

MUXserver 90

Hardware Installation Manual

Order Number: EK-DSRZF-IM

Update Information: This is a new manual

First Edition

July 1993

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This document was prepared using DECwrite, Version 2.1

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About This Manual

Purpose of the Manual

This manual describes the MUXserver 90 Remote Terminal Server, its functions in the MUXserver Network, its physical and environmental dimensions and requirements and procedures used to install it.

Intended Readers

This manual is intended for readers responsible for installing the MUXserver 90 Remote Terminal Server.

Structure of the Manual

This manual is organised as follows:

- | | |
|-----------|--|
| Chapter 1 | Introduces the MUXserver 90, its functions, its features, its practical limits and prerequisites for its use. Describes the MUXserver Network generally. |
| Chapter 2 | Gives an overview of the installation process. Provides a quick guide for the experienced installer. |
| Chapter 3 | Covers checklist details for unpacking the MUXserver 90 and related accessories. |
| Chapter 4 | Outlines steps you need to take in preparing network equipment and software prior to installing the MUXserver 90. Gives detailed site specifications for proper MUXserver 90 operation. These include power supply, cabling, ventilation and other environmental considerations. |
| Chapter 5 | Outlines options for physical positioning and connection of the MUXserver 90 to the LAN and to power, with alternatives for stand-alone and DEChub 90 installation. |
| Chapter 6 | Provides details for interpreting the self-test results on initial power-up. |

Chapter 7	Procedures outlined for connecting various devices to the link and port connections on the MUXserver, including terminals, modems, DECmux 300s.
Chapter 8	Guidelines for trouble-shooting the MUXserver 90 hardware operations. Description of trouble-shooting tools.
Chapter 9	Formalising the connections and installation of the MUXserver.
Appendix A	Connector Pin Descriptions and Related Cable structures.
Appendix B	How to Order the MUXserver.
Appendix C	Special Requirements for installation and use in the United Kingdom.
Glossary	Defines abbreviations and special terms used in this manual.
Index	Provides a page reference to the important topics covered in this manual.

Other MUXserver Publications

Other publications which might be required during installation include:

MUXserver Software Installation Guide (OpenVMS) Describes installing the MUXserver 90 software onto a VAX or RISC OpenVMS system.	AA-PESDB-TE
MUXserver Software Installation Guide (ULTRIX) Describes installing the MUXserver 90 software onto a VAX or RISC ULTRIX system.	AA-PEUUB-TE
MUXserver Software Installation Guide (OSF/1) Describes installing the MUXserver 90 software onto an OSF/1 system.	AA-PYUCA-TE
MUXserver Network Reference Manual Describes planning, installing, setting up and management of a MUXserver network.	AA-PESEB-TE
MUXserver Network Identification Card Records MUXserver installation details, including: Local equipment locations and identification information, Remote equipment locations and identification information, and Synchronous link details	EK-DSRZE-IC

Notes

1. The *MUXserver 90 Hardware Installation Manual* (this manual) and the *MUXserver Network Identification Card* are delivered with each MUXserver 90 hardware product.
2. The *MUXserver Network Reference Manual*, *Release Notes*, and the relevant *MUXserver Software Installation Guide* are delivered with each MUXserver 90 software distribution kit.
3. Additional copies of these documents may be ordered from Digital Equipment Corporation.

Other Relevant Publications

Reference to the following Digital Equipment Corporation publications may be required during installation of the MUXserver Network:

MUXserver/DECmux 300 Network Installation Manual EK-DSRZC-IM
Describes the installation of the MUXserver Network's remote unit: the DECmux 300.

DECconnect System Planning and Configuration Guide EK-DECSY-CG
Describes the planning and configuration of a DECconnect System network.

DECconnect System Facilities Cabling Installation Guide EK-DECSY-FC
Describes the procedures for installing cables for a DECconnect System network

DECconnect System General Description EK-DECSY-GD
Provides an overview of the DECconnect System products and services

Telecommunications and Networks Buyer's Guide
Provides a comprehensive description of Digital Equipment Corporation's networking and communications products, including ordering information.

Notes

1. The MUXserver/DECmux 300 Network Installation Manual is delivered with each DECmux 300.
2. Additional copies, and copies of other manuals, may be ordered from Digital Equipment Corporation.

Conventions

Throughout this manual:

- The overall MUXserver Remote Terminal Server network is referred to as the **MUXserver Network**.
- The local unit component of the MUXserver Network (the MUXserver 90 Remote Terminal Server) is referred to as the **MUXserver 90**.
- The remote unit component of the MUXserver Network (the DECmux 300 Remote Terminal Multiplexer) is referred to as the **DECmux 300**.

- Abbreviations for communications standards are intended to apply as summarised in the following table:

Abbreviation Used	Interface conforms to	
	CCITT Standard	EIA standard
V.24	V.24 with V.28 and ISO 2110	EIA-232-D
V.36	V.36 with V.11	EIA-449 with EIA-422-A
V.10	V.36 with V.10	EIA-449 with EIA-423-A
V.35	V.35	
X.21	X.21	
RS-232-C		RS-232-C (superseded by EIA-232-D)

Also in this manual, **Notes**, **Cautions** and **Warnings** have the following meanings:

- NOTE** The associated information is important to the understanding of the activities being described.
- CAUTION** Incorrect application of the associated information can cause equipment damage.
- WARNING** Incorrect application of the associated information can cause injury to the user or to other people.

UK Installations

Instructions contained in *Appendix C* must be observed when the MUXserver 90 product is being installed in the United Kingdom.

FCC NOTICE

This equipment generates, uses and may emit, radio frequency. The equipment has been type tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such radio frequency interference.

Operation of this equipment in a residential area may cause interference, in which case the user at his own expense will be required to take measures to correct the interference.

Hazardous Voltages

WARNING

Ethernet installations may extend to thousands of metres and involve many separate items of equipment. To prevent hazardous voltages appearing on the installation, it is important that all the equipment be part of a common equipotential system as defined in IEC publications 364-4-41 clauses 413.1.2 and 413.1.6. Where it is required to couple equipment outside of the main equipotential bonded area via Ethernet, then optical repeaters or other such galvanically isolated measures must be employed. If in doubt, refer to Digital Equipment Corporation for advice.

Introduction

This Chapter outlines the general characteristics and functions of the MUXserver 90 Remote Terminal Server. It describes the versions available for different installation options. It provides a summary of the main features of the MUXserver in its various versions, with a listing of its labels, controls, indicators and connectors.

Technical details of the MUXserver's requirements and performance are specified, and there is a brief outline of software requirements for MUXserver operations.

An overview of a simple MUXserver network gives an example of a typical LAN configuration using the MUXserver 90 to provide remote links for asynchronous terminals via multiplexers and modems.

A short description is also given of the kinds of management tools available for testing and trouble-shooting the unit's operations.

1.1 The MUXserver 90: an Overview of Features.

The MUXserver 90 is a DEChub 90 module which operates as a Remote Terminal Server with multiplexing facilities. Connected to an Ethernet Local Area Network (LAN), it offers remote users access to LAN services via DECmux 300 multiplexers. It distributes its services via a single synchronous link at speeds of up to 64 kbps.

The MUXserver 90 has the following features:

- stand-alone or rack mountable in a DEChub 90 Ethernet backplane;
- compact and easy to install;
- can be installed in, and removed from, the DEChub 90 Ethernet backplane while the backplane is powered on;
- suitable for both structured and unstructured wiring environments;
- offers a console port for local management and trouble-shooting; and
- enables network management through the Simple Network Management Protocol (SNMP) and Maintenance Operations Protocol (MOP) .

1.2 The MUXserver Network

The MUXserver Network connects remote terminals (or other asynchronous port devices) to an Ethernet Local Area Network (LAN). It consists of a MUXserver connected to the host computer system via an Ethernet LAN.

From the single synchronous link of the MUXserver 90, a DECmux 300 multiplexer may be connected to another DECmux 300. In turn, that multiplexer may be similarly connected — in daisy-chain fashion — to a third multiplexer. A limit of 3 DECmux 300s in total may be serially linked to the MUXserver in this way.

No changes are required to existing DECmux multiplexers to allow them to operate with the MUXserver 90.

The MUXserver Network connects each remote terminal to the LAN with access to certain LAT services and INTERNET hosts offered by the LAN.

The *MUXserver Network Reference Manual* gives full details of the features of the MUXserver Network.

1.2.1 Example of a MUXserver 90 Network

Figure 1-1, on page 1-3 illustrates a basic MUXserver Network using the MUXserver 90. It shows:

- one MUXserver 90 connected to a host via an Ethernet LAN,
- a console terminal connected to the MUXserver 90's supervisor port,
- a single synchronous link serviced by the MUXserver 90, and
- three DECmux 300s connected, in daisy-chain fashion, to the synchronous link

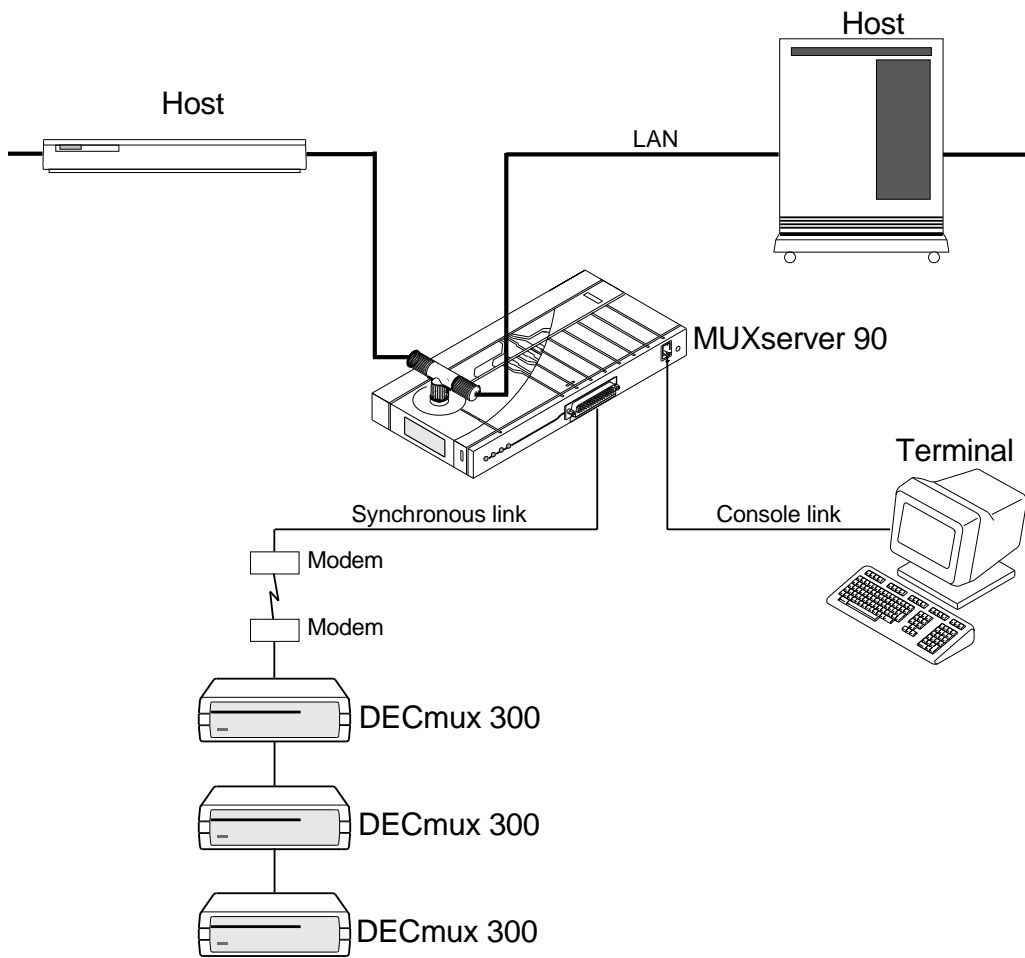
1.2.2 Installation

Installation options for the MUXserver 90 allow it either to be set up in stand-alone mode (for example, with desktop or wall-mounted positioning) or to be inserted into the DEChub 90 Ethernet backplane.

