F	F
F	F	F	F	F	F	F	F

Bus Grant Out/Bus Grant In

*Set for priority 0.

MODE SWITCHES

Top and Front

1	OFF
2	OFF
3	OFF
4	OFF
5	OFF
6	ON
7	ON
8	OFF

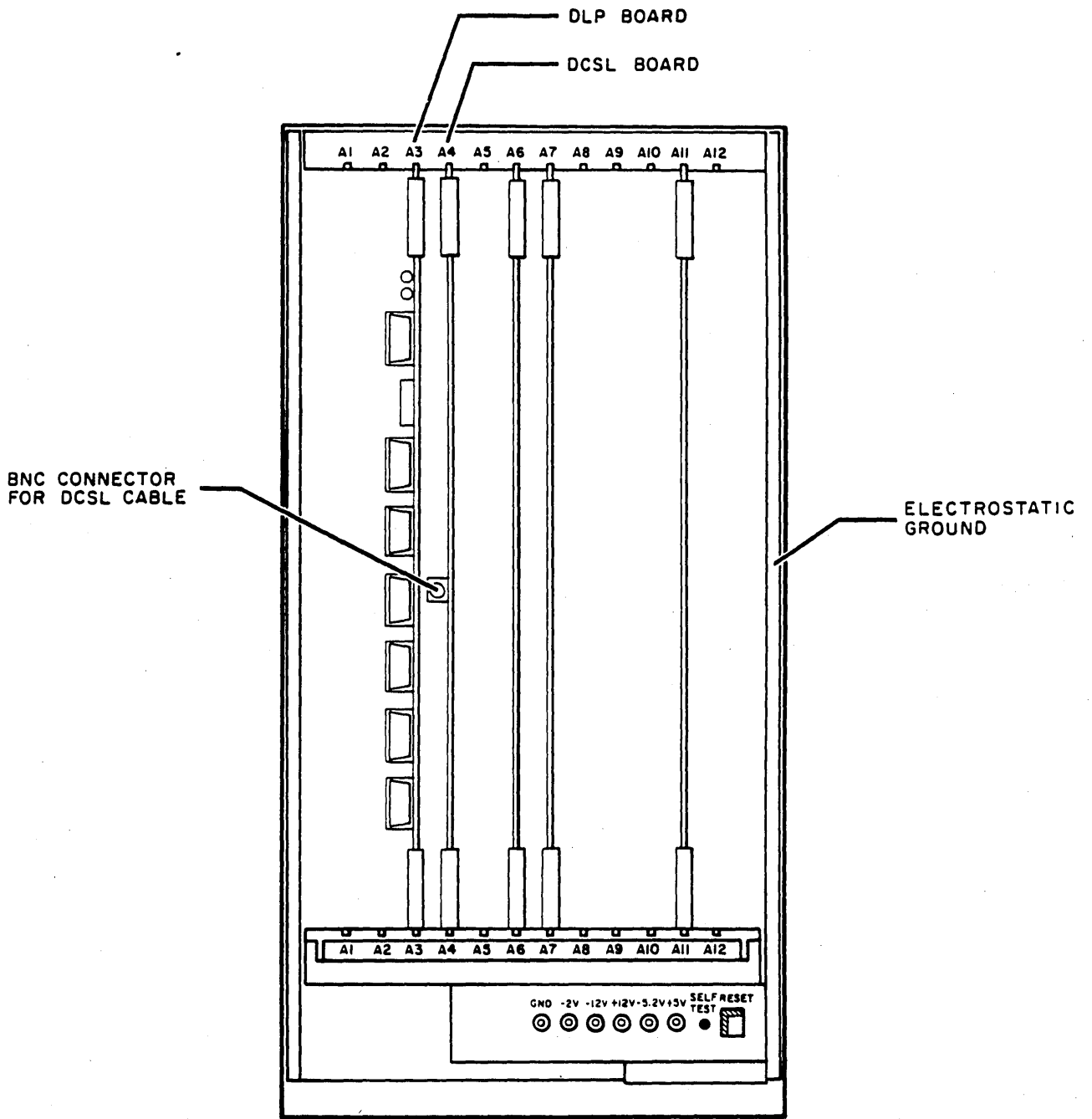
Figure 3-6. DCSL Switch Settings

6. Install a DCSL board into one of the 790 workstations to be connected to the first repeater on this branch of the network:

CAUTION

Power must not be applied to the workstation when installing printed-circuit boards. Be sure to install the DCSL board in slot A4 only (figure 3-7).

- a. Open the front door of the right-hand pedestal.
 - b. Hold the DCSL board by the plastic extractors at the top and bottom of the front of the board. Slide the board into the slot labeled A4 (color-coded black) until it is fully seated. Lock the extractors to hold the board firmly in place.
 - c. From the area under the logic rack, find the end of the cable tagged DCSL. Connect the cable to the BNC connector on the front edge of the DCSL board (figure 3-7) by pushing and rotating the cable's connector clockwise until it is fully seated. Then, turn the connector another quarter turn to lock it into place.
7. Verify that the workstation parameters and DLP switch settings match those given in sections 1 and 2, respectively.
 8. Install the repeater:
 - a. If necessary, replace the power plug with a plug appropriate for the site.
 - b. If necessary, reset the power-select switch to the correct setting (115V or 220V) by sliding it entirely to one side using a screwdriver or similar device until the desired voltage is displayed.
 - c. Ensure that the circuit breaker is set. When properly set, the button should stick out 1/8 inch only.
 - d. Connect the trunk cable coming from the channel interface (or previous repeater if applicable) to the TRUNK IN port on the repeater. (The TRUNK OUT port is used by the outgoing trunk cable.) Observe the CAUTION on page 3-16.



