

Networks • Communication

Eric Paine

Communications Options Minireference Manual

Volume 4

Ethernet Devices

Digital Equipment Corporation

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CHAPTER 1 INTRODUCTION

The Communications Options Minireference series of manuals provide Field Service personnel (trained in Digital Equipment Corporation's communications options, DEC modem products, and Ethernet products) with easy-to-use references that focus on essential installation and maintenance procedures.

This series of manuals is a replacement for and supersedes the *Communications Options Minireference Manual* (EK-CMINI-RM). All of the information contained in the *Communications Options Minireference Manual* is included. Information concerning most of Digital Equipment Corporation's new communication options, modem products, and Ethernet products has also been included. These manuals will be updated as new communications options, modem products, and Ethernet products are produced.

To effectively use these reference manuals and to quickly locate the desired information, it is important that the user be aware of the organization and content of the various manuals.

- Volume 1 contains generic communications information such as: cables, test connectors and terminators, special test programs, and special tools and equipment. Volume 1 also contains information concerning installation and maintenance of some of the communications options.
- Volume 2 contains only communications options. Communications options are presented in alphanumerical order beginning in Volume 1 and continuing into Volume 2.
- Volume 3 contains information concerning Digital Equipment Corporation's modem products.
- Volume 4 contains information concerning installation and maintenance of Ethernet products. Chapters include Ethernet Devices, Cables, Special Tools and Test Equipment, Accessories, and Network Troubleshooting. Provisions are made for adding information as it becomes available.

Option-specific data is located alphanumerically by option designation; that is, DECSA followed by DELNI through H4000.

For consistency and familiarity, the material contained in each option-specific section is organized and presented in the same format and sequence; installation data (which includes installation flowcharts, module outline drawings, device/vector address selection, and various other switch/jumper selectable options) is presented first. This material is followed by cabling diagrams, diagnostics (PDP-11 diagnostics, VAX-11 diagnostics, or both), maintenance aids, and Tech Tip/FCO index.



CHAPTER 2 ETHERNET DEVICES

2.1 INTRODUCTION

This chapter contains all information needed to configure, install, and test a variety of Digital Equipment Corporation's Ethernet devices.

The purpose of this chapter is to provide Field Service personnel (trained in servicing Ethernet devices) with a quick reference guide, highlighting important factors concerning installation and maintenance. The information contained in these sections is, therefore, short and to the point. If more detailed information is needed, reference should be made to microfiche, the technical manual, or other reference material concerning that particular device.

Each specific section contained in this chapter is organized in alphanumeric order.



DECSA COMMUNICATIONS SERVER

General Description

The DECSA communications server is an Ethernet-based communication subsystem for local area networks. The four basic versions of the communications server are:

- DECSA-CA Terminal server – supports up to 16 lines for VT100-like asynchronous terminals (see note).
- DECSA-DA Terminal server – supports up to 32 lines for VT100-like asynchronous terminals (see note).
- DECSA-EA DECnet router/X.25 gateway – supports up to 8 lines for interconnection between DECnet and X.25 networks.
- DECSA-FA DECnet/SNA gateway – supports up to 2 lines for interconnection between DECnet networks as well as between DECnet and SNA networks.

NOTE

The terminal server configurations provide the following features.

- Asynchronous terminal support
- Modem control
- Auto baud detection
- Split-speed terminal operation (up to 19.2K bits/s full-duplex)

Reference Documentation

Refer to the following documents for more information on the DECSA communications server.

- | | |
|---|-------------|
| • <i>Ethernet Communications Server Operations and Maintenance Guide</i> | EK-DECSA-OP |
| • <i>Ethernet Communications Server Site Preparation and Planning Guide</i> | EK-DECSA-SP |
| • <i>Ethernet Communications Server Installation Guide</i> | EK-DECSA-IN |
| • <i>Ethernet Communications Server Technical Description</i> | EK-DECSA-TD |
| • DECSA Print Set | MP01385 |
| • DECSA Microfiche | EP-DECSA-OP |

DECSA Communications Server Hardware Components

The following hardware components make up the DECSA communications server.

- PDP-11/24 processor
- Memory module (512K bytes or 1M byte)
- DEUNA Ethernet to UNIBUS adaptor

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- Console/bootstrap/terminator (CBT)
- Protocol assist modules (PAM) set
- Line cards (see the following table)
- H7200 and H7211 power supply modules

The following table describes the line cards and data types supported by the different versions of the DECSA communications server.

Table 1 Line-Card Description

DECSA Version	Line Card Supported	Module Number	Recommended Cable	Module Description
DECSA-CA DECSA-DA	DCSAX-LC	M3102	BC22D BC22E	Two line asynchronous up to 19.2K bits/s each full-duplex, RS-232-C/CCITT V.24.
DECSA-EA DECSA-FA	DCSAX-LA	M3100	BC17C BC17D	One line synchronous up to 19.2K bits/s full- or half-duplex, RS-232-C/CCITT V.24.
DECSA-EA DECSA-FA	DCSAX-LB	M3101	BC17E	One line synchronous up to 500K bits/s full- or half-duplex, CCITT V.35.

NOTE

The following cables are recommended for use with RS-232-C/V.24 configurations.

- BC22D – Asynchronous null modem cable
- BC22E – Asynchronous modem extension cable
- BC17D – Synchronous null modem cable
- BC17C – Synchronous modem extension cable

The BC17E synchronous modem cable is recommended for use with V.35 configurations.

DECSA Communications Server Software Components

The following software components are included with any DECSA configuration.

- RSX-11S operating system
- NS: QIO\$ interface (logical link facility)
- NX: QIO\$ interface (direct line access facility)
- System level interface
- Initialization task
- PAM device driver
- DEUNA device driver
- Network management
- Down-line load/up-line dump across the Ethernet

- Remote console support (console carrier only)
- Loadable diagnostic image (LDI)

The following table indicates which additional software is required for DECSA-EA and DECSA-FA DECnet routers and/or gateways.

Table 2 Additional Software Requirements for DECnet Routers

Software Package	Configuration	
	DECSA-EA	DECSA-FA
Looper/mirror	X	X
Line watcher	X	X
RSX extension package (XEP)	X	X
VAX X.25/X.29 extension package (XEP)	X	
DECnet/SNA gateway software		X

System Placement

The DECSA system should be placed on a table that supports at least 57.0 kg (125.7 lbs).

CAUTION

The DECSA system weighs approximately 50 kg (110.25 lbs). Three people are required to lift or move the system.

Power Requirements

The operating range of the DECSA system is contained in the following table.

Table 3 DECSA Power Requirements

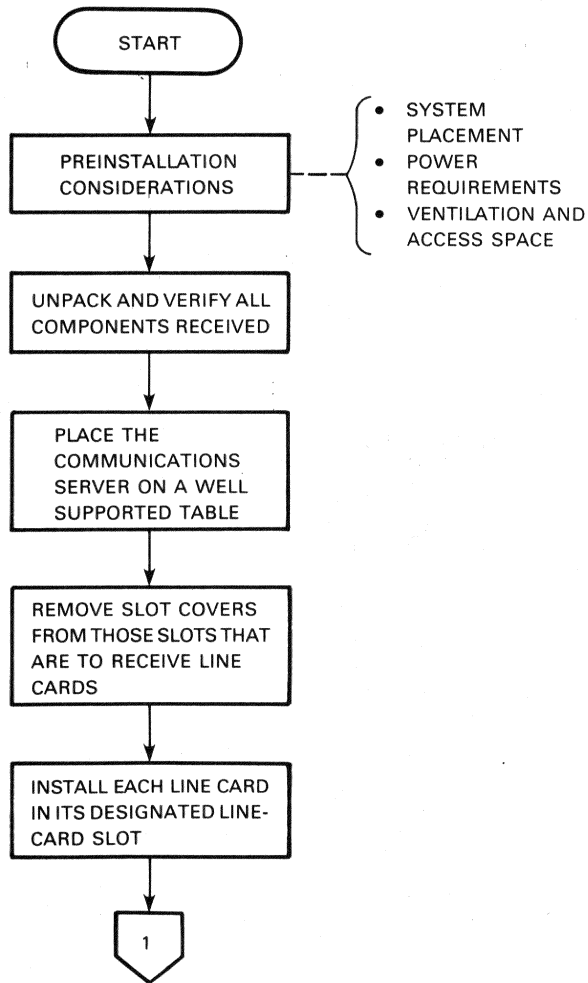
Nominal Voltage Required	Voltage Range	Current*	Frequency
120 Vac	90-128 (rms)	7.0	47-63 Hz
240 Vac	180-256 (rms)	3.5	47-63 Hz

*When operating at nominal voltage specified.

DECSA INSTALLATION

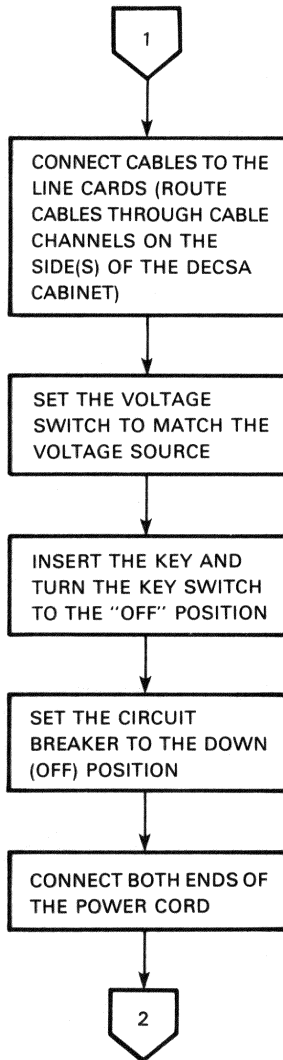
Installation Flow Diagram

The following flow diagram illustrates the procedures for installing and testing the DECSA communications server.



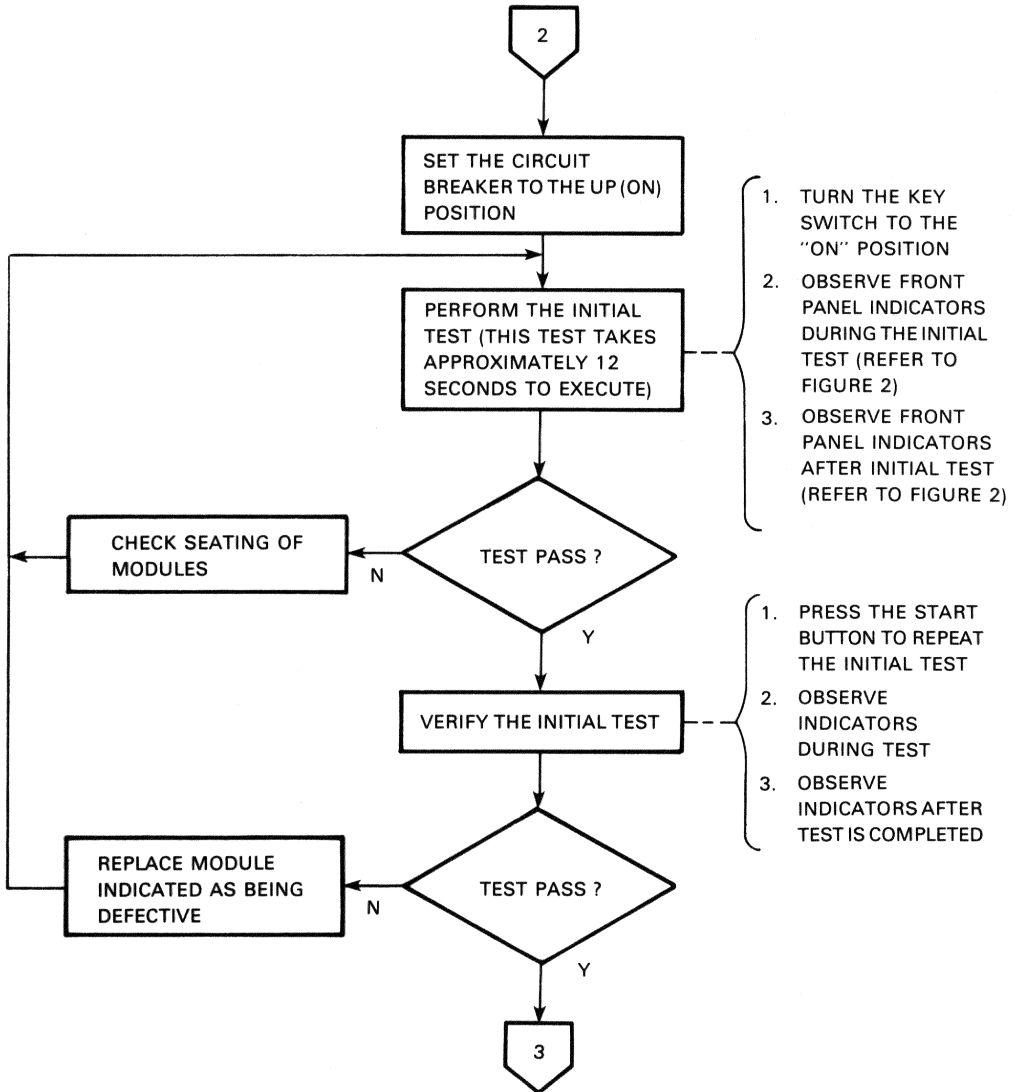
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Figure 1 Installation Flow Diagram (Sheet 1 of 5)



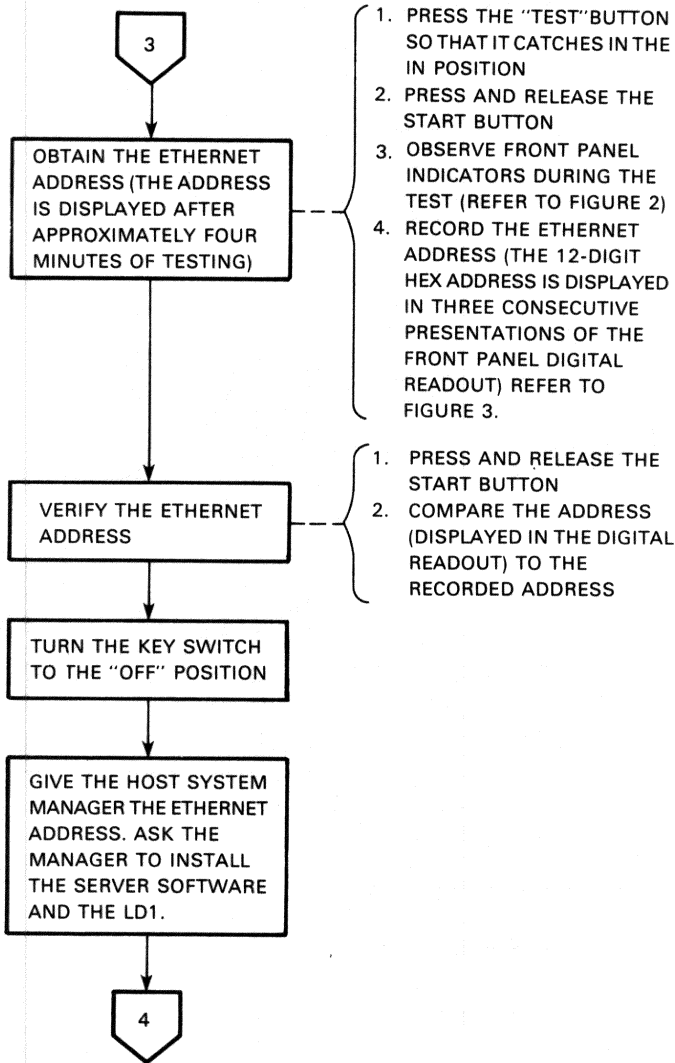
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Figure 1 Installation Flow Diagram (Sheet 2 of 5)



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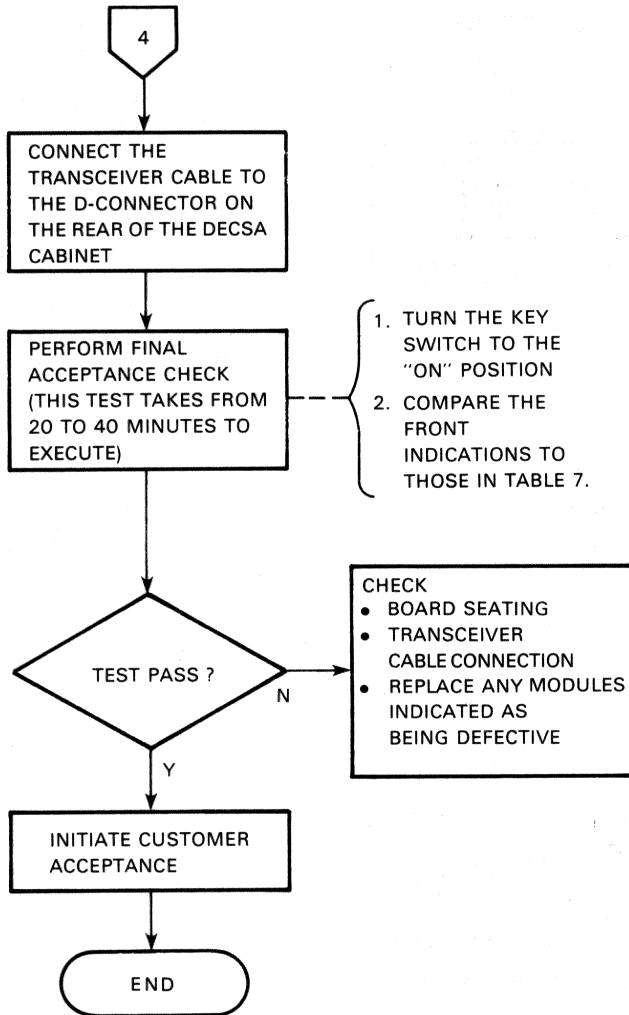
Figure 1 Installation Flow Diagram (Sheet 3 of 5)



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Figure 1 Installation Flow Diagram (Sheet 4 of 5)

DECSA INSTALLATION

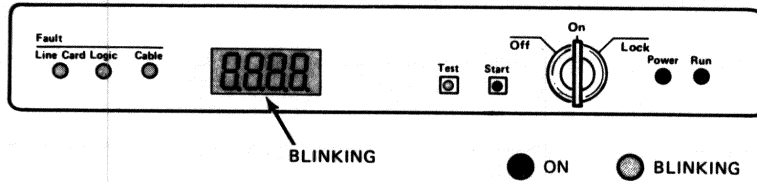


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Figure 1 Installation Flow Diagram (Sheet 5 of 5)

Initial Test Indications

The following figure describes the expected initial test indications that are displayed by the front panel indicators.



(1) Indicator	(2) Color	(3) While Test Is Running*	(4) After Test Completion
Line Card Fault	Red	Blinks	Off
Logic Fault	Red	Blinks	On†
Cable Fault	Red	Blinks	Off
Segment Display 1	Red	Blinking 8.	_ Underscore On
Segment Display 2	Red	Blinking 8.	_ Underscore On
Segment Display 3	Red	Blinking 8.	0
Segment Display 4	Red	Blinking 8.	2
Test	Red	Blinks	Off
Start	Red	On	On
Power	Green	On	On
Run	Green	On	Off
Line Card Light(s)▲	Red	On	On

* Blinking rates: 3 per second for short version of Initial Test; 1 per second for long version of Initial Test.

▲ Located on the individual line cards.

† Expected indication: Communications Server NOT connected to Ethernet yet.

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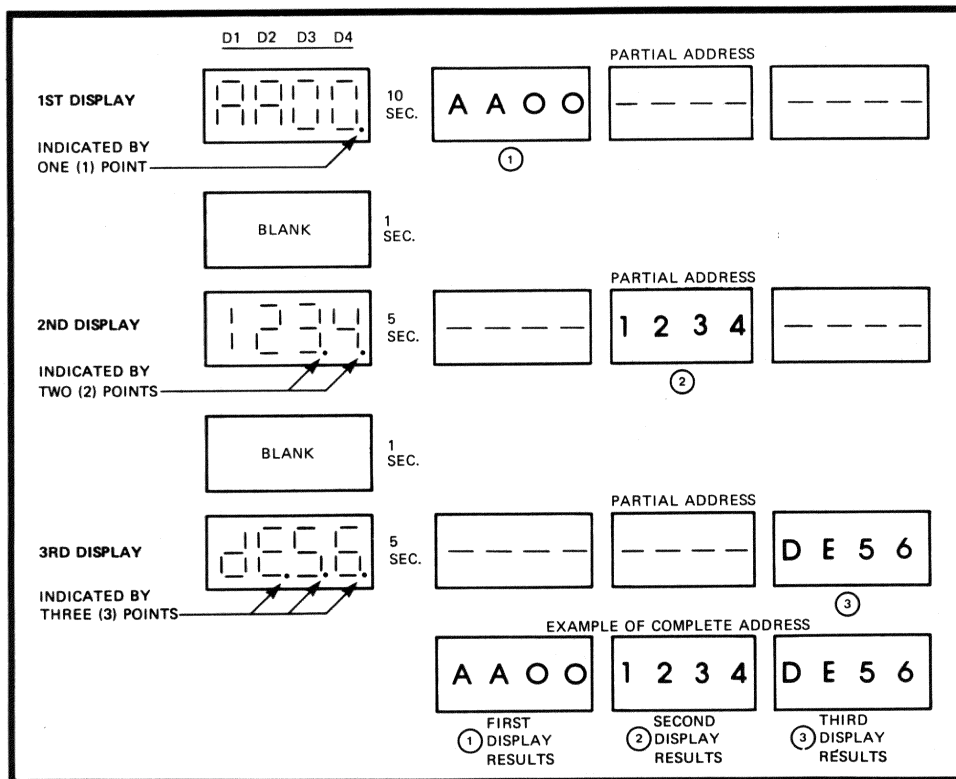
Figure 2 Expected Initial Test Front Panel Indications

DECSA INSTALLATION

Ethernet Address Display

The following figure provides an example of an Ethernet address display.

1. The first display (lasting ten seconds) provides the first four characters of the address.
2. The second display (lasting five seconds) provides the second four characters of the address.
3. The first display (lasting five seconds) provides the last four characters of the address.



NOTE:

THE CHARACTERS SHOWN HERE ARE EXAMPLES ONLY.

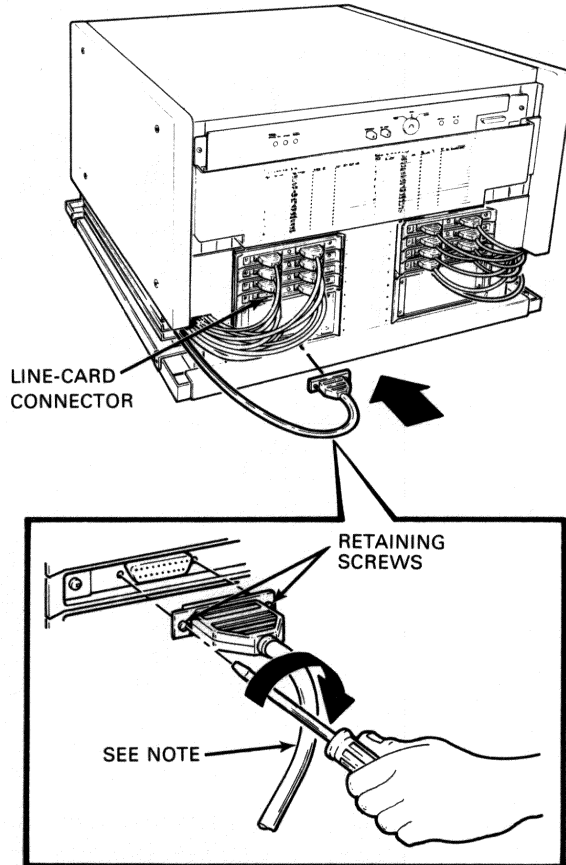
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Figure 3 Example of an Ethernet Address Display

DECSA Cabling

This section provides information for connecting cables to the communications server.

The following figure illustrates connecting a cable to a line card.



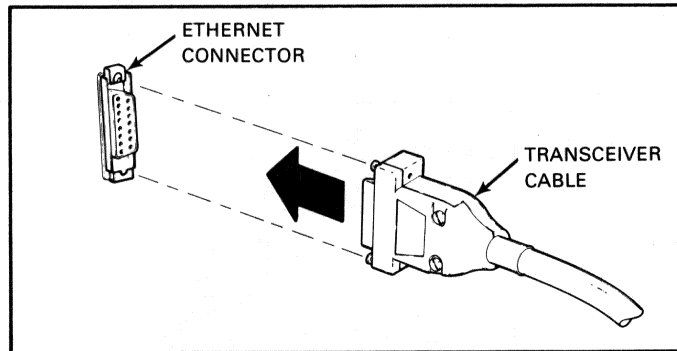
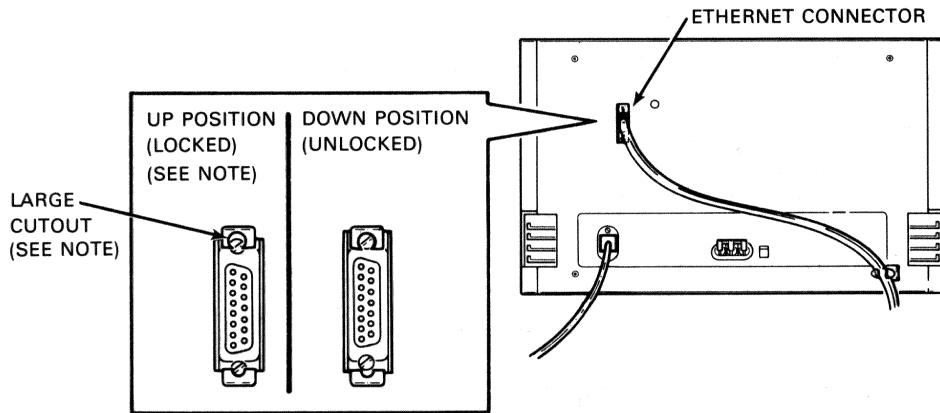
NOTE:
USE CABLES LISTED IN TABLE 1. OTHER CABLES (THOSE WITH TWO-PIECE CONNECTOR HOUSINGS) USE MORE SPACE AND MAY REQUIRE A BC17L ADAPTOR CABLE.

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Figure 4 Connecting Cables to Line Cards

DECSA CABLING

The following figure illustrates connecting and locking a transceiver cable to the Ethernet connector on the rear of the server.



NOTE:
ON SOME SLIDE-LATCH ASSEMBLIES THE DOWN POSITION MAY LOCK THE CABLE IN PLACE. IN EITHER CASE, THE LOCK ENGAGES WHEN THE SLIDE LATCH IS PUSHED IN THE DIRECTION OF THE LARGE CUTOUT IN THE LATCH.

MKV84-1603

Figure 5 Connecting a Transceiver Cable to the Server

DECSA Diagnostics

This section contains the following tables.

- Self-Test and Diagnostics Descriptions
- Locally Initiating Diagnostics
- Remote Execution of Diagnostics
- Successful Initial Test (Short and Long Versions) Indications
- Successful Loadable Diagnostic Image (LDI) Indications
- Initial Test (Short and Long Versions) Fault Indications
- LDI Fault Indications
- Logic Module Slot Numbers

Diagnostic Descriptions

The following table briefly describes the diagnostics for the DECSA communications server. The diagnostics are:

- Initial test (short version)
- Initial test (long version)
- Loadable diagnostic image (LDI)

Table 4 Self-Test and Diagnostics Descriptions

Hardware or Function Tested	Initial Test Short Version (12 seconds)	Initial Long Version (4 or 8 minutes)*	LDI (Loadable Diagnostic Image) (20 or 40 minutes)*
Lamps and displays	X	X	
PDP-11/24 processor		X	X
Memory		X	X
Console/bootstrap/terminator (CBT)		X	X†
Protocol assist modules (PAMs)			X†
DEUNA port module		X	X†
DEUNA link module		X	X†
Display Ethernet address		X	
Line cards			X
External loopback‡			X

* The longer time is for testing the DECSA-FA (with 1M byte memory). The shorter time is for testing other DECSA versions that have 512K bytes of memory.

† The LDI runs a more extensive test than the initial test.

‡ Loopback is via line-card test connectors.

DECSA DIAGNOSTICS

Running Initial Tests and Diagnostics

Initial tests and diagnostics may be initiated:

1. Locally by using the front panel controls as shown in the following table.
2. Remotely (from a DECnet host on the same Ethernet network):
 - a. By sending an INIT signal over the Ethernet, or
 - b. By starting a down-line load of software.

Table 5 Locally Initiating Diagnostics

Desired Operation	Front Panel Controls			What the Server Does			
	Key	"TEST" Button	"START" Button	Initial Test Short Version	Initial Test Long Version	Load and Execute LDI	Load and Run Server Software
Run Initial Test*	Turn ON †	OUT	—	X			X
Restart/Rerun Initial Test*	ON	OUT	Press and Release †	X			X
Run Full Diagnostics	Turn ON †	IN ††	—		X	X	X
Restart/Rerun Full Diagnostics	ON	IN ††	Press and Release †		X	X	X

- * These procedures are also used to "start" the DECSA server.
- † Set the other controls if necessary, then perform this action.
- †† Return "TEST" button to OUT position after test completes.

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Running DECSA Diagnostics from a Remote Host

The DECSA LDI may be run from a remote host. The following steps represent a typical sequence from an RSX host.

NOTE

The <CR> symbol used in the following examples denotes typing a carriage return.

1. Load the "target" DECSA system with the LDI.

The image is found in the NETUIC on the system volume (LB:) and is named as follows:

- a. Terminal server/router/SNA configurations – CSVLDI.SYS
- b. X.25 configurations – CSVDIAG.SYS

The following is an example of the commands needed to load a DECSA node "xxx" with a service password of "yyy".

>SET /NETUIC [100,54]<CR> ; netuic for this system is [100,54]

>NCP LOAD NODE xxx FROM LB:[100,54]CSVLDI.SYS SERVICE PASS yyy<CR>

NOTE

After approximately one minute the > prompt should be displayed indicating that the LDI is loaded. Otherwise a timeout error message is displayed.

2. Connect the remote console (CONSOLE CARRIER) with the following command.

>CCR NODE xxx<CR>

The system should respond with:

[REMOTE CONSOLE RESERVED . . .]

NOTE

If the [REMOTE CONSOLE RESERVED . . .] prompt does not appear, a possible problem exists in making the connection. The connection attempt eventually aborts (after several minutes) and control of the terminal is returned to the host system.

3. Type <CR> in response to the [REMOTE CONSOLE RESERVED . . .] prompt. The system should respond with "PLU>" (Plumon prompt).
4. Enter any of the commands from the following table.

Table 6 Remote Execution of Diagnostics

Command	Diagnostic
RUN CIDSAA	Runs PAM Repair Diagnostic 1
RUN CIDSBA	Runs PAM Repair Diagnostic 2
RUN CIDSCA	Runs LINE CARD Repair Diagnostic 1
RUN CIDSDA	Runs LINE CARD Repair Diagnostic 2
RUN CIDSEA	Runs the CBT Repair Diagnostic
RUN SYSEXE	Runs the DECSA systems exerciser
AUTO	Starts/restarts the default script
HELP	Lists the valid commands

Any DRS (diagnostic runtime services) commands may be entered in response to the DR> prompt with the following exceptions.

- PRINT
- ^ Z (Control Z)
- ^ C (Control C)

DECSA DIAGNOSTICS

The following commands control the console carrier.

- \wedge D (Control D) – disconnects the link.
- \wedge B (Control B) – halts the DECSA PDP-11/24 CPU and enters MICRO ODT.

NOTE

If a DRS start command (STA to the DR> prompt) is given after repair-level diagnostics finish executing, the remote console may UN-LOAD. The following sequence may be used to reconnect the remote console.

1. Enter \wedge D (Control D) which disconnects the console carrier.
2. Enter the “CCR NODE...” command to reconnect the console (the CCR command previously described in Step 2 of this procedure).

Diagnostic Results

The results of all DECSA diagnostics are indicated by the front panel display and lights of the CBT (console/bootstrap/terminator).

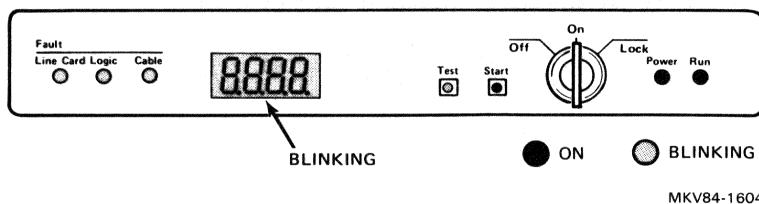


Figure 6 CBT Display During Test

Successful Initial Test Indications

The following table describes the front panel LED and digital readout indications during and after both versions of the initial test.

Table 7 Successful Initial Test (Short and Long Versions) Indications

DECSA State	Line Card	Logic	Cable	D1	D2	D3	D4	Test	Start	Power	Run
During Initial Test	*	*	*	8*	8*	8*	8*	ON	ON	ON	ON
After Initial Test†	OFF	OFF	OFF	‡	‡	‡	‡	ON	ON	ON	OFF

* Blinking rates = 3 per second for short version of initial test; 1 per second for long version of initial test.

† In the long (4 - 8 minute) version of the initial test, this display occurs after the Ethernet address is displayed.

‡ After either version of the initial test these displays are blank. An "L" is displayed when the LDI and/or server software load process begins.

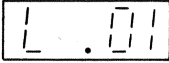
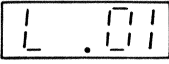
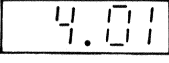
DECSA DIAGNOSTICS

Successful LDI Indications

The following table describes the front panel digital readout indications during loading and running of the LDI and server software.

Note that line-card lights (located on each line card) should always be ON prior to initialization by the server software.

Table 8 Successful LDI Indications

Event	Approximate Duration	Indication
Loading LDI	2 minutes	 *
Running LDI	20 to 40 minutes	A series of changing numbers is displayed. †
Loading Server Software	2 minutes	 *
Running Server Software	Until server is turned OFF	A regular repeating light pattern in the digital readout. Alternating with  node address † †

* The 3rd and 4th digits of the digital readout change as the LDI is loaded.

† The number of the test being run is displayed. More information on the test being run may be obtained by connecting a 1200 baud / RS-232-C terminal to the maintenance panel connector of the DECSA communications server.

† † A node address is not displayed by the LAT terminal server. Otherwise, the node address is indicated by three consecutive displays. An example of a displayed node address (40125) is:

1. 1st display (5 seconds) 4.01
2. 2nd display (3 seconds) 4.012
3. 3rd display (2 seconds) 0125

Individual node addresses vary.

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Fault Indications

If the DECSA communications server fails any diagnostic (including the short or long version of the initial test), the fault indications are displayed until:

- The DECSA server is restarted, or
- The power is turned OFF.