The latter option allows the MUXserver 90 to work as a DEChub module, with power and communications connections directly onto the backplane.

Stand-alone versions of the MUXserver 90 are linked to the LAN via ThinWire cabling from a 10BASE2 port. These versions all require a suitable DEChub 90 module power pack.

Figure 1-1 Example of MUXserver Network Connections



1.2.3 Loadable Software

The operating software for the MUXserver 90 is down-loaded to it from a "load host" on the LAN when the MUXserver is first powered up.

You can therefore update or re-configure the MUXserver's controlling program with relative ease — without the need for the installation of new firmware each time. (See *MUXserver Software Installation Guide*).

A recessed Reset push-button gives the user the power to reset default values for important software variables at start-up time.

The same button operates as a "dump" command during normal operations, initiating an up-line dumping of current program and data values from the MUXserver to the host for use by Digital in debugging and/or diagnostic checking.

1.2.4 Management and Diagnostic Options

A console port on the MUXserver 90 enables direct connection of a terminal for management and diagnostic purposes. Firmware and operational software direct information and error messages via this output port.

Light-emitting diodes (LEDs) on the MUXserver 90's front panel provide status information and help in management and trouble-shooting operations.

1.3 Controls, Indicators and Connectors

1.3.1 External Connectors

External connectors on the MUXserver 90 include:

- a 50-way D-type connector (front panel) which, with suitable adapters, can provide the following interfaces:
 - V.35
 - V.24
 - V.36
 - V.10
 - X.21 (leased circuit service)
- a console port (front panel) providing a DEC-423 data-leads-only connection via a Modified Modular Jack (MMJ) connector for use with the console terminal.
- the 10BASE2 ThinWire Ethernet connector (top of unit) for use in stand-alone mode.

- a DEChub 90 backplane connector (behind removable rear panel) which includes:
 - Power
 - Backplane Management serial line
 - Ethernet access

- a power jack (rear panel) for connecting to a power pack in stand-alone mode.

Figure 1-2 Labels, Controls, Indicators and Connectors

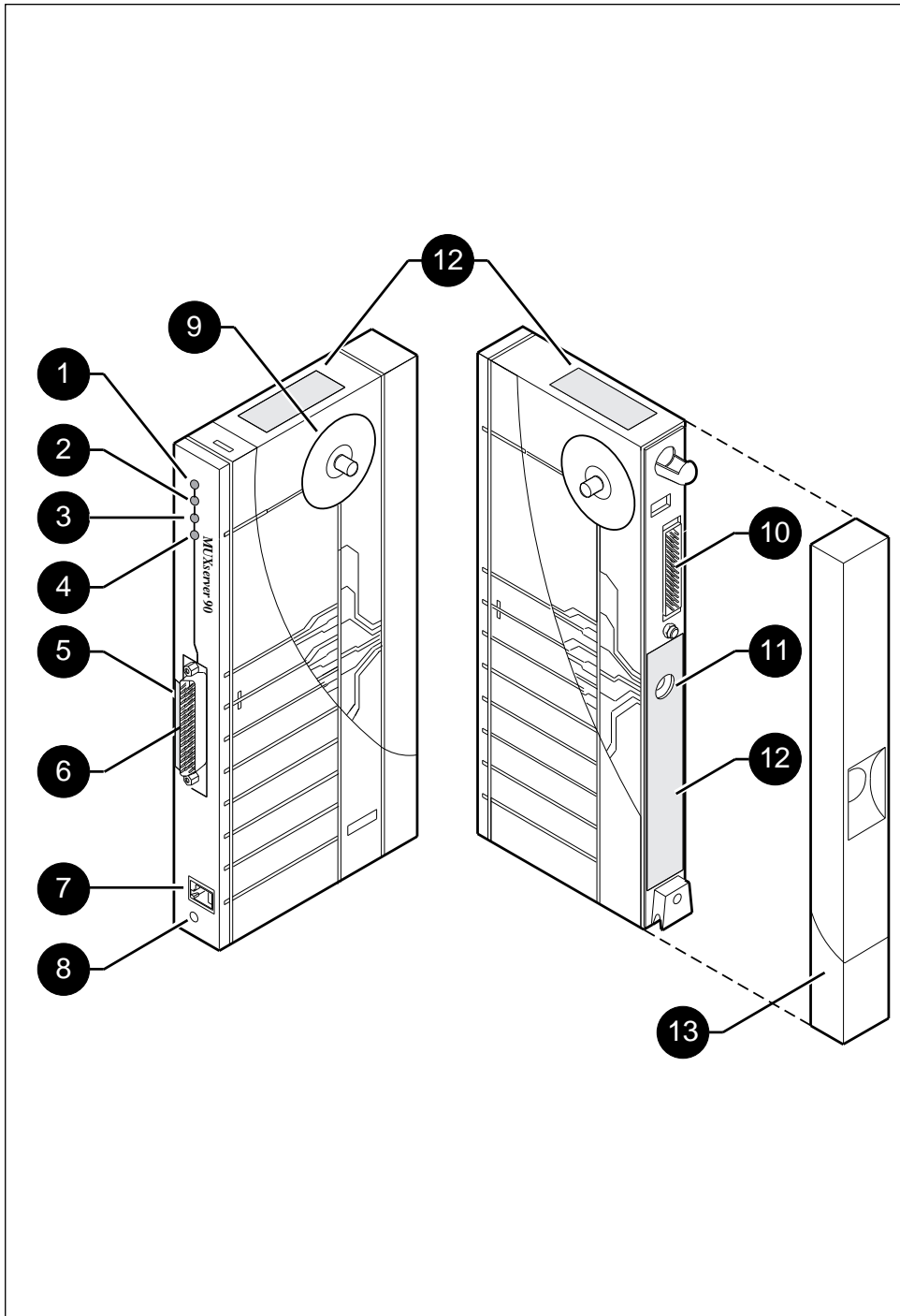


Table 1-1 Description of Labels, Controls, Indicators and Connectors

Key	Item	Description
1	Power Indicator	Light turns on when power is supplied to the unit.
2	System OK Indicator	Light turns on when the unit has successfully completed its diagnostics.
3	Network OK Indicator	Light turns on when the unit is connected to a properly terminated network and software has been successfully down-line loaded.
4	Software OK Indicator	Light flashes when software is operating.
5	Ethernet Address	Label showing unique physical address of the unit
6	50-pin D-type Connector	Connects a synchronous device to the MUXserver. The device connects to the port via an adapter cable and an extension cable. Refer to Appendix A, <i>Connector Pins and Cables</i> for information about these cables.
7	Console Port Connector (MMJ)	Connects a terminal to the MUXserver 90 for performing diagnostic procedures and setting parameters.
8	Reset/Dump Push Button (recessed)	If pressed while power is first applied, (for example, during initialisation operations or on installation into a DEChub 90 Ethernet backplane) this resets EEPROM-stored parameters to default values (see <i>MUXserver Network Reference Manual</i>). Otherwise, if pressed when the software is running, it initiates an up-line dump of the image of data and loadable software, directing the dump to the load host.
9	Network Connector (BNC)	Connects the unit to the Ethernet LAN. Not used when the unit is installed in the DEChub 90 Ethernet backplane.
10	Backplane Connector	Provides network and power connections to the MUXserver 90 when it is installed in the DEChub90 Ethernet backplane. Not used in stand-alone units.
11	Power Connector	Provides power from the MUXserver 90 stand-alone power supply. Not used when the unit is installed in the DEChub 90 Ethernet backplane.
12	Labels	Product Identification, Serial Number, Safety and PTT regulatory labelling.
13	Cover	Present on stand-alone units only. Covers the backplane connector and mounting assembly.

Quick Installation Guide

This chapter provides a summary of the MUXserver 90 hardware installation activities. It is intended as a guide for those with experience in installation of network hardware, and is not intended as a complete guide.

For full information necessary to ensure correct installation of the MUXserver 90, you should refer to other sections of this manual, and to other relevant manuals as appropriate.

Following is a summary of installation tasks, with lists of activities involved in each, and references to the detailed instructions for each activity.

Activity

Reference

2.1 Unpacking the MUXserver 90

1. Unpack cartons and check their contents. See Chapter 3, page 3-1.
2. Fill in details for the MUXserver Network Identification Card immediately.

2.2 Site Preparation and Verification

1. Plan and install the associated MUXserver network, including installation and testing of inter-site synchronous links and synchronous modems (not covered by this manual). *MUXserver Network Reference Manual and DECmux 300 Network Installation Manual.*
2. Check with system manager whether MUXserver 90 software is loaded on the load host(s).
3. Ensure that ventilation is adequate and environmental conditions are correct. See Chapter 4, Sections 4.2 and 4.3, page 4-2.
4. Ensure that correct cables are available, and that maximum cable lengths are not exceeded. Section 4.4, page 4-3
5. Check power requirements for desk or wall mounting or availability of backplane slot for DEChub 90 variant. Sections 4.5.1 and 4.6, page 4-4.

Activity

Reference

2.3 Positioning and Connecting

1. **Stand-alone:** See Chapter 5, pages 5-1 to 5-4.
Place flat on desktop or mount to wall using back panel screw holes.
Connect Ethernet T-connector to BNC connector on MUXserver 90, using terminator if necessary.
Plug in power lead(s) and apply power.
2. **DEChub 90 backplane unit:** Section 5.2 page 5-5.
If necessary, remove back cover.
Place lower mounting tab on back of MUXserver into a backplane mounting slot.
Rock into place, pushing top into slot. (Power is applied from slot on insertion.)

2.4 The Power-On Self-Test

1. Test commences automatically with power-on (see 2.3 above). See Chapter 6, page 6-1.
2. Check progress of front panel LED displays for indication of success or failure. Success is indicated if Power and System OK LEDs stay lit after approx. 1 minute. Sections 6.1. to 6.2, pages 6-1 to 6-2.

2.5 Connections to the MUXserver

1. **Connect Console:** See Chapter 7, page 7-1.
Set up DECconnect cable between MMJ connector on MUXserver to terminal I/O connector, using 25-pin adapter if required.
Set terminal to 9600 bps, 8 bits, 1 stop bit, no parity communication mode.
2. **Connect to the 50-pin Device Port:** Section 7.3, page 7-4.
Select appropriate adapter cable and extension cable for modem or other device being connected.
Connect 50-pin female D-type connector on adapter to MUXserver.
Connect adapter cable to extension cable.
Connect extension cable to modem or other device.

2.6 Trouble-shooting

1. First checks:
 - Loose cable connections?
 - Environmental problems (power surges, temperature too high)?
 - Related devices (backplane, Ethernet segment, connected device)?See Chapter 8, page 8-1.
2. Tools for trouble-shooting:
 - Check diagnostic flow-chart.
 - Check LED status table.
 - Report or act on any console port error messages.Section 8.2, page 8-1.
See also Table 6-1, page 6-2.

2.7 Completing the Installation

1. Check details, then forward Network Identification Card to system manager. See Chapter 9.

Unpacking the MUXserver 90

Unpack the unit and check the shipment for damage or missing parts.

3.1 Packing Check Lists

The contents of the shipment for the DEChub 90 backplane versions of the MUXserver 90 are:

- one MUXserver 90 unit,
- one MUXserver 90 Hardware Installation Manual, (this document),
- one MUXserver Network Identification Card,
- one MUXserver 90 Software Licence.

For the stand-alone versions, the shipment also includes a power supply and a rear cover. Specific country codes are used to identify stand-alone models. (Refer to Table B-1 in Appendix B for a list of these codes.)

Cables for connecting a modem or DECmux 300 to the MUXserver 90 must be ordered separately.

If any items are damaged or missing, stop unpacking and immediately notify the delivery agent and the Digital Equipment Corporation sales representative. Retain the packing material in case any item needs to be returned to Digital Equipment Corporation.