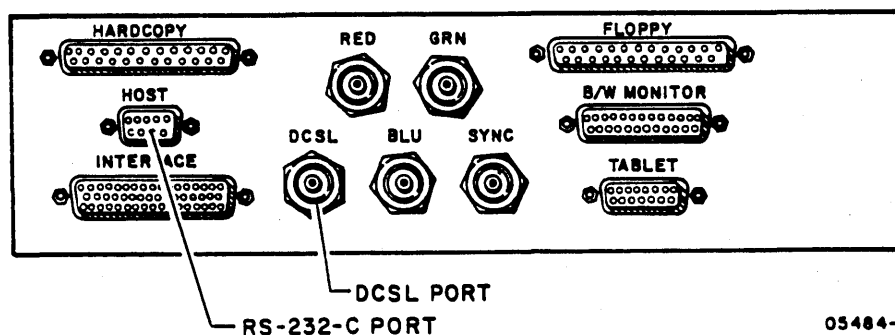
05532-4

Figure 3-7. DCSL Board Installation

CAUTION

Ensure that no metallic object is touching the metal parts of the repeater's TRUNK IN port in order to protect its earth ground, which is provided by the power cord of the channel interface or the previous repeater. (The TRUNK OUT port is connected to earth ground by its own repeater's power cord.)

- e. Plug the power cord into the designated socket. Power is on when the repeater is plugged in. The POWER LED will light.
9. Make the cable connection between the repeater and the workstation:
- a. Open the panel on the back of the right-hand pedestal of the workstation.
 - b. Connect the 50-foot coaxial cable that came with the DCSL board to the workstation's I/O panel at the port labeled DCSL (figure 3-8).
 - c. Connect the other end of the cable to the repeater port labeled 1.



05484-1

Figure 3-8. DCSL Port

10. When READY FOR INPUT is displayed at the workstation, have the customer log on to the host computer. When the user is logged into NOS, enter DCSL,* and press NEXT. Then, call up an application program that sends prepared graphics to the workstation. If the output is received, the DCSL link has been made successfully.

Exit the application program, enter the NOS command DCSL,ON2 (for normal operating mode) and press NEXT. Enter BYE and press NEXT.

11.

NOTE

Turn the workstation off each time before performing this step.

Move the cable to the next port of the repeater. Repeat steps 10 and 11 until you have tested every port of this repeater.

NOTE

If a repeater has a nonfunctioning port but enough ports are available, complete the installation with that repeater. Order a replacement repeater if appropriate.

12. Install and check out the other workstations at this repeater site (steps 5, 6, 7, 9, and 10).
13. Install the remaining repeaters and DCSL boards on this main trunk (steps 5 through 12).

NOTE

The outgoing trunk cable (to the next repeater) is connected to the TRUNK OUT port of the repeater.

14. Before beginning installation of the second main trunk, move the trunk cable from TRUNK A to TRUNK B of the channel interface and check out the TRUNK B port by performing step 10 on at least one of the workstations already installed successfully.

NOTE

If a channel interface has a non-functioning port but enough ports are available, complete the installation with that channel interface. Order a replacement channel interface if appropriate.

15. Install the second branch of the network (if there is one), methodically checking the DCSL boards and repeater ports as you go as described in this installation procedure.

OPERATIONS

The following paragraphs describe the use of the two network routes, RS-232-C and DCSL, for data exchange during log-on, job processing, and log-off.

LOG-ON

The log-on sequence is exchanged over the RS-232-C link. This sequence includes sending the system banner (for example, WELCOME TO NOS 2.3, ..., FAMILY:) to the workstation, receiving the operator's log-on, calling up the requested application program, and receiving application input from the workstation.

When the operator's log-on is accepted, a unique, non-zero terminal number is assigned to that workstation via the RS-232-C link. The number is shown in the log-on message as CONN: xx, where xx is the assigned terminal number. This number is used until the job is logged off.

JOB PROCESSING

When the workstation operator is using the application program, input to the host is received through the RS-232-C route. Output to the workstation is automatically sent through the DCSL network (if the DCSL equipment is on).

Before output is sent to the workstation, the terminal number is sent via the DCSL. The workstation responds, via the DCSL, with two logical 1 bits (ready) or one logical 1 bit (busy). If the workstation is busy, the job is rolled out to disk and the terminal number is resent periodically until a ready indication is received. When ready is received, the job is rolled back in and a 1- to 256-byte block is sent preceded by the terminal number. The block is received by every workstation but accepted only by the workstation with the matching terminal number.

If a hardware malfunction prevents the first transmission of application output to a workstation, the following occurs:

- The day file message DCSL ERROR will be displayed only at the workstation that was expecting the initial output when the malfunction was detected.
- The DCSL EST entry is turned off so that output to every workstation on the DCSL network is automatically sent through the RS-232-C network.
- Other workstations on the network will not be notified but may notice a slower rate of delivery of output on their graphics terminals.

If the DCSL network failure occurs in such a way that the DCSL software does not diagnose a hardware failure and/or the workstation loses its terminal number due to malfunction or power failure, the following occurs:

- There will be no notification of the workstation operators.
- There will be no default to the RS-232-C network.
- No workstations will receive updates to their displays. Some data may be lost.
- Every workstation operator must exit to the operating system using control T or its equivalent (break 2).
- The DCSL network must be deactivated and the RS-232-C network activated for output in one of two ways: every workstation operator enters DCSL,OFF and presses NEXT (when they are at the operating system); or the system console operator turns off the DCSL EST entry.