Initial Test Fault Indications – The following table shows front panel indications for faults found during either version of the initial test.

Table 9 Initial Test (Short and Long Versions) Fault Indications

Line Card	Logic	Cable	D1	D2	D3	D4	Indication
ON			___*	___*	(01 to 16)		Line-card slot number
	ON		___*	___*	(01 to 10)		Logic module slot number
		ON	___*	(001 to 999)			Cable fault†

*Underscores (___) in the digital readout indicate that the displayed results are from the initial test.

†A cable fault was detected. Normal troubleshooting equipment such as a TDR (time domain reflectometer) should be used to locate the fault. The numbers displayed in the digital readout reflect internal logic and should be disregarded.

DECSA DIAGNOSTICS

LDI Fault Indications – The following table shows front panel indications for faults found during execution of the LDI.

NOTE

When a failure is detected by the LDI, the slot number of the defective module is displayed. Three module choices are given because the DECSA architecture does not allow the LDI to isolate the failure to a single module. The "1st choice" module should be swapped first, the "2nd choice" module swapped second, and so on.

Table 10 LDI Fault Indications

Line Card	Logic	Cable	D1	D2	D3	D4	Indication
ON			1		(01 to 16)		Line-card slot number* 1st choice
ON			2		(01 to 16)		Line-card slot number* 2nd choice
ON			3		(01 to 16)		Line-card slot number* 3rd choice
	ON		1		(01 to 10)		Logic module slot number† 1st choice
	ON		2		(01 to 10)		Logic module slot number† 2nd choice
	ON		3		(01 to 10)		Logic module slot number† 3rd choice
		ON			(001 to 999)		Cable fault‡

*Line-card slot numbers are located on the front panel of the DECSA system. The (red) LED on a defective line card should be ON.

†Logic module slot numbers are listed in Table 11.

‡A cable fault was detected. Normal troubleshooting equipment such as a TDR (time domain reflectometer) should be used to locate the fault. The numbers displayed in the digital readout reflect internal logic and should be disregarded.

Logic Module Slot Numbers – The following table shows logic module slot numbers referred to by the initial test and the LDI.

Table 11 Logic Module Slot Numbers

Slot Number	Module
1	M3112 CBT
2	M7793 Ethernet-to-UNIBUS adaptor (LINK module)
3	M7792 Ethernet-to-UNIBUS adaptor (PORT module)
4	G7273 grant card
5	M8743-AA or M8743-BA memory
6	M3110 PAM 1 module 1
7	M3111 PAM 1 module 2
8*	M3110 PAM 2 module 1 (optional)
9*	M3111 PAM 2 module 2 or G7273 grant card
10	M7133 PDP-11/24 CPU

*For a 32-line terminal server, slots 8 and 9 contain M3110 and M3111 PAM modules respectively. For a 16-line terminal server, a DECnet router server, a DECnet router/X.25 gateway, and a DECnet/SNA gateway, slot 8 is unused and slot 9 contains a G7273 grant card.

DECSA MAINTENANCE AIDS

Required Equipment

The following extender modules may be required to perform some maintenance procedures described in this manual.

- W900 - Dual-height extender module
- W987 - Quad-height extender module
- W904 - Hex-height extender module

The DECSA controlled distribution (CD) repair kit contains only those modules that are unique to the DECSA server. Those modules include:

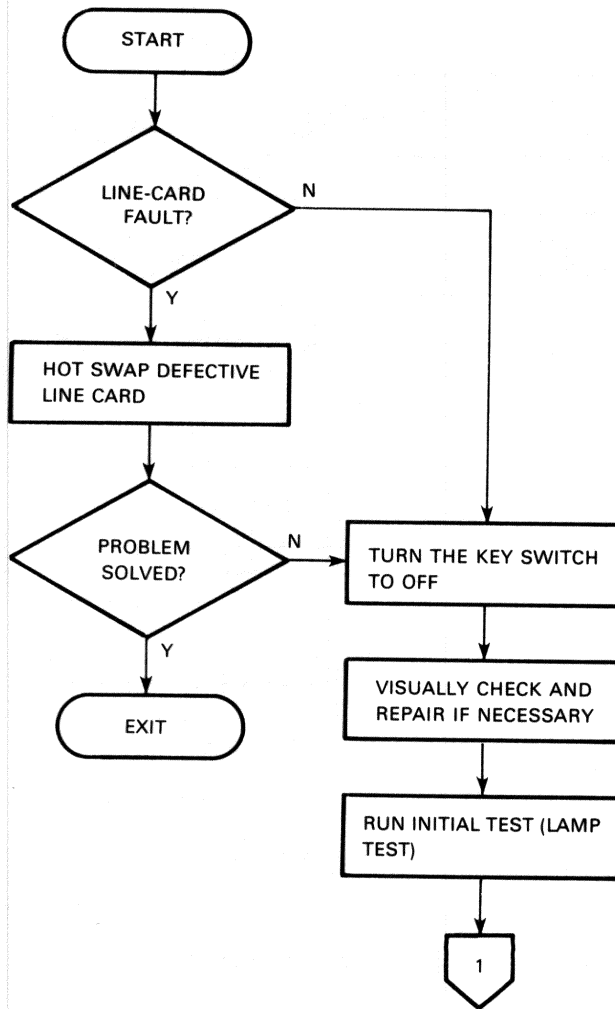
- Line cards
- PAM modules
- CBT modules
- 512K byte memory modules

The following modules are not included in the DECSA CD repair kit. However, these modules should be available at the DIGITAL Field Service Office.

- DEUNA modules
- CPU module
- 1M byte memory module
- +5 V regulator
- ± 15 V regulator

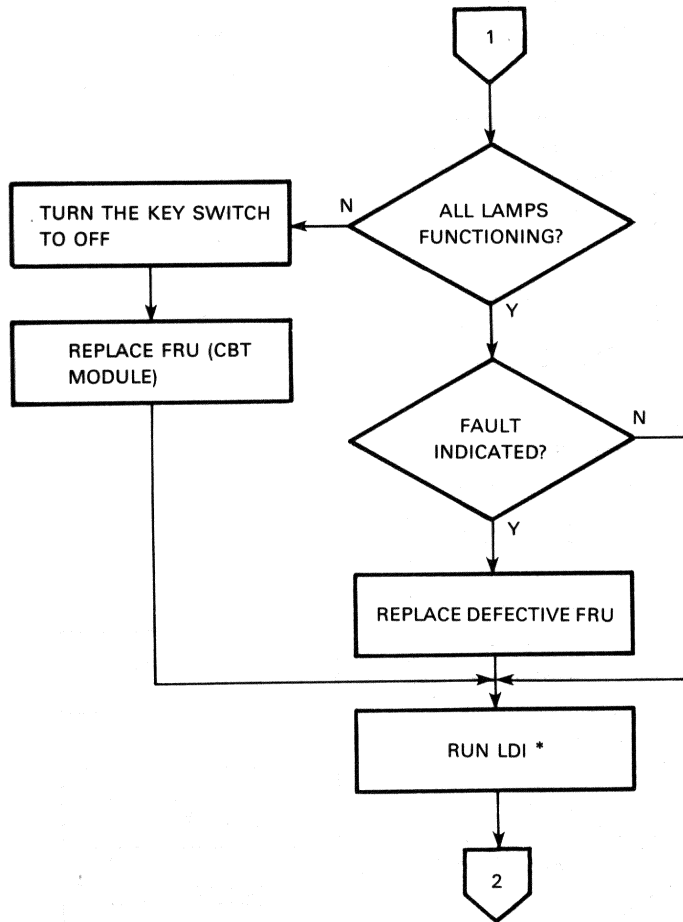
Troubleshooting

The following flow diagram provides a typical troubleshooting sequence.



MKV84-1605

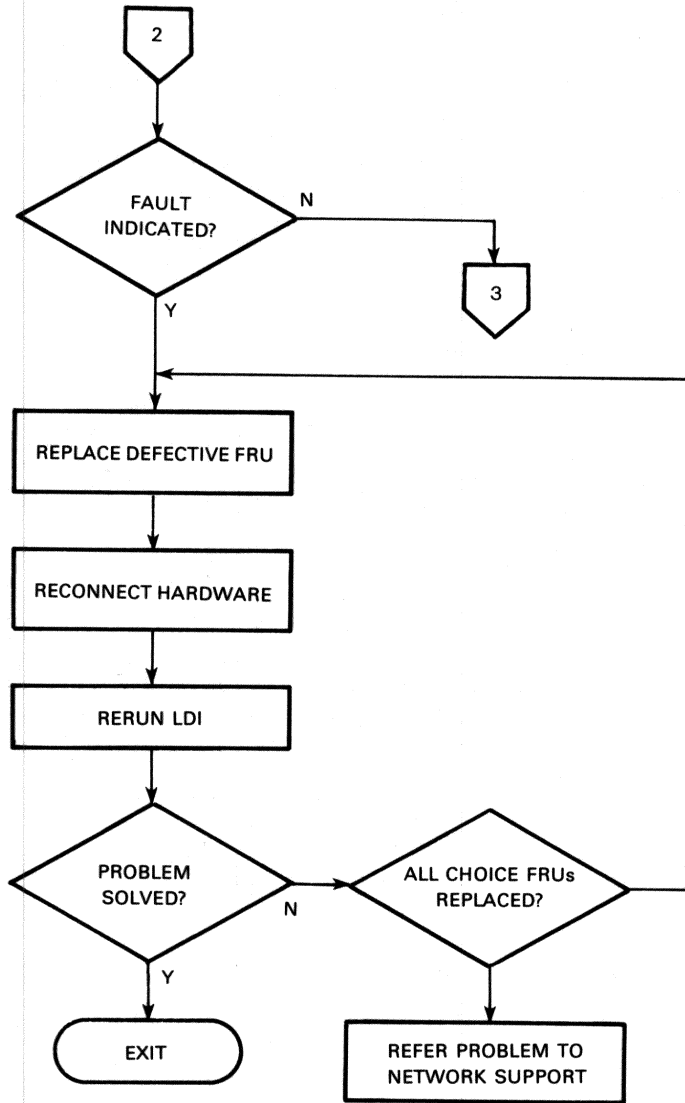
Figure 7 Troubleshooting Flow Diagram (Sheet 1 of 5)



* LDI INDICATES FULL DIAGNOSTIC PROCEDURE

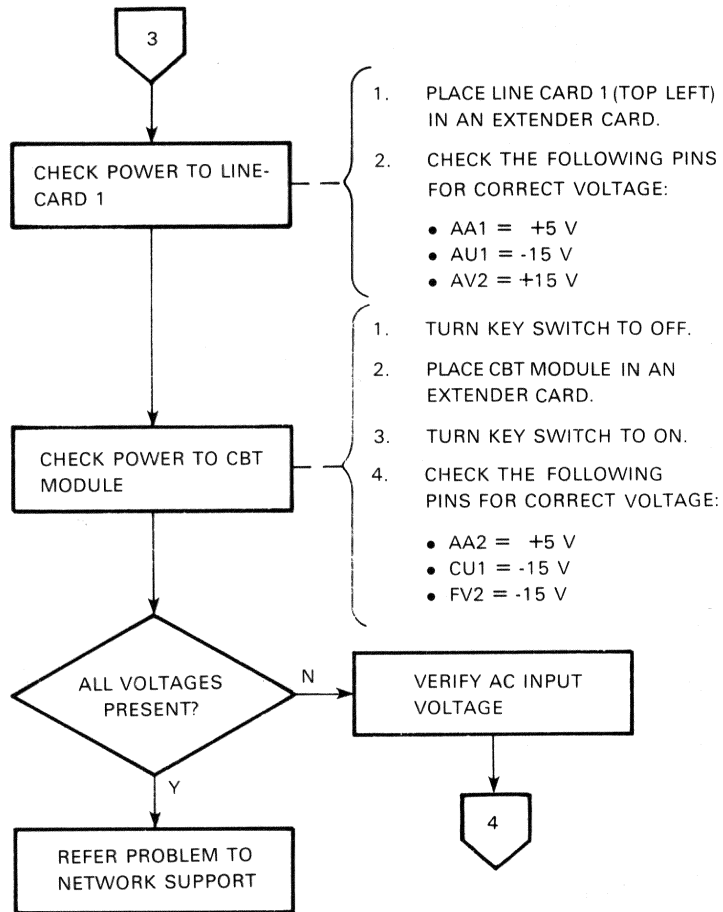
MKV84-1606

Figure 7 Troubleshooting Flow Diagram (Sheet 2 of 5)



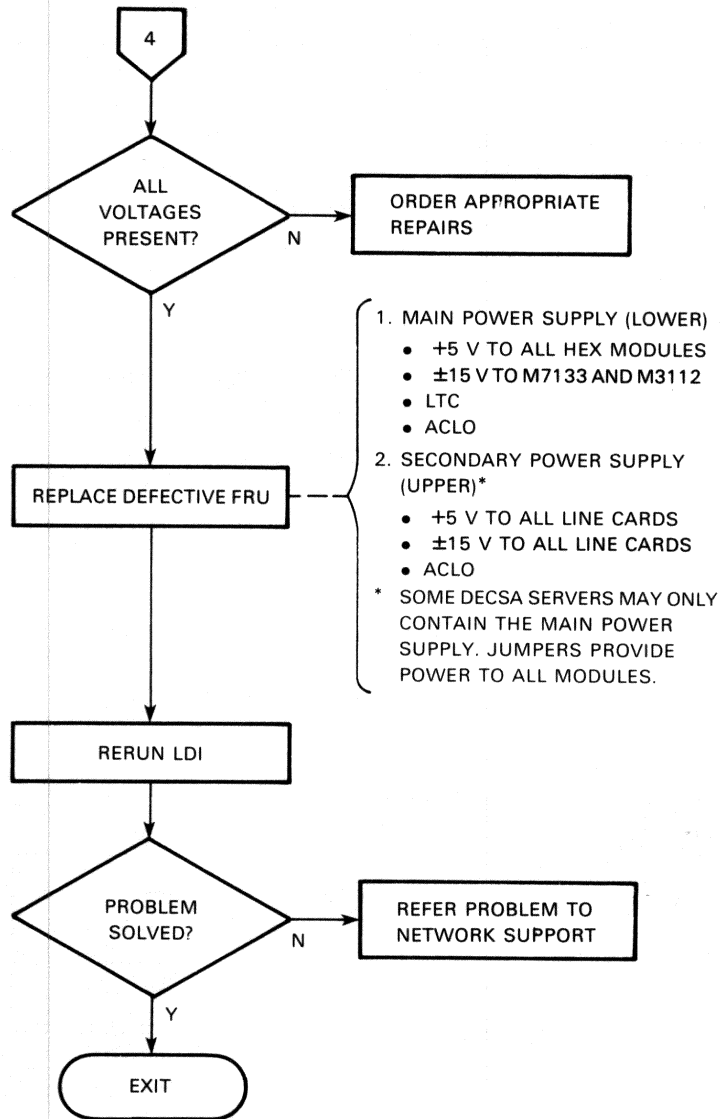
MKV84-1607

Figure 7 Troubleshooting Flow Diagram (Sheet 3 of 5)



MKV84-1608

Figure 7 Troubleshooting Flow Diagram (Sheet 4 of 5)



MKV84-1609

Figure 7 Troubleshooting Flow Diagram (Sheet 5 of 5)

DECSA MAINTENANCE AIDS

Module Replacement and Upgrades

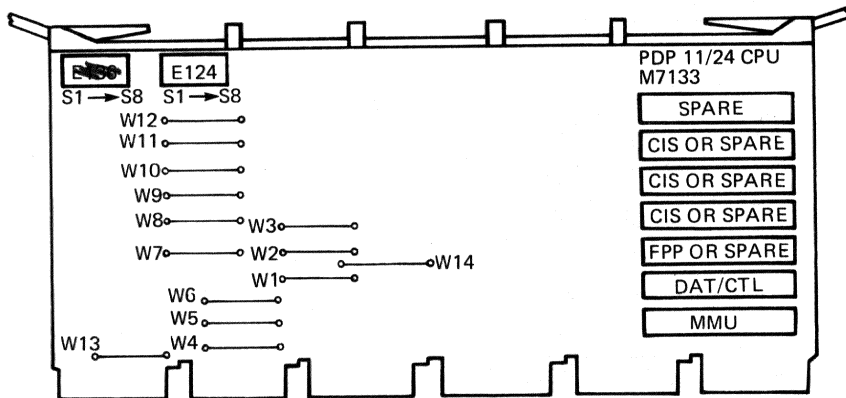
The following modules may require setting DIP switches, checking/setting jumper configurations, or changing a PROM.

- M7133 – PDP-11/24 CPU
- M7792 – DEUNA (port module)
- M7793 – DEUNA (link module)
- M8743-AA – 512K byte memory
- M8743-BA – 1M byte memory

M7133 PDP-11/24 CPU Module Replacement – The switch and jumper configurations are outlined in the following table and figure.

Table 12 M7133 (PDP-11/24) CPU Switch and Jumper Configurations

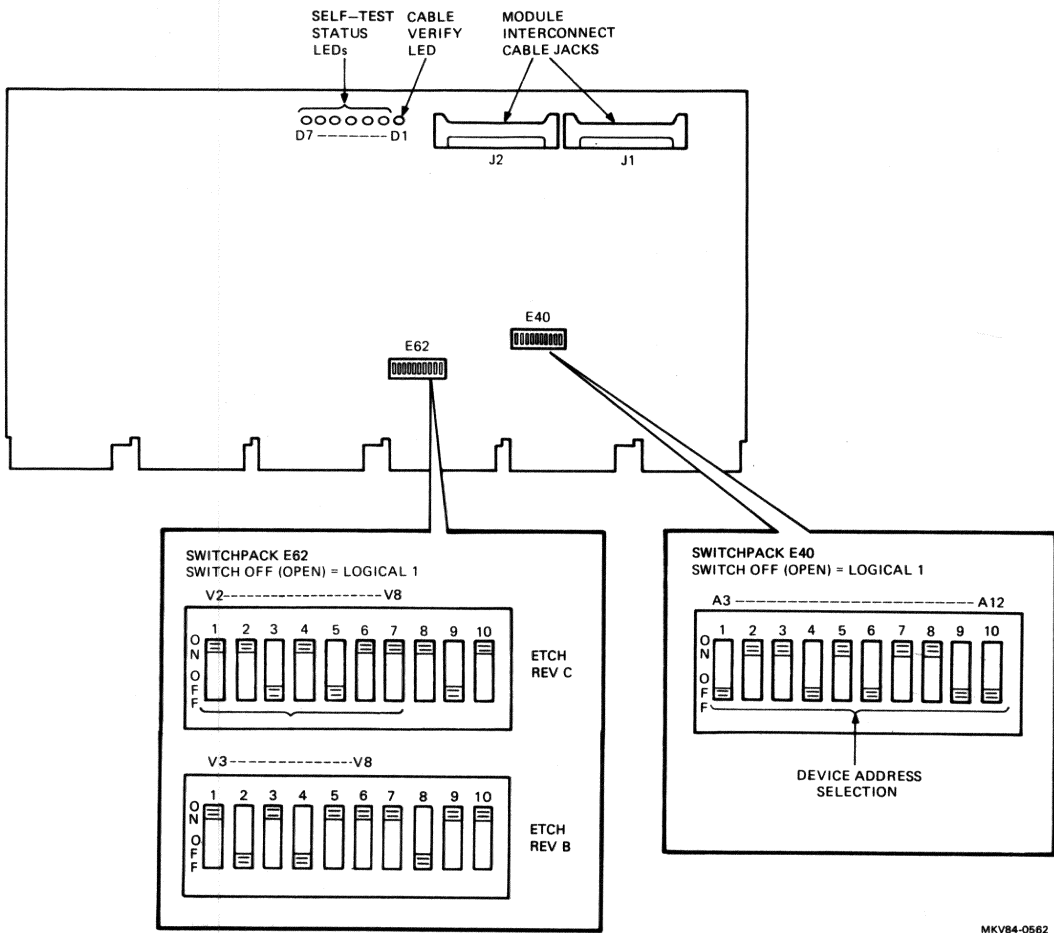
Switchpack or Jumper	OFF Jumper IN	ON Jumper OUT
E135	1,5	All others
E124	1,3,5,7,8	2,4,6
Jumpers W1 – W14	W1,W2,W3, W10,W12	W4,W5,W6,W7,W8 W9,W11,W13,W14



MKV84-0561

Figure 8 M7133 (PDP-11/24) CPU Switch and Jumper Locations

M7792 DEUNA Port Module Replacement – The switch settings for Revision Etch B and Revision Etch C of the port module are shown in the following figure and table.



MKV84-0562

Figure 9 M7792 Port Module Switch Settings

Table 13 M7792 Switch Settings

Switchpack	OFF	ON
E40	1,4,6,9,10	2,3,5,7,8
E62 (REV B)	2,4,8	1,3,5,6,7,9,10
E62 (REV C)	3,5,9	1,2,4,6,7,8,10

DECSA MAINTENANCE AIDS

M7793 DEUNA Link Module Replacement – The PROM in the M7793 link module contains the Ethernet address. When replacing a DEUNA link module adhere to the following conditions:

1. If possible, move the PROM from the defective module to the new module being installed.
2. If the PROM must be changed, report the new Ethernet address to the system or network manager.

M8743-xA Memory Module Replacement – All address switches on a replacement M8743 module must be set to ON.

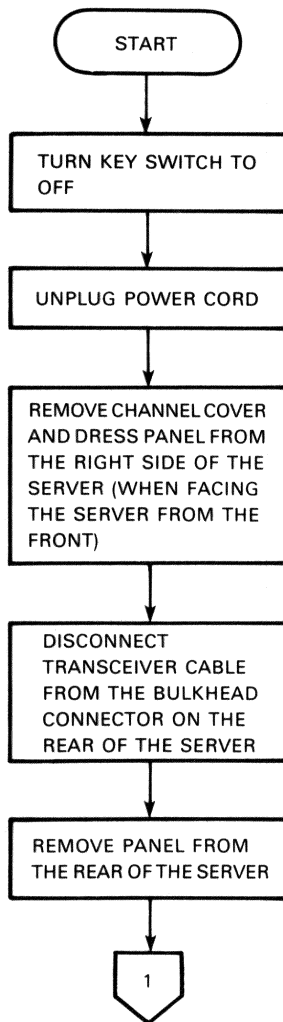
Verify the following jumper configuration.

IN:	OUT:
W1,W2,W3,W4	W5

System Upgrade

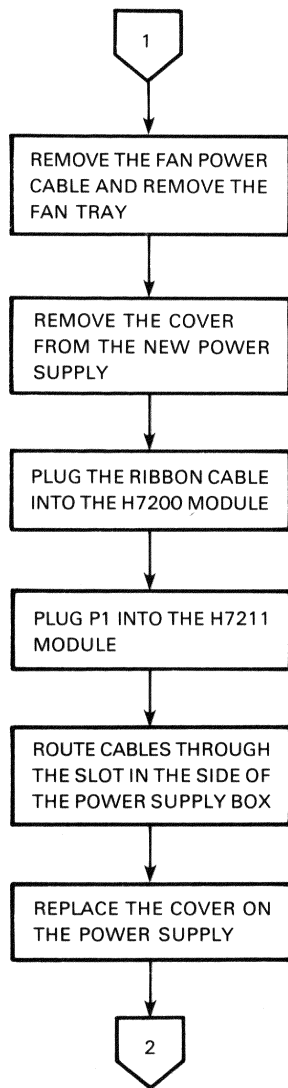
When it is necessary to upgrade a terminal server from 16 to 32 lines, an additional (secondary) power supply and PAM set is required.

The following flow diagram provides the steps for adding a secondary power supply and PAM set.



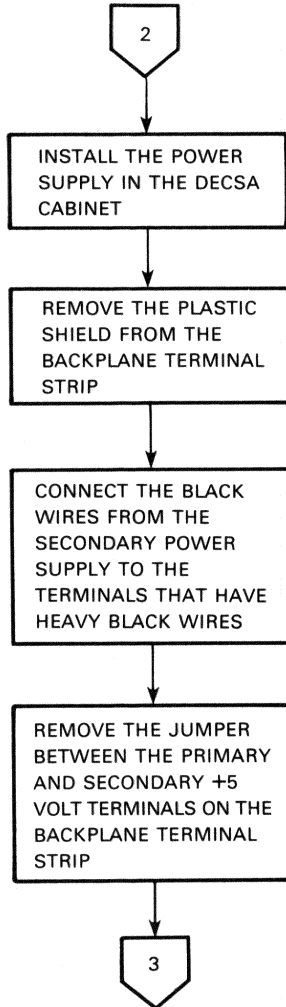
MKV84-1610

Figure 10 Upgrade: Adding a Second PAM Set and Power Supply
(Sheet 1 of 5)



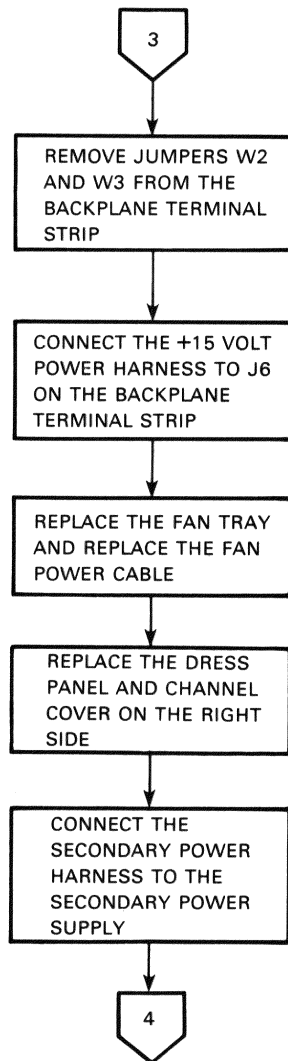
MKV84-1611

Figure 10 Upgrade: Adding a Second PAM Set and Power Supply
(Sheet 2 of 5)



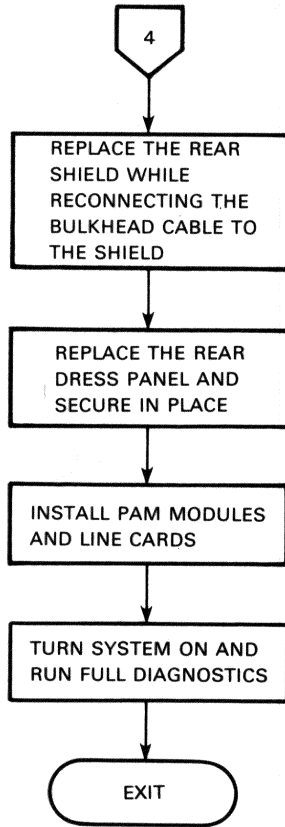
MKV84-1612

Figure 10 Upgrade: Adding a Second PAM Set and Power Supply
(Sheet 3 of 5)



MKV84-1613

Figure 10 Upgrade: Adding a Second PAM Set and Power Supply
(Sheet 4 of 5)



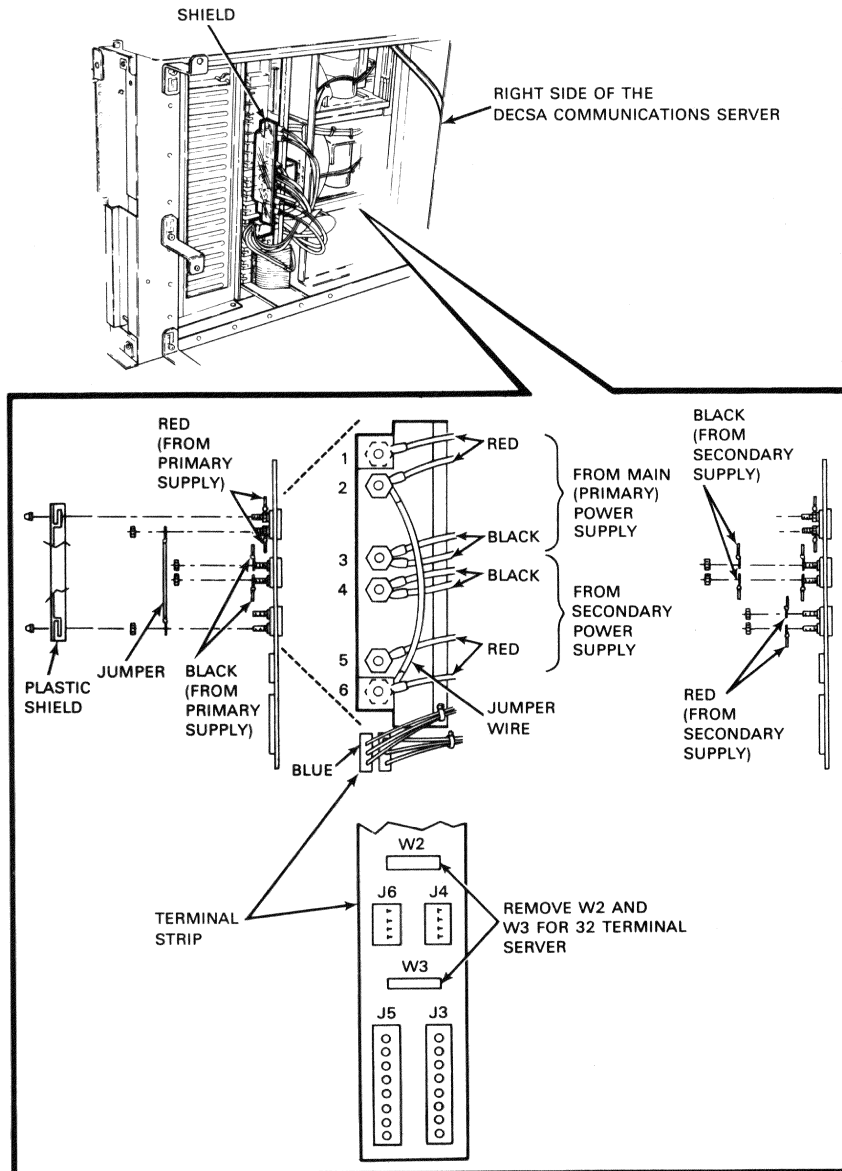
MKV84-1614

Figure 10 Upgrade: Adding a Second PAM Set and Power Supply
(Sheet 5 of 5)

DECSA MAINTENANCE AIDS

Backplane Terminal Strip Wiring

The following figure shows the location and wiring of the backplane terminal strip. Also shown are the jumpers that must be removed when adding a second PAM set and power supply.

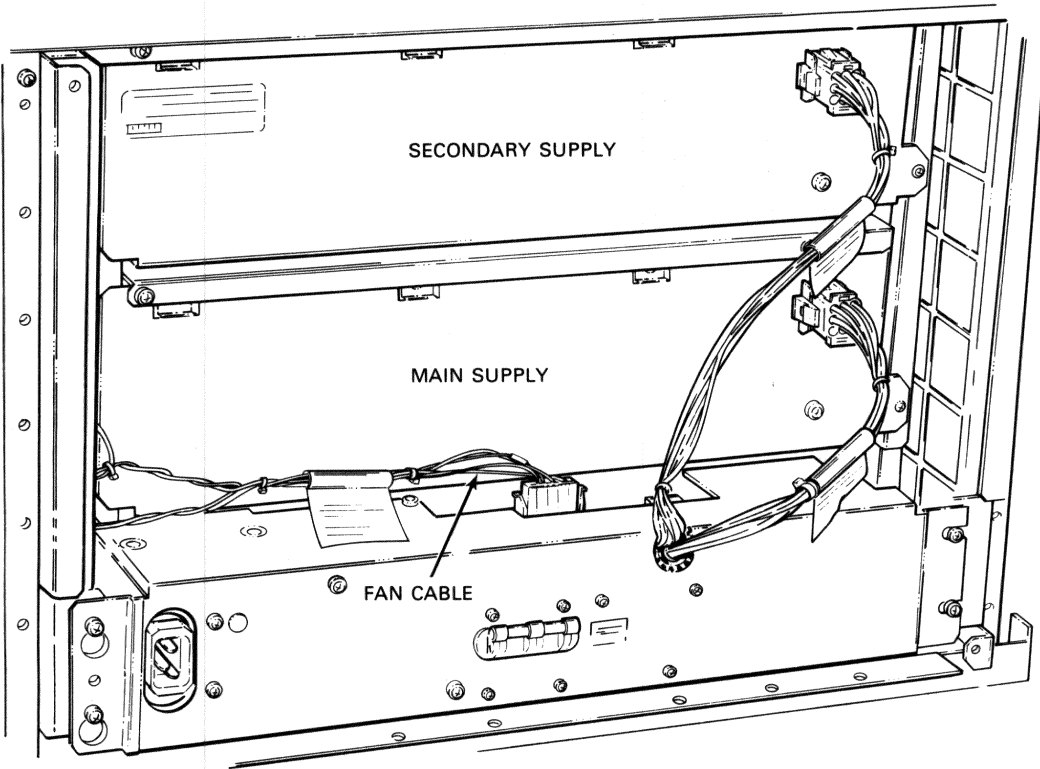


MKV84-1615

Figure 11 Backplane Terminal Strip Location and Connections

Secondary Power Supply Cabling

The following figure shows the relative locations for the main and secondary power supplies. The cabling for both power supplies and the fan is also shown.



MKV84-0564

Figure 12 Secondary Power Supply Cabling

DECSA MAINTENANCE AIDS

DECSA Tech Tips/FCO Index

The following table lists Tech Tips and FCOs that pertain to the DECSA Communications Server. Space is provided for adding new information.

Table 14 DECSA Tech Tips/FCO Index

Tech Tip No.	Title	Speed Bulletin No.
	DEUNA-AA Revised DC Power Requirements	293
	M7792 Switchpack E-62 Switch Assignments	293
	M8743-BA FCO-R0007	315
	M8743-BA DEC-O-LOG	315

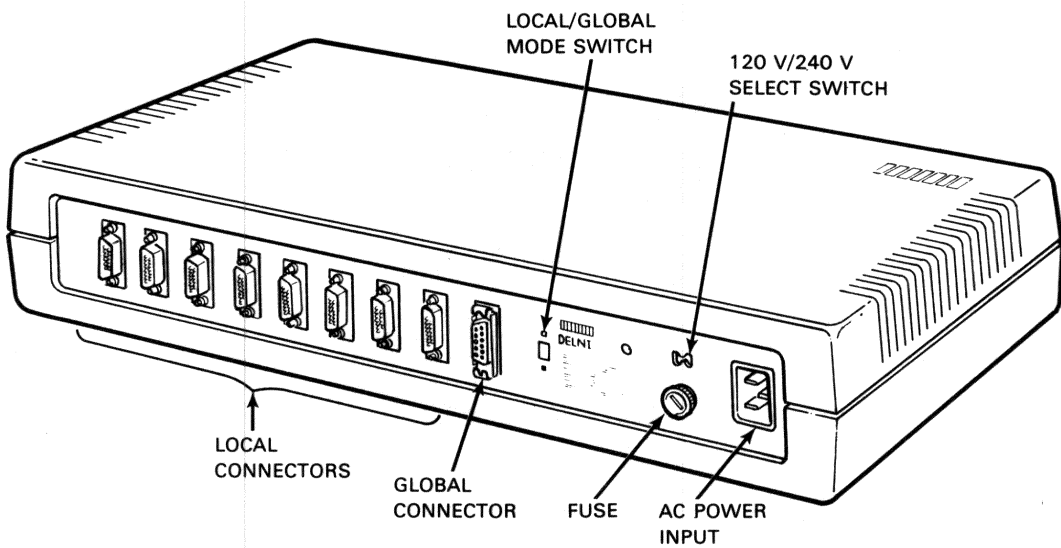
DELNI LOCAL NETWORK INTERCONNECT

General Description

The DELNI local network interconnect is a standalone device that permits interconnection and communication between Ethernet-compatible stations. The DELNI local network interconnect is shown in the following figure.