3.2 MUXserver Network Identification Card

Before proceeding any further, check the MUXserver for the following details, and enter them on your *MUXserver Network Identification Card*:

- the unit's serial number located on the rear of the unit under the back cover (if installed). See Figure 5-1, page 5-2 for details of cover removal,
- the Ethernet address (recorded on the front of the unit),
- the intended physical location (e.g. room number, floor number, building) for the MUXserver's installation,
- your name and (if known) the date of installation.

Retain this card for the present. When installation is successfully completed, the card should be forwarded to your system manager, who will also need to add further details (node name, server name, DECnet or INTERNET address etc.).

Instructions contained in Appendix C must be observed when the MUXserver 90 product is being installed in the United Kingdom.

Site Preparation and Verification

This Chapter describes the checks required to ensure that the selected installation site meets the MUXserver 90's physical, environmental, electrical and network cabling requirements, and that suitable equipment is available to complete the installation.

4.1 Installation Pre-conditions

4.1.1 Network Planned

This manual does not detail the steps you need to take to establish the network associated with the MUXserver. Nor does it detail procedures for installing and testing inter-site synchronous links, synchronous modems and DECmux 300s. Relevant details for these procedures are given in the *MUXserver Network Reference Manual* and the *MUXserver/DECmux 300 Network Installation Manual*.

4.1.2 Software Installation for Self-Test

Installation of the MUXserver software on any load host to be associated with the MUXserver is not a strict prerequisite for installation of the hardware. You can install the hardware in the absence of the software. Obviously, however, the MUXserver cannot operate properly if its software cannot be loaded.

If you wish to observe the full operation of the power-on self test described in Chapter 6, (for example, after you have done an initial installation, and have attached serial devices to the MUXserver 90), you should ensure that the software has been installed on at least one load host.

If you are uncertain as to whether software has been installed on the load host, check with your system manager.

The methods used for installation of the software for the OpenVMS, ULTRIX or OSF/1 operating systems are outlined in each of the relevant Software Guides.

Refer to

- the *MUXserver Software Installation Guide (OpenVMS)*,
- the *MUXserver Software Installation Guide (ULTRIX)*, or
- the *MUXserver Software Installation Guide (OSF/1)*.

4.2 Environmental Requirements

Check that the environmental conditions at the planned site are within the ranges listed in Table 4-1, below.

Table 4-1 Environmental Requirements

Parameter	Value
Operating Environment:	
Temperature	5° to 50° C (41° F to 122° F)
Maximum rate of change	20° C/hr (36° F/hr)
Relative humidity	10% to 95% (non-condensing)
Wet-bulb temperature	< 32° C (90° F)
Altitude	Sea level to 2.4 km (8000 ft)
Non-operating environment:	
Temperature	-40° C to 66° C (-40° F to 151° F)
Relative humidity	Up to 95% (non-condensing)
Altitude	Up to 4.9 km (16,000 ft)

If the MUXserver 90 is to be operated at an altitude greater than 2,400 m (8000 ft), decrease the operating temperature specification by 1.8° C for each 1,000 metres above 2,400 metres (1° F for each 1,000 ft above 8,000 ft).

4.3 Dimensions and Ventilation

The physical dimensions of the MUXserver 90 are listed in Table 4-2 below. In reviewing your installation site, check that the site will provide:

- at least 45 cm (18 in) clearance above the floor to reduce exposure to dust from foot traffic.
- at least 10 cms (4 in) of unobstructed airspace around the MUXserver 90.

Table 4-2 Physical Dimensions

Dimension	Value
Height	3.18 cm (1.25 in)
Width	27.31 cm (10.75 in)
Depth	12.70 cm (5.0 in)
Weight	0.77 kg (1.7 lb.)

4.4 Cabling Requirements

Where stand-alone installation is involved, ensure that the required adapter cable for connecting the synchronous device to the MUXserver 90's 50-pin port is available.

Details of the cables which may be connected to the 50-pin port of the MUXserver 90 are provided in Appendix A, *Connector Pins and Cables*, page A-1.

Prior to installation, you should check that the lengths of cables to be used to connect the MUXserver 90's synchronous link to either a modem or a co-located DECmux 300 do not exceed the limits listed in Table 4-3 below.

Table 4-3 Maximum Cable Lengths — MUXserver to Devices

Line Protocol	Data Rate	Cable Length	Comments
V.24	All supported speeds	15 m (50 ft)	Cable capacitance is assumed to be 50pF/ft
V.10	Up to 19.2 kbps	400 m (1300 ft)	Cable capacitance is assumed to be 15pF/ft
	48 kbps	150 m (500 ft)	
	64 kbps	130 m (400 ft)	
V.36, X.21	All supported speeds	1200 m (3900 ft)	The cable is assumed to have a capacitance of 15pF/ft and to be terminated (at the far end) with 100 ohms.
V.35	All supported speeds	60 m (200 ft)	Recommended maximum length only.
Note: The total length of synchronous link cables includes extension cables connected between the MUXserver 90 and the associated modem.			

For additional information on cabling and configuring of local area networks, and using DECconnect system products, refer to the *MUXserver Network Reference Manual* and the *DECconnect System Planning and Configuration Guide*.

4.5 Stand-alone Use

If a stand-alone MUXserver 90 is to be installed, you should check that the ThinWire Ethernet cabling is installed, tested and tagged, and that a suitable power source is available.

In particular, you should ensure:

- if the MUXserver 90 is **not** to be installed at the end of the ThinWire segment, a BNC T-connector is available, or
- if the MUXserver 90 is to be installed at the end of the ThinWire segment, a BNC T-connector **and** 50 ohm terminator are available, and

- an AC power outlet matching the MUXserver's power supply cable is within 2.5 metres (8 ft) of the installation site and meets the relevant electrical specifications.(see Table 4-4 below)

Check also that the following requirements are met:

- the maximum ThinWire cable segment length must not exceed 185 metres (606 ft);
- there must be a maximum of one ground per cable segment;
- there must be at least 0.5 metres (19 in) between T-connectors;
- the maximum number of stations between terminators must not exceed 30;
- ThinWire cable segments must not be configured in a loop; and
- ThinWire cable segments must not have any branch segments.

Table 4-4 Electrical Specifications for MUXserver 90's Power Supply

Parameter	Value
Voltage (U.S. Domestic, Canada, Japan)	104 Vac to 128 Vac (nominal 120 Vac)
Current at 120 V	0.25 A
Voltage (International)	208 Vac to 256 Vac (nominal 240 Vac)
Current at 240 V	0.125 A
Frequency	50 Hz to 60 Hz
Power consumption	16 W

4.5.1 Back Cover Removal and Wall Mounting

If required for wall-mounting, or if there is any other reason to remove the back cover of the MUXserver 90 unit, you will need a small screwdriver or similar tool.

For wall-mounting, you will also need screws to match the mounting holes in the cover (for example, 8-gauge, 20 mm). Heads of the screws should be approximately 6mm (1/4") in diameter. Screws are not provided with the unit.

4.6 DEChub 90 Use

For this option, you will need to ensure that a DEChub 90 Ethernet backplane is installed and operable, and that a usable slot is free for the MUXserver 90. The MUXserver 90 can be installed in any slot of the DEChub 90 Ethernet backplane.

The following specifications apply to the electrical operation of the MUXserver 90 unit itself:

Table 4-5 MUXserver 90 Electrical Specifications

Voltage	Current (Amperes)	Power (Watts)
+5.0	1.7	8.5

Positioning and Connecting

This chapter describes the methods to be followed :

1. To position the MUXserver 90 in an appropriate working environment,
2. To establish a LAN connection to it, and
3. To connect the MUXserver 90 to an appropriate power supply.

To install the MUXserver 90 as a stand-alone unit, refer to Section 5.1.

To install the MUXserver 90 in a DEChub 90 Ethernet backplane, refer to Section 5.2.

5.1 Stand-alone Configuration

5.1.1 Physical Positioning

As a stand-alone unit, the MUXserver 90 can be placed on a table or desktop or mounted to a wall, using the back cover as a mounting base.

Desktop Installation

For desktop installation, lie the MUXserver 90 horizontally, with the Ethernet cable connection point on top.

Wall Mounting

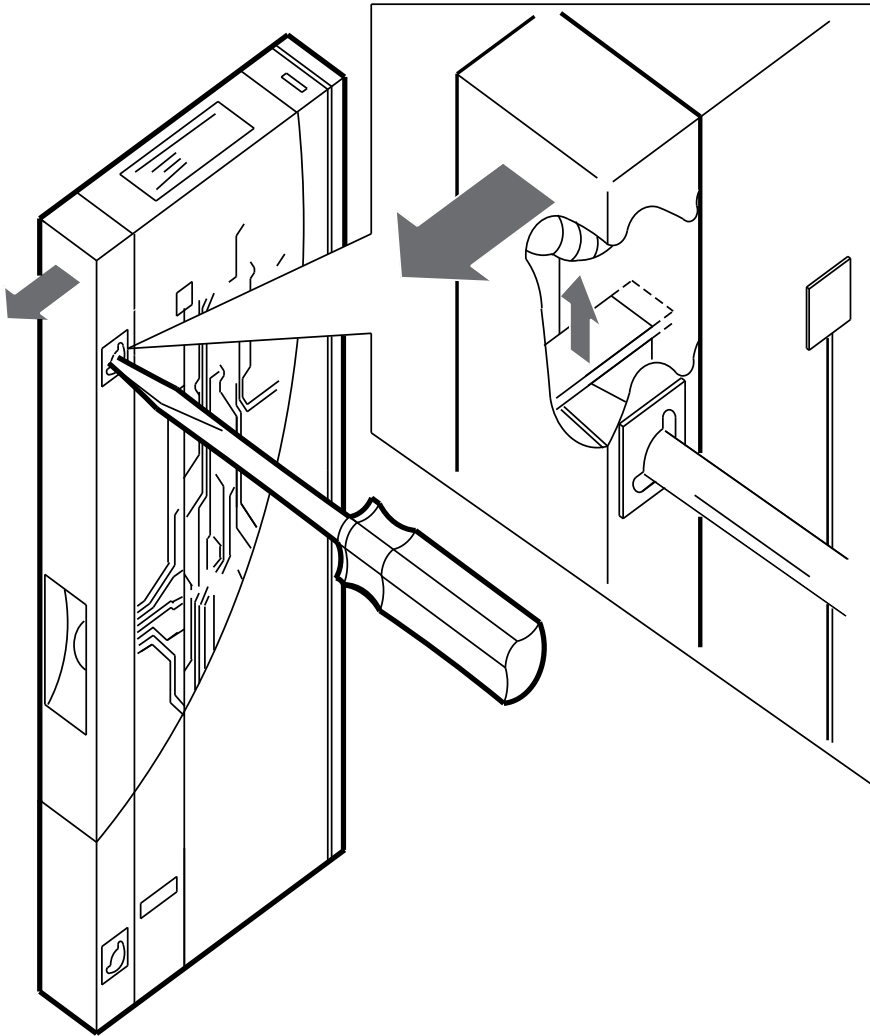
For wall-mounting, remove the back cover of the unit and mount the unit as described below:

To remove the back cover of the MUXserver 90, refer to Figure 5-1 below and take the following steps:

1. Insert a small screwdriver into the top mounting hole in the cover,
2. Lift up on the internal latch which holds the cover in position,
3. While holding the latch up, pull the top of the cover away from the unit and down.

Once you have removed the back cover, use the mounting holes on the cover as a template to locate the mounting screws. After marking for the mounting screws, mount the back cover to the wall, leaving 4 mms (approx. 5/32") clearance between screw head and the wall and then snap the unit into the back cover.