When under control of NOS, the workstation operator can verify that the DCSL network is or is not being used for output to that workstation by entering DCSL,* (and pressing NEXT). No output (update of the display) will occur if the DCSL network is not being used.

During normal network operation, the workstation operator may choose to use the RS-232-C route instead of the DCSL network by entering DCSL,OFF and pressing NEXT. The DCSL network operation for this workstation may be reactivated by entering DCSL,ON2 and pressing NEXT. These NOS commands must be entered when under control of NOS, not during execution of an application program.

LOG-OFF

When an operator logs off the operating system (via RS-232-C), a message is sent via DCSL to that workstation to drop its terminal number.

MAINTENANCE

The following paragraphs describe preventive maintenance measures, diagnostic tools, corrective maintenance, and return procedures.

PREVENTIVE MAINTENANCE

There is no regularly scheduled maintenance routine for the network. The following measures may be considered preventive:

- Caps must be installed on all unused ports of the channel interface and the repeaters to protect them from foreign materials.
- All cables should be placed in a protected location where they can not be jostled, pinched, or stepped on.
- All connections including all main trunk cable connections should be as tight as possible.
- Main trunk cable connections must be protected by an insulated splice covering.

DIAGNOSTIC TOOLS

There are no preprogrammed diagnostics for this network that can isolate a failing component or that can characterize the data error rate. The diagnostic tools available are:

- DCSL,* command
- External indicators
- DCSL board alphanumeric display
- DCSL ERROR message

DCSL,* Command

The DCSL,* command makes the DCSL driver try the DCSL link repeatedly, preventing default to the RS-232-C link. It is entered from a workstation when under control of NOS. Ideally, this command should be used in conjunction with an application that sends output repeatedly to a workstation. This can be useful when using an oscilloscope on the DCSL main trunk cables or for verifying that the DCSL network is or is not being used by that workstation. This command is cancelled by entering DCSL,ON2 or DCSL,OFF.

External Indicators

LEDs that indicate the presence of data on the line may be helpful in isolating a failing component. The activity of the LEDs is described in External Indicators earlier in this section. The circuit breakers on the channel interface and the repeaters also help indicate the condition of the power supplies of these units. The SELF-TEST and HALT LEDs on the DCSL boards provide further status indication.

DCSL Board Alphanumeric Display

The eight-position alphanumeric display at the lower front edge of the DCSL board is controlled by mode switches 6 and 7 at the upper front edge of the DCSL board. With the normal settings of mode switches 6 and 7 (both switches set to ON), the display indicates the status of the workstation's ring buffer. Mode switches 6 and 7 may also be set to display the workstation's assigned terminal number, the message/block count, or the character count.

The following paragraphs describe each of the mentioned displays. After using the alphanumeric display, return mode switches 6 and 7 to ON. The other mode switches are always left in the OFF position.

Assigned Terminal Number

When both switches 6 and 7 are OFF, the workstation's terminal number, which is assigned by the host operating system at sign-on, is displayed as TERM xx, where xx is the terminal number. The T in TERM is shown in the bottommost position.

Message/Block Count

When switch 6 is ON and switch 7 is OFF, the number of messages/blocks received from the host on the DCSL network line can be viewed. The number is displayed in decimal and it rolls over to zero when a count of 65535 (64K blocks) is reached. The display shows M xxxxx, where xxxxx is the number of blocks received.

Character Count

When switch 6 is OFF and switch 7 is ON, the number of characters received from the host on the DCSL network line can be viewed on the alphanumeric display. The number displayed is in decimal, and when it reaches 65535 (64K characters), it rolls over to zero. The display shows C xxxxx, where xxxxx is the number of characters received. The number is updated at the end of each block transfer.

Ring Buffer Status

When both switches 6 and 7 are ON, the workstation's ring buffer status is indicated on the alphanumeric display. The word DATA is displayed when the ring buffer contains data. NO DATA is displayed when the ring buffer is empty. The display should change back and forth between DATA and NO DATA, indicating that data is being taken from the ring buffer.

DCSL ERROR Message

The software-generated message DCSL ERROR, described in Operations earlier in this section, is displayed on one workstation (and/or saved in the day file) to indicate DCSL network failure in some conditions. SAM-3 in section 4 describes how to isolate failing network components when the DCSL ERROR message occurs.

CORRECTIVE MAINTENANCE

The DCSL maintenance philosophy is to isolate a problem to a field-replacable unit (FRU) level (channel interface, repeater, DCSL board) and replace the unit.

NOTE

Although the customer is responsible for purchasing, installing, and replacing the main trunk cable(s), modems, and multiplexers, the CDC customer engineer is responsible for isolating malfunctions in these components.

RETURN PROCEDURES

Use the shipping carton that the new component was delivered in to return parts in need of repair. Remember to use the static-free bag to return the DCSL board. All FRUs (including parts with Ramtek part numbers) are returned to the CDC World Distribution Center. (Part numbers are given in appendix B.)

World Distribution Center
Customer Engineering Materials
304 North Dale St.
St. Paul, Minnesota 55103

This section contains SAM (structured analysis method) listings to aid in isolating a malfunction and correcting it. Corrective maintenance of the communication interfaces consists of replacing the failing FRU. FRUs include such items as cables, repeaters, and printed-circuit boards.

It is recommended to seek support when maintenance or troubleshooting procedures beyond the scope of this manual are required. CDC hotline numbers for software support or for help determining whether you have a software problem are given in the preface of this manual. Hardware support may be found within CDC Engineering Services.