NOTE

The DELNI unit is not addressable or programmable. In addition, the DELNI unit does not require or use the -15 V that is normally supplied by the Ethernet controller or the auxiliary power supply (DEXPS). The DELNI unit does, however, supply -15 V to its GLOBAL connector for use by a connected Ethernet transceiver.



MKV84-1634

Figure 1 DELNI Local Network Interconnect

DELNI-1

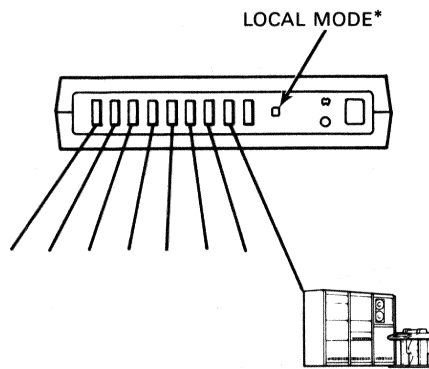
DELNI INSTALLATION

DELNI Configurations

The DELNI interconnect may be used to configure the following LANs (local area networks).

1. As a single-tier standalone network interconnect up to 8 stations may be interconnected via the local connectors.
2. As a two-tier standalone network interconnect up to 64 stations may be interconnected.
3. As a connected network interconnect up to 8 stations may be connected to an Ethernet coaxial cable.

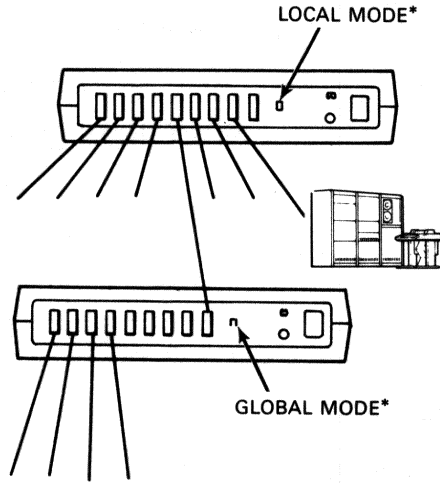
The following figures illustrate typical single-tier, two-tier, and connected DELNI LAN configurations. The mode switch position is also shown.



* SEE "MODES OF OPERATION" SECTION.

MKV84-1635

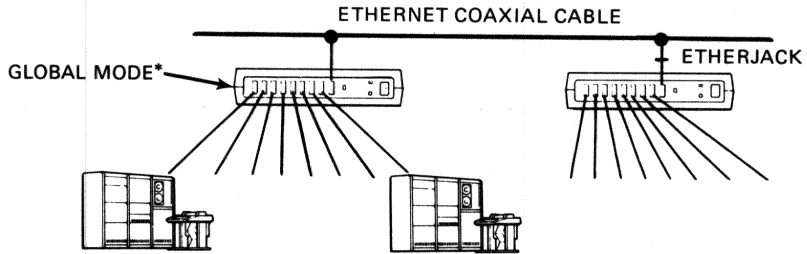
Figure 2 Single-Tier DELNI LAN Configuration



* SEE "MODES OF OPERATION" SECTION.

MKV84-1636

Figure 3 Two-Tier DELNI LAN Configuration



* SEE "MODES OF OPERATION" SECTION.

MKV84-1637

Figure 4 DELNI LAN Connected to an Ethernet Network

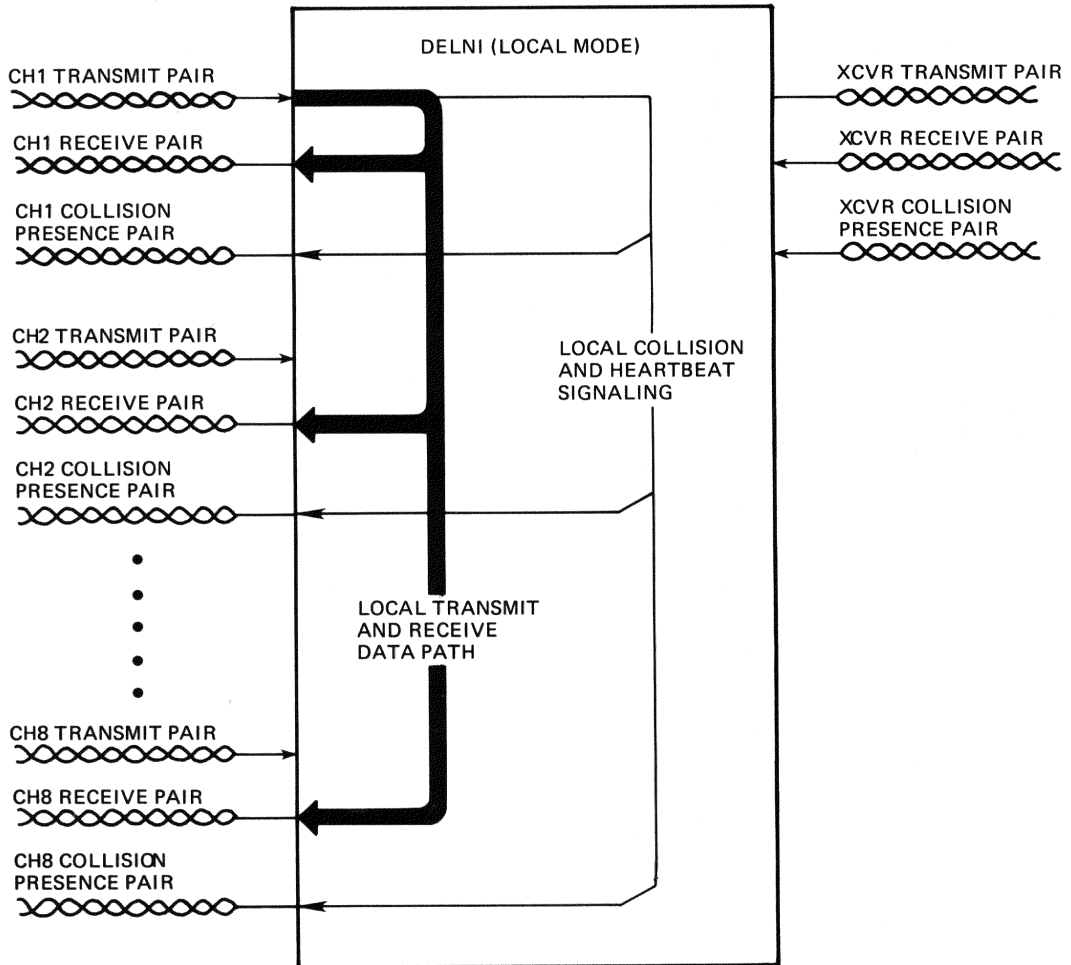
DELNI INSTALLATION

Modes of Operation

The DELNI interconnect can operate in one of two modes:

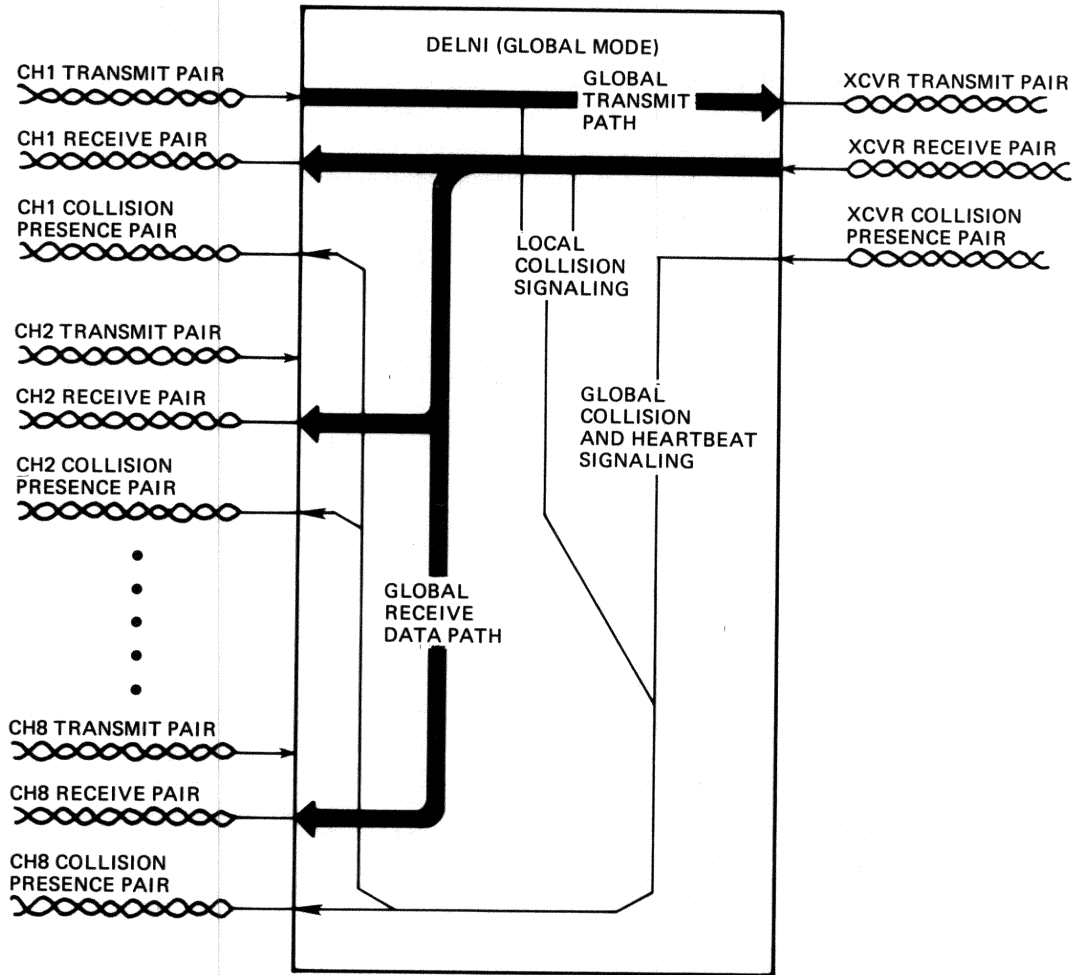
- In LOCAL mode the eight local connectors are interconnected.
- In GLOBAL mode the eight LOCAL connectors and the GLOBAL connector are interconnected.

The following figures show differences in the data and collision signaling paths that characterize the LOCAL and GLOBAL modes of operation.



MKV84-1038

Figure 5 LOCAL Mode Input/Output Signal Flow



MKV84-1037

Figure 6 GLOBAL Mode Input/Output Signal Flow

Physical Description

Length	19.68 cm (7.75 in)
Width	44.45 cm (17.50 in)
Height	5.72 cm (2.25 in)
Weight	6.35 kg (14.0 lbs)

Environmental Requirements

Temperature	5° to 50°C (41° to 122°F)
Relative Humidity	10% to 90% (no condensation)

DELNI INSTALLATION

Reference Documentation

Refer to the following documents for more information relative to the DELNI local network interconnect.

- *DELNI Local Network Interconnect Technical Manual* EK-DELNI-TM
- DELNI Local Network Interconnect Microfiche EP-DELNI-TM
- DELNI Field Maintenance Print Set MP-01656
- *The Ethernet – Local Area Network, Data Link Layer and Physical Layer Specifications* AA-K759A-TK
- *DEXRM DELNI Rackmount Kit Installation Guide* EK-DEXRM-IN

DELNI Versions

There are two versions of the DELNI interconnect.

- DELNI-AA (configured for U.S. area applications)
- DELNI-AB (configured for European/GIA applications)

The following table lists the differences between the versions.

Table 1 DELNI Version Differences

Version	Fuse Rating	Fuse Holder	Voltage Switch Setting
DELNI-AA	AGC 1/2	.06 mm (.25 in)	120 Vac
DELNI-AB	.5 A	5.0 mm (.20 in)	240 Vac

DELNI Hardware Components

The following tables list the parts that make up a DELNI-AA and DELNI-AB network interconnect.

Table 2 DELNI-AA Parts List

Description	Part Designation
DELNI-AA	<ul style="list-style-type: none">• DELNI system box• Power cord• <i>DELNI Installation/Owner's Manual</i>

Table 3 DELNI-AB Parts List

Description	Part Designation
DELNI-AB	DELNI system box
DELNK-Ax	DELNI country kit: <ul style="list-style-type: none"> • Power cord • <i>DELNI Installation/Owner's Manual</i>

Country Kits

Appropriate power cords and installation/owner's manuals are shipped in country kits that must be ordered separately with each DELNI interconnect. The following table indicates the country kit associated with each particular country.

Table 4 Country Kits

Country Used In	Country Kit Designation
Australia	DELNK-AZ
Belgium	DELNK-AB
Canada – England	DELNK-AQ
Canada – France	DELNK-AC
Denmark	DELNK-AD
Finland	DELNK-AF
France	DELNK-AN
Germany	DELNK-AG
Holland	DELNK-AH
Italy	DELNK-AI
Spain	DELNK-AS
Sweden	DELNK-AM
Switzerland – France	DELNK-AK
Switzerland – Germany	DELNK-AL
United Kingdom	DELNK-AE

System Placement

The DELNI interconnect can be located in any convenient location. Typical locations might include a:

- Shelf,
- Table, or
- DEXRM rackmount assembly (optional).

Power Requirements

The DELNI interconnect operates on ac power, 50 to 60 Hz. A voltage select switch is used to select operation from 120 Vac or 240 Vac.

The DELNI interconnect draws 0.35 A at 120 Vac and 0.18 A at 240 Vac.

DELNI INSTALLATION

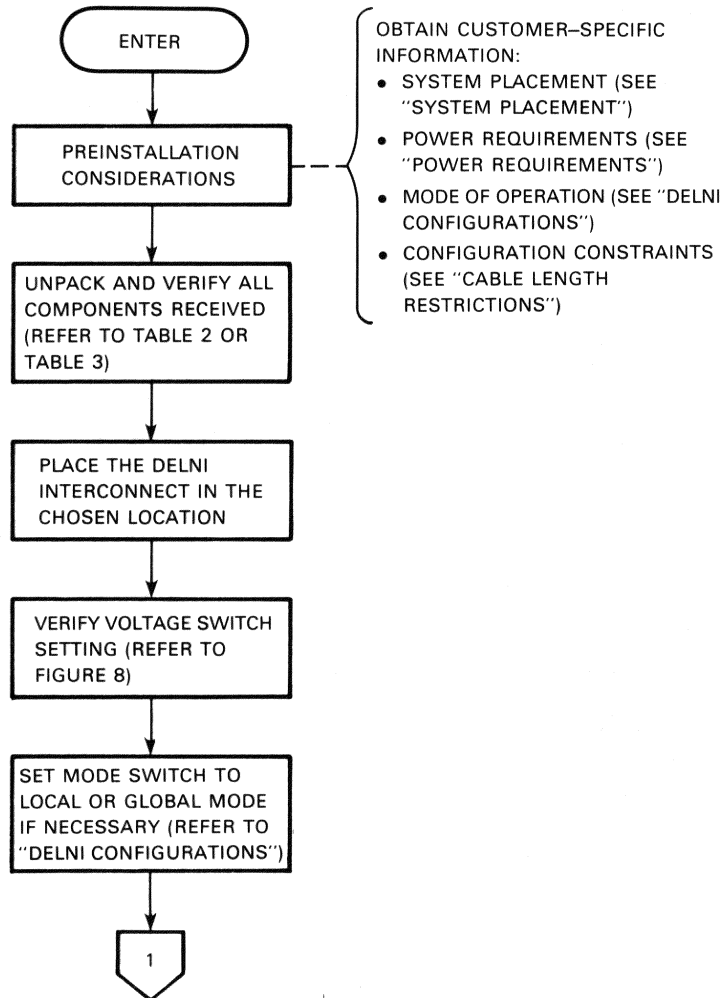
Required Equipment

The H4000-Tx transceiver tester is required to test the function of an installed DELNI network interconnect. The following diagnostics may also be helpful in verifying DELNI functions.

- NI exerciser
- Functional (on-line) diagnostics run from the connected Ethernet controller

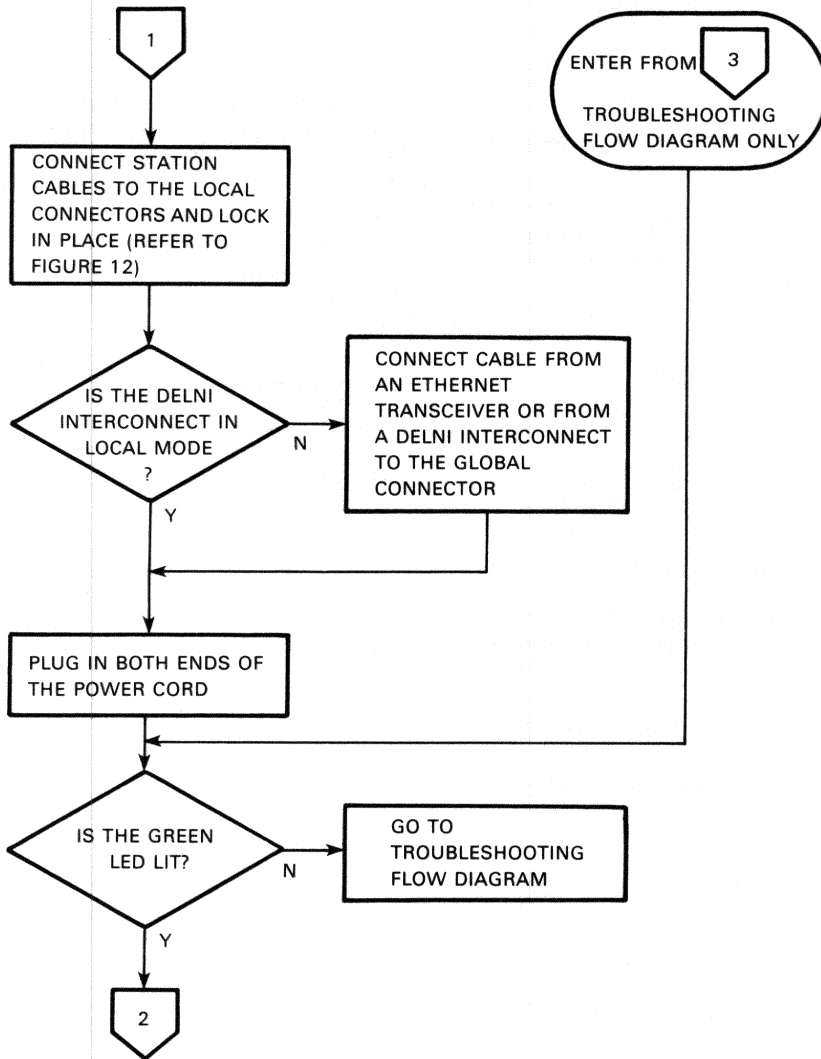
Installation Flow Diagram

The following flow diagram illustrates the procedures for installing and testing the DELNI local network interconnect.



MKV84-1638

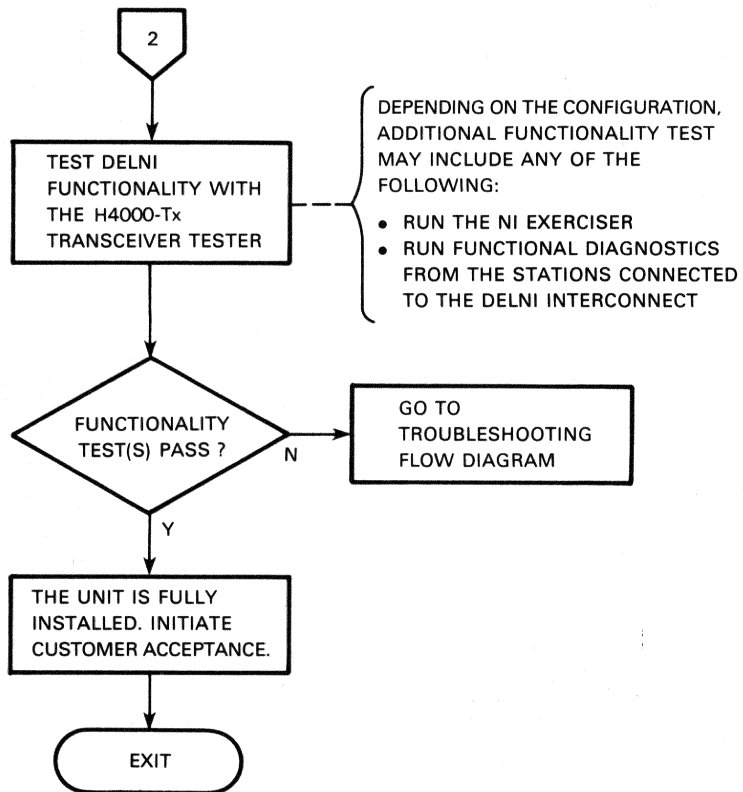
Figure 7 Installation Flow Diagram (Sheet 1 of 3)



MKV84-1639

Figure 7 Installation Flow Diagram (Sheet 2 of 3)

DELNI INSTALLATION

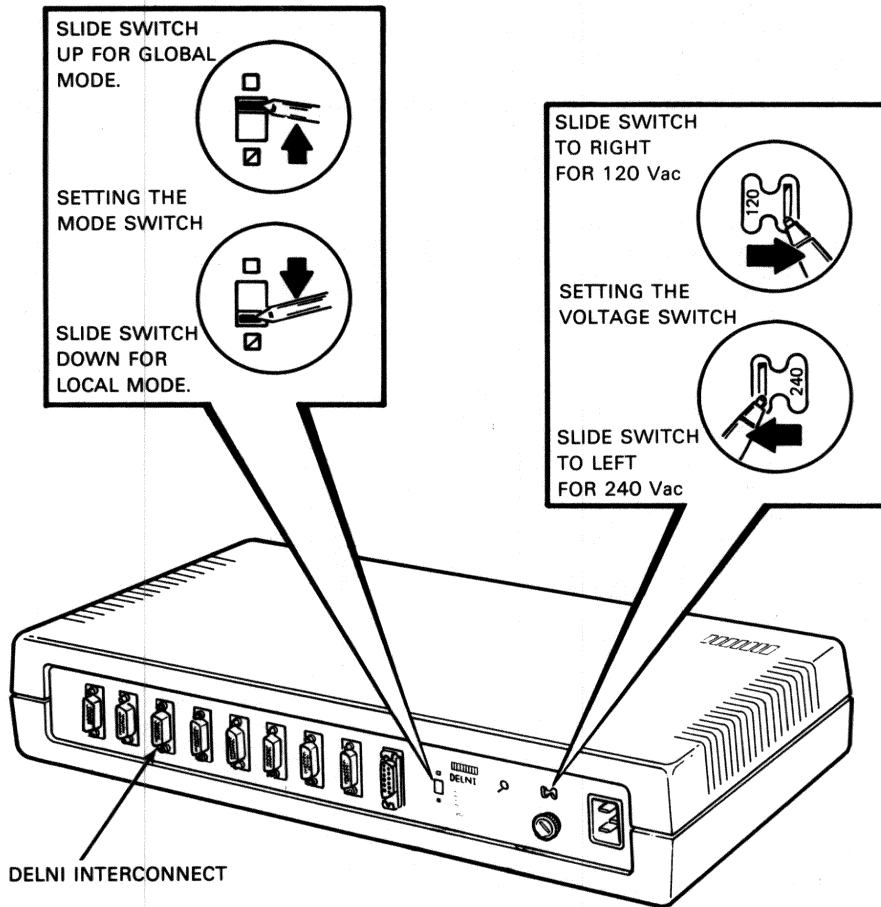


MKV84-1640

Figure 7 Installation Flow Diagram (Sheet 3 of 3)

Voltage and Mode Selection

Operating voltage and mode selection is accomplished by setting a voltage switch and a mode switch. Operation of the switches is shown in the following illustration.



MKV84-1641

Figure 8 Setting the DELNI Voltage and Mode Switches

DELNI CABLING

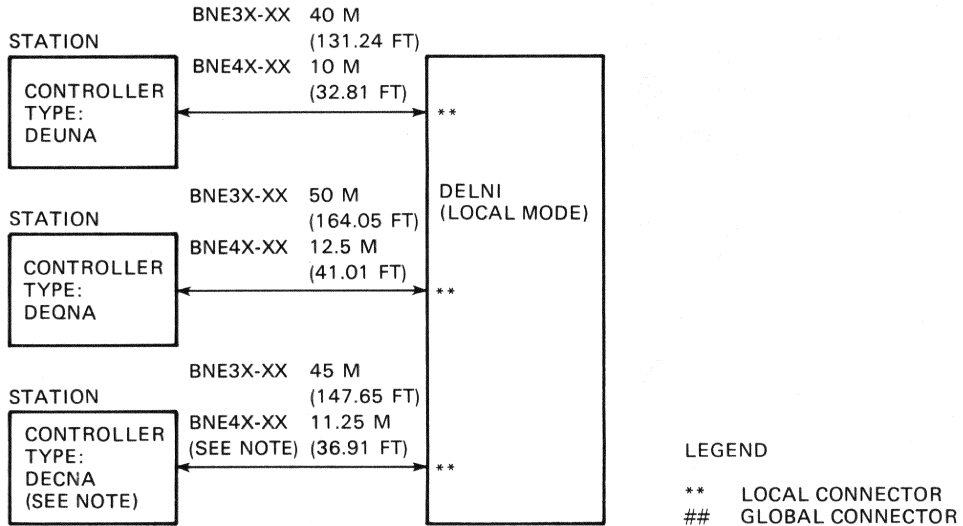
Cable Length Restrictions

Two cable types may be connected to the DELNI interconnect. They are:

- BNE3x-xx
- BNE4x-xx

The BNE4x-xx cable is a flexible office-type cable that has approximately four times the attenuation of a BNE3x-xx cable.

The following illustrations indicate the maximum allowable cable lengths for the two cable types.

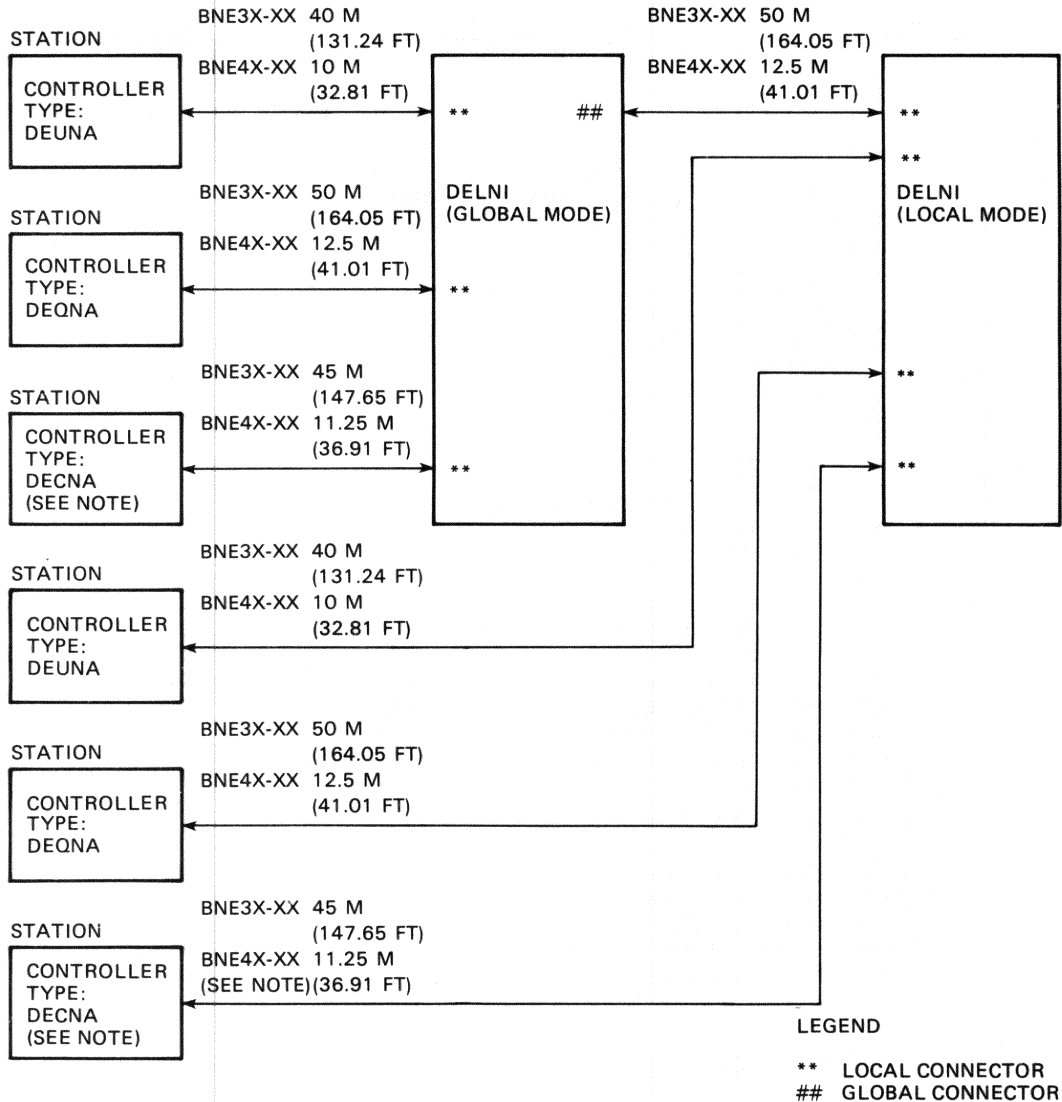


NOTE:
 THE DECNA CONTROLLER IS EQUIPPED WITH A 5 M (16.41 FT) LENGTH OF BNE3X-XX CABLE THAT HAS A SPECIAL CONNECTOR ON THE CONTROLLER END OF THE CABLE. THE CABLE LENGTH SPECIFIED ABOVE IS IN ADDITION TO THIS 5 M (16.41 FT) CABLE LENGTH.

MKV84-1642

Figure 9 Maximum Cable Lengths with Single-Tier DELNI LAN

DELNI CABLING

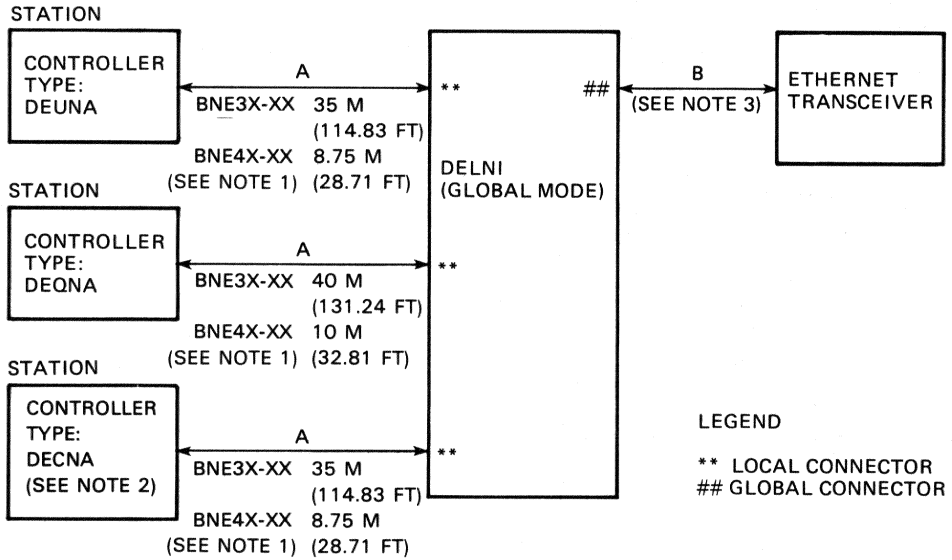


NOTE:
 THE DECNA CONTROLLER IS EQUIPPED WITH A 5 M (16.41 FT) LENGTH OF BNE3X-XX CABLE THAT HAS A SPECIAL CONNECTOR ON THE CONTROLLER END OF THE CABLE. THE CABLE LENGTH SPECIFIED DOES NOT INCLUDE THIS 5 M (16.41 FT) CABLE LENGTH.

MKV84-1643

Figure 10 Maximum Cable Lengths with Two-Tier DELNI LAN

DELNI CABLING



NOTES

1. THE LENGTH SPECIFIED IS THE TOTAL CABLE LENGTH ALLOWABLE BETWEEN THE CONTROLLER AND THE DELNI INTERCONNECT AND BETWEEN THE DELNI INTERCONNECT AND THE ETHERNET TRANSCEIVER (THAT IS, LENGTHS A + B).
2. THE DECNA CONTROLLER IS EQUIPPED WITH A 5 M (16.41 FT) LENGTH OF BNE3X-XX CABLE THAT HAS A SPECIAL CONNECTOR ON THE CONTROLLER END OF THE CABLE. THE CABLE LENGTH SPECIFIED ABOVE IS IN ADDITION TO THIS 5 M (16.41 FT) CABLE LENGTH.
3. THE CABLE SEGMENT LABELED B MAY BE MADE UP OF TWO TRANSCEIVER CABLES JOINED IN AN ETHERJACK CONNECTION BOX.