Figure 5-1 Removing Back Cover



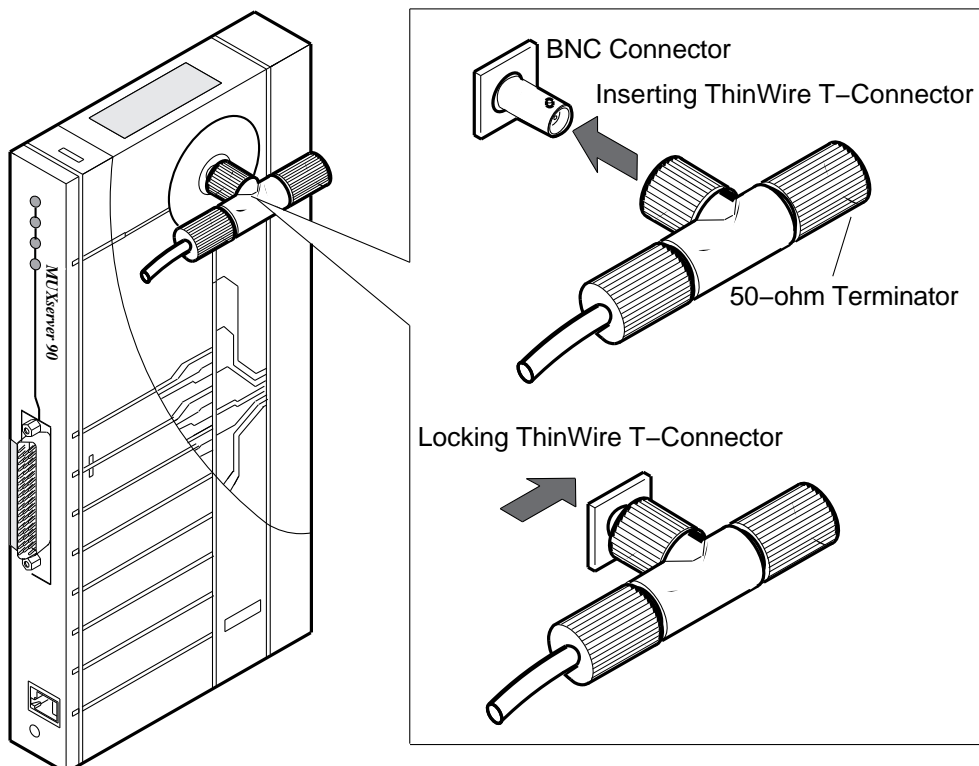
5.1.2 LAN Connection

Once your MUXserver 90 unit is placed or mounted, perform the following steps to connect it to the ThinWire Ethernet local area network:

ThinWire Ethernet Connection

1. Attach the Ethernet T-connector to the BNC connector on the MUXserver 90, as shown in Figure 5-2 below. This shows the T-connector terminated using a 50-ohm terminator. Alternatives are:
 - the 50-ohm terminator is replaced by a cable if the MUXserver is not at the end of a cable segment;
 - the cable segment must be terminated by 50-ohm terminators at both ends unless a Digital Ethernet Multi-Port Repeater (DEMPR) or a Digital Ethernet Single Port Repeater (DESPR) is used;
 - where a cable segment is terminated in a DEMPR, a DESPR, or a DEChub 90, the opposite end needs to have a 50-ohm terminator.
2. Turn the barrel of the connector clockwise to lock.

Figure 5-2 ThinWire Ethernet T-Connection for Stand-alone Versions



5.1.3 Stand-alone Power Supply Connection

Figure 5-3 illustrates the MUXserver 90 installed in a stand-alone configuration using a U.S., Canadian or Japanese power supply. Figure 5-4 illustrates the same type of configuration, but using an international power supply. Refer to these figures when installing your MUXserver 90.

Perform the following steps for power connection:

1. Plug the external power supply connector into the MUXserver 90's power connector.
2. Attach the power cord to the power supply (if you are using an international power supply, rather than the U.S. version).
3. Plug the power supply or power supply cord into a working AC outlet.
4. Switch on the AC outlet to apply power. Note that when power is applied, the MUXserver 90 immediately begins its self-test, which takes approximately one minute to complete. Refer to Chapter 6, *The Power-On Self-Test*, page 6-1, for information about running the self-test.

Figure 5-3 Stand-alone Installation with Power Supply (for U.S., Canada, Japan)

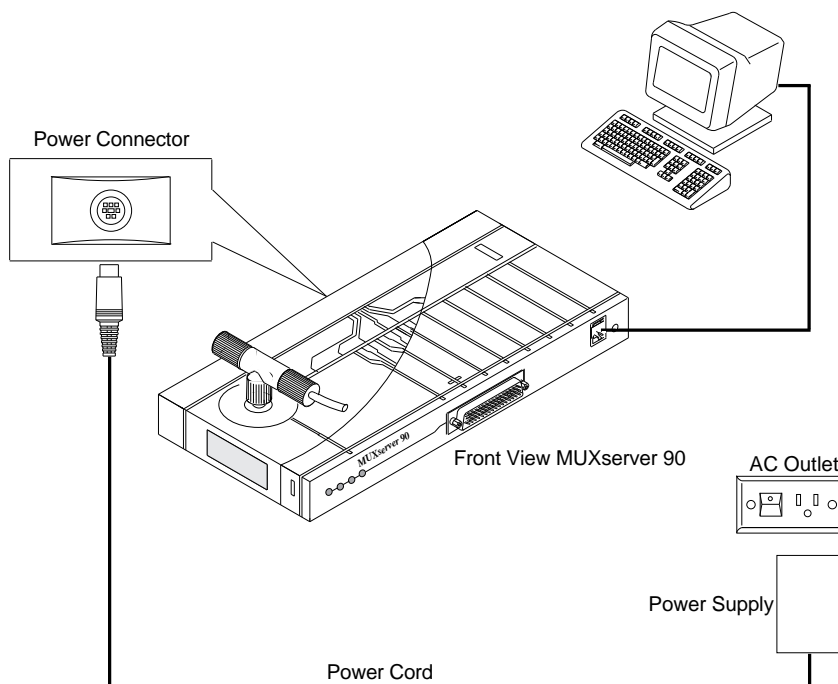
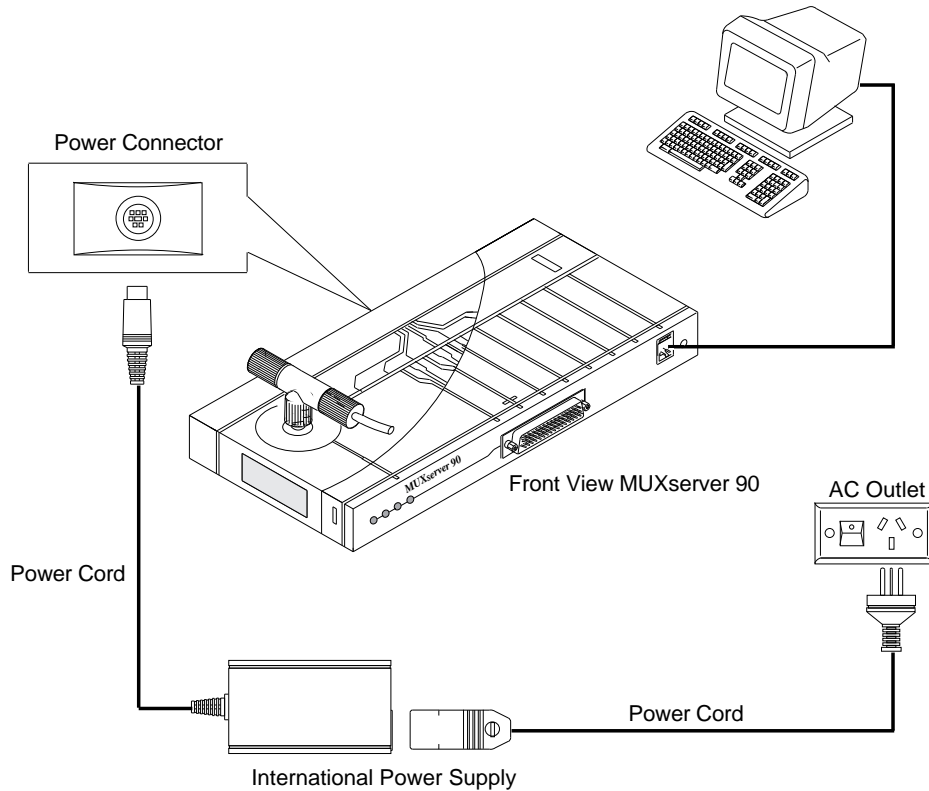


Figure 5-4 Stand-alone Installation with International Power Supply



5.2 Backplane Installation

If there is a cover on the back of the MUXserver 90, you must remove it before inserting the unit into the backplane (see Figure 5-1 on page 5-2, and accompanying instructions).

Insert the MUXserver 90 into the DEChub 90 Ethernet Backplane this way:

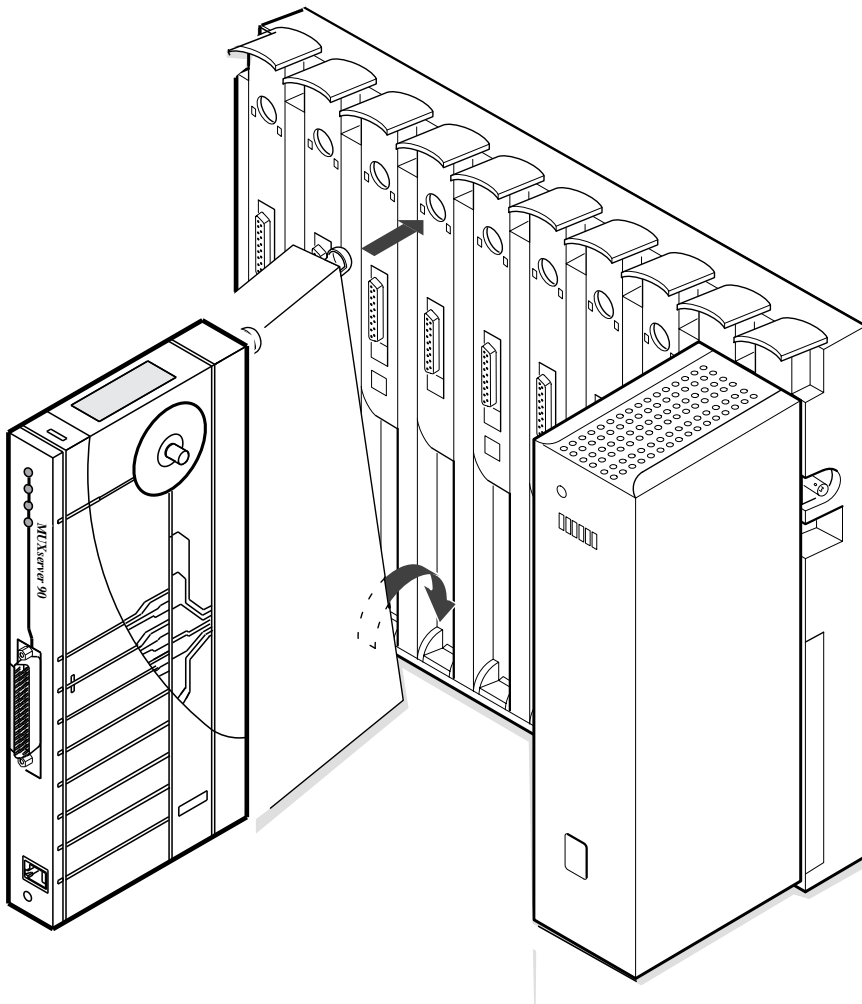
1. Place the lower mounting tab, located on the back of the MUXserver 90 into a mounting slot on the backplane, as shown in Figure 5-5.

Note that the MUXserver 90 can be installed in the DEChub 90 Ethernet backplane while the backplane is powered-up and connected to the network. A mounted MUXserver 90 can also be replaced with another (that is, “hot-swapped”) without having to power down the backplane.

In each case, where power is applied to the backplane, the MUXserver 90 immediately begins its self-test, which takes approximately one minute to complete. Refer to Chapter 6, *The Power-On Self-Test*, page 6-1, for information about running the self-test.

2. Push in the top to rock the unit into place. An audible click is heard when the unit is securely latched into place.

Figure 5-5 MUXserver 90 Insertion in DEChub 90 Backplane



To remove the MUXserver 90 from the DEChub 90 backplane:

1. Lift up the tab above the slot holding the MUXserver unit.
2. Pull the top of the unit forward, and when the top comes free from the slot, lift the bottom of the unit up and pull the whole unit outwards.