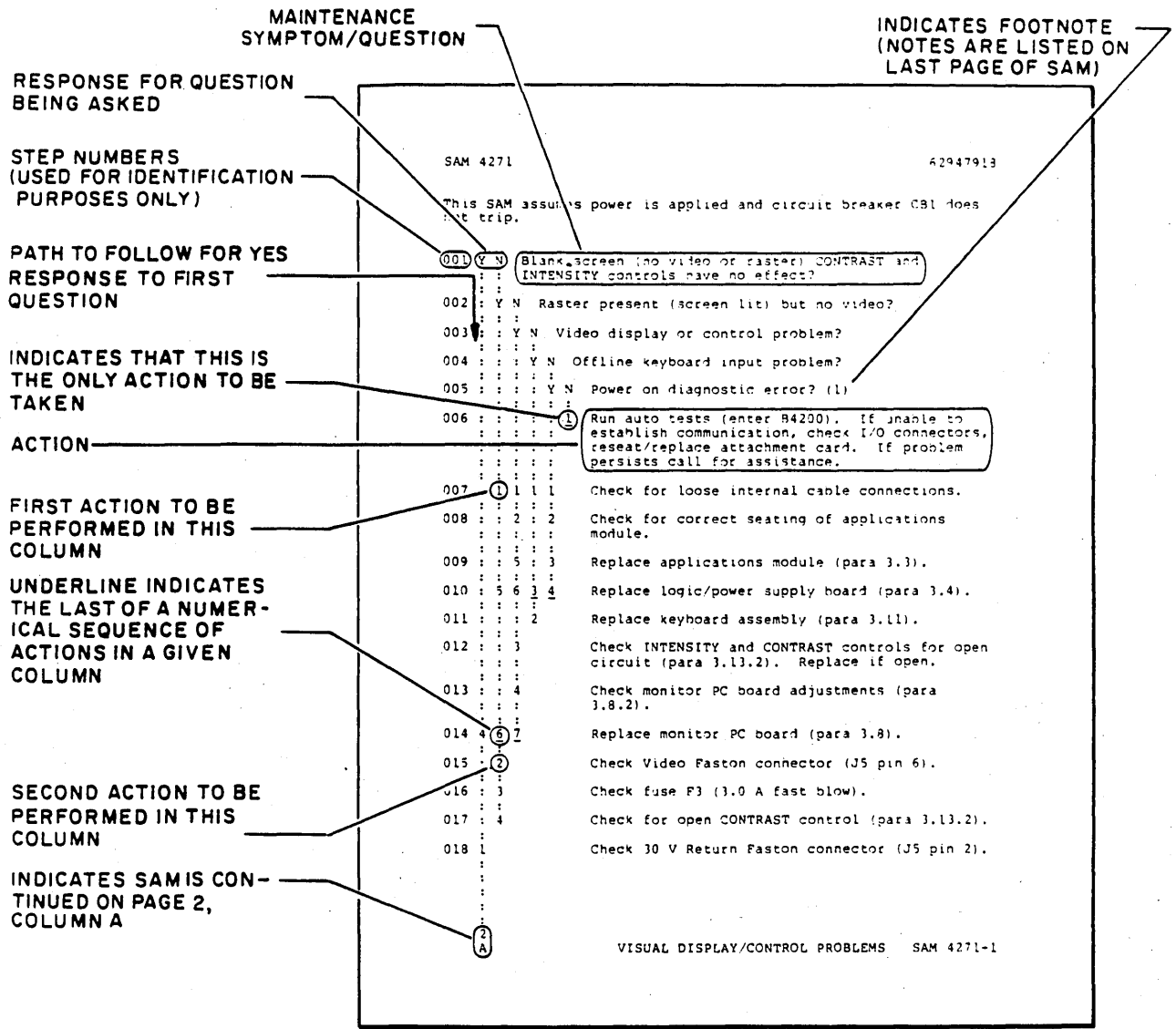
HOW TO USE SAMS

A SAM presents troubleshooting information in a logical manner. Each SAM contains a sequential listing of questions that can be answered yes (Y) or no (N). The response made to a particular question leads either to the next question or to an action or sequence of actions.

In addition, SAMS are identified by a number and a descriptive title. Pages numbers within the SAM are given at the right-hand corner of each page. The format is illustrated in figure 4-1.

Refer to the SAM that covers the existing problem and:

- a. Verify that all assumptions stated at the beginning of the SAM exist.
- b. Observe any preliminary instructions.
- c. Answer yes (Y) or no (N) to the question asked or the condition being tested.
- d. Follow down the appropriate Y or N column and when column leads to action numbers, perform the corresponding actions in numerical order to correct the problem.



03388

Figure 4-1. SAM Format

SAM 1 - DIRECT COMMUNICATIONS (ONE WORKSTATION) FAILING

Assumptions: One workstation connected directly to the computer's communications controller is not communicating properly with the computer. The workstation is functioning properly in LOCAL mode. The workstation is in REMOTE mode when attempting to communicate with the host computer. The priority switches on the optional DCSL board are set correctly if present (settings are described in section 3) and the priority jumpers on the card cage backplane are positioned correctly (jumper positions are described in section 2 of publication 62950149). Use your network map (or create one) that shows every portion of the RS-232-C link between the workstation and the computer.

- 001 N Y Able to sign on to the host operating system?
- 002 N Y Graphics image elongated along the Y axis?
- 003 1 Graphics monitor may be in 30-Hz mode. Reset the monitor circuit breaker located on the modesty panel below the tabletop.
- 004 1 During application processing, communications halt or data gets lost or appears garbled. A conflict exists in software controls between the host application program and the workstation.
- 005 1 Ensure that the host is not down temporarily.
- 006 2 Check all connectors at every connection in the line, including DLP board internal cables to ensure that they are correct and secure. Reconnect where necessary.
- 007 3 Check the workstation's direct cable and adapter cable by replacing them one at a time and trying the link again.
- 008 4 Check the host I/O port definition to ensure that the system generation procedure has been performed correctly.
- 009 5 Switch the cable to another host I/O port and perform the correct system generation procedure.