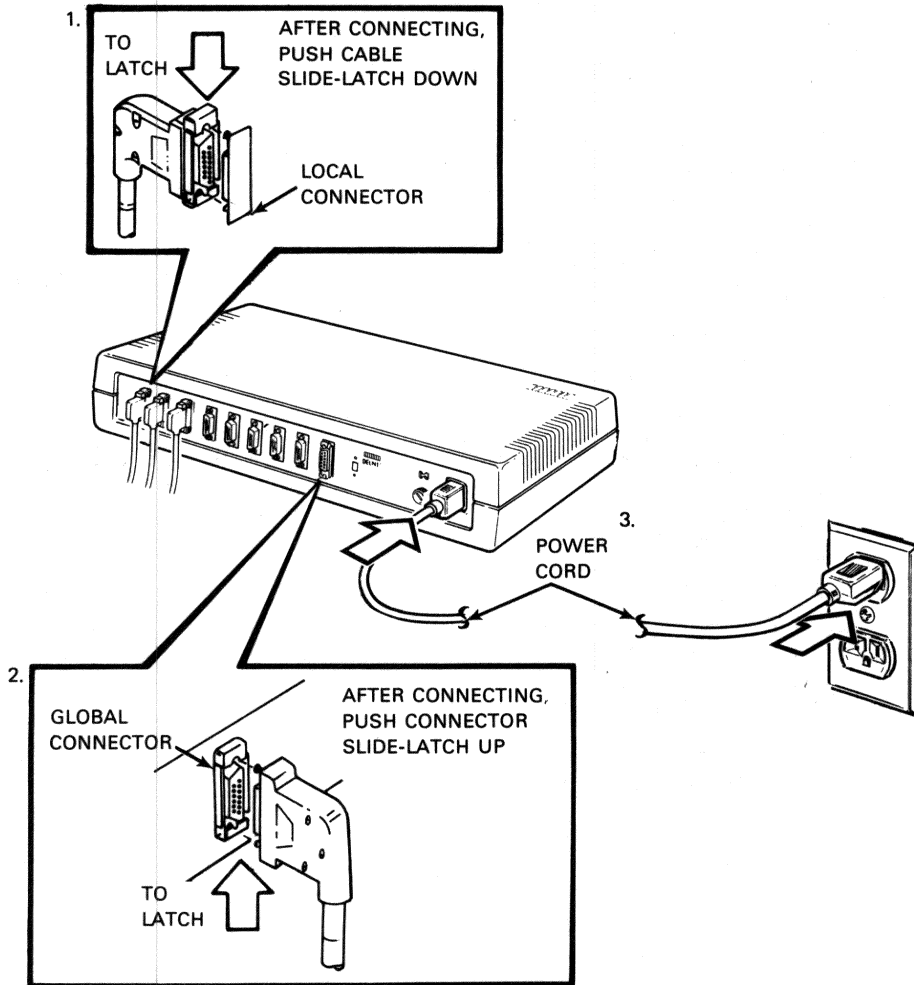
MKV84-1644

Figure 11 Maximum Cable Lengths with a Connected DELNI LAN

Cable Connections

The following illustration shows:

1. Connecting cables to a LOCAL connector.
2. Connecting a cable to the GLOBAL connector.
3. Connecting the power cord.



MKV84-1645

Figure 12 Connecting Cables to the DELNI Interconnect

DELNI DIAGNOSTICS

Diagnostics

There are no diagnostics designed specifically for the DELNI interconnect. Note, however, that the following may be helpful in isolating faults.

- The NI exerciser (NIE)
- Functional diagnostics run on systems connected to the DELNI unit under test (UUT)

DELNI Field Replaceable Units (FRUs)

When the DELNI interconnect is suspected of any malfunction, the entire DELNI unit should be replaced.

Troubleshooting Equipment

The H4000-TA (or “-TB” for non-U.S. versions) transceiver tester is required for maintaining the DELNI local network interconnects.

Troubleshooting Tips

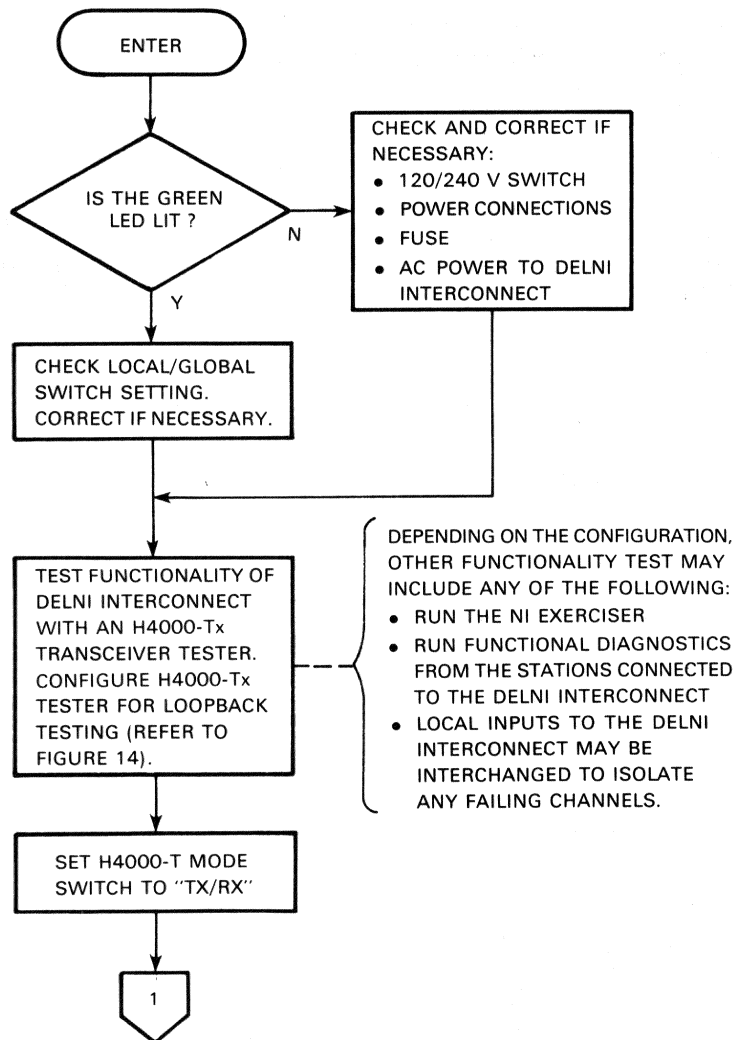
The following hardware problems can affect DELNI interconnect performance.

- Excessive cable lengths or cable damage.
- Cable and/or connector failure.
- Improperly assembled connectors (refer to the “Cables” section of this manual).
- Certain transceiver power problems.

DELNI MAINTENANCE AIDS

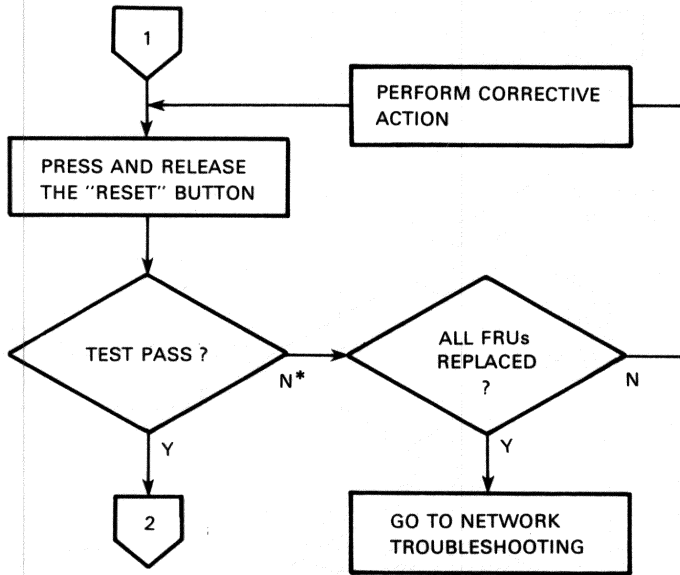
Troubleshooting Flow Diagram

The following flow diagram indicates the procedures for fault isolation in the DELNI interconnect.



MKV84-1646

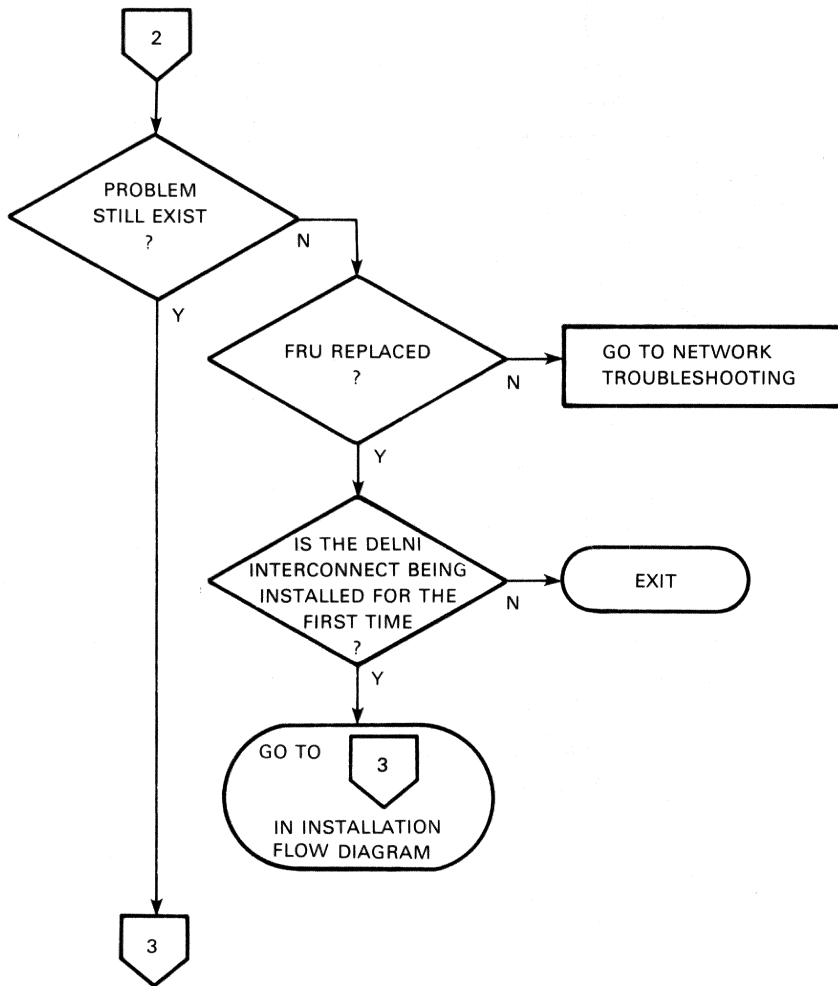
Figure 13 Troubleshooting Flow Diagram (Sheet 1 of 7)



* DID THE SYMPTOM CHANGE? IF SO, THEN A NEW OR ADDITIONAL PROBLEM MAY EXIST. REPLACE THE ORIGINAL FRU TO SEE IF THE ORIGINAL SYMPTOMS RETURN. THIS NEW INFORMATION MAY BE USEFUL IN ANALYZING THE PROBLEM.

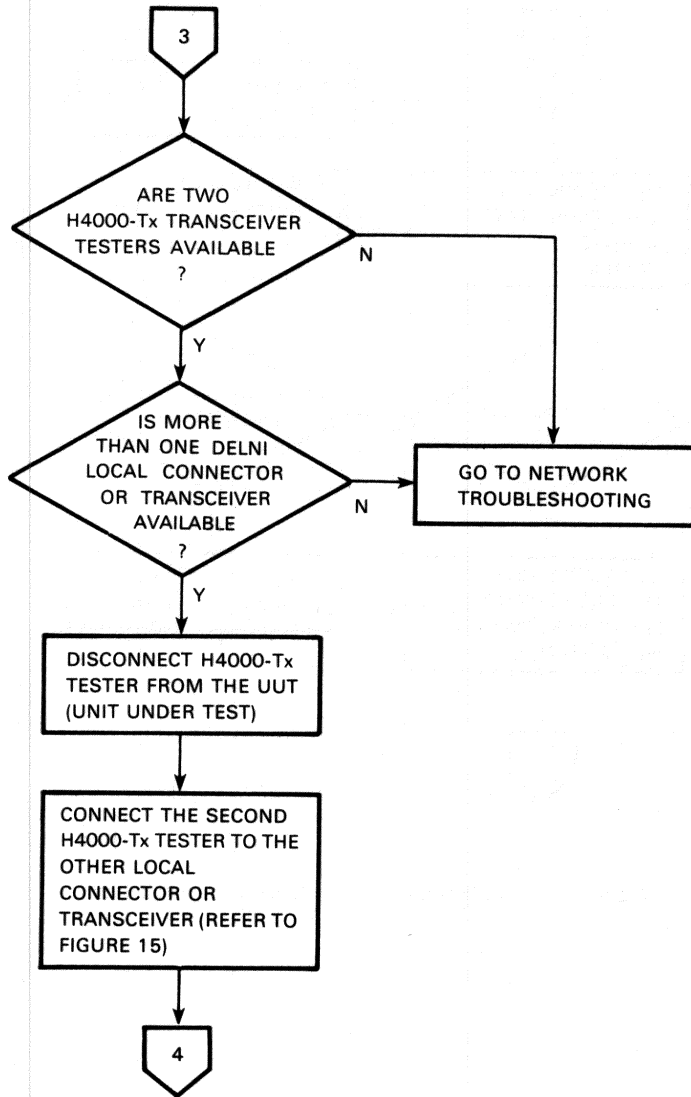
MKV84-1647

Figure 13 Troubleshooting Flow Diagram (Sheet 2 of 7)



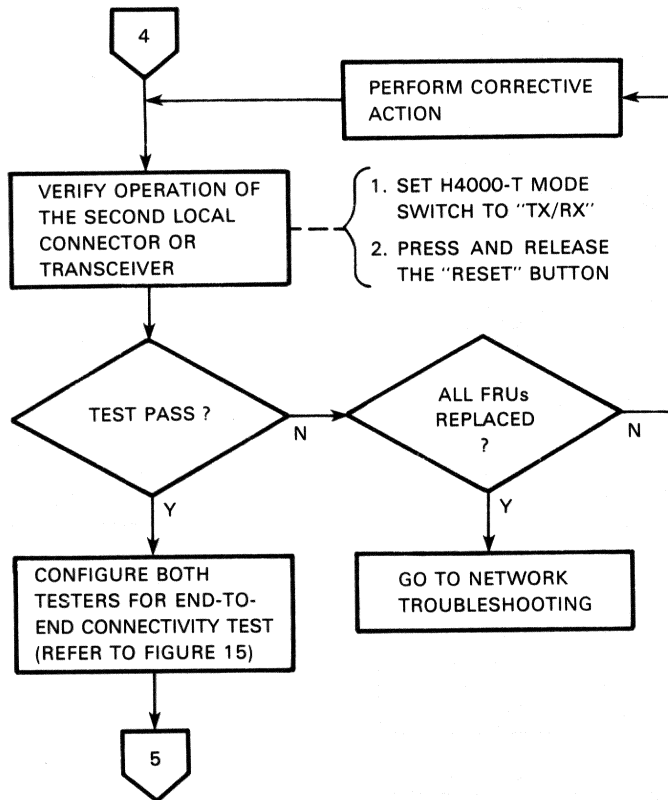
MKV84-1648

Figure 13 Troubleshooting Flow Diagram (Sheet 3 of 7)



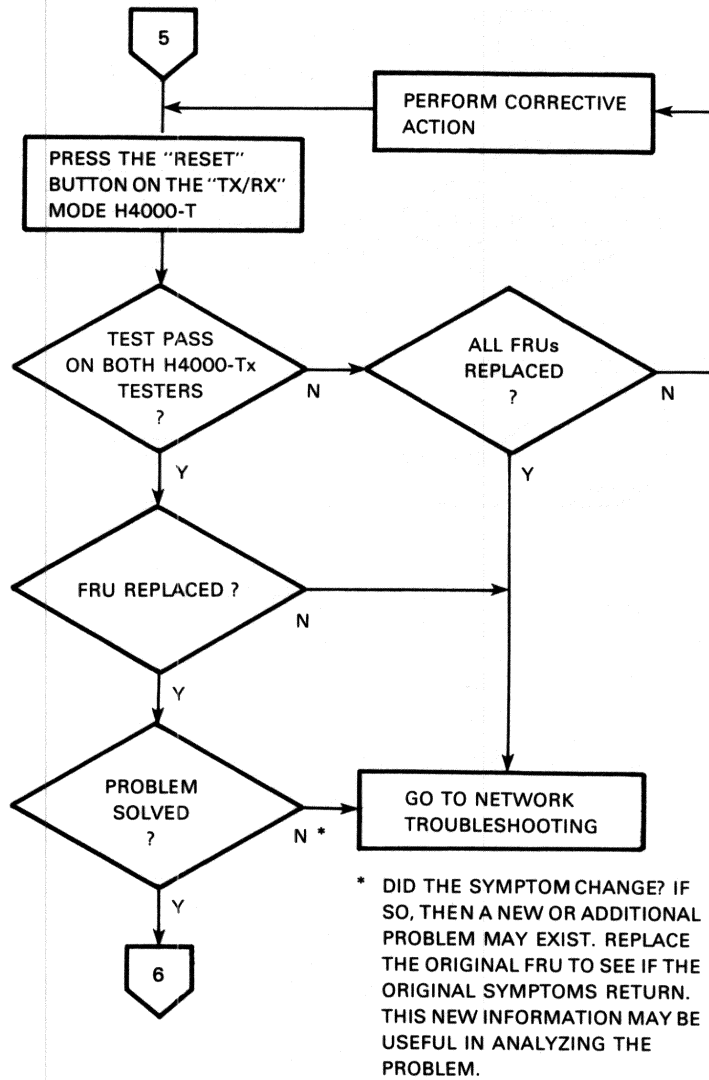
MKV84-1649

Figure 13 Troubleshooting Flow Diagram (Sheet 4 of 7)



MKV84-1650

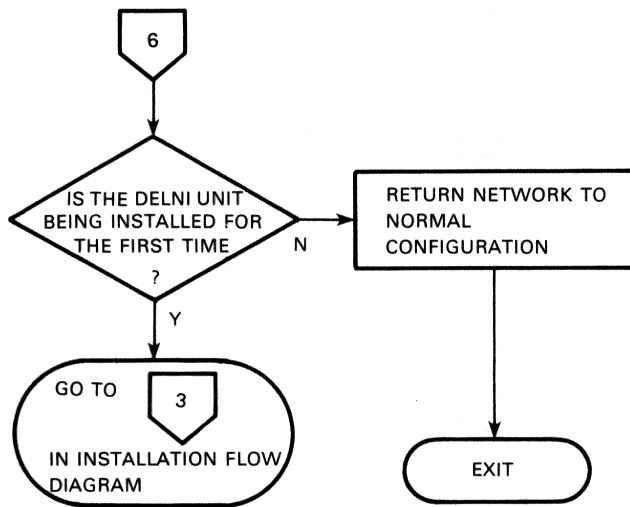
Figure 13 Troubleshooting Flow Diagram (Sheet 5 of 7)



MKV84-1651

Figure 13 Troubleshooting Flow Diagram (Sheet 6 of 7)

DELNI MAINTENANCE AIDS



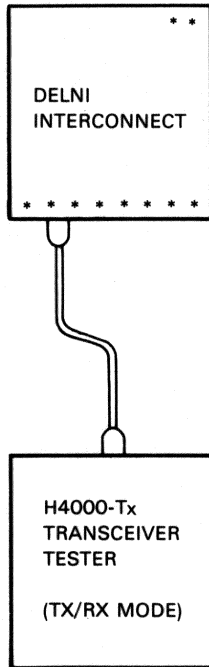
MKV84-1652

Figure 13 Troubleshooting Flow Diagram (Sheet 7 of 7)

Typical H4000-Tx Tester Configurations

The following figure shows a typical H4000-Tx tester configuration for loopback testing of a DELNI interconnect. Note that the tester may be connected to any local connector on the DELNI unit.

The tester configuration for a DELNI unit connected to an Ethernet cable is the same as shown below. Be sure that the mode switch is set to the GLOBAL mode.



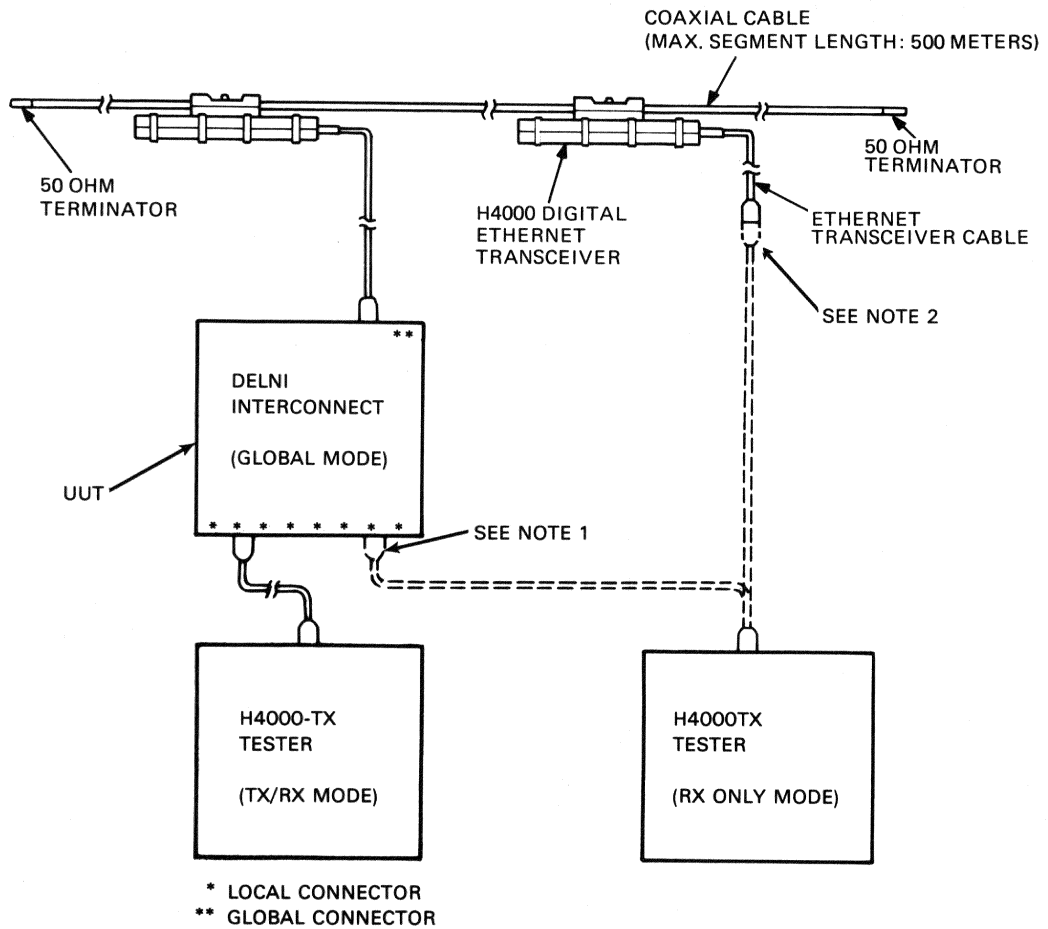
- * LOCAL CONNECTOR
- ** GLOBAL CONNECTOR

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Figure 14 Typical H4000-Tx Configuration for Loopback Testing

DELNI MAINTENANCE AIDS

The following figure shows a typical H4000-Tx tester configuration for end-to-end testing of a DELNI interconnect. Note that the H4000-Tx tester(s) may be connected to any local connector on the DELNI unit.



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Figure 15 Typical H4000-Tx Configuration for End-to-End Testing

DELNI Tech Tips/FCO Index

The following table lists Tech Tips and FCOs that pertain to the DELNI local network interconnect. Space is provided for adding new information.

Table 5 DELNI Tech Tips/FCO Index

Tech Tip No.	Title	Speed Bulletin
	DELNI Troubleshooting	296
	DELNI Installation Precautions	297



DEUNA UNIBUS NETWORK ADAPTOR

General Description

The DEUNA adaptor is a data communications controller used to interface VAX-11 and PDP-11 family computers to the Ethernet local area network. The DEUNA adaptor complies with the "Ethernet Specification" and (using the Ethernet shielded coaxial cable) allows communication with up to 1024 addressable devices.

The DEUNA adaptor physically and electrically connects to the Ethernet coaxial cable via the DIGITAL H4000 transceiver and an appropriate transceiver cable.

Features of the DEUNA adaptor include the following.

- 10M bits/s transmission and reception
- Transmit and receive data link management
- Data encapsulation and decapsulation
- Data encoding and decoding
- Down-line loading and remote load detect capabilities
- Internal ROM-based microdiagnostics to facilitate diagnosis and maintenance to both the DEUNA adaptor and the DIGITAL H4000 transceiver
- Collision detection and automatic retransmission
- 32-bit cyclic redundancy check (CRC) error detection
- 32K byte (16K word) buffer for continuous datagram reception, transmission, and maintenance requirements

Reference Documentation

Refer to the following documents for more information on the DEUNA adaptor.

- | | | |
|---|---------------------------------|-------------|
| • | <i>DEUNA Technical Manual</i> | EK-DEUNA-TM |
| • | <i>DEUNA User's Guide</i> | EK-DEUNA-UG |
| • | <i>H4000 Technical Manual</i> | EK-H4000-TM |
| • | <i>H4000 Installation Guide</i> | EK-H4000-IN |
| • | DEUNA Print Set | MP01378 |
| • | DEUNA Microfiche | EP-DEUNA-TM |

DEUNA INSTALLATION

DEUNA Adaptor Component List

The following table provides a list of the parts supplied with each DEUNA adaptor.

Table 1 DEUNA Parts List

Part	Part Designation
DEUNA port module	M7792
DEUNA link module	M7793
Module interconnect cable	BC08R-1 (2)
Bulkhead cable assembly	70-18798-**
Bulkhead interconnect panel assembly	70-18799-00
<i>DEUNA User's Guide</i>	EK-DEUNA-UG

Device Placement

The DEUNA adaptor requires two hex-height small peripheral controller (SPC) backplane slots (preferably two adjacent slots). Any SPC backplane [DD11-B (REV E) or later] can accept the DEUNA adaptor modules.

To prevent adverse bus latency, the DEUNA adaptor should be placed on the UNIBUS conductor before all devices that have a lower NPR rate and before all UNIBUS repeaters.

UNIBUS Loading

The M7792 and M7793 modules that make up the DEUNA adaptor have the following UNIBUS loads.

- 1 dc load
- 4 ac loads

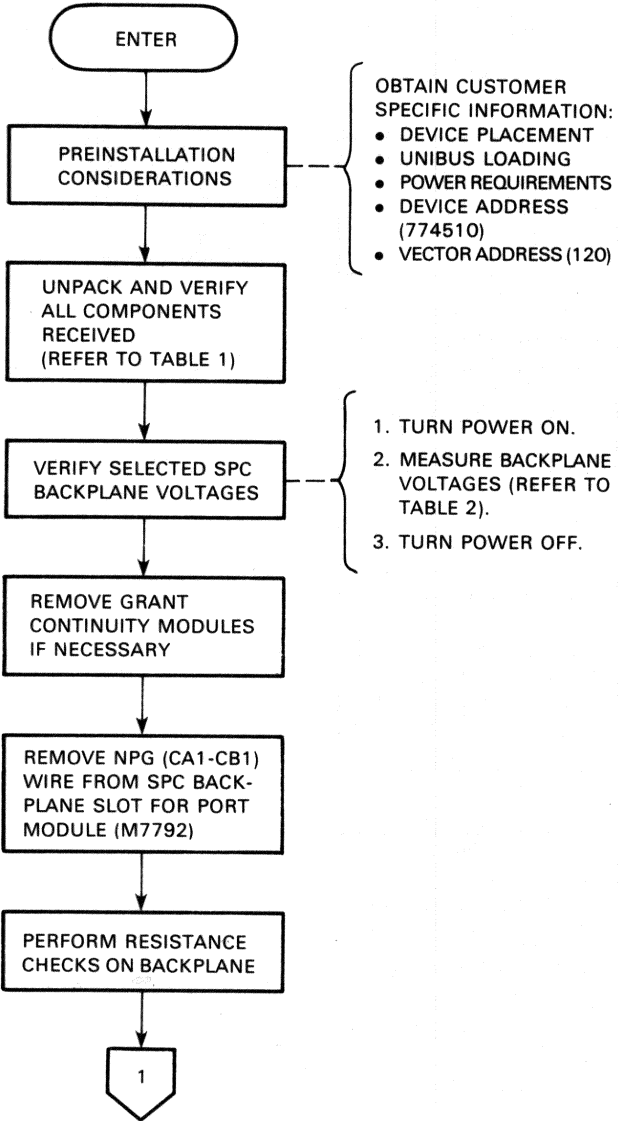
DEUNA Power Requirements

The DEUNA adaptor power requirements are shown in the following table.

Table 2 DEUNA Power Chart

Module	Voltage Rating (Approximate Values)	Maximum Voltage	Minimum Voltage	Backplane Pin
M7792	+5 V @ 7.0 A*	+5.25 V	+4.75 V	CA2
M7793	+5 V @ 9.0 A* -15 V @ 2.0 A	+5.25 V -15.75 V	+4.75 V -14.25 V	CA2 FB2

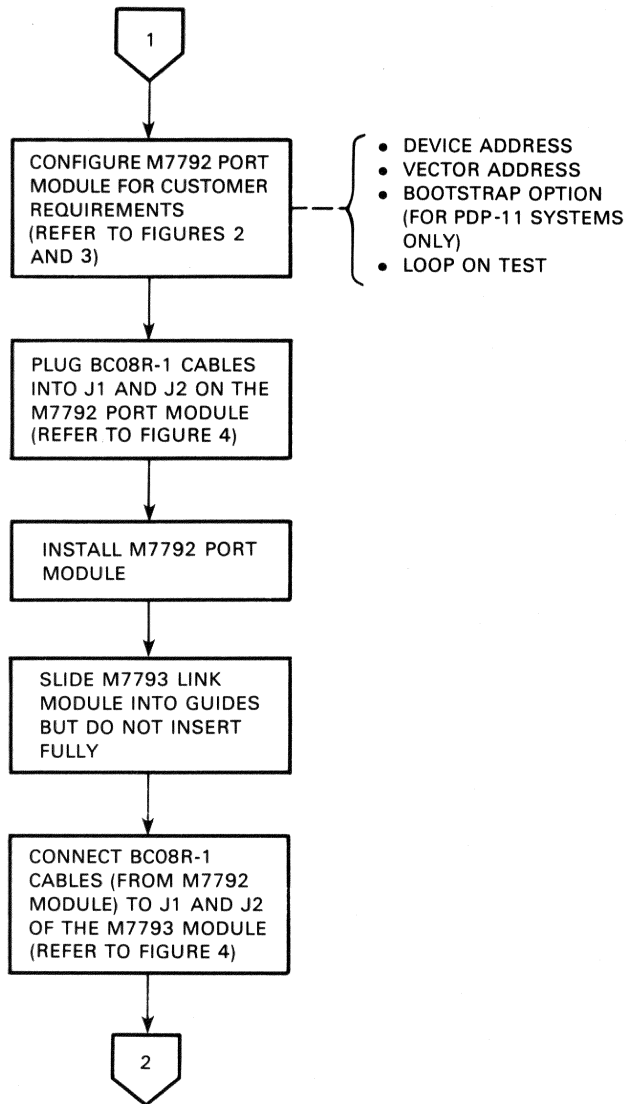
*Refer to Tech Tip # DEUNA-TT-1



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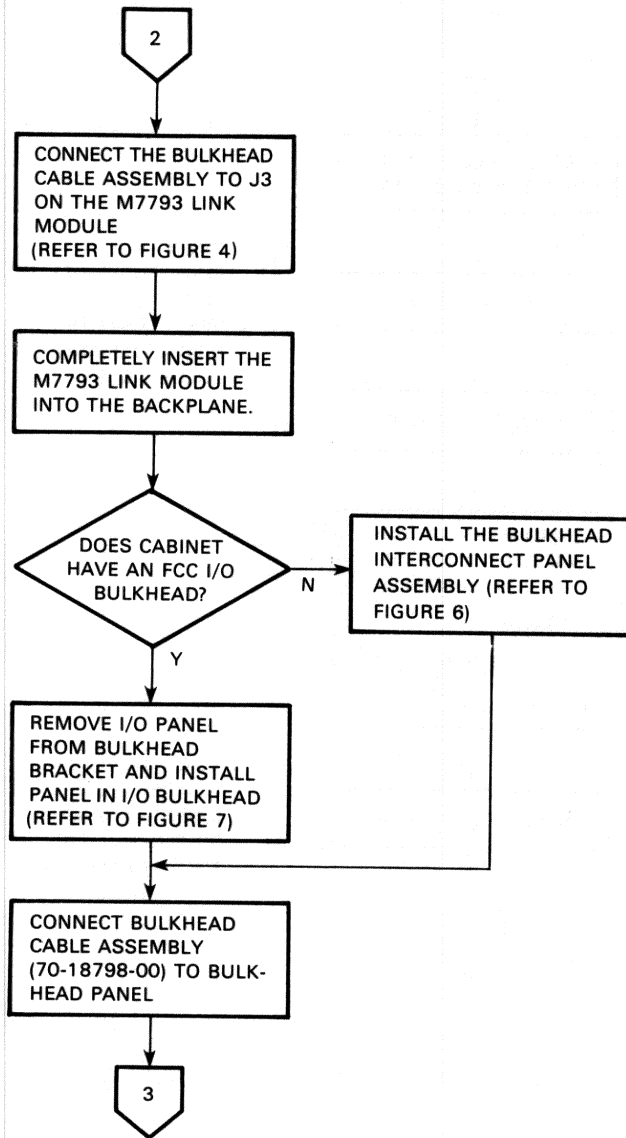
Figure 1 Installation Flow Diagram (Sheet 1 of 5)

DEUNA INSTALLATION



MKV84-0757

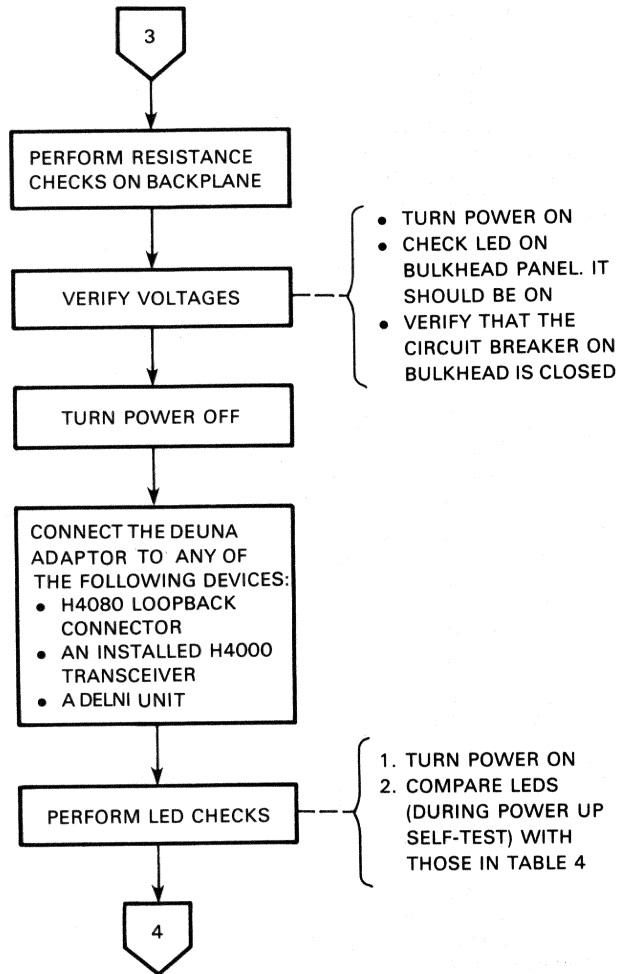
Figure 1 Installation Flow Diagram (Sheet 2 of 5)