The Power-On Self-Test

This chapter describes the MUXserver 90's initial self-test routine which is initiated automatically when power is applied to it.

6.1 Test Sequence

Switching on power connected to the power cord, or inserting the MUXserver into an active DEChub 90 backplane causes the MUXserver to begin its self-test.

The self-test consists of diagnostic routines that test and verify the operation of the unit. Pass/fail test results are indicated by the MUXserver's LEDs.

The following sequence of events occurs:

1. As soon as power is applied to the unit, the green Power LED is lit.
2. The MUXserver 90 Hardware is tested to verify correct operation. The self-test takes approximately one minute.
3. Both the Software LED and the Network LED remain turned off if the self-test fails to complete. Results of the self-test are displayed by the unit's LEDs, as outlined in Table 6-1 below.
4. If it has successfully completed its self-test, the MUXserver attempts to down-line load the MUXserver 90 software image over the Ethernet LAN, from a suitably-configured load host. During this process, the Power LED and the System OK LED remain lit.
5. If the operational software is successfully loaded, the Network OK LED is lit, together with the Power and System OK LEDs. If the Software OK LED then flashes, the MUXserver 90 is fully operational, with software running.
6. If the software is not located, the Network OK LED, which has been off, starts to flash.
7. Flashing of the Network OK LED continues for a variable "time-out" period (see below). The LED then goes out and stays out for 30 seconds.
8. The MUXserver will make repeated attempts to locate the software, looping to Step 4. above. The duration of the "time-out" flashing period in Step 7. increases with each unsuccessful attempt, starting at 4 seconds, increasing to 8, 16, 32 seconds and so on – reaching as high as 300 seconds or so.

The following table summarises the states of the MUXserver 90 LEDs. Note that if hardware installation precedes installation of MUXserver software onto a the load host, normal operation does not commence.

Table 6-1 States of the MUXserver 90 LEDs

Power	System OK	Network OK	Software OK	Meaning
Off	Off	Off	Off	No power.
On	Off	Off	Off	Internal Self test in progress.
On	Flashing	Off	Off	Self test failed to complete.
On	On	Off	Off	Internal Self test worked, attempting to load software.
On	On	Flashing	Off	Software load failed, waiting to retry.
On	On	On	Off	Self test worked, software loaded, but not operational
On	On	On	Flashing	Normal operation

6.2 Evaluating Test Results

Upon completion of the self-test, examine the state of the MUXserver 90 LEDs to evaluate the test results.

Successful Self-Test

If the MUXserver 90 successfully completes the self-test to the stage where the Power and System OK LEDs remain lit, proceed to connect a device to the serial port, as described in Chapter 7, *Connections to the MUXserver*.

Self-Test Failure

If the MUXserver 90 fails its self-test (System OK LED Off after 60 seconds, or flashing):

1. Verify that the Ethernet is correctly connected and terminated.
2. Turn the MUXserver 90 off and then on again.

If the self-test fails again, refer to Chapter 8, *Trouble-shooting*.

Software Load Failure

If the MUXserver 90 fails to load its software image, (longer and repeated Network OK LED flashing), verify that the software is correctly installed on the load host and is reachable from the MUXserver 90. (Refer to the relevant Software Installation Guide *and the MUXserver Network Reference Manual*.)

Connections to the MUXserver

This chapter describes the procedures to be followed to connect various devices to the MUXserver, aside from those involved in connection to the LAN itself (for the latter, see Chapter 5, *Positioning and Connecting*).

7.1 Connecting a Terminal to the Console Port Connector

To connect a terminal to the console port connector:

1. Insert the cable's modified modular plug (MMP) into the MUXserver's modified modular jack (MMJ) connector, as shown in Figure 7-1 below.
2. Insert the cable's MMP into the MMJ connector on the terminal, as shown in Figure 7-2.

If the terminal has a 25-pin D-Type connector, use an H8571-A adapter or an H8575-A adapter (see Figure 7-3).

3. Power up the terminal.
4. Configure the terminal to operate with a speed of 9600 bits/sec, with a character size of 8 bits, 1 stop bit and no parity.

Refer to the specific terminal user's guide if you need help setting the terminal parameters.

Figure 7-1 Connecting to the Console Port Connector

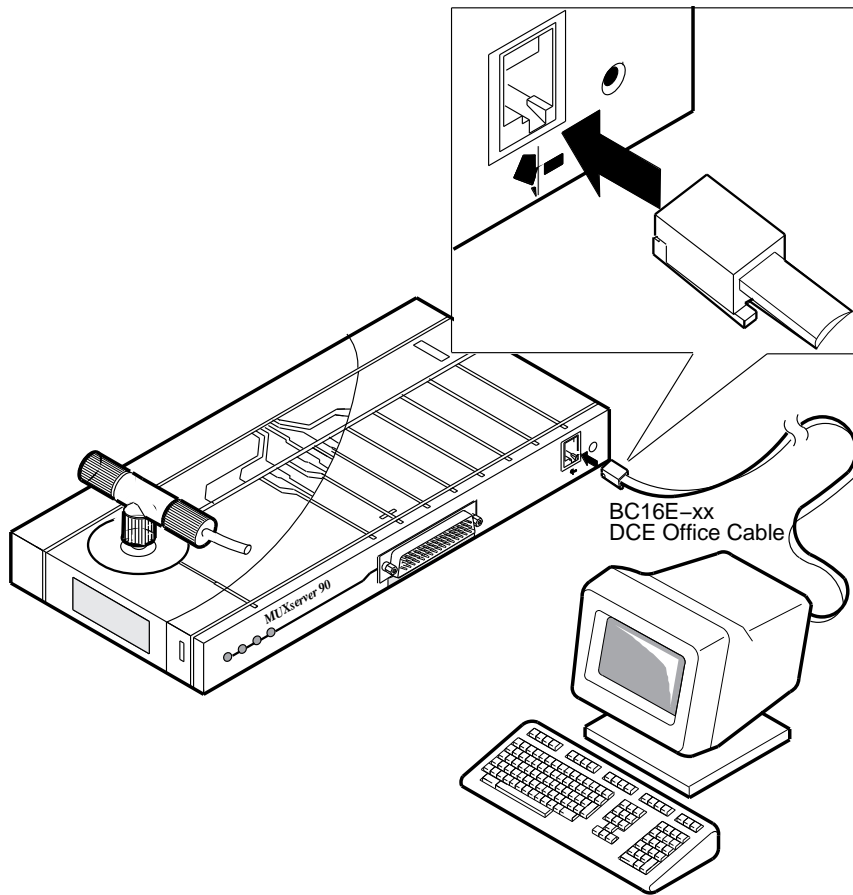


Figure 7-2 Connecting to the Terminal

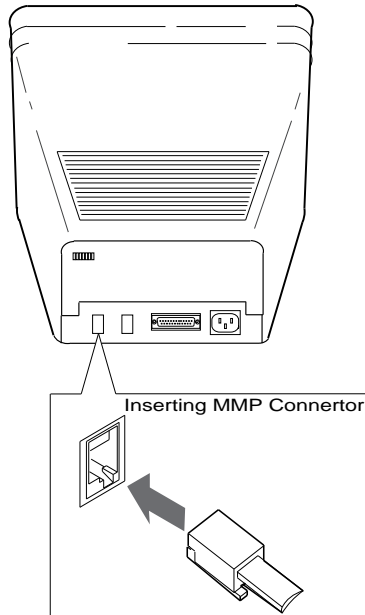
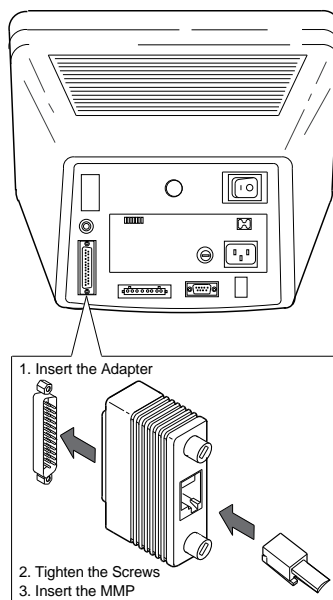


Figure 7-3 Connecting to 25-Pin D-Type Connector Terminal



7.2 Interface Standards

The design of the MUXserver 90 ensures that it is compliant with the following interface standards:

- CCITT V.24 with V.28 (equivalent to EIA-232-D)
- CCITT V.36 with V.11 (EIA-449 with EIA-422-A)
- CCITT V.35
- CCITT X.21 (Leased circuit service only)

The MUXserver 90 is also interface pin-compatible, and will operate with, equipment that complies with the following interface standards:

- CCITT V.36 with V.10 (EIA-449 with EIA-423)
- U.K. (United Kingdom) BT Kilostream Service

7.3 Connecting a Device to the 50-pin Device Port

To connect a device to the MUXserver's synchronous port, you will usually need an adapter cable and an extension cable.

Section A.2.1 on page A-6, provides detailed information about which adapter cable and extension cable to use, depending on the type of device you are connecting.

CAUTION

For older (RS-232-C) installations, a V.24/RS-232-C adapter (12-27591-01) must be fitted between the adapter cable and the extension cable, or between the adapter cable and the modem (see Figure 7-7), if the modem or modem eliminator has any of the following:

- a signal with a DCE source on pin 18
- signal quality implemented on pin 21
- Data Signal Rate Selector (DCE source) on pin 23

Failure to comply with this could result in damage to the interface module and modem or modem eliminator. If you are not sure what signals the modem or modem eliminator provides, contact Digital Field Service.

As a modem is the device most commonly connected to a MUXserver, this is the example used in this section.

To connect a modem to the MUXserver's synchronous port, take the following steps:

1. Connect the 50-pin female D-connector of the adapter cable to the 50-pin male D-connector on the MUXserver 90 (see Figure 7-4 below).
2. Connect the adapter cable to an extension cable (see Figure 7-5).
3. Connect the extension cable to the modem. Figure 7-6 illustrates this.