SAM 2 - REMOTE RS-232-C COMMUNICATIONS FAILING

Assumptions: One or more workstations connected remotely to the RS-232-C communications controller of the host computer are not communicating properly. The workstations are functioning properly in LOCAL mode. The workstation is in REMOTE mode when attempting to communicate with the host computer. You have identified all failing workstations in the remote network using the network map of the facility.

- 001 N Y Only one workstation not communicating properly?
- 002 N Y Able to sign on to the host operating system?
- 003 N Y Graphics monitor elongated along the Y axis?
- 004 1 Graphics monitor may be in 30-Hz mode. Reset the monitor circuit breaker located on the modesty panel below the tabletop.
- 005 1 During application processing, communications halt or data gets lost or appears garbled. A conflict exists in software controls between the host application program and the workstation.
- 006 1 Ensure that the host computer is not down temporarily.
- 007 2 Check to see that the modem is operating properly by trying a different modem.
- 008 3 Check the host I/O port to which the remote workstation is connected. Check the hardware by using all visual indicators available. Check the software by checking for correct system generation parameters.
- 009 4 Check the network line (customer-supplied cable or telephone-company communications line).
- 010 1 Ensure that the host is not down temporarily.
- 2 If the failing workstations are all connected to one multiplexer (mux) and no other workstations are failing, determine which of the following network components is not working and replace it: terminal-end mux, host-end mux, or network line. Repair/replace as appropriate.
- 3 If all workstations connected to one communications controller (255X or IAC8) are failing, call for support to troubleshoot and/or replace the communications controller.

SAM 3 - DCSL ERROR DISPLAYED

Assumptions: DCSL ERROR is displayed/stored in the day file when a workstation tries to receive application output for the first time during the application. (This automatically causes output to all workstations on the DCSL network to be sent through the RS-232-C network and the DCSL EST entry to be turned off.) You have already checked the circuit breakers, POWER LEDs, and power-select switches on the channel interface and the repeaters. You have already checked the LED sequences to help isolate a failing component.

- | | | | |
|-----|---|---|--|
| 001 | N | Y | DCSL board (color-coded black) in slot A4 (also color-coded black)? |
| 002 | N | Y | Internal cable properly and securely connected to the BNC connector on the front of the DCSL board? |
| 003 | N | Y | Repeater cord properly and securely connected to the DCSL connector on the workstation's I/O panel and to a port (1 through 6) on the repeater? (Turn off 790 before checking cord.) |
| 004 | | | <p>1 Check the DCSL board as follows:</p> <p>a. Move the DCSL board from the failing workstation to a workstation known to work on the DCSL network. (If there are no other workstations available, go to step 009.)</p> <p>b. Have the system console operator turn on the DCSL EST entry. Log on to the operating system. Enter DCSL,* and press NEXT. Call up an application program that sends data to the workstation. If DCSL ERROR appears or no output is received at the workstation, replace the DCSL PC board. (If DCSL ERROR was displayed, the DCSL EST entry must be turned on by the system console operator to reactivate DCSL before retrying the network.)</p> |
| 005 | | | <p>2 Check the repeater cable as follows:</p> <p>a. Log off the operating system. Turn off the workstation. Move the repeater cable from the failing workstation to a working workstation and from the failing workstation's</p> |
| | 3 | 3 | 3 2 |
| | A | B | C D |

D
1

repeater port to the working workstation's repeater port. A workstation must be off when disconnecting or installing its repeater cable. Ensure that the cable connections are correct and secure.

- b. Turn on the workstation. Log on to the operating system. Enter DCSL,* and press NEXT. Call up an application program that sends data repeatedly to the workstation. If DCSL ERROR appears or no output appears at the workstation, replace the repeater cable. If DCSL ERROR was displayed/ stored in the day file, the DCSL EST entry must be turned on by the system console operator to reactivate DCSL before retrying the network.

006 3 Check the repeater port to which the failing workstation was connected as follows:

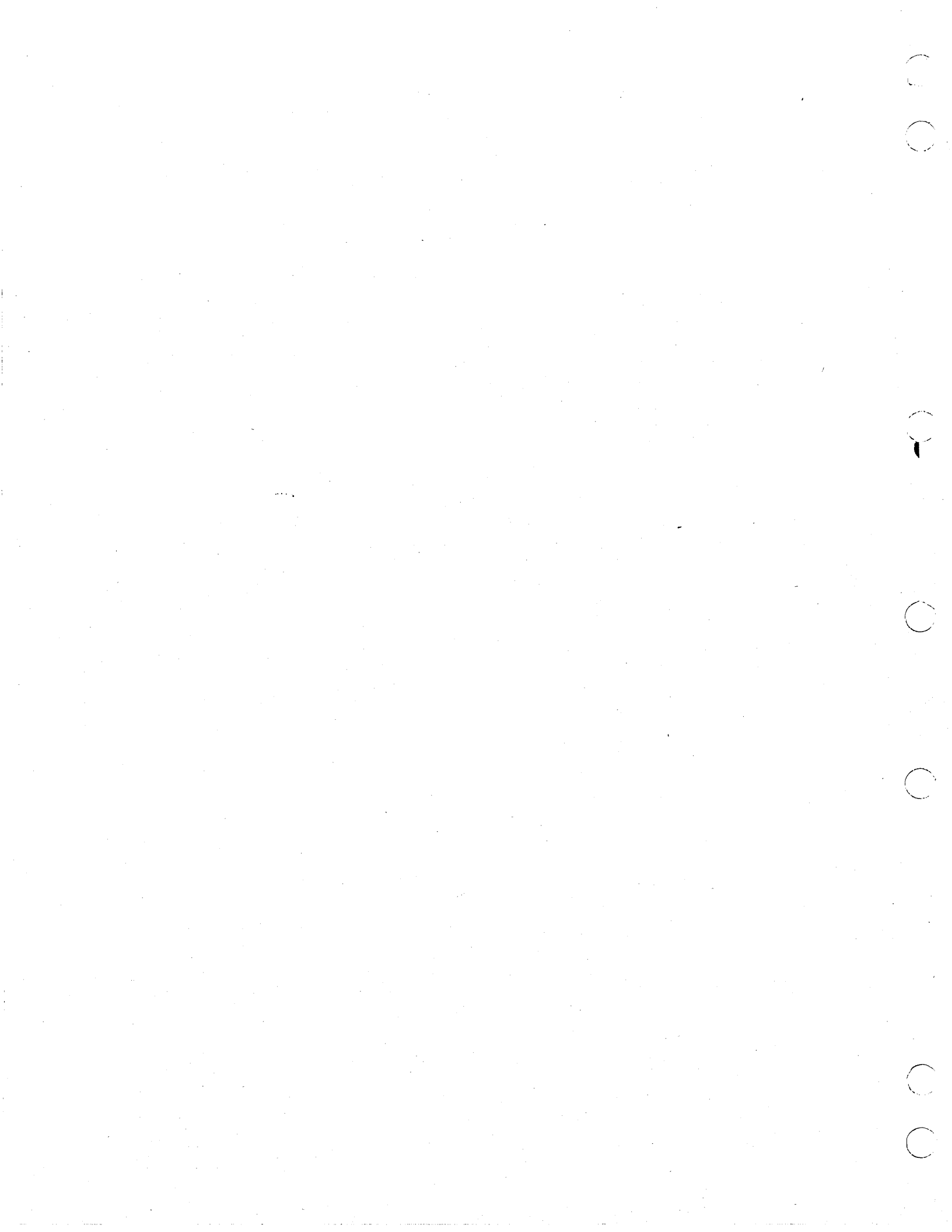
- a. With the workstation turned off, move the repeater cord back to the repeater port to which the failing workstation was connected.
- b. Log on to the operating system. Enter DCSL,* and press NEXT. Call up an application program that sends data to the workstation. If DCSL ERROR appears or no output was received, the repeater port is bad. Replace the repeater if necessary. If DCSL ERROR was displayed or stored in the day file, the DCSL EST entry must be turned on by the system console operator to reactivate DCSL before retrying the network.

007 4 Ensure that the application software is not the problem.

008 5 The workstation's internal DCSL cable may have problems. Disconnect the internal cable labeled DCSL from the front of the DCSL board and disconnect the repeater cable from the I/O panel connector labeled DCSL. Connect the repeater cable directly to the BNC connector on the front of the DCSL board. Now, try the DCSL link again by logging on, entering DCSL,* and pressing NEXT. Call up an application program that sends data to the workstation. If DCSL ERROR appears or no output was received, the DCSL internal cable is bad. Install a new internal DCSL cable. If DCSL ERROR was displayed or stored in the day file, the DCSL EST entry must be turned on by the system console operator before retrying the network.

3
D

	A	B	C	D	
	<u>1</u>	<u>1</u>	<u>1</u>	<u>2</u>	
009				<u>6</u>	If this is the only workstation on the site, log on to the operating system. Enter DCSL,* and press NEXT. Call up an application program that sends data to the workstation. Perform the following actions until DCSL ERROR is not displayed/stored in the day file and/or data is finally received. Have the system console operator turn on the DCSL EST entry to reactivate the DCSL network every time that DCSL ERROR is displayed/stored in the day file.
					<ul style="list-style-type: none"> a. Try a new DCSL PC board. b. Log off the operating system. Turn off the workstation. Install a new repeater cable. Turn on the workstation and log on to the operating system. Enter DCSL,* and press NEXT. Call up an application program that sends prepared graphics to the workstation. c. Turn off the workstation. Try a different repeater port. d. Try a different application program. e. Check the internal DCSL cable. (See step 008.)
010		<u>1</u>	<u>1</u>		Make the cable connection properly and securely.
011	<u>1</u>				Wearing an electrostatic wristwrap, install the board in the correct slot (A4). Log on to the operating system. Call up a program that sends data repeatedly to the workstation. If DCSL ERROR is displayed or no output is received, replace the DCSL board.



This appendix contains cable diagrams that show the pin assignments of all RS-232-C cables used with 790 workstations. These diagrams are in the following order:

- CYBER 120 Direct Connection Cables
- CYBER 120 Remote Connection Cables
- CYBER 170/CYBER 180 Direct Connection Cables
- CYBER 170/CYBER 180 Remote Connection Cables

All connectors are D-type. The pin count and male/female (M/F) configuration of connectors are noted at the top of the diagrams and cable information is at the bottom.