MKV84-0758

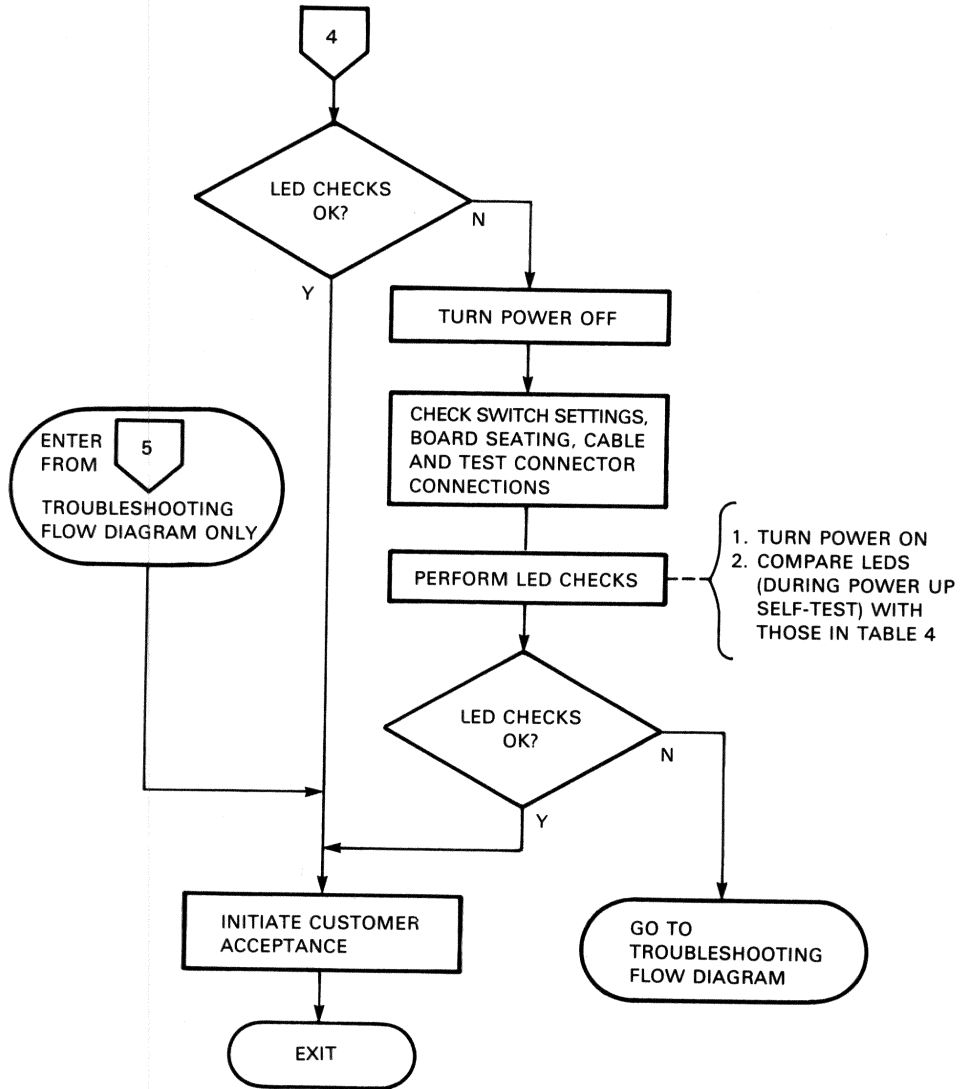
Figure 1 Installation Flow Diagram (Sheet 3 of 5)

DEUNA INSTALLATION



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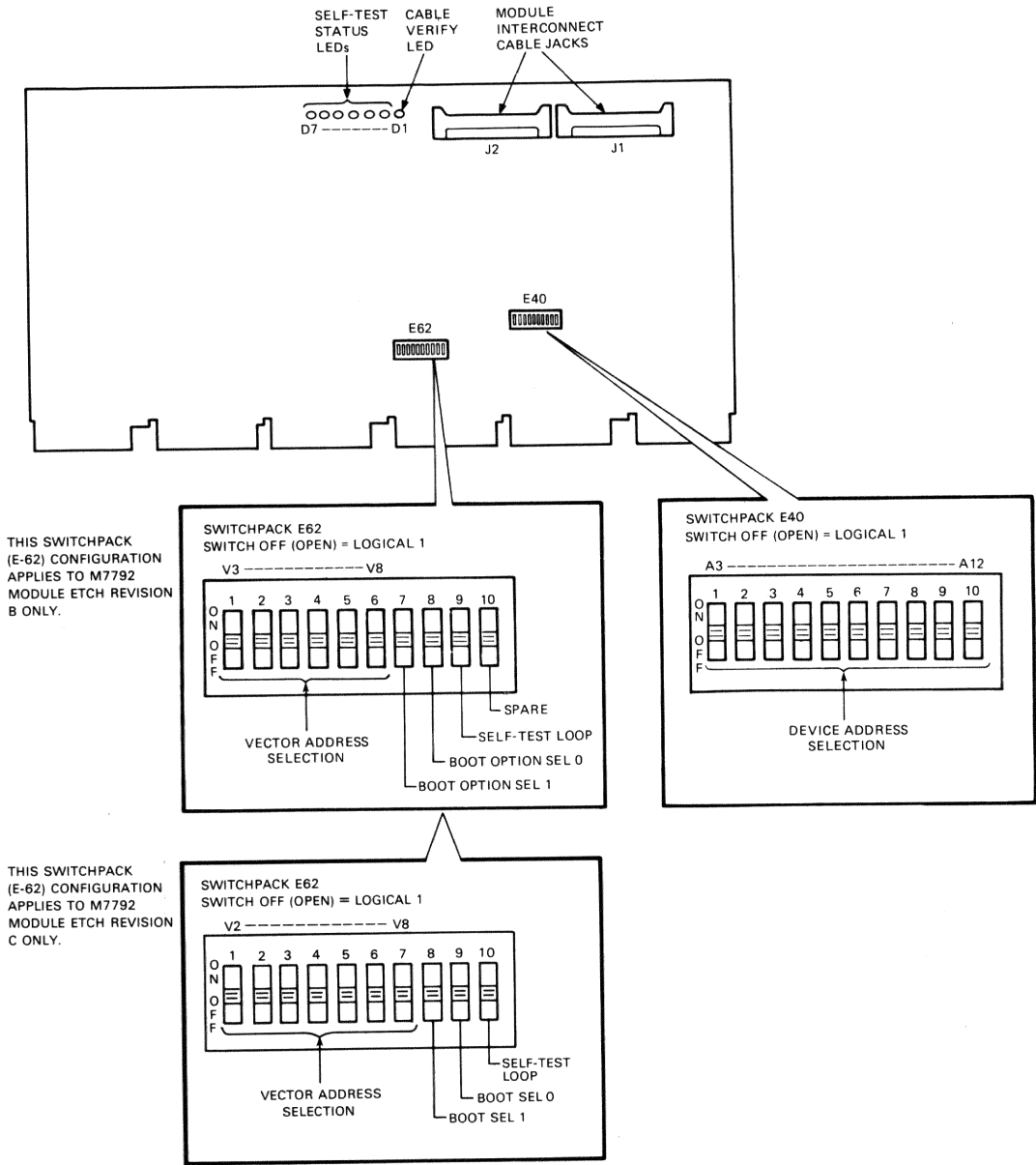
Figure 1 Installation Flow Diagram (Sheet 4 of 5)



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Figure 1 Installation Flow Diagram (Sheet 5 of 5)

DEUNA INSTALLATION



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Figure 2 M7792 Switchpacks and Jumpers (Sheet 1 of 2)

Boot Option Selection *

SEL 0	SEL 1	Function
ON	ON	Remote boot disabled [†]
OFF	ON	Remote boot with system load
ON	OFF	Remote boot with ROM
OFF	OFF	Remote boot with power-up boot and system load

* For M7792 Etch Rev B modules, SEL 0 = S8 / SEL 1 = S7
 For M7792 Etch Rev C modules, SEL 0 = S9 / SEL 1 = S8

[†] Switch setting for a DEUNA adapter installed in a VAX-11 system.

Self-Test Loop Switch *

Switch Position	Function
ON (closed)	Disabled
OFF (open)	Enabled

* M7792 E62 S9 for Etch rev B modules
 M7792 E62 S10 for Etch rev C modules

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Figure 2 M7792 Switchpacks and Jumpers (Sheet 2 of 2)

DEUNA INSTALLATION

FLOATING ADDRESS ASSIGNMENT

FOR ETCH REV B AND C MODULES

MSB											LSB				
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	1	1	SWITCHPACK E40										0	0	0

SWITCH NUMBER	S10	S9	S8	S7	S6	S5	S4	S3	S2	S1	FLOATING ADDRESS
									OFF	OFF	760010
									OFF	OFF	760020
									OFF	OFF	760030
									OFF	OFF	760040
									OFF	OFF	760050
									OFF	OFF	760060
									OFF	OFF	760070
									OFF	OFF	760100
											...
									OFF		760200
											...
									OFF	OFF	760300
											...
									OFF		760400
											...
									OFF	OFF	760500
											...
									OFF	OFF	760600
											...
									OFF	OFF	760700
											...
											761000
											...
											762000
											...
											763000
											...
											764000

NOTE: SWITCH OFF (OPEN) RESPONDS TO LOGICAL ONE ON THE UNIBUS.

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Figure 3 Address and Vector Switch Assignments (Sheet 1 of 2)

DEUNA INSTALLATION

FLOATING VECTOR ASSIGNMENT

FOR ETCH REV B
MODULES

MSB												LSB			
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	SWITCHPACK E62						1/0	0	0

SWITCH NUMBER	S6	S5	S4	S3	S2	S1	FLOATING VECTOR
		OFF	OFF				300
		OFF	OFF				310
		OFF	OFF			OFF	320
		OFF	OFF		OFF	OFF	330
		OFF	OFF	OFF			340
		OFF	OFF	OFF		OFF	350
		OFF	OFF	OFF	OFF		360
		OFF	OFF	OFF	OFF	OFF	370
OFF							400
	OFF		OFF				...
	OFF	OFF					500
	OFF	OFF					...
	OFF	OFF	OFF				600
	OFF	OFF	OFF				...
	OFF	OFF	OFF				700

NOTE: SWITCH OFF (OPEN) PRODUCES LOGICAL ONE ON THE UNIBUS.

FOR ETCH REV
C MODULES

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	
0	0	0	0	0	0	0	SWITCHPACK E62								0	0

SWITCH NUMBER	S7	S6	S5	S4	S3	S2	S1	FLOATING VECTOR
		OFF	OFF					300
		OFF	OFF				OFF	304
		OFF	OFF			OFF	OFF	310
		OFF	OFF			OFF	OFF	314
		OFF	OFF		OFF			320
		OFF	OFF		OFF		OFF	324
		OFF	OFF		OFF	OFF		330
		OFF	OFF		OFF	OFF	OFF	334
		OFF	OFF	OFF				340
		OFF	OFF	OFF			OFF	344
		OFF	OFF	OFF		OFF		350
		OFF	OFF	OFF		OFF	OFF	354
		OFF	OFF	OFF	OFF			360
		OFF	OFF	OFF	OFF		OFF	364
		OFF	OFF	OFF	OFF	OFF		370
		OFF	OFF	OFF	OFF	OFF	OFF	374
OFF								400
	OFF		OFF					...
	OFF	OFF						600
	OFF	OFF	OFF					...
	OFF	OFF	OFF					700

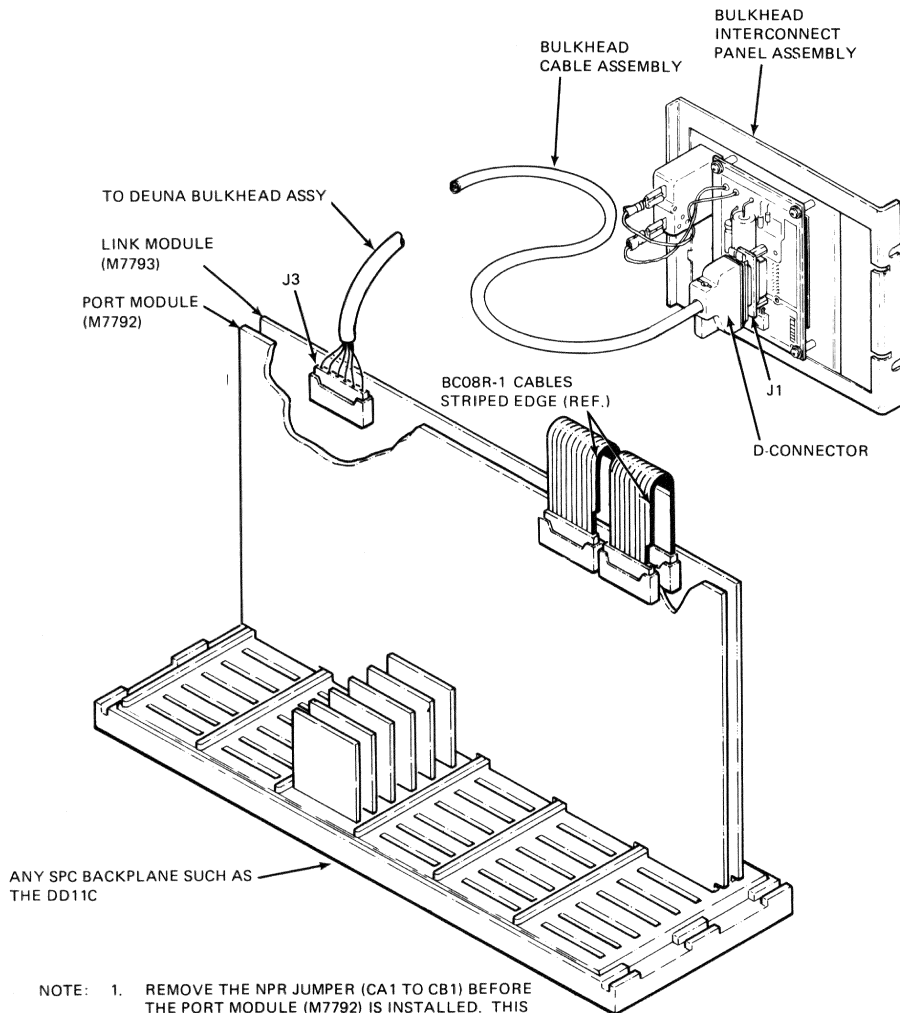
MKV84-0764

Figure 3 Address and Vector Switch Assignments (Sheet 2 of 2)

DEUNA CABLING

Cabling

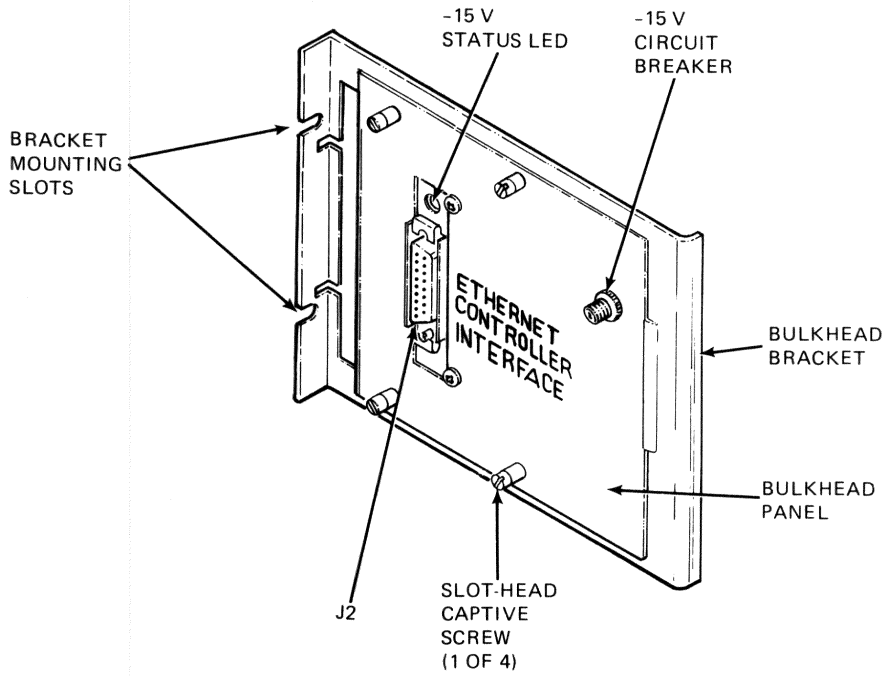
This section contains cabling diagrams for DEUNA adaptor configurations.



- NOTE:
1. REMOVE THE NPR JUMPER (CA1 TO CB1) BEFORE THE PORT MODULE (M7792) IS INSTALLED. THIS JUMPER MUST BE INSTALLED IF THE DEUNA ADAPTOR IS REMOVED FROM THE SYSTEM.
 2. THE ORDER OF MODULE INSTALLATION IN THE BACKPLANE IS NOT FIXED.
 3. POWER: +5 Vdc @ 16 A
-15 Vdc @ 1 A

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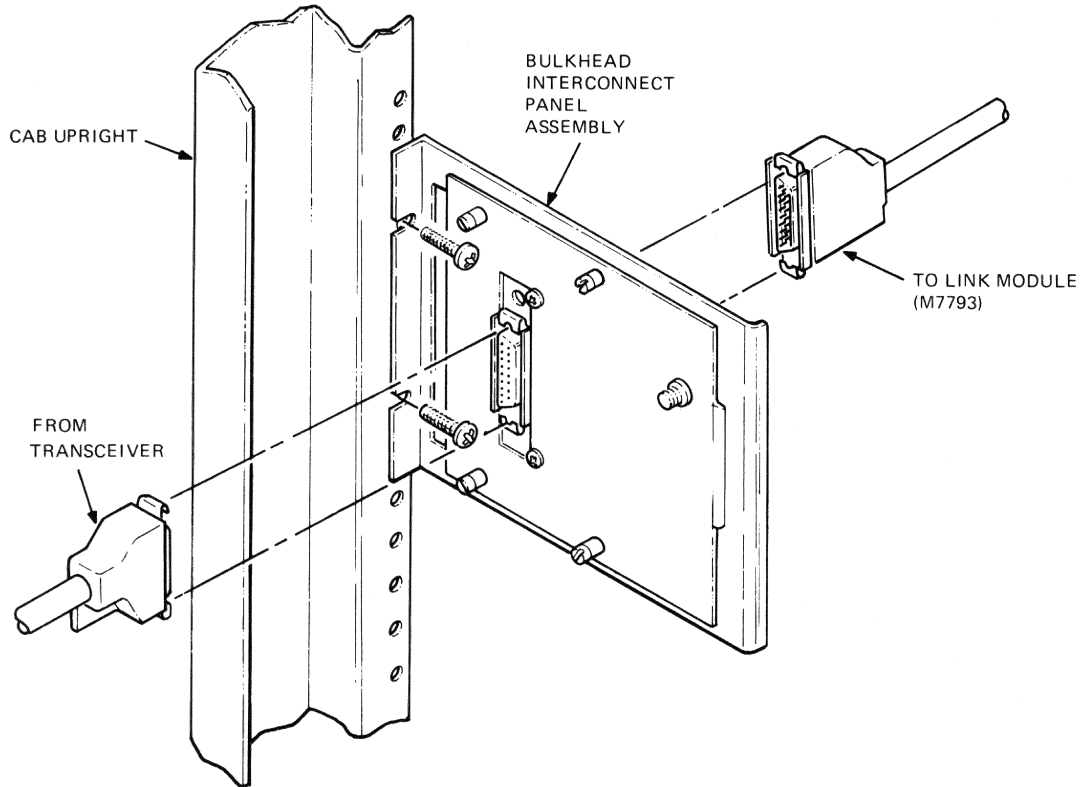
Figure 4 DEUNA Cabling Diagram



MKV84-0766

Figure 5 Bulkhead Interconnect I/O Panel Assembly

DEUNA CABLING

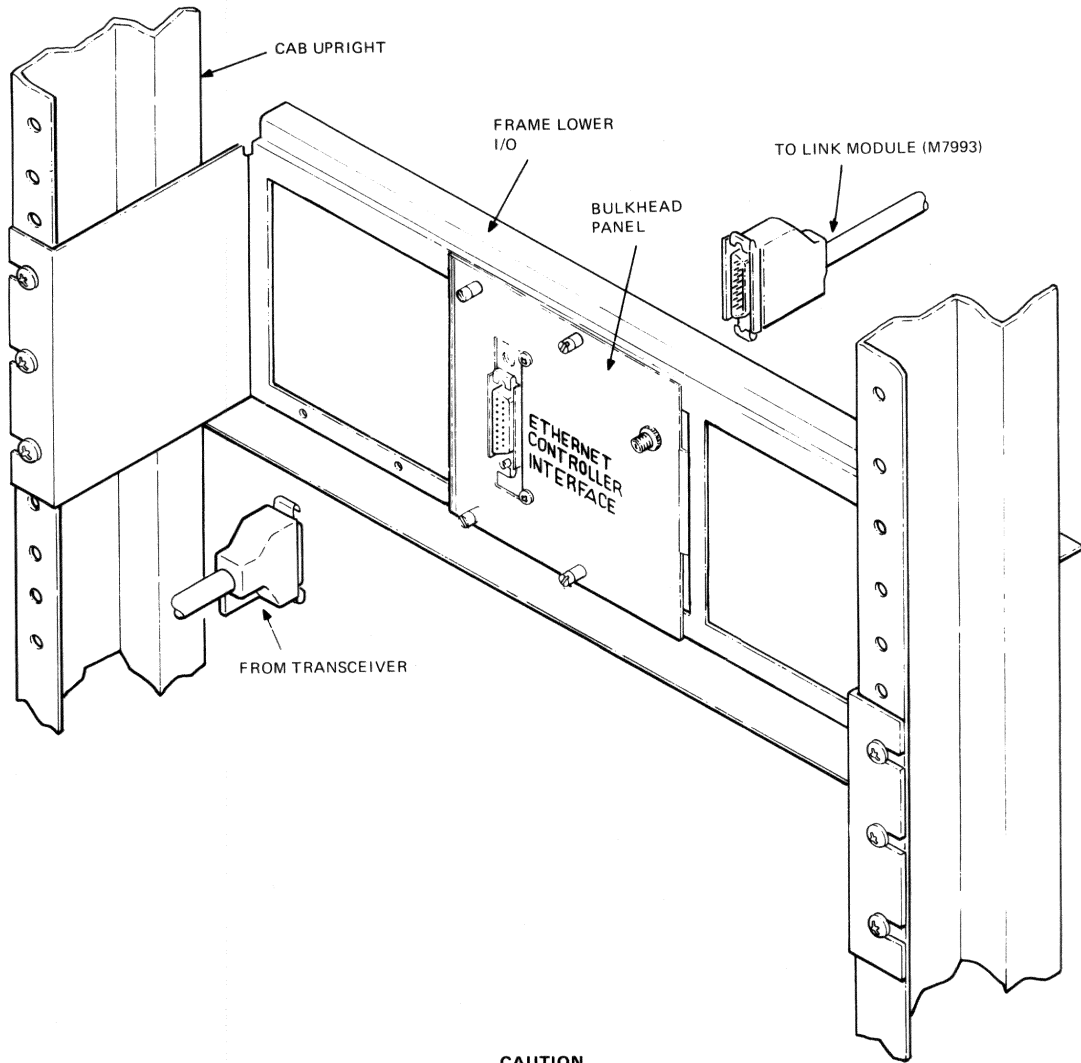


CAUTION

THE BACK OF THE BULKHEAD PANEL CONTAINS A CIRCUIT BOARD THAT CARRIES -15 V. BE SURE THIS CIRCUITRY DOES NOT TOUCH ANYTHING THAT COULD CAUSE A SHORT CIRCUIT ON POWER-UP.

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Figure 6 Bulkhead Interconnect Panel Assembly Installation



CAUTION
THE BACK OF THE BULKHEAD PANEL CONTAINS A CIRCUIT BOARD THAT CARRIES -15 V. BE SURE THIS CIRCUITRY DOES NOT TOUCH ANYTHING THAT COULD CAUSE A SHORT CIRCUIT ON POWER-UP.

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Figure 7 Typical System Cabinet Bulkhead Installation

DEUNA DIAGNOSTICS

Table 3 DEUNA Diagnostics for VAX-11 and PDP-11 Systems

Diagnostic Function	Diagnostic Name	PDP-11 Systems	VAX-11 Systems
Self-test	ROM-based self-test	N/A	N/A
Off-line test	Repair level diagnostic	CZUAA*	EVDWA**
Functional test	Functional diagnostic	CZUAB*	EVDWB**
System exerciser (PDP-11 only)	DEC/X11 DEUNA module	CXUAC*	N/A
Network exerciser	Network interconnect exerciser	CZUAC*	EVDWC**

Table 4 DEUNA LED Check Indications

Location	LED #	Indication
M7792 module	D1	Verifies, when lit (ON), that the two module interconnect cables are properly connected to J1 and J2 on both the port and link modules.
M7792 module	D2 – D7	Provides a visual indication of the current status of the ROM-based self-test microdiagnostics. All LEDs are lit (ON) following successful completion of the self-test (see Notes 1 and 2).
Bulkhead panel	D1	Indicates that –15 V transceiver power is available at the bulkhead connector J2. This verifies that: <ol style="list-style-type: none"> 1. The bulkhead cable assembly is properly connected at both ends, and 2. The bulkhead interconnect panel circuit breaker is properly set.

NOTES

1. **The self-test microdiagnostic program is initiated each time the DEUNA adaptor is powered up, and takes about 10 seconds to run. During this period, these LEDs blink rapidly as the various functions of the DEUNA adaptor are tested.**
2. **Whenever the DEUNA protocol enters the RUN state under system software, LED D7 blinks ON and OFF at a one second rate (approximate). For more information on the self-test diagnostics, refer to the following section on DEUNA Maintenance Aids or the DEUNA Technical Manual.**

DEUNA DIAGNOSTICS

Diagnostic Dialogs

Table 5 Typical PDP-11/DEUNA (CZUAA*) Diagnostic Dialog

PROMPT DR> The operator must respond by typing one or more commands;
for example, STA/PASS:NNNN/TEST:NNNN

Dialog	Description
R CZUAAAB DRS LOADED DIAG. RUN-TIME SERVICES REV. D APR-79 CZUAA-B-0 DEUNA REPAIR DIAGNOSTIC UNIT IS DEUNA DR>START	
CHANGE HW (L) ? YES	The program asks if any logical hardware changes are required.
# UNITS (D) ? 1	The number of units on the system to be tested.
UNIT 0	Designates unit to be tested.
WHAT IS THE PCSR0 ADDRESS? (0) ? 174510	Enter appropriate octal values.
WHAT IS THE VECTOR ADDRESS? (0) ? 120	
ETHERNET DEFAULT ADDRESS (HEX): AA-00-03-12-0A-E3	The ROM-based address is displayed.
ROM MICROCODE VERSION (DECIMAL): 5 SWITCHPACK SET FOR :	Displays hardware switch settings.
SELF-TEST LOOP DISABLED	
REMOTE BOOT ENABLED	
CZUAA EOP 1 0 CUMULATIVE ERRORS ^C	End of first pass. Number of errors.

VAX-11/DEUNA Diagnostics

The VAX-11 diagnostics run under a diagnostic supervisor. In the example (Table 6), the diagnostic supervisor prompt = DS>.

The following software revision levels are required to run VAX-11/DEUNA diagnostics.

- VMS revision 3.4 or later
- Diagnostic supervisor revision 6.9 or later

NOTE

The DEUNA functional diagnostic (EVDWB*.*) will not run unless both the line and circuit to be tested are set to OFF. System manager privileges are required to perform this operation.

The following SYSTEM and PROCESS parameters are required to run the VAX-11/DEUNA functional diagnostic.

```
SYSTEM MAXBUF = 1600
PROCESS BYTLM = 30000
```

To change BYTLM parameter:

```
$ SET DEF SYS$SYSROOT:[SYSEXE]
$ RUN AUTHORIZE
UAF> MODIFY <USER ACCN'T NAME>/BYTLM = 30000
UAF> EXIT
$ LOGOUT (USER MUST LOGOUT TO WRITE BYTLM QUOTA)
```

To change the SYSGEN MAXBUF parameter:

```
$ MCR SYSGEN
SYSGEN> SET MAXBUF 1600
SYSGEN> WRITE ACTIVE
SYSGEN> EXIT
```

DEUNA DIAGNOSTICS

The following table describes the process used to run VAX-11/DEUNA diagnostics.

Table 6 Typical VAX-11/DEUNA Diagnostic Operation

Command Function	Example
1. ATTACH the UNIBUS interface (UBA or UBI) to the system bus.	DS> ATT DW750 HUB DW0
2. ATTACH the device to the system. Enter CSR/VECTOR/BR.	DS> ATTACH UNA11 DW0 XEA0 CSR? 774510 120 5
3. LOAD appropriate diagnostic.	DS> LOAD EVDWB
4. SELECT devices that have been attached to the system.	DS> SEL ALL (or) SEL XEA0
5. Optional (if printout is desired).	DS> SET TRACE
6. Run the test.	DS> START

The following figure shows a typical VAX-11/DEUNA diagnostic printout.

```

*****
Test 1: READ INTERNAL ROM
Test 2: READ/WRITE INTERNAL WCS
Test 3: INTERNAL LINK ADDRESS TEST
Test 4: READ/WRITE INTERNAL LINK MEMORY
Test 5: TRANSMIT CRC TEST
Test 6: RECEIVE CRC TEST
Test 7: PROMISCUOUS ADDRESS TEST
Test 8: ENABLE ALL MULTICAST TEST
Test 9: STATION TEST
Test 10: PAD RUNT TEST
Test 11: NO RECEIVE BUFFERS AVAILABLE
Test 12: UNA STRESS TEST
UNA11 COUNTER SUMMARY - INTERNAL LOOPBACK MODE
SECONDS SINCE LAST ZEROED      : 1
PACKETS RECEIVED                : 0
MULTICAST PACKETS RECEIVED     : 0
PACKETS RECEIVED IN ERROR      : 21
BYTES RECEIVED                  : 0
MULTICAST BYTES RECEIVED       : 0
RCVS LOST - LOCAL BUF ERROR    : 0
LOCAL BUFFER ERRORS            : 0
PACKETS TRANSMITTED            : 21
MULTICAST PACKETS TRANSMITTED  : 0
PKTS XMITTED WITH 1 COLLISION  : 0
PKTS XMITTED WITH > 1 COLLISION : 0
PKTS XMITTED BUT DEFERRED      : 0
BYTES TRANSMITTED              : 14532
MULTICAST BYTES TRANSMITTED    : 0
TRANSMIT PACKETS ABORTED       : 0
XMIT COLLISION CHECK FAILURE   : 21
UNRECOGNIZED FRAME DESTINATION : 0
SYSTEM BUFFER ERROR            : 0
USER BUFFER ERROR              : 0

ETHERNET DEFAULT ADDRESS (HEX) AA-00-03-01-0C-70

ROM MICROCODE VERSION (DECIMAL): 5

SWITCH PACK SET FOR :
    NO REMOTE BOOT ENABLED
    SELF TEST LOOP DISABLED

.. End of run; 0 errors detected, pass count is 1,
   time is 11-APR-1984 08:49:22.22
DS> EXIT
$

```

MKV84-0773

Figure 8 Typical VAX-11 Functional Diagnostic Printout

DEUNA MAINTENANCE AIDS

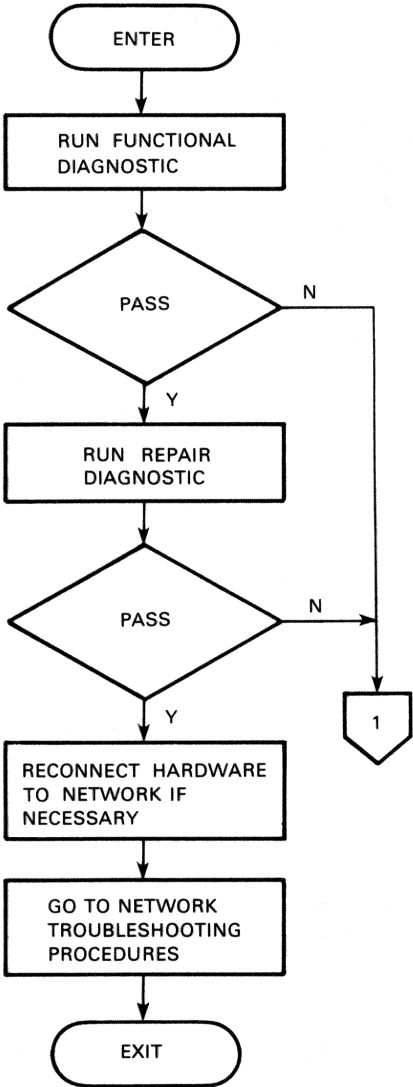
Required Equipment

There is no special equipment required for maintaining the DEUNA adaptor. However, the H4080 loopback test transceiver may be helpful in isolating some faults.

Field Replaceable Units (FRUs)

The following items are FRUs for the DEUNA adaptor.