Figure 7-4 Connecting to the 50-Pin D-Type Connector

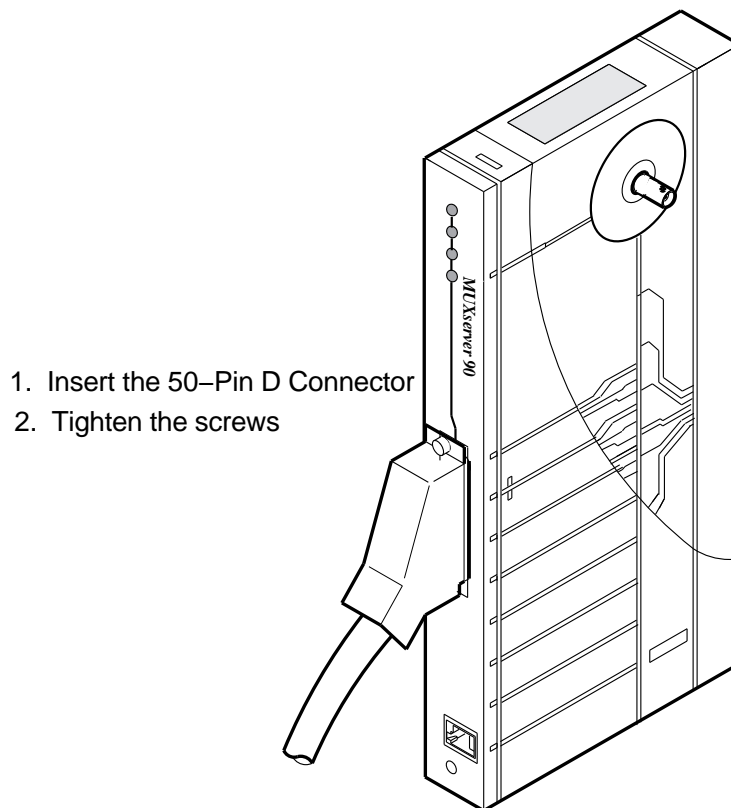


Figure 7-5 Connecting an Adapter Cable to an Extension Cable

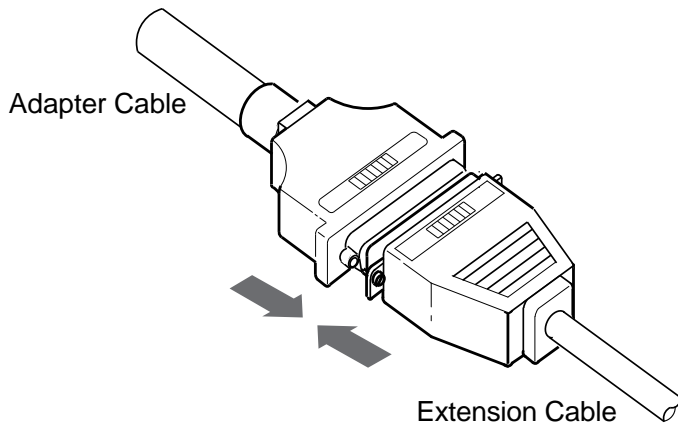


Figure 7-6 Connecting to the Modem

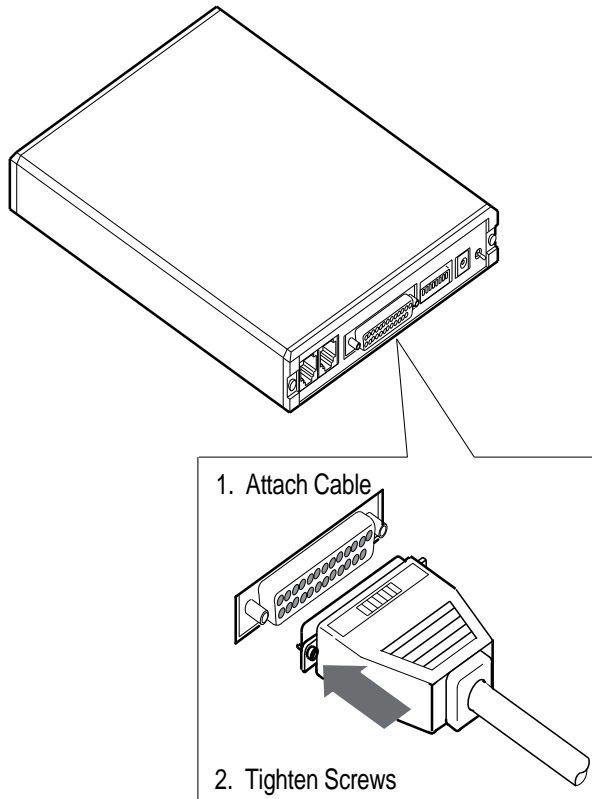
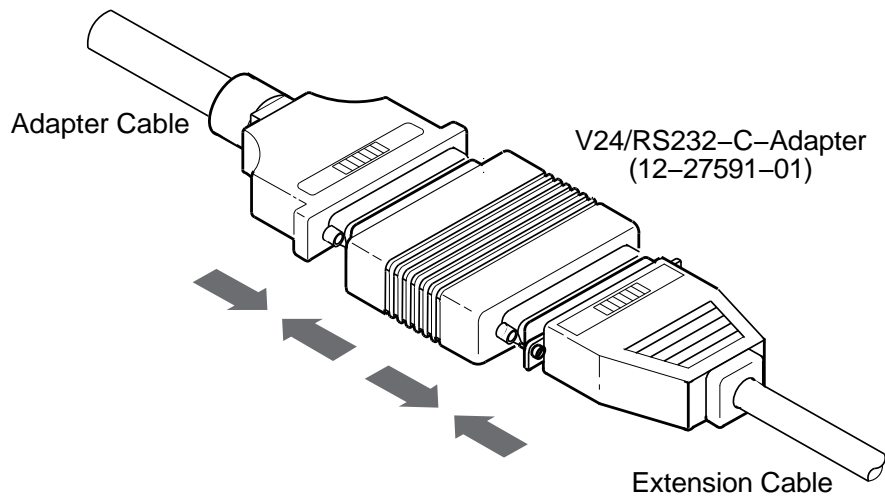


Figure 7-7 Connecting Adapter Cable, V24/RS-232-C Adapter, and Extension Cable



Trouble-shooting

The trouble-shooting information in this section helps you identify and correct problems you may find during the installation of the MUXserver 90 hardware.

The procedures outlined here are for diagnosing and correcting hardware-related problems only.

Notify the system manager if the trouble-shooting procedures indicate the problem is software-related or if these procedures do not correct the problem.

8.1 Guidelines

Follow these guidelines when trouble-shooting the MUXserver 90 hardware:

- Always check for loose cable connections before commencing extensive trouble-shooting.
- Consider possible environmental problems such as power fluctuations or high ambient temperatures.
- If the MUXserver 90 has been functioning for a while without any problems, but now indicates a fault, it is possible that the fault is in a related device (for example, the DEChub 90 Ethernet backplane, the Ethernet segment, the device connected to the MUXserver's serial port, or the device cables).
- If the fault is isolated to a malfunction of a connected device or cable, replace the device or cable or refer to documents associated with the device for trouble-shooting information.
- If the fault is isolated to the MUXserver 90, contact your Digital Sales Representative to make arrangements for a replacement unit.

8.2 Tools

The self-diagnostic program and the MUXserver 90 LEDs are the primary diagnostic tools used for trouble-shooting the MUXserver hardware. Pass or fail test results are indicated by the combined states of the MUXserver's LEDs.

To detect the source of any problems or operating failures of the MUXserver 90 hardware, refer to Table 6-1. This lists the states of the MUXserver as indicated by the LED display. Refer to the diagnostic flow charts shown in Figures 8-1 and 8-2.

You can also connect to the console port connector (as described in Chapter 7) and monitor any error messages that are sent to the console port by the MUXserver firmware.

8.2.1 Console-Displayed Error Messages

If a terminal has been connected to the Console port connector, it will display MUXserver console messages. The text below describes error messages that might be encountered during self-test and recommended corrective action.

Error Message 1010

```
Init -1010- Parameter checksum error detected in EEPROM
```

Probable Cause:

Self-test has detected a check sum error in the permanent parameters stored in EEPROM.

Corrective Action:

Reset the MUXserver to default settings, using the Reset/Dump button (see item 8, Table 1-1 on page 1-7). If this fails to correct the problem, notify the system manager that the MUXserver must be returned to Digital Equipment Corporation for repair or for replacement.

Down-Line Load Starts, Then Fails

The following sequences of messages are displayed on the console terminal at various time intervals:

```
Init -1101- Attempting to locate load host, (ISO8802)
Init -1101- Attempting to locate load host, (ETHERNET)
Init -1100- Requesting load from host xx-xx-xx-xx-xx-xx
Init -1102- Load failure, timeout
```

Probable Cause:

The load host has failed to complete the down-line load to the MUXserver.

Corrective Action:

Notify the system manager, reporting the error message exactly as it appears on the console terminal.

Down-Line Load Does Not Start

The following sequences of messages are displayed on the console terminal at various time intervals:

```
Init -1101- Attempting to locate load host, (ISO8802)
Init -1101- Attempting to locate load host, (ETHERNET)
Init -1103- Router will retry operation in n seconds
```

Probable Cause:

The load host(s) not responding to the MUXserver's down-line load request within the allotted time-out period, or the software has not been installed on any load host on the network.

Corrective Action:

Notify the system manager, reporting the error message exactly as it appears on the console terminal.

Figure 8-1 Diagnostic Flowchart

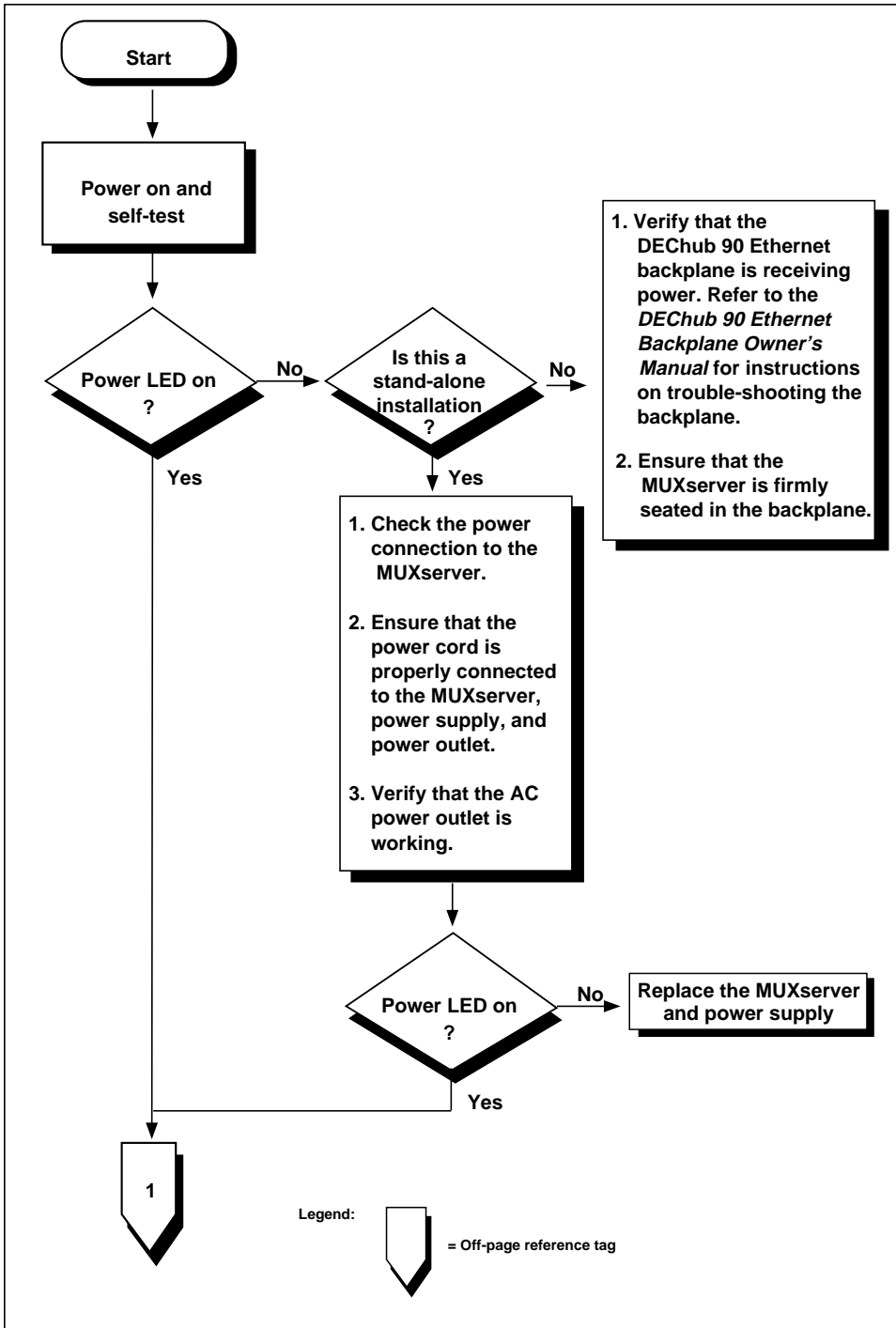
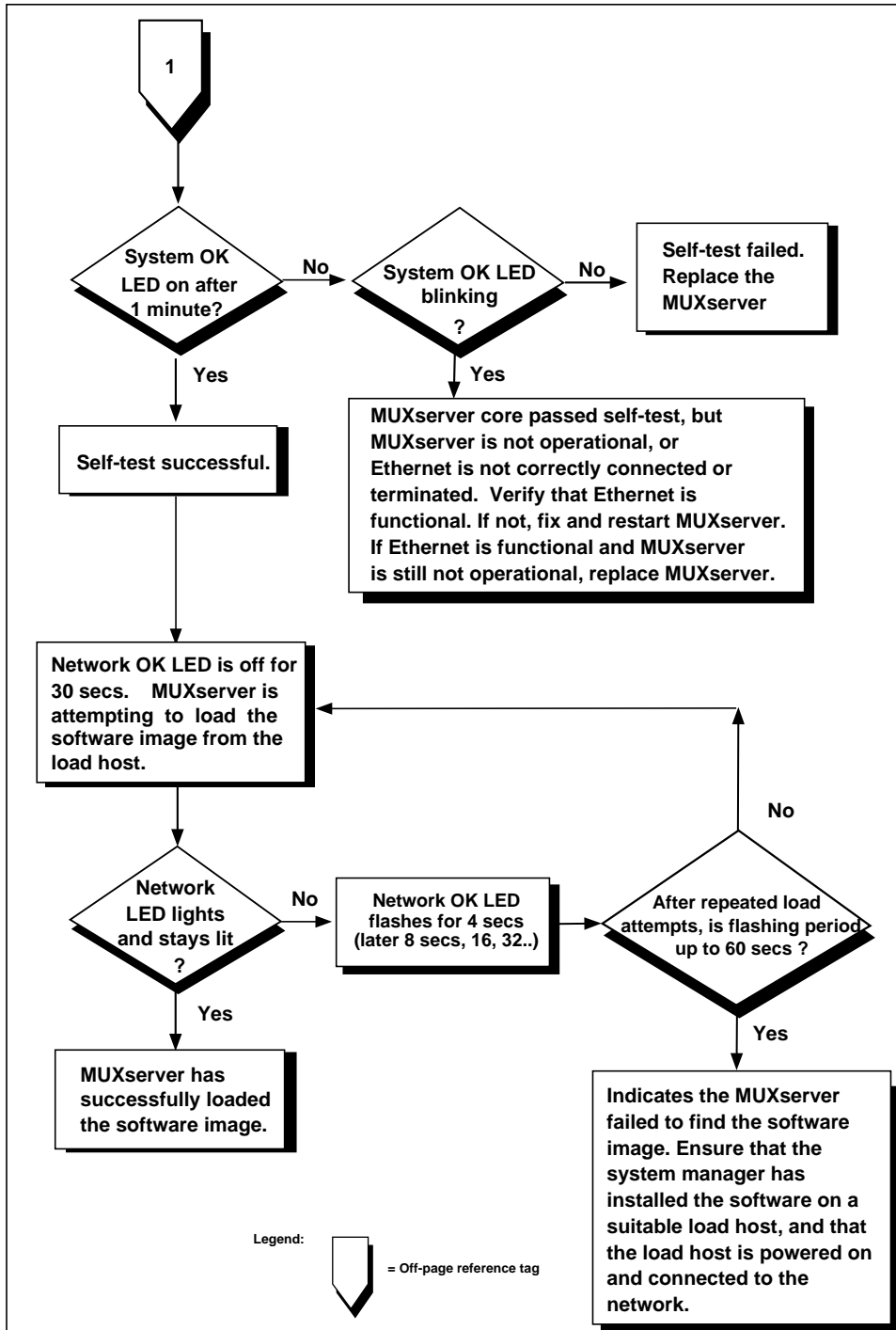