CYBER 120 DIRECT CONNECTION CABLES

	<u>790 HOST PORT</u>		<u>790 MODEM CABLE</u>		<u>GENDER CHANGER</u>		<u>DIRECT CABLE</u>		<u>IAC8 or IAC16 PORT</u>	
	9-Pin F	9-Pin M	25-Pin M	25-Pin F	25-Pin F	25-Pin M	25-Pin F	25-Pin M		
	9		9 Frame Ground 1	1	Fr. Gnd. 1		1 Frame Ground 1		1	
Transmitted Data	1	1	2	2	2	2	3	3	Received Data	
Received Data	4	4	3	3	3	3	2	2	Transmitted Data	
Request To Send	7	7	4	4	4	4				
Clear To Send	3	3	5	5	5	5				
Signal Ground	5	5	7	7	7	7	7	7	Signal Ground	
Data Carrier Detect	6	6	8	8	8	8	5	5	Clear To Send	
Data Terminal Ready	8	8	20	20	20	20				
						6				
							4	4	Request To Send	
							6	6	Data Set Ready	
							8	8	Data Carrier Detect	

Length: 25 feet
Supplied with 790

Not supplied

Length: 10/25 feet
Part No. 61409484/85
Equipment No. YA282-A/B
Product No. 773-10/25

CYBER 120 REMOTE CONNECTION CABLES

<u>790 HOST PORT</u>		<u>790 MODEM CABLE</u>		<u>MODEM PORT</u>	
9-Pin F		9-Pin M		25-Pin M	
	9	9	Frame Ground	1	1 Frame Ground
Transmitted Data	1	1		2	2 Transmitted Data
Received Data	4	4		3	3 Received Data
Clear To Send	3	3		5	5 Clear To Send
Signal Ground	5	5		7	7 Signal Ground
Data Carrier Detect	6	6		8	8 Data Carrier Detect
Request To Send	7	7		4	4 Request To Send
Data Terminal Ready	8	8		20	20 Data Terminal Ready

Length: 25 feet
Supplied with 790

<u>MODEM PORT</u>		<u>CDC MODEM CABLE</u>		<u>IAC 8 PORT</u>	
25-Pin F		25-Pin M		25-Pin F	
	1	1	Frame Ground	1	1
Transmitted Data	2	2		2	2 Transmitted Data
Received Data	3	3		3	3 Received Data
Request To Send	4	4		4	4 Request To Send
Clear To Send	5	5		5	5 Clear To Send
Data Set Ready	6	6		6	6 Data Set Ready
Signal Ground	7	7		7	7 Signal Ground
Data Carrier Detect	8	8		8	8 Data Carrier Detect
Data Terminal Ready	20	20		20	20 Data Terminal Ready

Length: 10/25/50 feet
Part No. 61409005/06/07
Equipment No. YA281-A/B/C
Product No. 776-10/25/50

CYBER 170/CYBER 180 DIRECT CONNECTION CABLES

790 HOST PORT

790 MODEM CABLE

GENDER CHANGER

DIRECT CABLE

CLA 2561-12

	9-Pin F	9-Pin M	25-Pin M	25-Pin F	25-Pin F	25-Pin M	25-Pin F	25-Pin M	
Frame Ground	9	9	Frame Ground 1	1	Fr. Gnd. 1	1	Frame Ground 1	1	
Transmitted Data	1	1	2	2	2	2	3	3	Received Data
Received Data	4	4	3	3	3	3	2	2	Transmitted Data
Request To Send	7	7	4	4	4	4	8	8	Data Carrier Detect
Clear To Send	3	3	5	5	5	5			
Signal Ground	5	5	7	7	7	7	7	7	Signal Ground
Data Carrier Detect	6	6	8	8	8	8	4	4	Request To Send
							5	5	Clear To Send
Data Terminal Ready	8	8	20	20	20	20	6	6	Data Set Ready
							6	20	20 Data Terminal Ready

Length: 25 feet
Supplied with 790

Not supplied

Length: 50 feet
Part No. 21937629
Supplied with 2561-1

CYBER 170/CYBER 180 REMOTE CONNECTION CABLES

790 HOST PORT

790 MODEM CABLE

MODEM PORT

	9-Pin F	9-Pin M	25-Pin M	25-Pin F	
	9	9	Frame Ground 1	1	
Transmitted Data	1	1	2	2	Transmitted Data
Received Data	4	4	3	3	Received Data
Clear To Send	3	3	5	5	Clear To Send
Signal Ground	5	5	7	7	Signal Ground
Data Carrier Detect	6	6	8	8	Data Carrier Detect
Request To Send	7	7	4	4	Request To Send
Data Terminal Ready	8	8	20	20	Data Terminal Ready