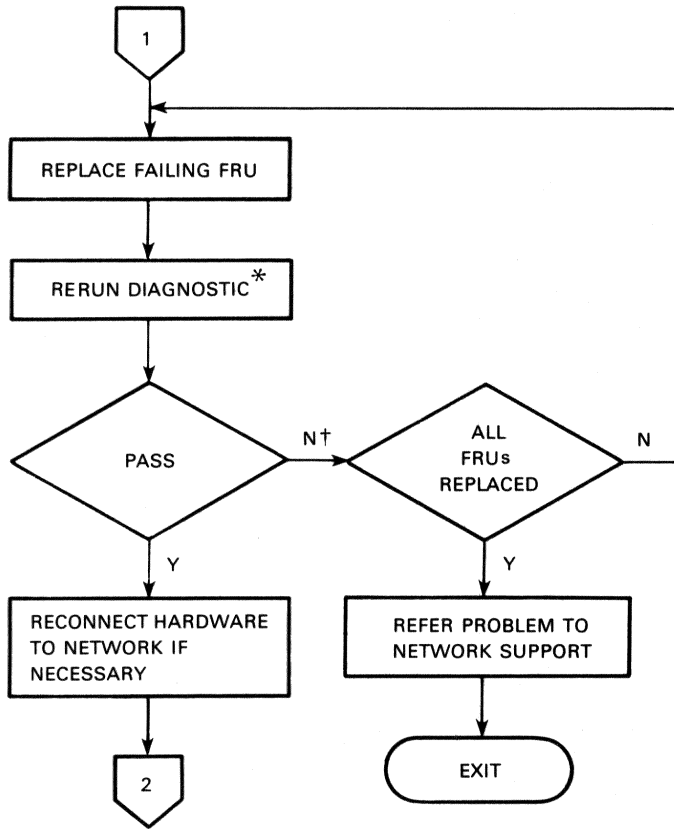
- M7792 DEUNA port module
- M7793 DEUNA link module
- BC08R-1 Module interconnect cable
- 70-18798-** Bulkhead cable assembly
- 70-18799-00 Bulkhead interconnect panel assembly



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Figure 9 DEUNA Troubleshooting Flow Diagram (Sheet 1 of 3)

DEUNA MAINTENANCE AIDS

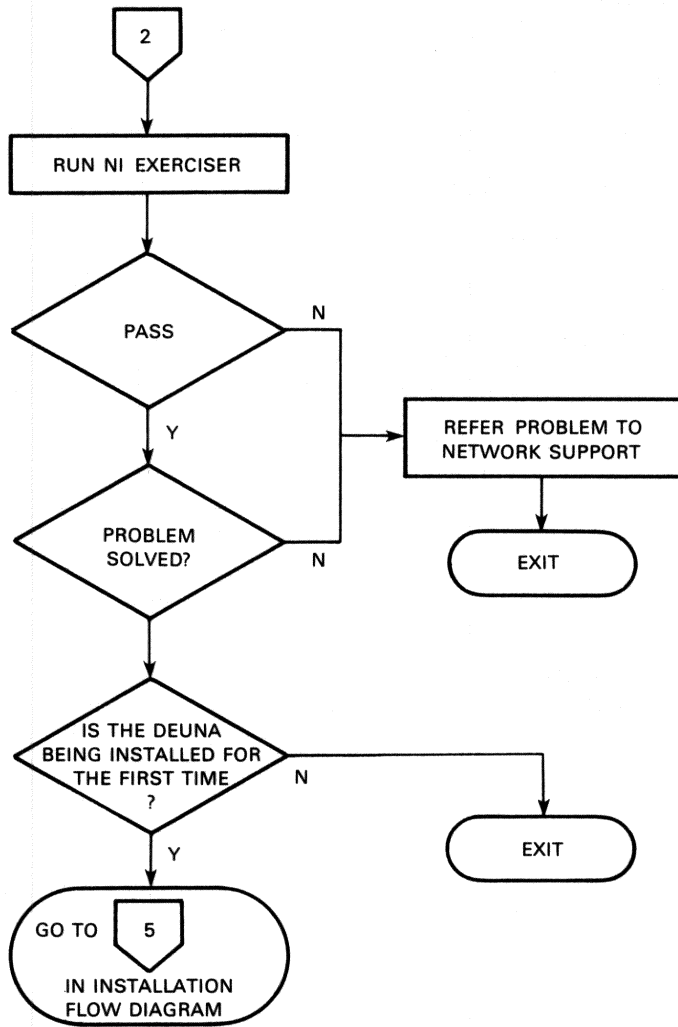


* REFERS TO PREVIOUSLY RUN DIAGNOSTIC

† DID THE SYMPTON CHANGE? IF SO, THEN A NEW OR ADDITIONAL PROBLEM MAY EXIST. REPLACE THE ORIGINAL MODULE TO SEE IF THE ORIGINAL SYMPTOMS RETURN. THIS NEW INFORMATION MAY BE USEFUL IN ANALYZING THE PROBLEM.

MKV84-0770

Figure 9 DEUNA Troubleshooting Flow Diagram (Sheet 2 of 3)



MKV84-0771

Figure 9 DEUNA Troubleshooting Flow Diagram (Sheet 3 of 3)

DEUNA MAINTENANCE AIDS

ROM-Based Self-Test and LEDs

The ROM-based self-test is initiated in two ways.

1. On power up
2. On issuing the following self-test port command to the low byte of PCSR0:
 - a. Perform a device reset by setting bit 5 of PCSR0,
 - b. Verify that the DNI bit (PCSR0 – bit 11) is set,
 - c. Issue self-test port command by setting bits 0 and 1 in the low byte of PCSR0,
 - d. Verify that the DNI bit (PCSR0 – bit 11) is set, and
 - e. Observe the self-test results (they should be displayed by LEDs on the port module).

The following is a typical example of a self-test port command.

```
RSET = PCSR0 <05>
DNI = PCSR0 <11>

LOOP1:  MOVB #RSET, @# PCSR0      ;device reset
        BIT #DNI, @# PCSR0      ;test for reset complete
        BEQ LOOP1

LOOP2:  MOVB #3, @# PCSR0        ;self-test port command
        BIT #DNI, @# PCSR0      ;test for self-test complete
        BEQ LOOP2
        HALT                    ;self-test results appear
                                   ;in port LEDs
```

DEUNA Self-Test LEDs and Codes

The following figure shows the location of the DEUNA self-test LEDs.

The accompanying table describes the self-test LED octal codes. In the table, ON represents a logical ONE (1); OFF represents a logical ZERO (0). For the purpose of this table, all LEDs are assumed to be OFF unless otherwise noted.

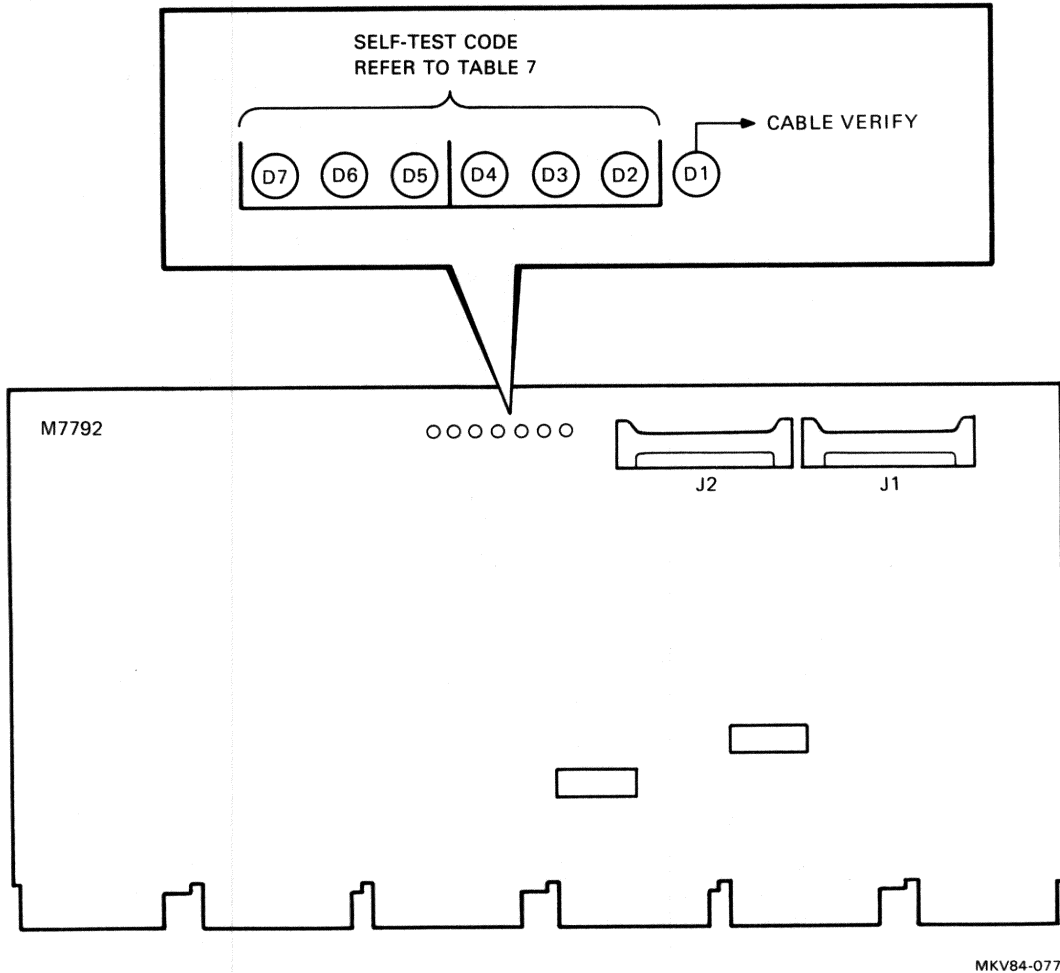


Figure 10 DEUNA Port Module Self-Test LEDs

Table 7 DEUNA Self-Test LED Codes

LED Code (Octal)	D7	D6	D5	D4	D3	D2	Test Name	(Module)
77	ON	ON	ON	ON	ON	ON	Never Got Started	M7792/M7793
1						ON	CPU Instruction	M7792
2					ON		ROM	M7792
3					ON	ON	Writeable Control Store	M7792
4				ON			T11 UNIBUS Address Register	M7792
5				ON		ON	Receiver UNIBUS DMA	M7792
6				ON	ON		PCSR1 Lower Byte & T11 DMA Read	M7792/UNIBUS
7				ON	ON	ON	PCSR0 Upper Byte & T11 DMA Write	M7792
10			ON				PCSR0 Lower Byte & Link Mem. DMA	M7792
11			ON			ON	PCSR2 & PCSR3	M7792
12			ON		ON		Timer	M7792
13			ON		ON	ON	Physical Address ROM	M7792
20		ON					Link Memory	M7792/M7793
							Local Loopback	
26		ON		ON	ON		Bugcheck (N1 & UNIBUS in HALTED STATE) - Internal Transmit Buffer Resource Allocation Error on Boot	M7792/M7793
30			ON	ON			Transmitter Timeout	M7792/M7793
31			ON	ON		ON	Receiver Timeout	M7792/M7793
32			ON	ON		ON	Buffer Comparison	M7792/M7793
33			ON	ON		ON	Byte Count	M7792/M7793
34			ON	ON	ON		Receiver Status	M7792/M7793
35			ON	ON	ON	ON	CRC Error	M7792/M7793
36			ON	ON	ON	ON	Match Bit Error	M7792/M7793
37			ON	ON	ON	ON	TDR Error	M7792/M7793
							Transmitter Buffer Address	
40	ON						Transmitter Timeout	M7793
41	ON					ON	Receiver Timeout	M7793
42	ON				ON		Buffer Comparison	M7793
43	ON				ON	ON	Byte Count	M7793
44	ON				ON		Receiver Status	M7793
45	ON				ON	ON	CRC Error	M7793
							Receiver Buffer Address	
50	ON		ON				Transmitter Timeout	M7793
51	ON		ON			ON	Receiver Timeout	M7793
52	ON		ON		ON		Buffer Comparison	M7793
53	ON		ON		ON	ON	Byte Count	M7793
54	ON		ON	ON			Receiver Status	M7793
55	ON		ON	ON		ON	CRC Error	M7793
60	ON	ON					Runt Packet	M7793
61	ON	ON					Minimum Packet Size	M7793
62	ON	ON			ON		Maximum Packet Size	M7793
63	ON	ON			ON	ON	Oversize Packet	M7793
64	ON	ON		ON			CRC	M7793
65	ON	ON		ON		ON	Collision	M7793
66	ON	ON		ON	ON	ON	Heartbeat	M7793
	ON	ON		ON	ON	ON	Half Duplex	M7793
70	ON	ON	ON				Multicast	M7793
71	ON	ON	ON			ON	Address Recognition	M7793

NOTE
During the self-test, the LEDs should be observed counting from 1-77 octal.

72

CABLE TEST FAIL

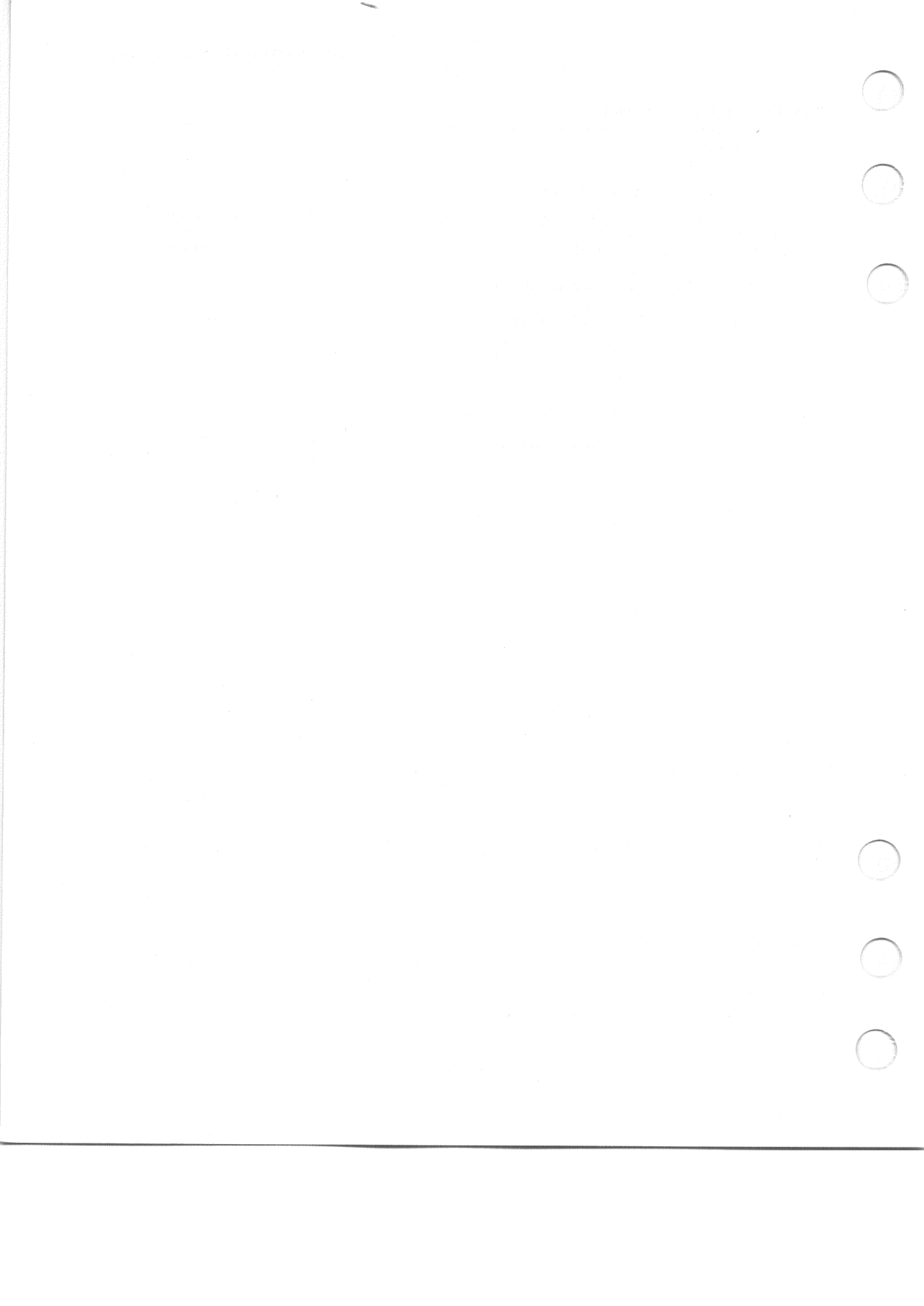
MKV84-0774

DEUNA Tech Tips/FCO Index

The following table lists Tech Tips and FCOs that pertain to the DEUNA UNIBUS network adaptor. Space is provided for adding new information.

Table 8 DEUNA Tech Tip Index

Tech Tip No.	Title	Speed Bulletin
DEUNA-TT-1	Revised DC Power Requirements	313
DEUNA-TT-2	DEUNA Switchpack E-62	313



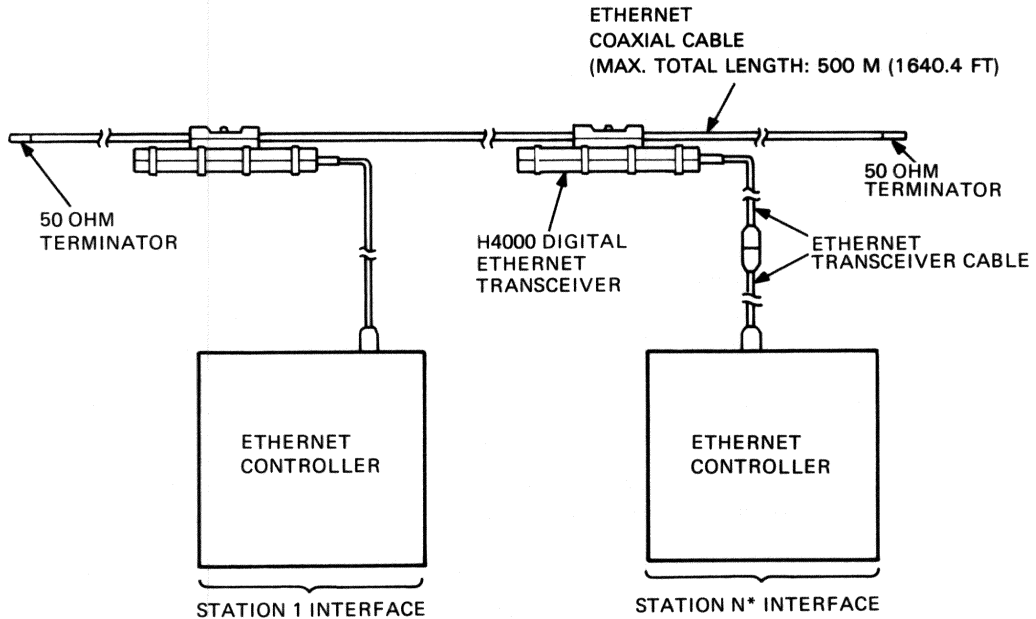
H4000 ETHERNET TRANSCEIVER

General Description

An H4000 Ethernet transceiver provides a physical and electrical interface between an Ethernet coaxial cable and other Ethernet devices such as controllers, repeaters, network interconnect devices, and so on.

The transceiver clamps directly onto the coaxial cable and has a 15-pin male D-connector for connecting to a transceiver cable. Power to drive the transceiver (-11.40 to -15.75 Vdc) is provided by the connected device or a DEXPS (auxiliary power supply) via the transceiver cable.

The H4000 transceiver is transparent to the data layers and is not addressable or programmable in any way.



*N ≤ 100 PER 500 M (1640.4 FT) COAXIAL CABLE SEGMENT

MKV84-1278

Figure 1 Typical H4000 Transceiver Configuration

H4000 Versions

The H4000 is the only version of the H4000 Ethernet transceiver.

H4000 Transceiver Components

The following parts are supplied with the H4000 transceiver.

- H4000 Transceiver
- *H4000 DIGITAL Ethernet Transceiver Installation Manual*

H4000 INSTALLATION

Reference Documentation

Refer to the following documents for more information regarding the H4000 Ethernet transceiver.

- *H4000 Ethernet Transceiver Technical Manual* EK-H4000-TM
- H4000 Ethernet Transceiver Microfiche EP-H4000-TM
- H4000 Ethernet Transceiver Print Set MP-01369
- The Ethernet – Local Area Network, Data Link Layer and Physical Layer Specifications AA-K759B-TK
- *Ethernet Installation Guide* EK-ETHER-IN
- *H4000 Installation Guide* EK-H4000-IN
- *Etherjack Installation Guide* EK-DEXJK-IN
- *H4000-T Ethernet Transceiver Tester User Guide* EK-ETHTT-UG

System Placement

System placement is not applicable to the H4000 transceiver.

Device Placement

The H4000 transceiver clamps directly onto an Ethernet coaxial cable. Note the following constraints.

- A maximum of 100 transceivers may be placed on a single 500 m (1640.4 ft) Ethernet coaxial cable segment.
- Transceivers must be positioned on (or as close as possible) to the annular rings marked every 2.5 m (8.2 ft) on the coaxial cable.
- Spacing between transceivers may not be less than 2.5 m (8.2 ft).

NOTE

If annular rings are not marked on the coaxial cable, transceivers must be spaced in multiples of 2.5 m (8.2 ft) only.

Required Equipment

The following equipment is required for installing an H4000 Ethernet transceiver.

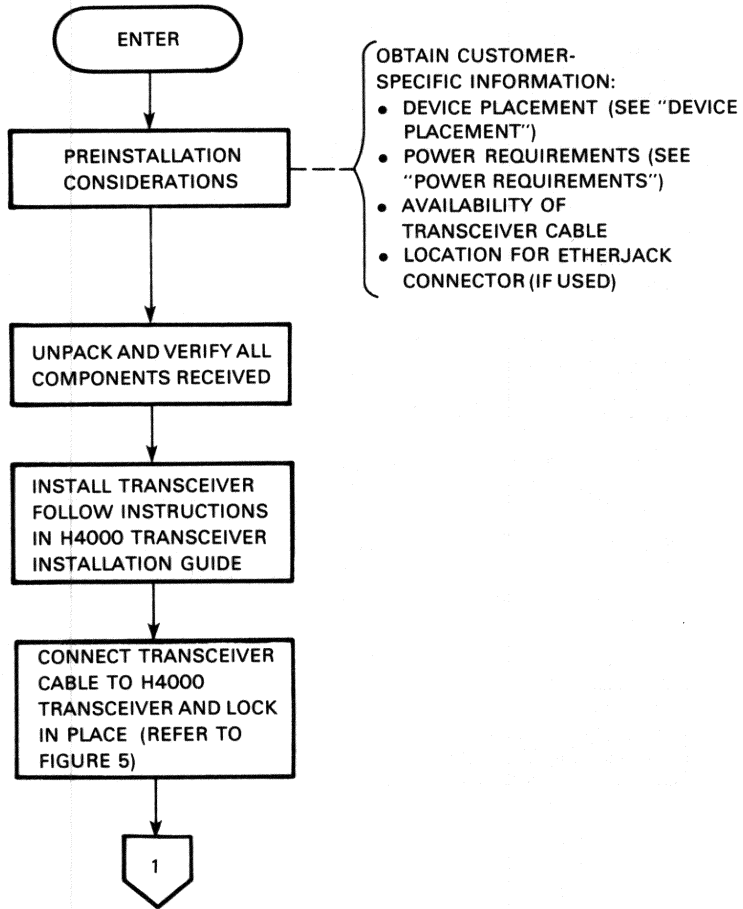
- H4090-KA/KB installation kit (instructions for using the kit are included with the kit).
- H4000-TA/TB transceiver tester

Power Requirements

An H4000 transceiver requires –11.40 to –15.75 Vdc for proper operation. The power is supplied by the following sources.

- The Ethernet device to which the transceiver is connected.
- An auxiliary power supply (DEXPS).

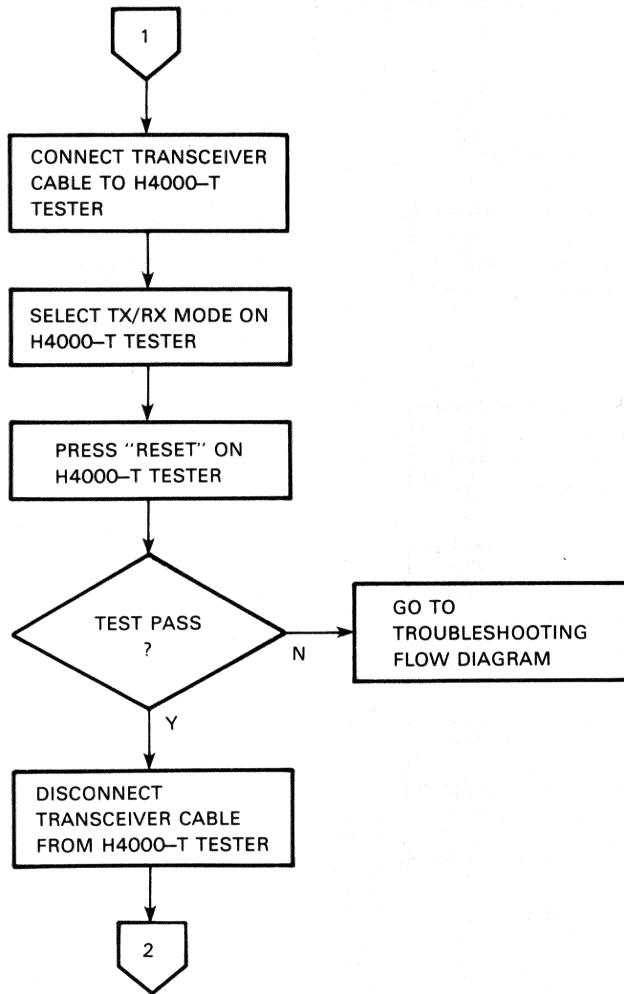
The following flow diagram outlines the H4000 transceiver installation process.



MKV84-1279

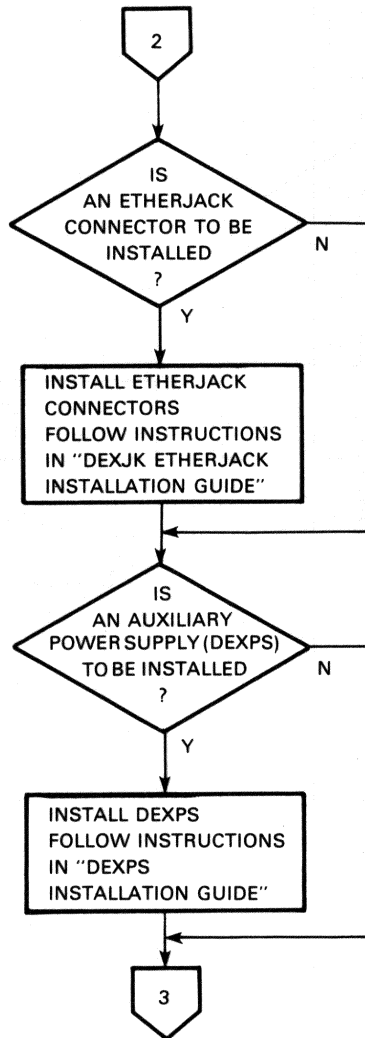
Figure 2 Installation Flow Diagram (Sheet 1 of 4)

H4000 INSTALLATION



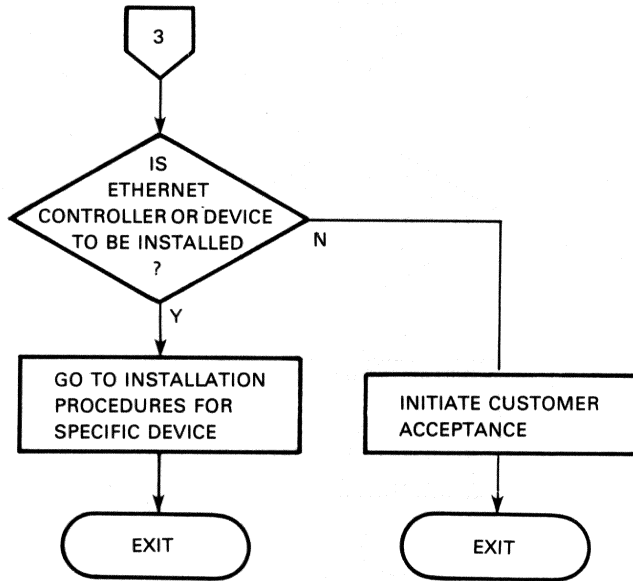
MKV84-1280

Figure 2 Installation Flow Diagram (Sheet 2 of 4)



MKV84-1281

Figure 2 Installation Flow Diagram (Sheet 3 of 4)

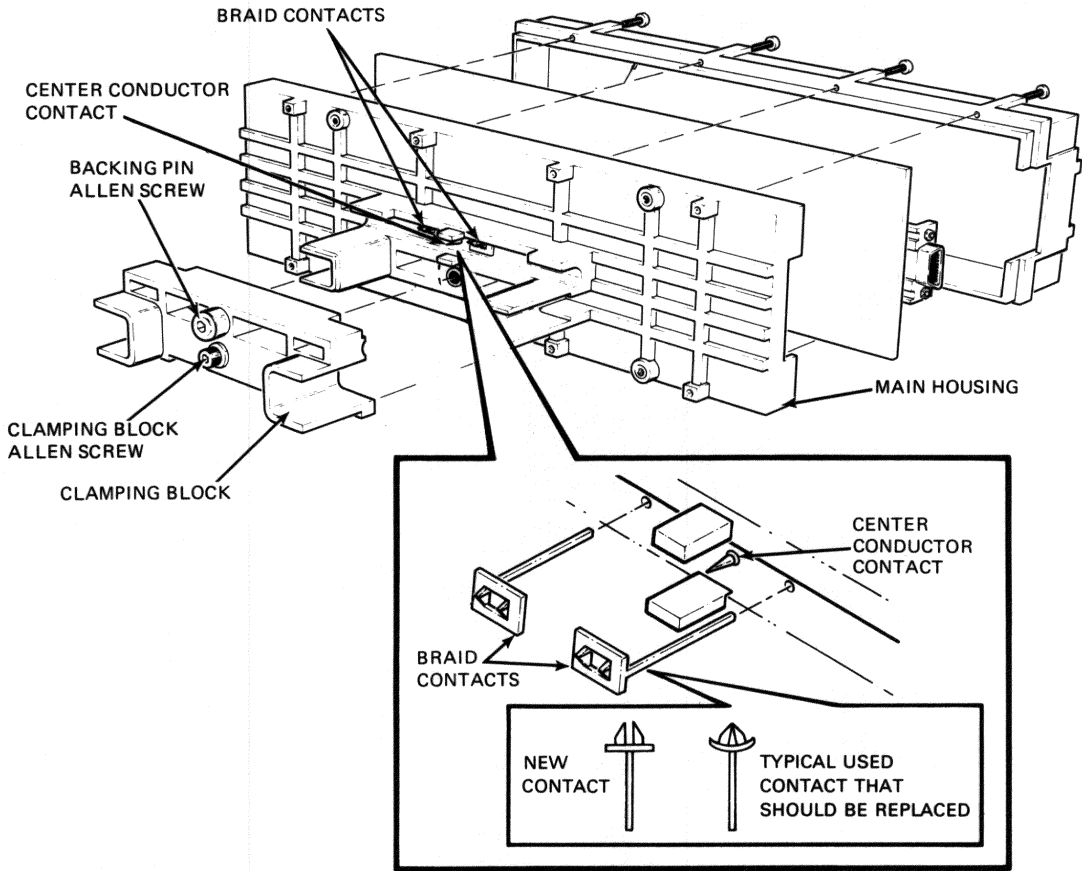


MKV84-1282

Figure 2 Installation Flow Diagram (Sheet 4 of 4)

H4000 INSTALLATION

The following figure shows the positions of the center conductor contact and braid contacts. Also shown is the clamping block. The clamping block holds the coaxial cable so that it connects with the center conductor contact and braid contacts.



MKV84-1283

Figure 3 Hardware for Installing the H4000 Transceiver on a Coaxial Cable

The following figure shows the actual connection between the coaxial cable and the contacts.

H4000-7

H4000 INSTALLATION

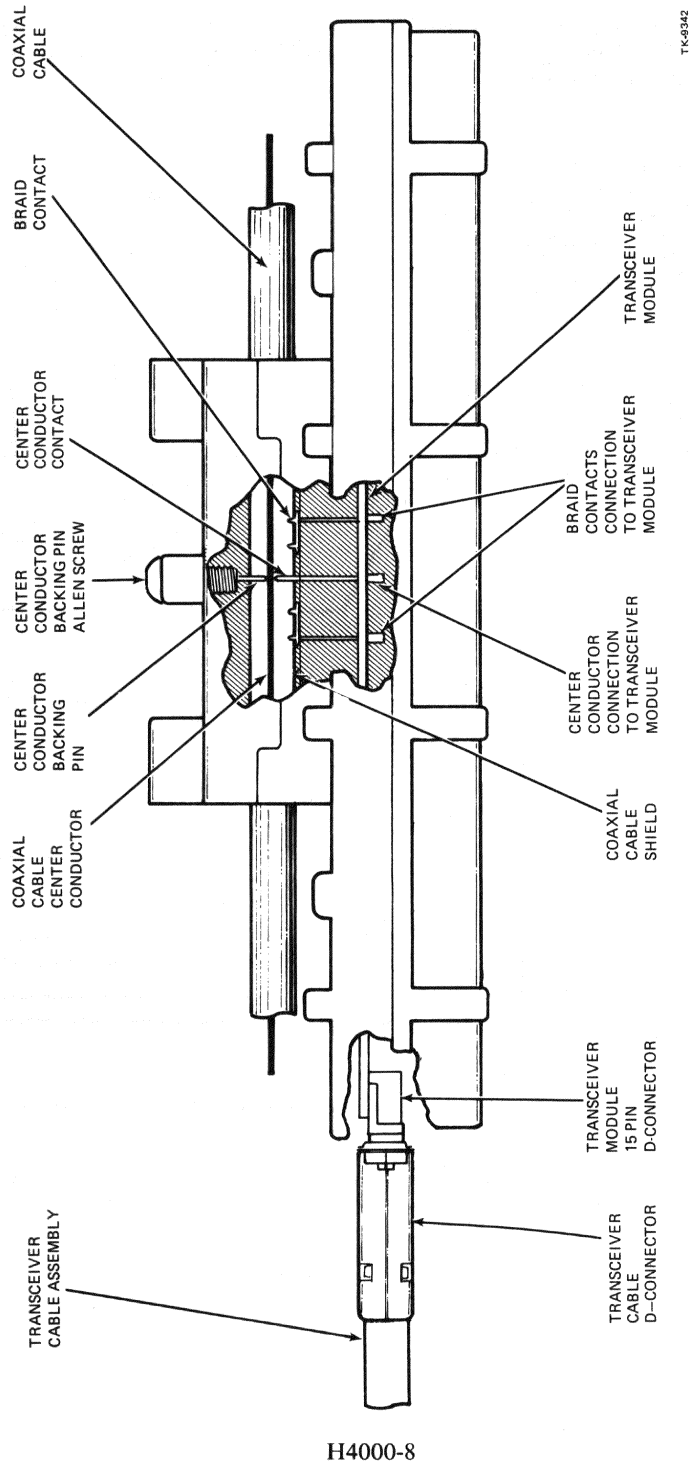
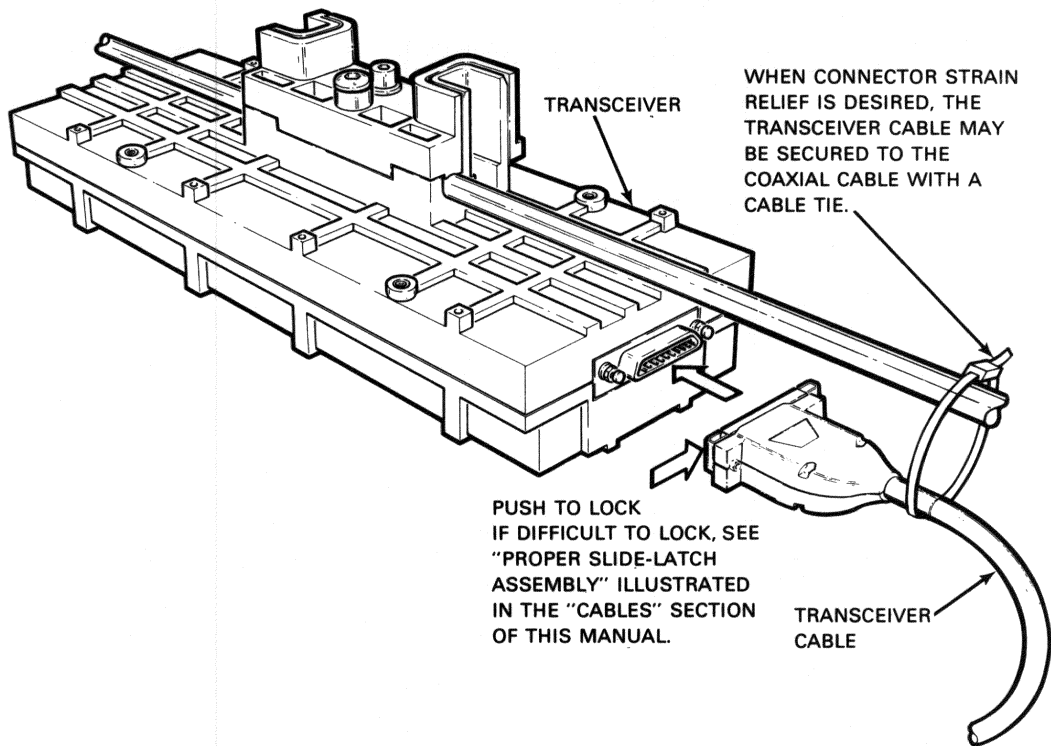


Figure 4 H4000 Ethernet Transceiver: Cutaway View Showing Coaxial Cable Interface

Cabling

The following figure illustrates the procedure for connecting and locking the transceiver cable in place. The transceiver cable should be secured with a cable tie as shown for strain relief.