Figure 8-2 Diagnostic Flowchart (cont'd)



Completing the Installation

After you install and test the MUXserver 90 hardware, inform the system manager that the installation is complete.

If you have installed the MUXserver 90 hardware without having installed the relevant software on the load host, it should be the system manager's responsibility to verify the total system installation after installing the software.

Make sure you have recorded relevant information in the spaces provided in the *MUXserver Network Identification Card*, as recommended in Chapter 3, and that the date of installation and other details marked on the card are accurate.

Forward the completed Network Identification Card to the system manager.

Connector Pins and Cables

A.1 Connector Pin Descriptions

This appendix describes the pins of the MUXserver 90 hardware connectors and the cables used to interface with the MUXserver 90 hardware, including:

- the ThinWire Ethernet connector;
- the device port connector; and
- the console port connector.

A.1.1 Ethernet Transceiver Interface

The MUXserver 90 unit has a ThinWire Ethernet connector that is used when the unit is installed in a stand-alone configuration. The ThinWire Ethernet connector is a 50-ohm, RG58 type, BNC connector with one pin and a shield.

A.1.2 Device Port Connector

The 50-pin D-type connector is used to connect a synchronous device (modem or locally stationed DECmux 300) to the MUXserver 90. The device must support one of the following standards:

- CCITT V.24 with V.28 (EIA-232-D)
- CCITT V.36 with V.11 (EIA-449 with EIA-422-A)
- CCITT V.36 with V.10 (EIA-449 with EIA-423-A)
- CCITT V.35
- CCITT X.21 (Leased circuit service only)
- UK (United Kingdom) BT Kilostream service

NOTE: A separate adapter cable is required for each standard. Section A.2.1 provides information on the correct adapter cables to use. Figure A-1 shows how the pins are numbered and Table A-1 describes the signals on each pin.

Figure A-1 Pin Numbers for the 50 Pin D-type Connector

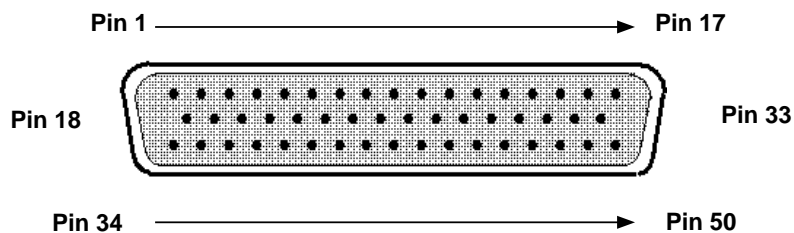


Table A-1 Pin Descriptions for 50-pin D-Connector

Pin	Signal Description	Signal Name	V.24 [#]	V.10 [#]	V.36 [#]	V.35 [#]	X.21
1	Code Gnd						
2	Code 0 *						
3	Code 1 *						
4	Code 2 *						
5	Code 3 *						
6	Transmitted data A	TXD A			103(A)		T(A)
7	Transmitted data B	TXD B			103(B)		T(B)
8	Transmitted data	TXD	103	103			
9	Request to send A	RTS A			105(A)		C(A)
10	Request to send B	RTS B			105(B)		C(B)
11	Received data A	RXD A	104	104(A)	104(A)		R(A)
12	Received data B	RXD B	102	104(B)	104(B)		R(B)
13	Local Loop	LOC LPBK	141	141	141		
14	Data signal rate selector (DCE) A	SMI	112				
15	Test indicator	TEST IND	142	142	142		
16	Remote loopback	REM LPBK	140	140	140		
17	Ring indicator	RI	125	125	125		
18	Receiver signal element timing (DCE) A	RXCLK A	115	115(A)	115(A)		B(A)
19	Receiver signal element timing (DCE) B	RXCLK B	102	115(B)	115(B)		B(B)
20	Transmit signal element timing (DCE) A	TXCLK A	114	114(A)	114(A)		S(A)
21	Transmit signal element timing (DCE) B	TXCLK B	102	114(B)	114(B)		S(B)
22	Transmit signal element timing (DTE)	CLK	113	113			
23	V35 Transmit signal element timing (DCE) A	V35 TXCLK A				114(A)	
24	V35 Transmit signal element timing (DCE) B	V35 TXCLK B				114(B)	
25	V35 Transmit signal element timing (DTE) A	V35 CLK A				113(A)	

* Code number (0-3) identifies the adapter cable that is attached to the 50-pin connector
See separate Table A-2 for EIA Circuit Equivalents of CCITT Nos.

Table A-1 (cont'd) Pin Descriptions for 50-pin D-Connector

Pin	Signal Description	Signal Name	V.24 [#]	V.10 [#]	V.36 [#]	V.35 [#]	X.21
26	V35 Transmit signal element timing (DTE) A	V35 CLK B				113(B)	
27	V35 RXD A	V35 RXD A				104(A)	
28	V35 RXD B	V35 RXD B				104(B)	
29	V35 TXD A	V35 TXD A				103(A)	
30	V35 TXD B	V35 TXD B				103(B)	
31	V35 Receiver signal element timing (DCE) A	V35 RXCLK A				115(A)	
32	V35 Receiver signal element timing (DCE) B	V35 RXCLK B				115(B)	
33	Data terminal ready	DTR	108/2	108/2			
34	Data set ready A	DSR A	107	107(A)	107(A)	107	
35	Data set ready B	DSR B	102	107(B)	107(B)	102	
36	Request to send	RTS	105	105		105	
37	Data channel received line signal detector A	DCD A	109	109(A)	109(A)	109	I(A)
38	Data channel received line signal detector B	DCD B	102	109(B)	109(B)	102	I(B)
39	Clear to send A	CTS A	106	106(A)	106(A)	106	
40	Clear to send B	CTS B	102	106(B)	106(B)	102	
41	DCE ground	DCE GND	102	102a	102a	102	
42	Test transmit data	TEST TXD	**				
43	Test RTS	TEST RTS	**				
44	DTE ground	DTE GND	102	102b	102b	102	Ga
45	Data terminal ready A	DTR A			108/2(A)		
46	Data terminal ready B	DTR B			108/2(B)		
47	Terminal timing A	CLOCK A			113(A)		
48	Terminal timing B	CLOCK B			113(B)		
49	Test transmit clock	TEST TXCLK	**				
50	Data signal rate selector	DSRS	111	111	111		
** These three pins are used for testing # See separate Table A-2 for EIA Circuit Equivalents of CCITT Nos.							

A.1.3 CCITT EIA Circuit Equivalences

Conventional circuit labels in Table A-1 above do not show EIA terms. These can be read from the following conversion table:

Table A-2 CCITT-EIA Circuit Label Equivalences

Function	CCITT Circuit Number	EIA Circuit	
		EIA-232	EIA-449
DTE Gnd	102a		SC
DCE Gnd	102b		RC
TXD	103	BA	SD
RXD	104	BB	RD
RTS	105	CA	RS
CTS	106	CB	CS
DSR	107	CC	DM
DTR	108/2	CD	TR
DCD	109	CF	RR
DSRS	111	CH	SR
SMI	112	CI	
CLK (DTE)	113	DA	TT
TXCLK	114	DB	ST
RXCLK	115	DD	RT
RI	125	CE	IC
RL	140	RL	RL
LL	141	LL	LL
TI	142	TM	TM
Gnd	102	AB	

A.1.4 Console Port Connector

The console port connector on the MUXserver 90 is a modified modular jack (MMJ). The MMJ supports DEC 423 Data Leads Only connections.

The figure below shows how the pins are numbered on an MMJ connector and Table A-3 lists the signals on the pins.

Figure A-2 Pin Numbers for the Console Port Connector

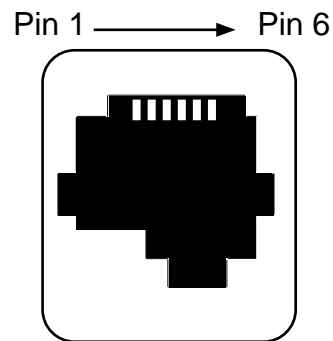


Table A-3 Pin Descriptions for the Console Port Connector

Pin Number	Signal Name
1	Tied to +5V via 150-ohm resistor
2	Transmit Data
3	Transmit Common
4	No connection
5	Receive Data
6	Tied to GND via 3kohm resistor

A.2 Cable Structures

This section describes the cable structures that are compatible with the device port and console port on the MUXserver 90. Wiring diagrams of individual cables are provided for use in trouble-shooting and cable building.

NOTE: For the European versions of the MUXserver 90, ignore the connections for pins 13 and 16 shown in the cable wiring diagrams in this section. These pins are not used on the European versions of the MUXserver 90.

A.2.1 Device Cables, Loopback Connector for 50-Pin Connector

Use an adapter cable and extension cable to connect a device to the 50-pin D-connector. Choose an adapter and extension cable or loopback connector to match the standard of the device you wish to connect, from Table A-4. Refer to the page nominated in this table for the detailed wiring diagram for the adapter or loopback connection.