Length: 25 feet
Supplied with 790

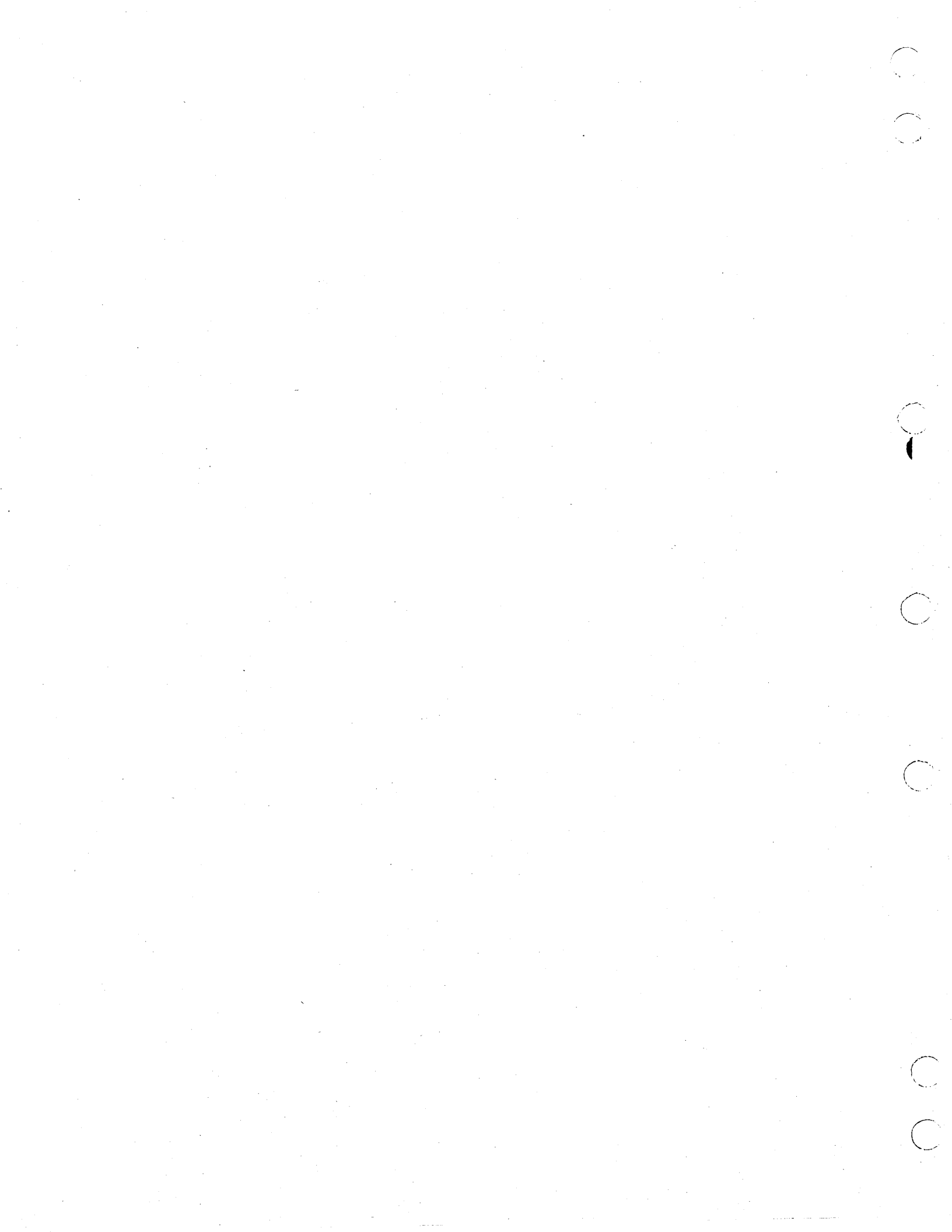
MODEM PORT

CDC MODEM CABLE

CLA 2561-11

	25-Pin F	25-Pin M	25-Pin F	25-Pin M	
	1	1	Frame Ground 1	1	
Transmitted Data	2	2	2	2	Transmitted Data
Received Data	3	3	3	3	Received Data
Request To Send	4	4	4	4	Request To Send
Clear To Send	5	5	5	5	Clear To Send
Data Set Ready	6	6	6	6	Data Set Ready
Signal Ground	7	7	7	7	Signal Ground
Data Carrier Detect	8	8	8	8	Data Carrier Detect
Secondary DCD	12	12	12	12	Secondary DCD
Secondary RTS	19	19	19	19	Secondary RTS
Data Terminal Ready	20	20	20	20	Data Terminal Ready
Ring Indicator	22	22	22	22	Ring Indicator

Length: 50 feet
Part No. 74876194
Supplied with 2561-1



This appendix provides the part numbers of field-replacable units for the RS-232-C interface (table B-1) and the DCSL Interface (table B-2). The list of suggested vendors (table B-3) that is supplied to customers for purchase of the DCSL main trunk cable and associated parts is also provided.

TABLE B-1. RS-232-C PART NUMBERS

790 Modem Cable	508389-01*
CY120 Direct Cable	61409484/85/86
CY120 Modem Cable	61409005/06/07
CY170 Direct Cable	21937629
CY170 Modem Cable	74876194
*Ramtek part number	

TABLE B-2. DCSL PART NUMBERS

DCSL Channel Interface	15633569
PPU Cable	19191600
DCSL Repeater	15633573
DCSL PC Board	510102-01*
DCSL Software Modification	D8XXP-069 (DSSP license) or H8XXP-069
*Ramtek part number	

TABLE B-3. SUGGESTED VENDORS FOR DCSL MAIN TRUNK CABLE PARTS*

PART	VENDORS	PART NUMBER
50-ohm cable	Times Wire and Cable Times Wire and Cable Belden Belden Malco Malco Phalo Phalo	AA4478 (FEP) AA4479 (PVC) 98880 (FEP) 9880 (PVC) 250-4314-0003 (FEP) 250-4315-0004 (PVC) 036-001-80145 (FEP) 036-001005633 (PVC)
Type N cable connector	Amphenol	82-4426-100X
Type N splice, straight	Amphenol	82-101-X
Type N splice, elbow	Amphenol	82-98
Insulated splice cover	Amphenol	31-5010

*Customer is responsible for purchase and installation.

COMMENT SHEET

MANUAL TITLE: 790 Workstation Communications Interfaces
Hardware Maintenance Manual

PUBLICATION NO.: 62950153

REVISION: B

NAME: _____

COMPANY: _____

STREET ADDRESS: _____

CITY: _____ STATE: _____ ZIP CODE: _____

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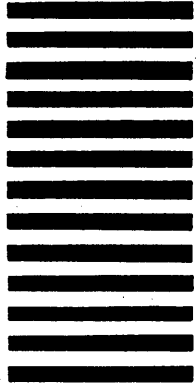
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