MKV84-1284

Figure 5 Typical Transceiver Cable Connection

H4000 DIAGNOSTICS

Diagnostics

There are no diagnostics designed specifically for the H4000 specifically Ethernet transceiver. However, the following diagnostics may be helpful in isolating faults to the transceiver.

- NIE (Network Exerciser) – See Network Troubleshooting in this volume of the *Communications Options Minireference Manual*.
- Functional diagnostics for the device connected to the transceiver (refer to specific device for applicable diagnostics).

Required Equipment

The following equipment is required for isolating faulty H4000 Ethernet transceivers.

- H4000-TA (or -TB for non-U.S. versions) transceiver tester.

Field Replaceable Units (FRUs)

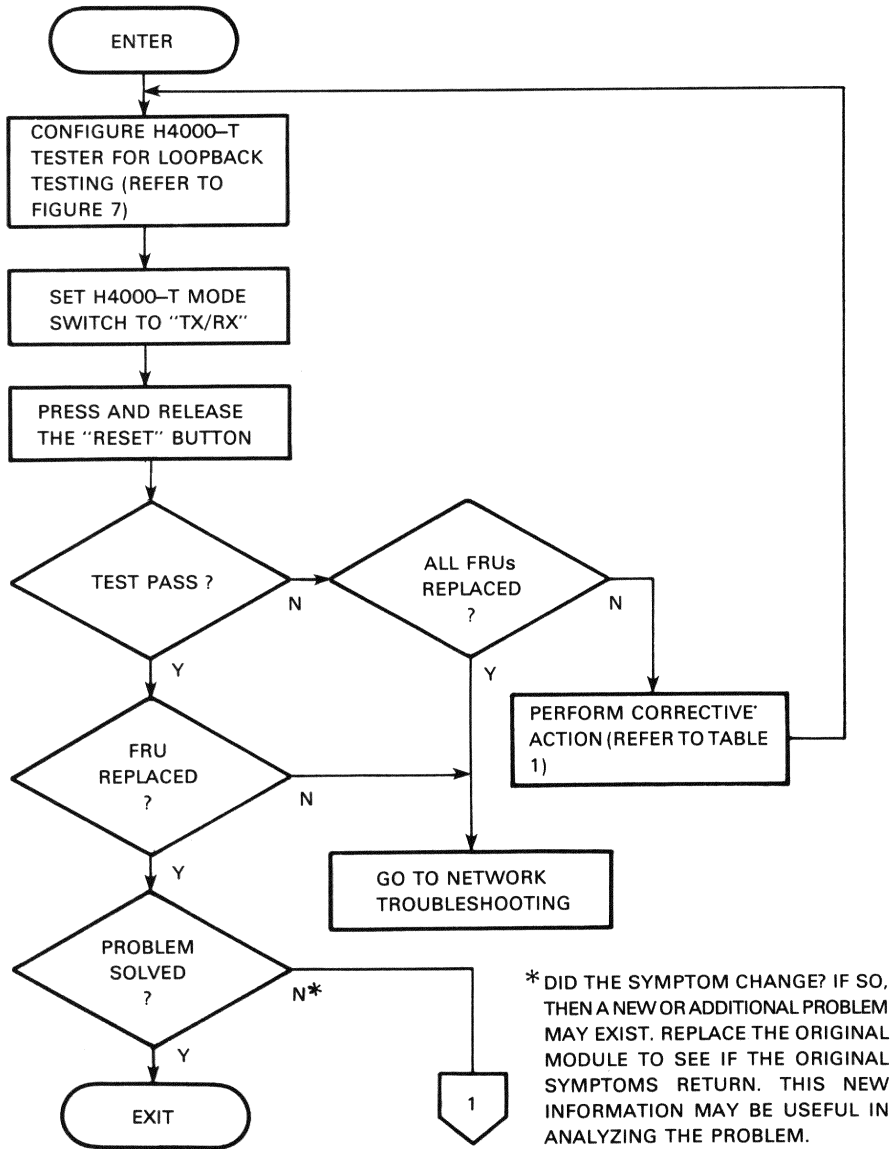
The following items are FRUs for the H4000 transceiver.

- Transceiver module 54-14966-00
- Braid contacts (box of 100) 29-24339
- H4000 transceiver H4000

H4000 MAINTENANCE AIDS

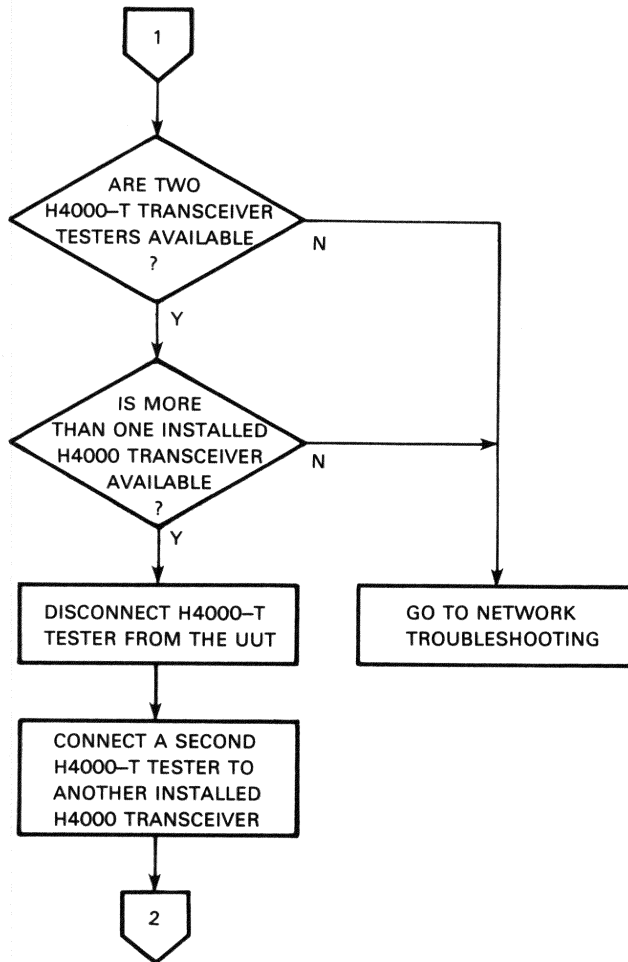
Troubleshooting Flow Diagram

The following troubleshooting flow diagram illustrates the procedures for locating a malfunctioning H4000 Ethernet transceiver.



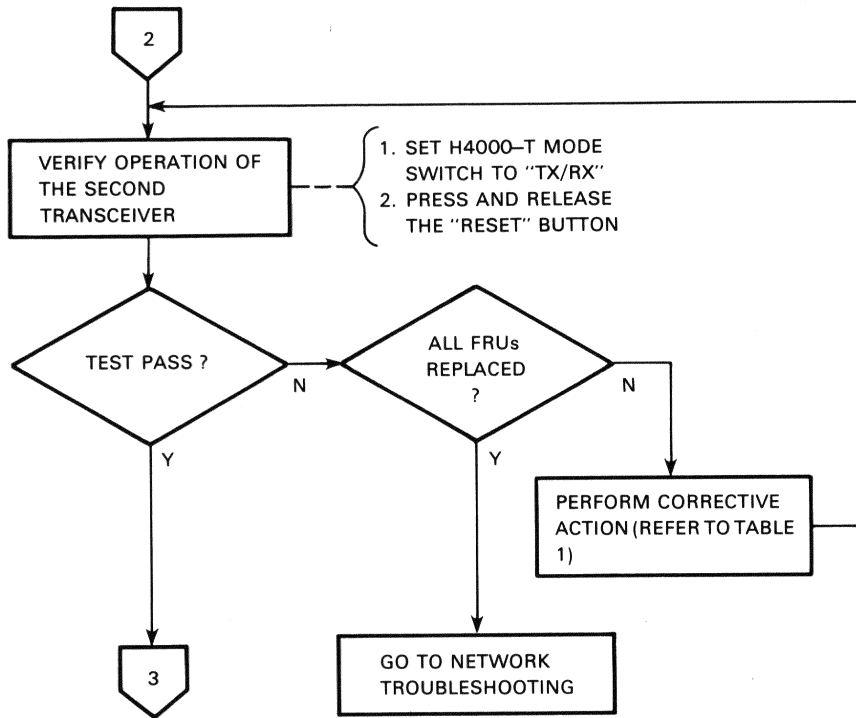
MKV84-1285

Figure 6 Troubleshooting Flow Diagram (Sheet 1 of 4)



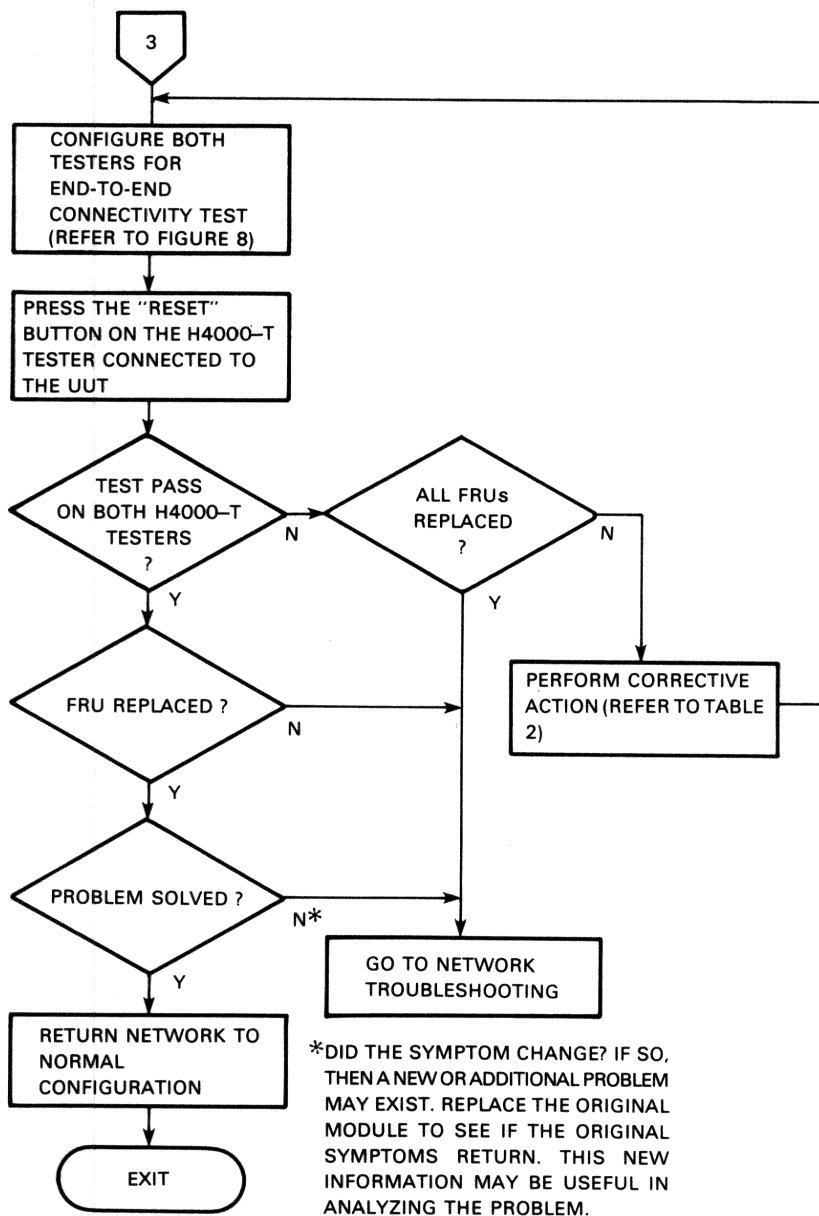
MKV84-1286

Figure 6 Troubleshooting Flow Diagram (Sheet 2 of 4)



MKV84-1287

Figure 6 Troubleshooting Flow Diagram (Sheet 3 of 4)



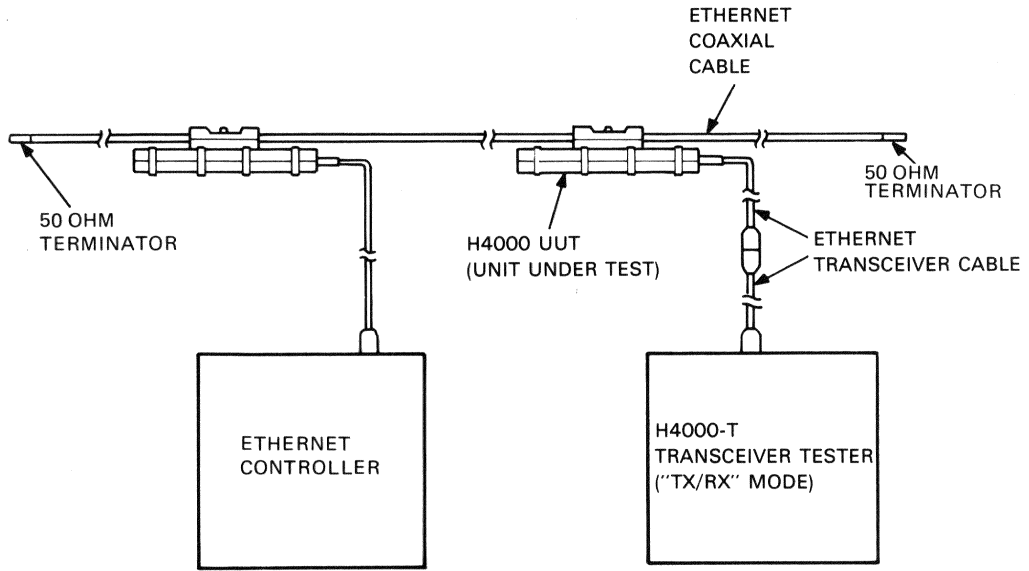
*DID THE SYMPTOM CHANGE? IF SO, THEN A NEW OR ADDITIONAL PROBLEM MAY EXIST. REPLACE THE ORIGINAL MODULE TO SEE IF THE ORIGINAL SYMPTOMS RETURN. THIS NEW INFORMATION MAY BE USEFUL IN ANALYZING THE PROBLEM.

MKV84-1288

Figure 6 Troubleshooting Flow Diagram (Sheet 4 of 4)

H4000 MAINTENANCE AIDS

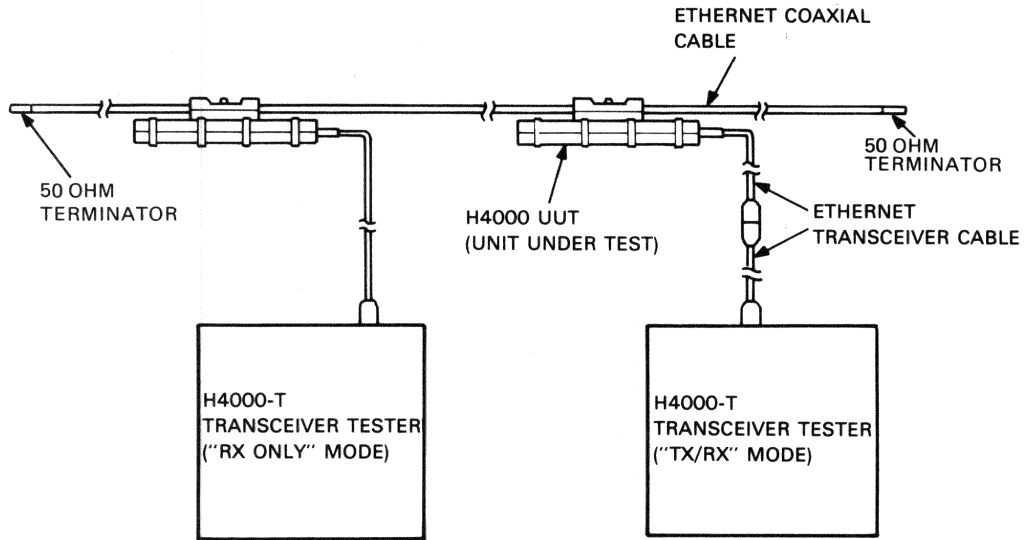
The following figure shows a configuration for a single H4000-T transceiver tester connected to an H4000 UUT (unit under test).



MKV84-1289

Figure 7 Typical H4000-T Configuration for Loopback Testing

The following figure shows a configuration for two H4000-T transceiver testers connected for end-to-end connectivity testing. One tester is set in TX/RX mode, the other tester is set in RX ONLY mode.



MKV84-1290

Figure 8 Typical H4000-T Configuration for End-to-End Testing

H4000 MAINTENANCE AIDS

Table 1 H4000-T Indications and Corrective Action (TX/RX Mode)

Lamp	Indication	Corrective Action*
DATA PASS	Data packet transmitted and received correctly.	
DATA FAIL	Data packet not received correctly.	Repair/replace: <ul style="list-style-type: none"> • Transceiver cable† • Module‡ • Check tap for bent or broken contacts • Retap • Replace entire H4000 transceiver.
COLLISION TEST	Collision test signal not received after sending data packet.	Repair/replace: <ul style="list-style-type: none"> • Transceiver cable† • Module‡
COLLISION	<i>Intermittent light:</i> Normal collision signal received. <i>Steady light:</i> Late collision.	If COLLISION is ON and SELF-TEST is flashing check for: <ul style="list-style-type: none"> • Missing terminators • Malfunctioning controller • Improperly configured network
TIMEOUT	Carrier signal not received within 19 microseconds.	Repair/replace: <ul style="list-style-type: none"> • Transceiver cable† • Module
SELF TEST PASS	Indicates successful self-test when flashed every 3-4 seconds.	

*When several FRUs are suggested for replacement, begin by replacing the first of the several items.

†Make sure that the transceiver cable is properly assembled. Check "Proper Slide-Latch Assembly" illustrated in the "CABLES" section of this manual.

‡Before replacing module, remove power by disconnecting transceiver cable.

Table 2 H4000-T Indications and Corrective Action (RX ONLY Mode)

Lamp	Indication	Corrective Action*
DATA PASS	Data packet received correctly.	
DATA FAIL	Data packet not received correctly.	<p>If DATA PASS lamp is lit on TX/RX tester:</p> <ul style="list-style-type: none"> • Troubleshoot cable plant • Replace UUT
COLLISION TEST	Not used.	
COLLISION	<p>Steady light:</p> <p>Normal or late collision.</p>	<p>If the COLLISION lamp is also lit on the TX/RX tester, check for:</p> <ul style="list-style-type: none"> • Missing terminators • Malfunctioning controller • Improperly configured network
TIMEOUT	Not used.	
SELF TEST PASS	Steady ON indicates the single self-test was successful.	

*When several FRUs are suggested for replacement, begin by replacing the first of the several items.

H4000 MAINTENANCE AIDS

Table 3 H4000 Tech Tips/FCO Index

Tech Tip No.	Title	Speed Bulletin No.
ETHERNET-TT-2	Recommended Use of H4000 and Physical Channel Coax	313

CHAPTER 3 CABLES

3.1 INTRODUCTION

This chapter contains the following information.

- Outline drawings of each cable type needed to install the network devices described in this manual.
- Outline drawings of connectors and terminators.
- Drawings of proper slide-latch assembly.

The following table alphabetically lists part numbers of the various cables, connectors, and terminators used with Ethernet networks. Use of listed cables is also described.

Table 1 Ethernet Cable, Connector, and Terminator Usage

Part Number	Name	Uses
BCO8R-1	Ribbon cable	Interconnects DEUNA link and port modules
BNC-F*	Female F to male BNC adaptor	Typically used for test equipment connection
BNE2*-.**	Coaxial cable	Ethernet physical channel cable (50 ohms)
BNE3*-.**	Low loss transceiver cable	Interconnects Ethernet devices
BNE4*-.**	High loss transceiver cable	Interconnects Ethernet devices
BN25B-**	Fiber-optic cable	Links remote Ethernet repeater units
CAB-6*	Broadband cable	Physical channel drop cable (75 ohms) for broadband Ethernet networks
DEXJB	Fiber-optic junction box	Used to change from one type of fiber-optic cable to another

*Manufactured by Jerrold Div., General Instrument Corp.

Table 1 Ethernet Cable, Connector, and Terminator Usage (Cont)

Part Number	Name	Uses
DEXJK	Etherjack connector	Wall-mounted receptacle for connecting a transceiver cable to an H4000 transceiver
F-56C*	Female F connector	Used for broadband drop cable
F-81C*	Female F to female F adaptor	Joins two lengths of broadband drop cable
TR-75F*	Female F terminator (75 ohms)	Terminates 75 ohm male F connectors
12-19817-01	Barrel connector	Joins two lengths of coaxial cable
12-19816-01	Terminator (50 ohms)	Terminates coaxial cable in its characteristic impedance (50 ohms)
70-18798-00	DEUNA bulkhead cable assembly	Interconnects DEUNA link module and bulkhead interconnect panel assembly
70-18799-00	DEUNA bulkhead interconnect panel assembly	I/O connector panel for DEUNA adaptor bulkhead

*Manufactured by Jerrold Div., General Instrument Corp.

3.2 CABLES AND CONNECTORS

The cables in this section are divided into the following categories.

- Baseband Ethernet coaxial cables (See Table 2)
- Baseband Ethernet connectors and terminators (See Table 3)
- Baseband Ethernet transceiver cables (See Table 4)
- Fiber-optic channel elements (See Table 5)
- Broadband Ethernet coaxial cable
- Broadband Ethernet connectors and terminators (See Table 6)
- Other cables (See Table 7)

Table 2 Baseband Ethernet Coaxial Cables

Cable Number	Length Variations Available*	Description
BNE2A-**	MA, MB, MC, MD	PVC composition
BNE2B-**	MA, MB, MC, MD	Teflon™ composition

*MA = 23.4 m (76.78 ft)
 MB = 70.2 m (230.33 ft)
 MC = 117.0 m (383.88 ft)
 MD = 500.0 m (1640.50 ft)

Teflon is a trademark of DuPont de Nemours and Co., Inc.

Table 3 Baseband Ethernet Connectors and Terminators

Part Number	Part Name	Description
H4060	Male N-connector	Connector for BNE2*-** cable (six per package)
12-19816-01	Terminator (50 ohms)	50 ohm terminator for BNE2*-** cable
12-19817-01	Barrel connector	Barrel connector for BNE2*-** cable
DEXJK	Etherjack	Etherjack connector

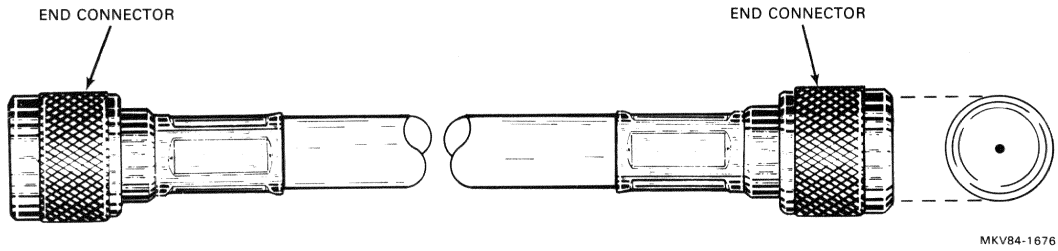


Figure 1 BNE2*.-** Coaxial Cable

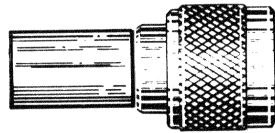


Figure 2 H4060 (End) Connector

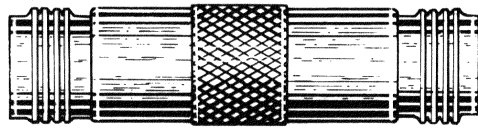


Figure 3 12-19817-01 Barrel Connector

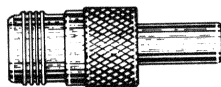
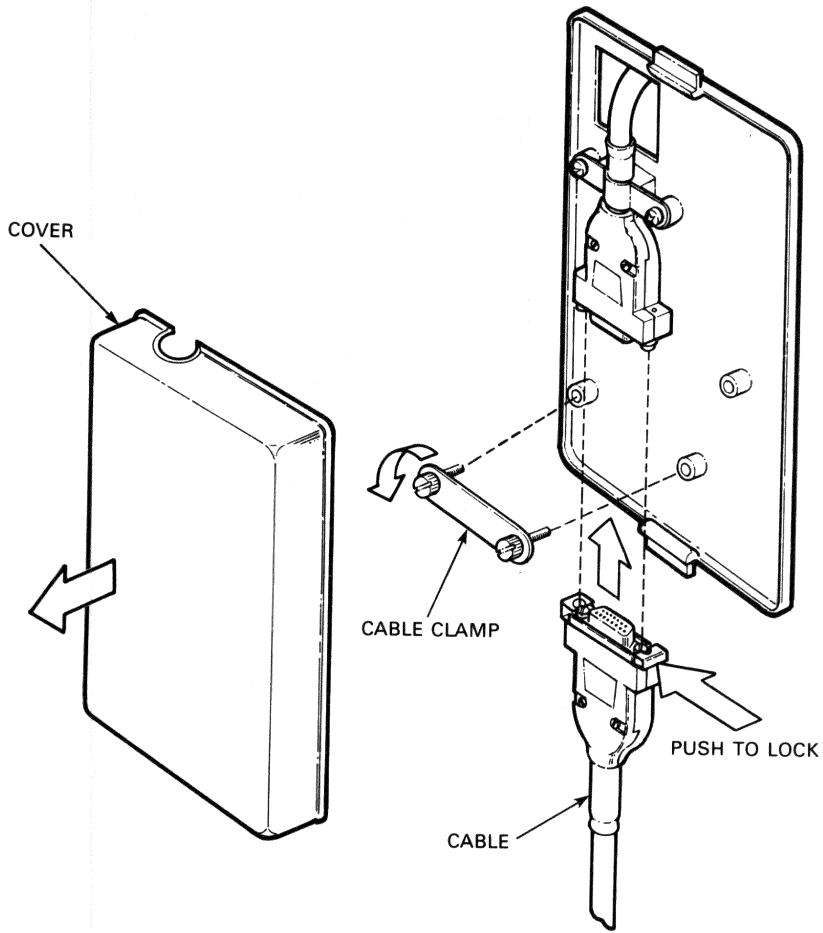


Figure 4 12-19816-01 Terminator



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Figure 5 DEXJK Etherjack Connector

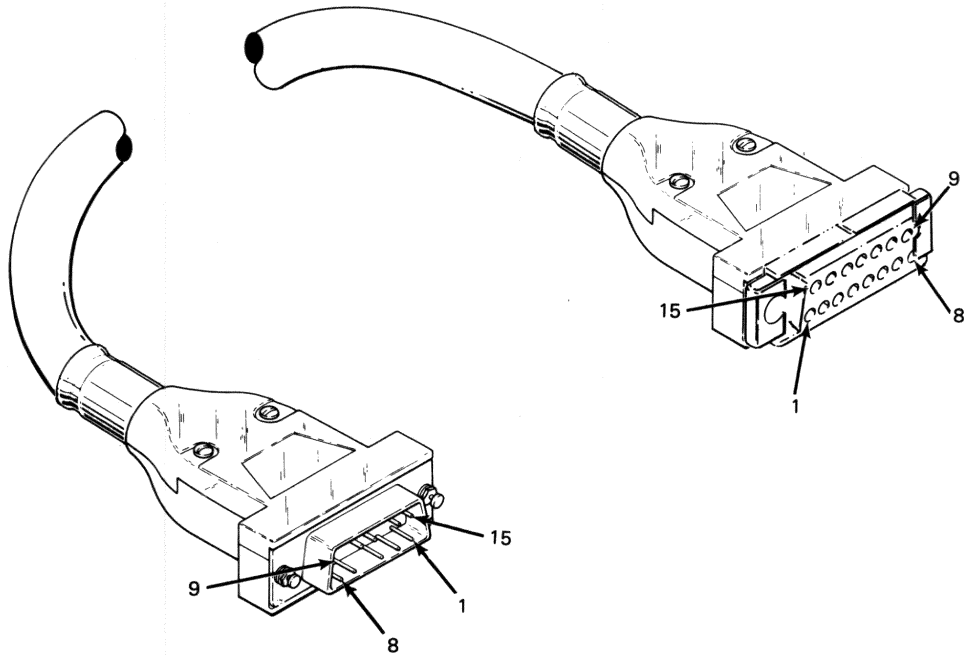
Table 4 Baseband Ethernet Transceiver Cables

Cable Number	Lengths Available*	Connector Description	Composition
BNE3A-** BNE4A-***†	05, 10, 20, 40	Straight angle	PVC
BNE3B-** BNE4B-***†	05, 10, 20, 40	Right angle	PVC
BNE3C-** BNE4C-***†	05, 10, 20, 40	Straight angle	Teflon™
BNE3D-** BNE4D-***†	05, 10, 20, 40	Right angle	Teflon™

*Lengths are in meters (1 meter = 3.281 feet).

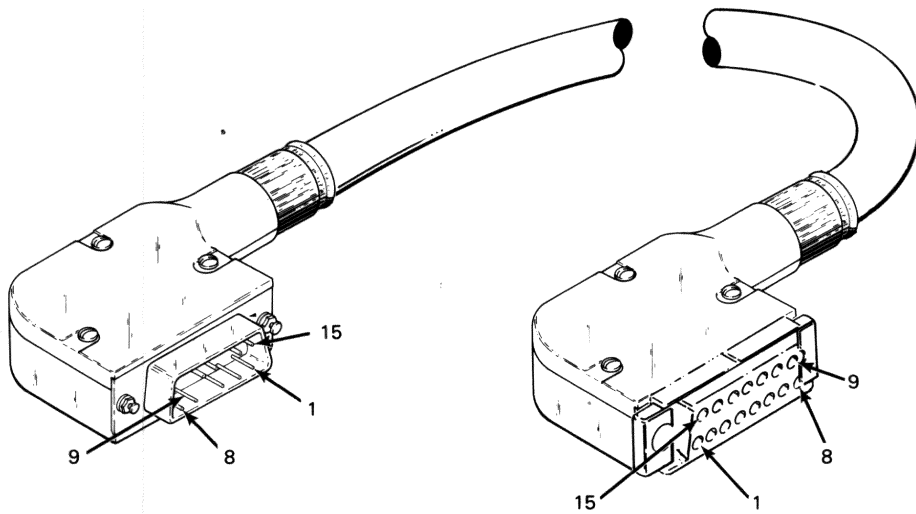
†BNE4*-** cable is a flexible office-compatible transceiver cable. The BNE4*-** cable has approximately four times the attenuation of a BNE3*-** cable.

Teflon is a trademark of DuPont de Nemours and Co., Inc.



MKV84-1670

Figure 6 BNE3A-*/BNE4A-*/ (PVC) and BNE3B-*/BNE4B-*/ (Teflon™) Transceiver Cables



MKV84-1671

Figure 7 BNE3C-*/BNE4C-*/ (PVC) and BNE3D-*/BNE4D-*/ (Teflon™) Transceiver Cables

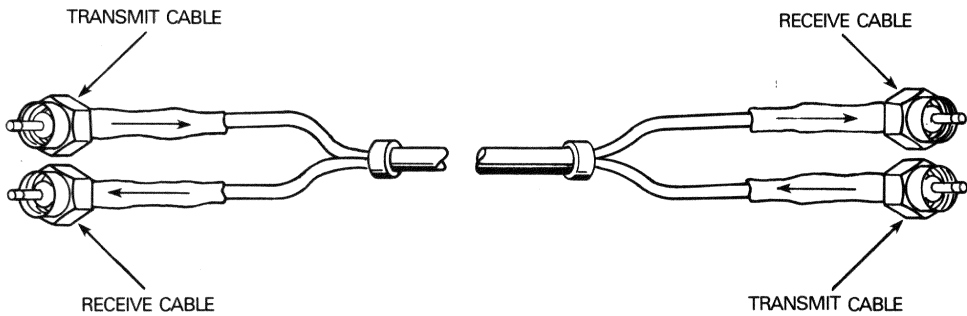
Table 5 Fiber-Optic Channel Elements

Part Number	Description
BN25B-**	Duplex fiber-optic cable (see note for length variations)
DEXJB	Fiber-optic junction box

NOTE

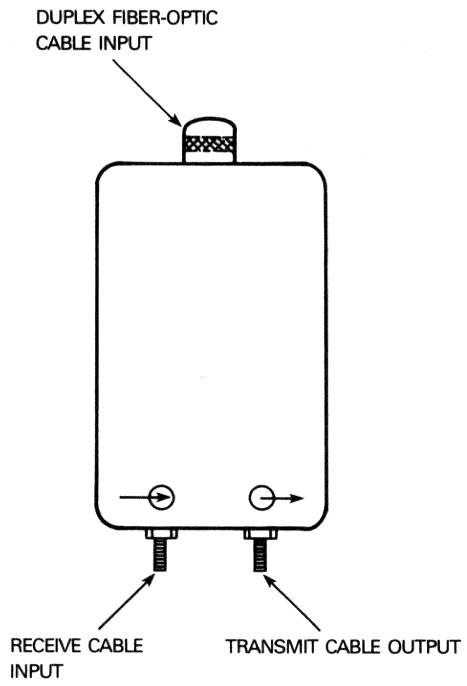
The following length variations are available 15, 30, 60, 90, A5 (=150), C0 (=300), E0 (=500), H5 (=750), and L0 (=1000)*.

*Lengths are in meters (1 meter = 3.281 feet).



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Figure 8 Duplex Fiber-Optic Cable



MKV84-1673

Figure 9 DEXJB Fiber-Optic Junction Box

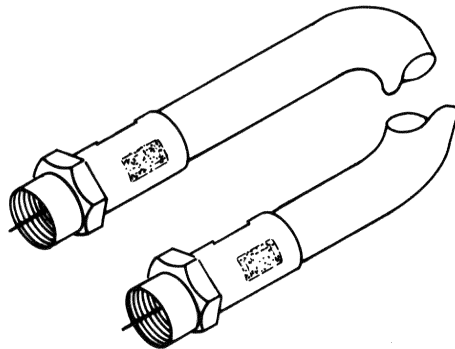
Broadband Ethernet Coaxial Cable

CAB-6* cable is a flexible office broadband cable. CAB-6 type cable is available in 304.8 m (1000 ft) lengths.

Table 6 Broadband Ethernet Connectors and Terminators

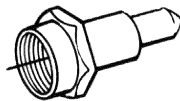
Part Number	Part Name	Description of Use
TR-75F*	Female F terminator	Used to terminate 75 ohm male F connectors
F-81C*	Female F to female F adaptor	Used to join two lengths of broadband cable
F-56C*	Female F connector	Used for CAB-6 type (broadband) cable
BNC-F*	Female F to male BNC adaptor	Typically used for test equipment connection

*Manufactured by Jerrold Div., General Instrument Corp.



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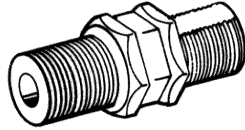
Figure 10 CAB-6 Broadband Office Cable



MKV84-1681

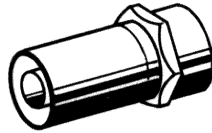
Figure 11 TR-75F Terminator

*Manufactured by Jerrold Div., General Instrument Corp.



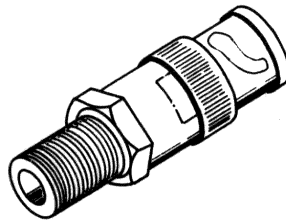
MKV84-1682

Figure 12 F-81C Adaptor



MKV84-1683

Figure 13 F-56C Connector



MKV84-1685

Figure 14 BNC-F Adaptor

Table 7 Other Cables

Part Number	Part Name	Description
BC08R-1	Ribbon cable	A .3 m (1 ft) ribbon cable that interconnects a DEUNA link and port module (two are required).
70-18798-**	Bulkhead cable assembly	A cable that interconnects a DEUNA link module and bulkhead interconnect panel assembly. The following length variations are available. <ul style="list-style-type: none"> • 70-18798-04 = 1.2 m (4 ft) • 70-18798-08 = 2.4 m (8 ft)
70-18799-00	Bulkhead interconnect panel assembly	An I/O connector panel with an adaptor bracket acceptable for installation in various cabinet types.

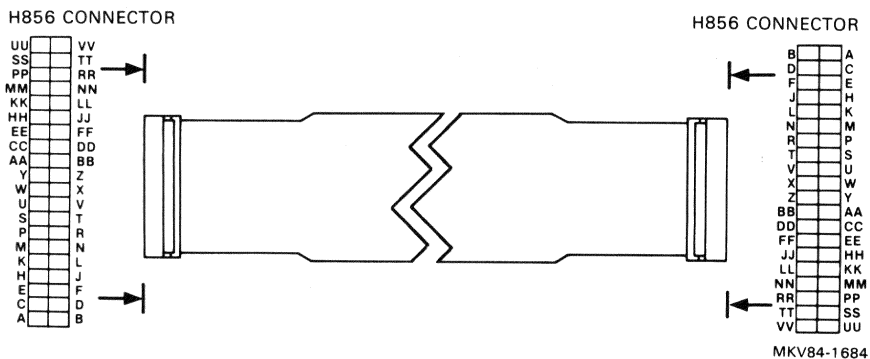


Figure 15 BC08R-1 Ribbon Cable

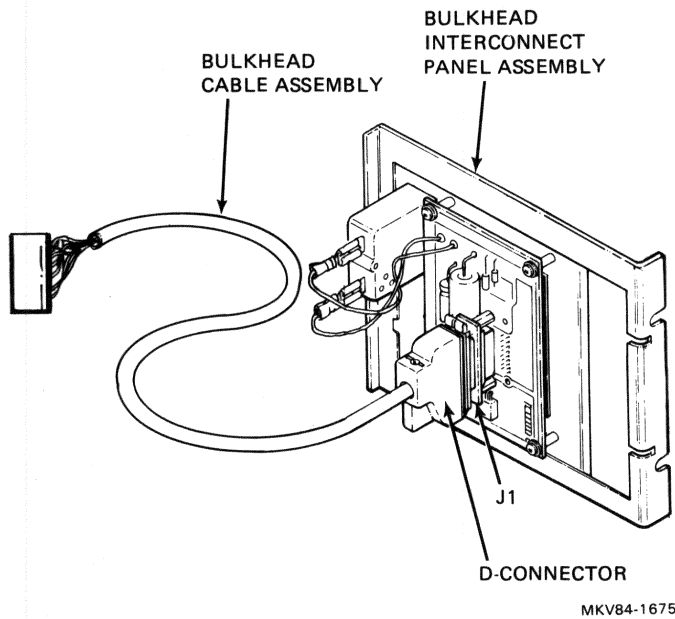


Figure 16 70-18798-** Bulkhead Cable Assembly and 70-18799-00 Bulkhead Interconnect Panel Assembly

3.3 PROPER SLIDE-LATCH CONFIGURATION

Slide-latches may not function properly unless they conform to the "correct" configuration shown below.

NOTE

The figure below is correct for bulkhead-mounted slide latches. Differences for cable-mounted slide latches are noted.

Verify the following.

- Each locking pin of the male connector has two flat washers.
- The smaller cutout on a bulkhead-mounted slide latch is close to pin 1.
- The smaller cutout on a cable-mounted slide latch is close to pin 8.
- There is no space between the slide latch and the connector. Note the "incorrect" drawing for detail.

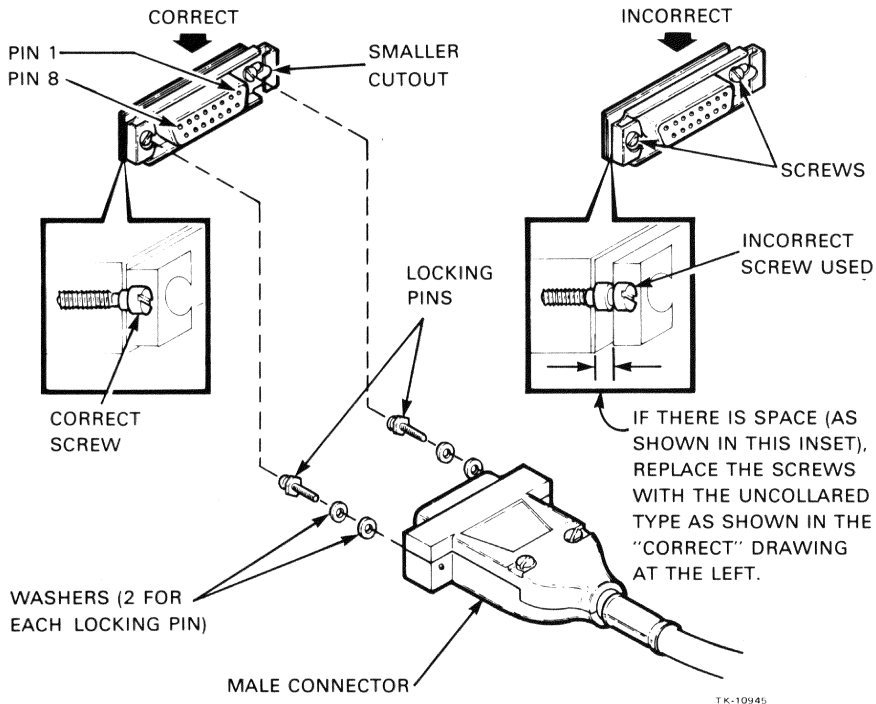


Figure 17 Proper Slide-Latch Configuration

CHAPTER 4 SPECIAL TOOLS AND TEST EQUIPMENT

NOTE

The following trademarks are used in this chapter:

- AMP 90302-1, 91239-7 are trademarks of AMP Special Industries, Inc.
- Amphenol 906 is a trademark of Amphenol, An Allied Co.
- Blonder Tongue SA-7U is a trademark of Blonder-Tongue Labs, Inc.
- Photodyne 5500 is a trademark of Photodyne, Inc.
- Tektronix 1503, OF-150, 564 are trademarks of Tektronix, Inc.
- Wavetek SAM III, 1801B are trademarks of Wavetek Rockland, Inc.

4.1 INTRODUCTION

This chapter provides brief descriptions of various special tools and test equipment that may be required for installing, testing, and troubleshooting Digital Equipment Corporation's Ethernet networks. The following tools and test equipment (or their equivalent) are recommended.

Baseband Equipment

- DIGITAL H4090 (-KA or -KB) transceiver installation kit
- DIGITAL H4000 (-TA OR -TB) Ethernet transceiver tester*
- DIGITAL H4080 loopback test connector
- Tektronix 1503™ TDR (time-domain reflectometer)*

Broadband Equipment

- Blonder Tongue SA-7U™ variable attenuator (to 62 dB)
- Wavetek 1801B™ swept RF oscillator
- Wavetek SAM III™ RF signal level meter/spectrum analyzer (5 to 400 MHz)

Fiber-Optic Equipment

- Photodyne 5500™ FOTDR (optical time-domain reflectometer)
- Tektronix OF-150™ FOTDR

Baseband Coaxial Cable Tools

- DIGITAL 29-24668 coaxial cable stripper
- DIGITAL 29-24663 ferrule and pin crimper
- DIGITAL 29-24667 coaxial cable cutter

*May also be used for testing broadband networks.

Baseband Transceiver Cable Tools

- AMP 90302™ D-connector pin crimper
- AMP 91239™ cable ferrule crimp tool and die set

4.2 BASEBAND TOOLS AND TEST EQUIPMENT

This section describes the various tools and test equipment required for installing and/or maintaining baseband Ethernet devices.

4.2.1 H4090 (-KA and -KB) Transceiver Installation Kit

The H4090-K* transceiver installation kit is required for installation of an H4000 Ethernet transceiver. Two versions of the kit are available from Digital Equipment Corporation: the H4090-KA and H4090-KB.

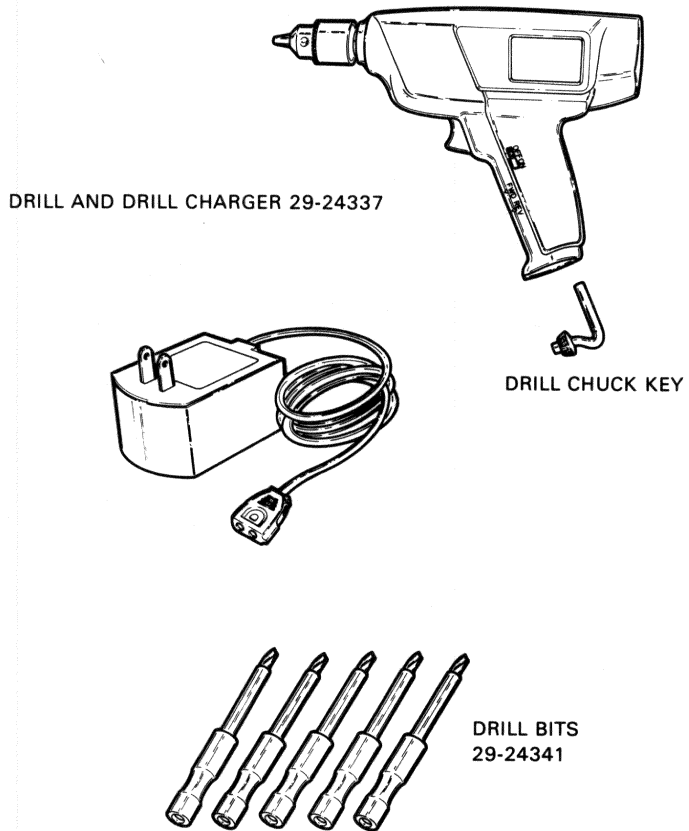
The parts that make up the H4090-KA and H4090-KB transceiver installation kits are shown in the following table.

Table 1 Parts Included in H4090 Transceiver Installation Kits

H4090-KA	H4090-KB	Part
1	*	29-24337 cordless electric drill and charger
5	5	29-24341 insulated drill bits
1	1	29-24338 drilling fixture assembly
1	1	29-24339 box with 100 braid terminators
1	1	29-24340 3/16-inch hex wrench

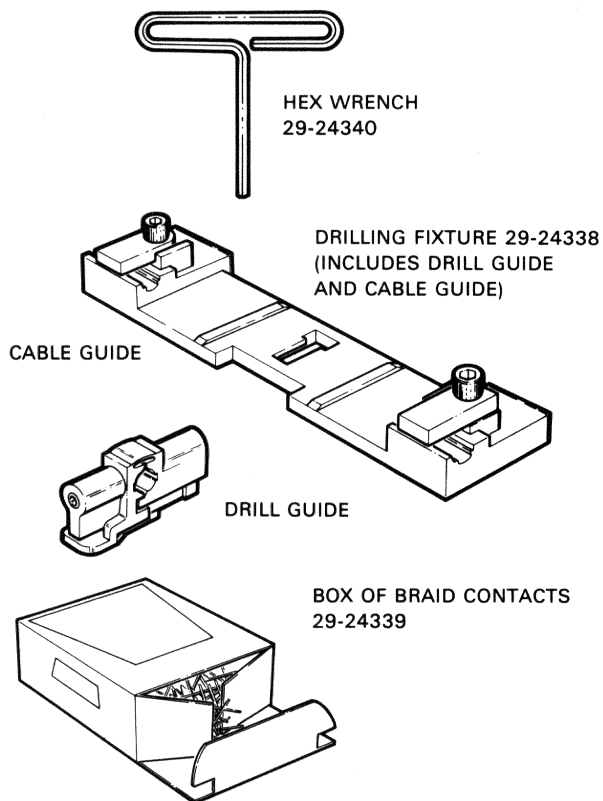
*Equivalent parts must be supplied by a local source.

The following illustration shows the parts that make up the H4090-KA and H4090-KB transceiver installation kits.



MKV84-1656

Figure 1 Transceiver Installation Kit Parts (Sheet 1 of 2)



MKV84-1657

Figure 1 Transceiver Installation Kit Parts (Sheet 2 of 2)

4.2.2 H4000-TA and H4000-TB Ethernet Transceiver Tester

The H4000-T* tester is a portable test device that may be used for on-line verification of the following Ethernet physical channel components.

- H4000 Ethernet transceivers
- Ethernet coaxial cable
- Transceiver cables
- Etherjack connectors
- DELNI network interconnects
- DEREPE Ethernet repeaters
- DECOM broadband transceivers

There are two versions of the H4000-T* transceiver tester.

- H4000-TA 120 V/60 Hz
- H4000-TB 240 V/50 Hz

An H4000-T* transceiver tester verifies a transceiver's capability to perform the following.

- Transmit a packet to an Ethernet coaxial cable
- Receive data from an Ethernet coaxial cable
- Detect a collision
- Generate CPT (collision presence test)

The H4000-T* transceiver tester operates in two modes.

- TX/RX (transmit/receive) mode

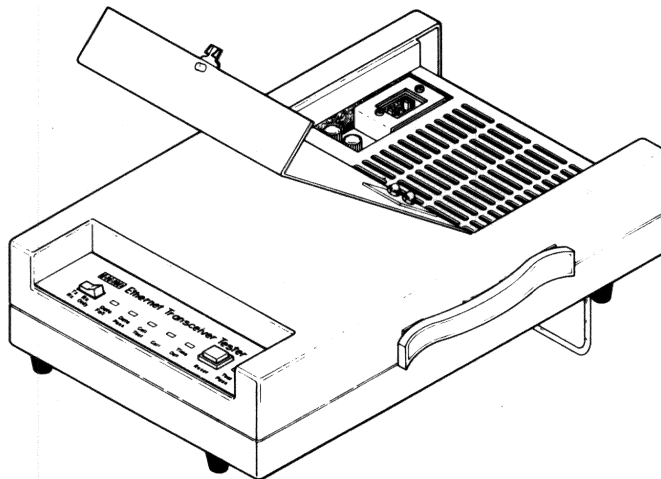
In this mode, one tester is used to verify the transceiver to which it is connected. The tester transmits a packet to the transceiver, receives these data packets back from the transceiver, and verifies the data packets.

- RX ONLY (receive only) mode

In this mode two testers are used to verify Ethernet network connectivity. Connectivity can be between a pair of transceivers, DELNI ports, or similar Ethernet ports. One transceiver tester is set in the TX/RX mode while the other tester (set in RX ONLY mode) receives and verifies the data packets transmitted by the TX/RX tester.

For specific instructions on the use of the H4000-T* transceiver tester, consult the *Ethernet Transceiver Tester User's Manual* (EK-ETHTT-UG).

The following illustration shows an H4000-T* transceiver tester.



MKV84-1658

Figure 2 H4000-T* Ethernet Transceiver Tester

4.2.3 H4080 Loopback Test Connector

The H4080 test connector acts as a "known-good" transceiver to simulate connection to an Ethernet coaxial cable. As such, it provides packet loopback, CPT (collision presence test) signals, and draws normal transceiver current. The H4080 connector may be used to test controllers, repeaters, DELNI network interconnects, and similar devices. The following illustration shows an H4080 connector.

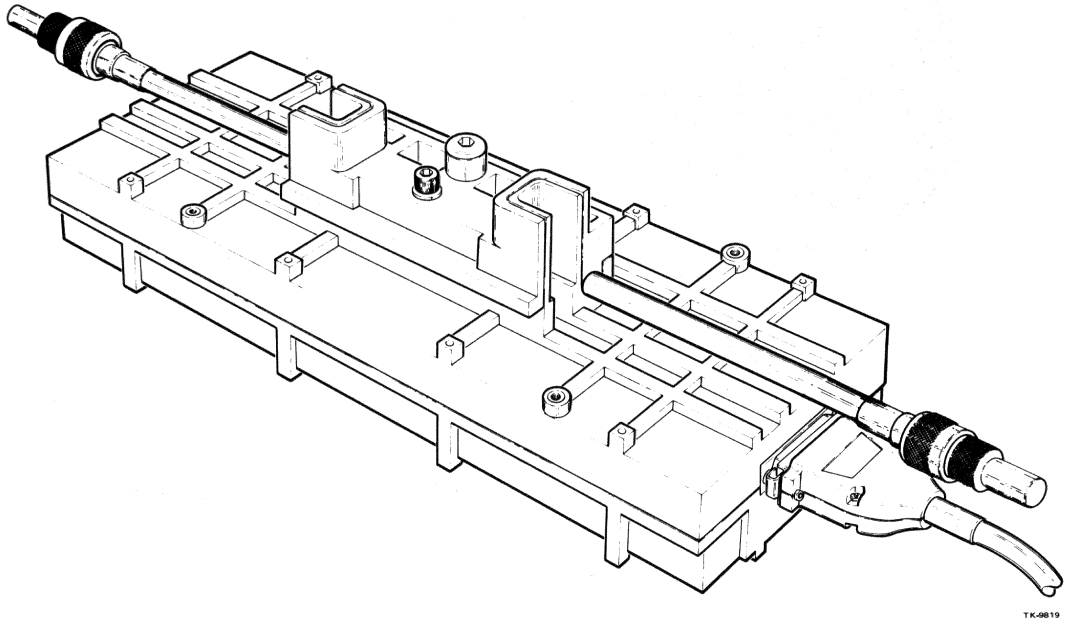


Figure 3 H4080 Loopback Test Connector

4.2.4 Tektronix Type 1503 Time-Domain Reflectometer (TDR)

The Tektronix 1503 TDR is a portable test device used to measure the length and attenuation of a single Ethernet coaxial cable (see notes). These parameters may be used to accurately determine the distance to cable faults such as shorted, open, or unterminated cable.

NOTES

1. For testing baseband (BNE2) cable, a BNC to N adaptor is required.
2. For testing broadband (CAB-6) cable, a BNC to F adaptor is required.

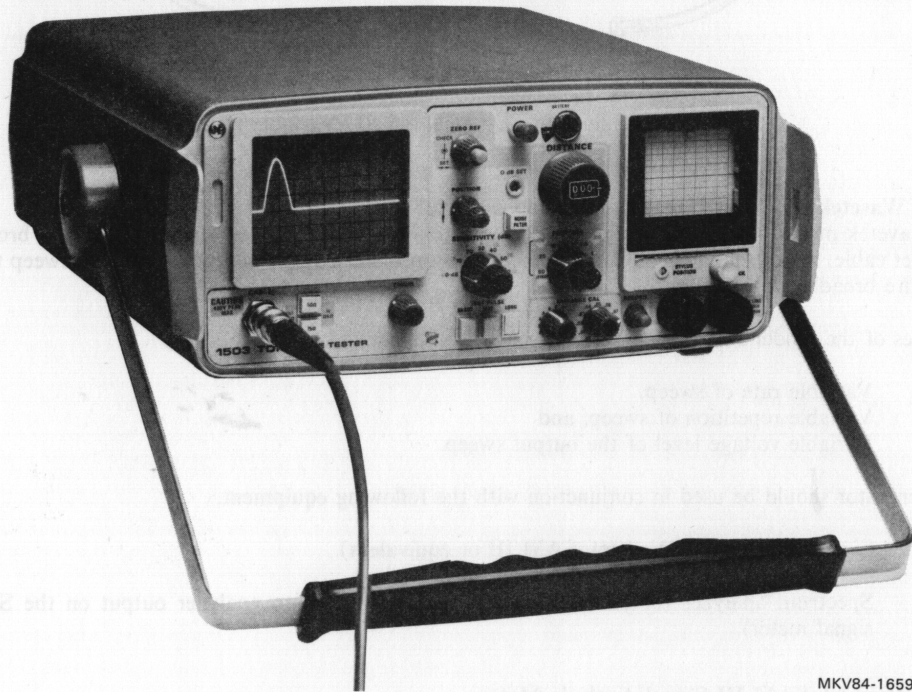
The Tektronix type 1503 TDR (or equivalent) is required for certification of the Ethernet coaxial cable.

Its features include:

- An oscilloscope-type display,
- A strip chart (optional) for recording cable "signatures",

- Selectable impedance levels (50, 75, 93 and 125 ohms), and
- Distance calibration switches for entering propagation delay.

The following illustration shows a Tektronix type 1503 TDR.



MKV84-1659

Figure 4 Tektronix Type 1503 TDR

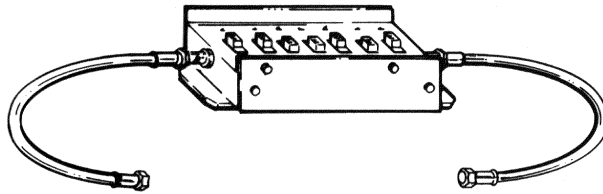
4.3 BROADBAND TOOLS AND TEST EQUIPMENT

This section describes the various tools and test equipment required for installing and/or maintaining broadband Ethernet devices.

4.3.1 Blonder Tongue Model SA-7U Variable Attenuator

The model SA-7U variable attenuator is used to verify the dynamic range of the broadband transceiver.

The SA-7U attenuator is portable [less than .454 kg (1 lb)] and attenuation may be varied by 1 dB steps to 62 dB.



MKV84-1660

Figure 5 Blonder-Tongue Model SA-7U Variable Attenuator

4.3.2 Wavetek Model 1801B Sweep Signal Generator

The Wavetek model 1801B sweep signal generator provides a means to test the bandpass of a broadband Ethernet cable. Specifically, the 1801B generator may provide a single frequency or may sweep through the entire broadband spectrum.

Features of the model 1801B sweep signal generator include:

- Variable rate of sweep,
- Variable repetition of sweep, and
- Variable voltage level of the output sweep.

The generator should be used in conjunction with the following equipment.

- Signal level meter (Wavetek SAM III or equivalent).
- Spectrum analyzer (or oscilloscope connected to spectrum analyzer output on the SAM III signal meter).

4.3.3 Wavetek SAM III Signal Analysis Meter

The Wavetek SAM III signal analysis meter is a portable test device used to measure RF signal levels in broadband (and other CATV type) cable systems.

The Wavetek SAM III meter has the following capabilities.

- Signal level measurement in dBmV.
- Internal calibration to within $\pm .25$ dBmV.
- A spectrum analyzer output that enables certain oscilloscopes to act as a spectrum analyzer.
- A front panel keyboard that permits selection of preprogrammed standard and HRC channels, or manual selection of any frequency in the 450 MHz (CATV) bandwidth.

4.4 FIBER-OPTIC TOOLS AND TEST EQUIPMENT

This section describes the various tools and test equipment required for installing and/or maintaining fiber-optic cables.

4.4.1 Photodyne Model 5500 Fiber-Optic Time-Domain Reflectometer (FOTDR)

The Photodyne model 5500 FOTDR is a portable test device used to measure the following parameters of a fiber-optic cable.

- Attenuation
- Distance to faults, breaks, and the end of the fiber

Features of the 5500 FOTDR include a four-digit digital readout (an oscilloscope-type display is not provided).

The 5500 FOTDR may be used with the following additional equipment.

- Amphenol type 906™ SMA connector
- Tektronix model 564™ oscilloscope or equivalent



MKV84-1661

Figure 6 Photodyne Model 5500 FOTDR

4.4.2 Tektronix Model OF-150 Fiber-Optic Time-Domain Reflectometer (FOTDR)

The Tektronix model OF-150 FOTDR is a portable test device used to measure the following parameters of a fiber-optic cable.

- Attenuation
- Distance to faults, breaks, and the end of the fiber

The Tektronix model OF-150 FOTDR (or equivalent) is required for certification of a fiber-optic link.

The OF-150 FOTDR may require an Amphenol type 906 SMA connector.

Features of the OF-150 FOTDR include:

- An oscilloscope-type display, and
- A strip chart for recording fiber "signatures".

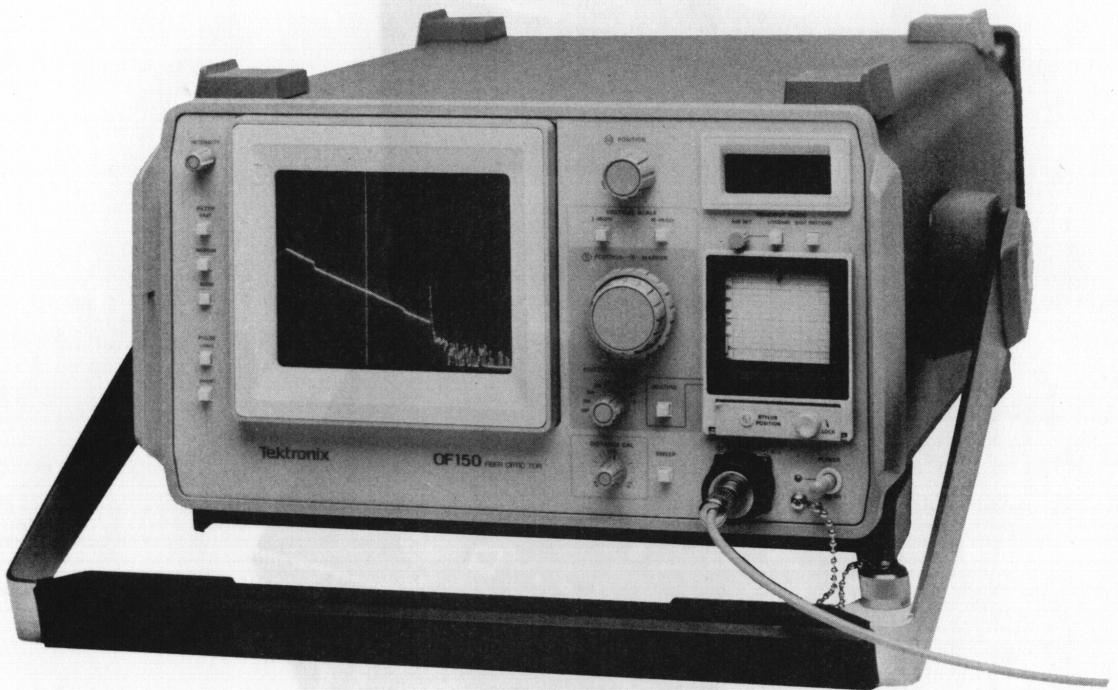


Figure 7 Tektronix Model OF-150 FOTDR

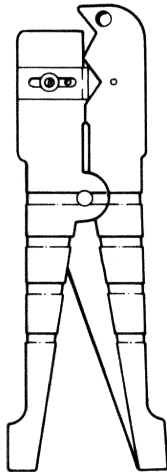
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4.5 BASEBAND COAXIAL CABLE TOOLS

This section describes the various tools and test equipment required for installing and/or maintaining Ethernet coaxial cables.

4.5.1 DIGITAL 29-24668 Coaxial Cable Stripper

The DIGITAL 29-24668 coaxial cable stripper is used to strip insulation and braided shield from the coaxial cable in preparation for installing male "N" type connectors.

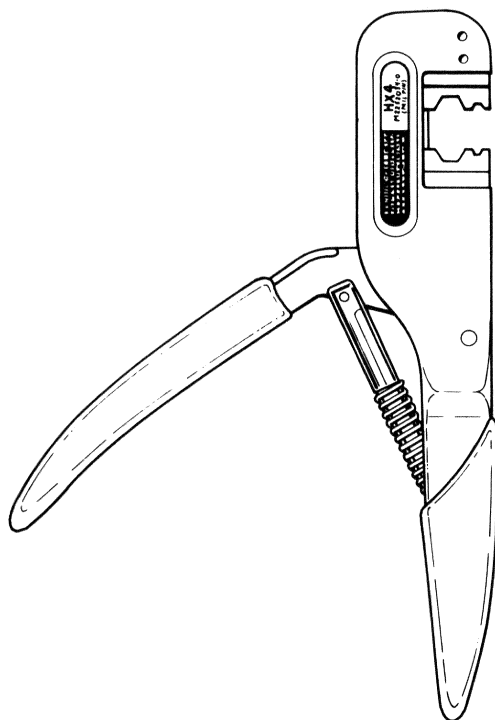


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Figure 8 DIGITAL 29-24668 Coaxial Cable Stripper

4.5.2 DIGITAL 29-24663 Ferrule and Pin Crimper

The DIGITAL 29-24663 ferrule and pin crimper is used to crimp a male “N” type connector ferrule on a prepared coaxial cable end.

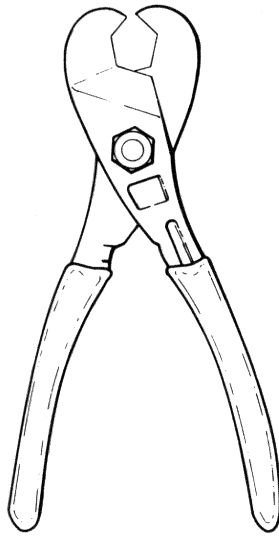


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Figure 9 DIGITAL 29-24663 Ferrule and Pin Crimper

4.5.3 DIGITAL 29-24667 Coaxial Cable Cutter

The DIGITAL 29-24667 coaxial cable cutter is used to cut coaxial cable with minimum deformation of the cable end.



MKV84-1665

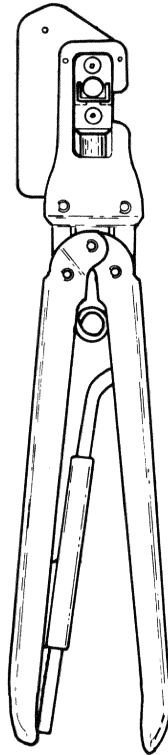
Figure 10 DIGITAL 29-24667 Coaxial Cable Cutter

4.6 BASEBAND TRANSCEIVER CABLE TOOLS

This section describes the various tools and test equipment required for installing and/or maintaining Ethernet transceiver cables.

4.6.1 AMP 91239-7 Cable Ferrule Crimp Tool and Die Set

The AMP 91239-7 cable ferrule crimp tool and die set is used to crimp the connector ferrule to the end of a transceiver cable.

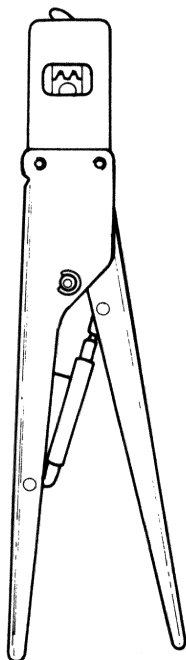


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Figure 11 AMP 91239-7 Cable Ferrule Crimp Tool and Die Set

4.6.2 AMP 90302-1 D-Connector Pin Crimper

The AMP 90302-1 D-connector pin crimper is used when installing the connector end on a transceiver cable. The tool can be used for crimping male pins or female sockets to the cable wire.



MKV84-1667

Figure 12 AMP 90302-1 D-Connector Pin Crimper



**CHAPTER 5
ACCESSORIES**

Information to be supplied at a later date.



CHAPTER 6 NETWORK TROUBLESHOOTING

This information to be added at a later date.

For assistance, refer to the *Field Service Support Strategies Notebook* or to the Field Implementation Plan for the specific product in question.



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