CAUTION

The V.24 to RS-232-C adapter must be fitted between the adapter cable (BC23V-02, BC19D-02, or BC19V-02) and the extension cable if the modem or modem eliminator has:

- A signal with a DCE source on pin 18
- Signal quality implemented on pin 21
- Data signal rate selector (DCE source) on pin 23

Failure to comply with this could result in damage to the interface module and modem or eliminator. If you are not sure what signals the modem or eliminator provides, contact Digital Field Service.

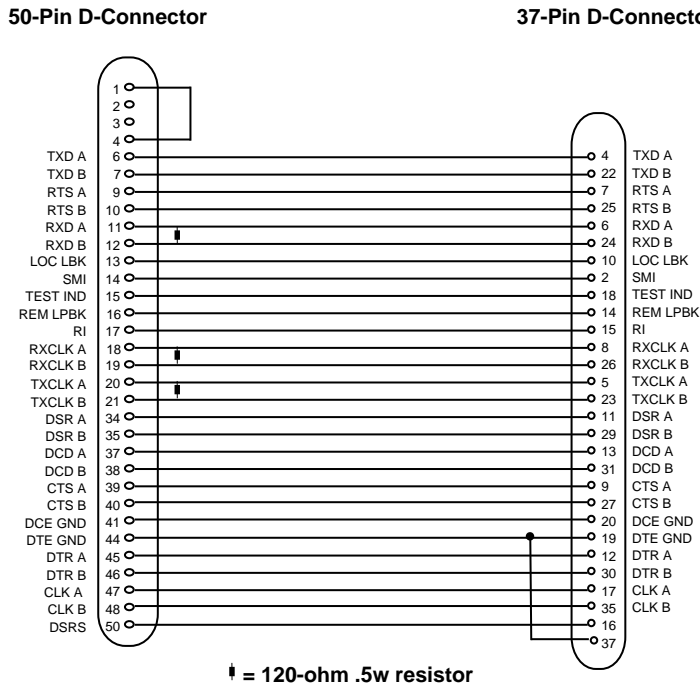
Table A-4 Device Adapters, Cables, Connectors

Device Standard	Adapter	Moulding	Pins	Wiring Diagram	Extension cable	Loopback Connector
V.24	BC19D-02	45 degree	50-25	page A-11	BC22F-yy* (fully shielded)	H3266
	BC19V-02	straight	50-25			
	BC23V-02	straight	50-25			
RS-232-C	BS19D-02 (includes BC19D-02, 12-27591-01 adapter)	45 degree	50-25			
	BS23V-02 (includes BC23V-02, 12-27591-01 adapter)	straight	50-25			
V.10	BC19E-02	45 degree	50-37	page A-9	BC55D-xx**	H3198 (see page A-16)
	BC19W-02	straight	50-37			
V.35	BC19F-02	45 degree	50-34	page A-10	BC19L-xx**	H3250 (see page A-17)
	BC19X-02	straight	50-34			
V.36	BC19B-02	45 degree	50-37	page A-8	BC55D-xx**	H3198 (see page A-16)
	BC19U-02	straight	50-37	page A-7		
X.21 leased line	BC19C-02	45 degree	50-15	page A-13	BC22Z-xx**	
BT Kilostream	BC22X-02		50-15	page A-12	BC22Z-xx**	
Null modem	BC19Y-10		50-50	page A-14		N/A
Universal Loopback			50-50	page A-10		H3199
* yy represents one of:				**xx represents one of:		
10	10ft (3.1m)	25	25ft (7.8m)			
25	25ft (7.6m)	50	50ft (15.2m)			
35	35ft (10.7m)	75	75ft (22.9m)			
50	50ft (15.2m)	A0	100ft (30.5m)			
<p>Note: For U.K. installations, the total length of V.24 and V.35 cables must not exceed 27ft (8.4m) comprising 2ft (0.6m) for the adapter cable and 25ft (7.8m) for the extension cable.</p>						
Other Cables and Adapters						
Cable or Adapter Type					Part No.	
25-pin male to MMJ (modified modular jack) adapter					H8571-A or H8575-A	
25-pin female to MMJ adapter					H8571-B or H8575-B	
DEC Office cable - terminal to console port connection (MMP connectors each end)					BC16E-xx	

A.2.2 BC19B-02, BC19U-02 Adapter Cables (V.36)

Use the BC19B-02 or BC19U-02 synchronous line adapter cable to connect the MUXserver 90 50-pin D-connector to V.36 devices. These are 28-wire cables with a 50-pin female, D-connector on one end and a 37-pin male D-connector on the other end. The figure below shows the wiring.

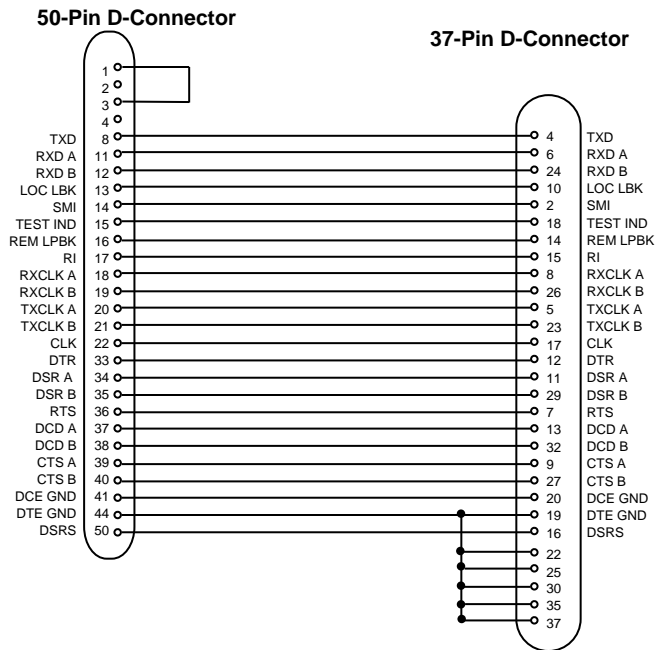
Figure A-3 BC19B-02/BC19U-02 Adapter Cable Wiring



A.2.3 BC19E-02, BC19W-02 Adapter Cables (V.10)

Use the BC19E-02 or BC19W-02 synchronous line adapter cable to connect the MUXserver 90 50-pin D-connector to V.10 devices. These are 24-wire cables with a 50-pin female, D-connector on one end and a 37-pin male D-connector on the other end. This figure shows the wiring.

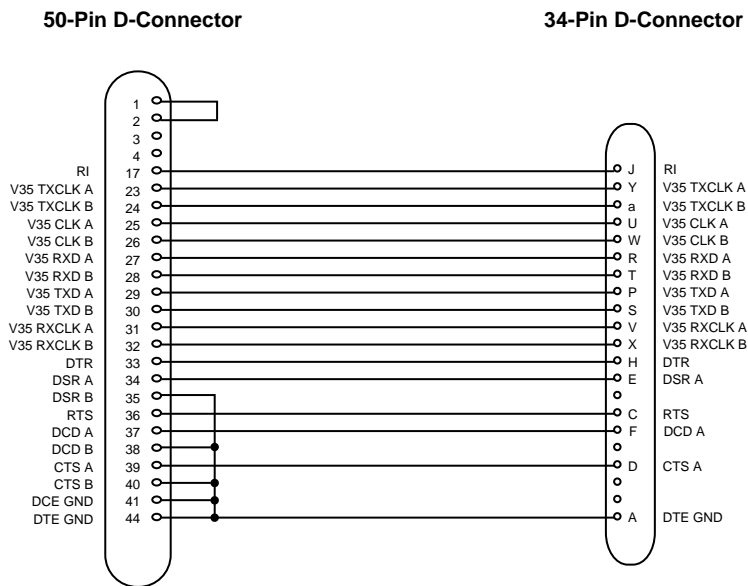
Figure A-4 BC19E-02/BC19W-02 Adapter Cable Wiring



A.2.4 BC19F-02, BC19X-02 Adapter Cables (V.35)

Use the BC19F-02 or BC19X-02 synchronous line adapter cable to connect the MUXserver 90 50-pin D-connector to V.35 devices. These are 16-wire cables with a 50-pin female, D-connector on one end and a 34-pin rectangular male connector on the other end. This figure shows the wiring diagram.

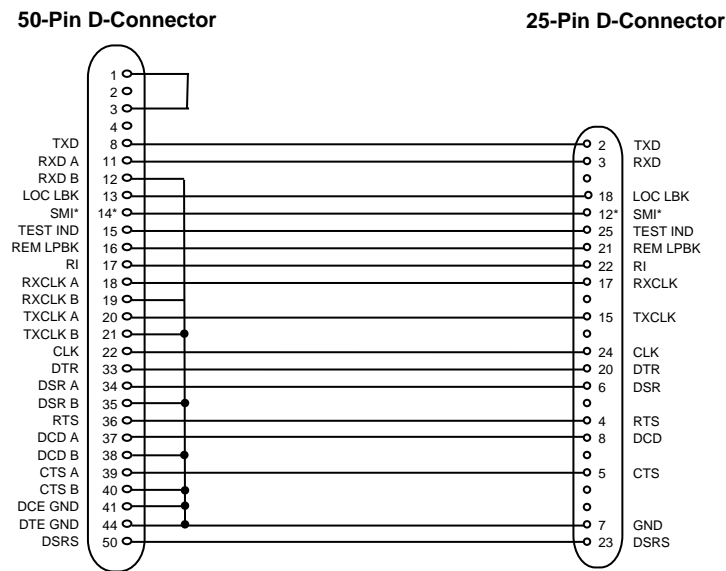
Figure A-5 BC19F-02/BC19X-02 Adapter Cable Wiring



A.2.5 BC23V-02, BC19V-02, BC19D-02 Adapter Cables (V.24)

Use one of these cables (see below) to connect the MUXserver 90 50-pin D-connector to V.24 devices. These are 16-wire cables with a 50-pin female, D-connector on one end and a 25-pin male D-connector on the other end. The figure below shows the wiring diagram.

Figure A-6 BC23V-02, BC19V-02 & BC19D-02 Adapter Cable Wiring

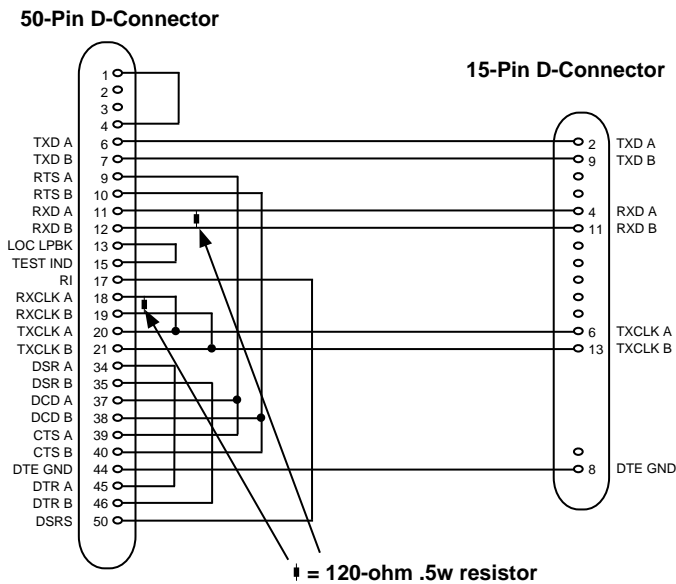


*The SMI connection between pin 14 on the 50-pin D-connector and pin 12 on the 25-pin D-connector is not present in the BC19V-02 or the BC19D-02, but applies only to the BC23V-02. (SMI signal is not required for the MUXserver 90.)

A.2.6 BC22X-02 BT Kilostream Adapter Cable (U.K. only)

Use the BC22X-02 BT Kilostream adapter cable to connect the MUXserver 90 50-pin D-connector to British Telecom's Kilostream service (through the BC22Z-xx extension cable and the 64k bit/sec, X.21 interface). The BC22X-02 is a 7-wire cable with a 50-pin female, D-connector on one end and a 15-pin male D-connector on the other end. The figure below shows the wiring diagram.

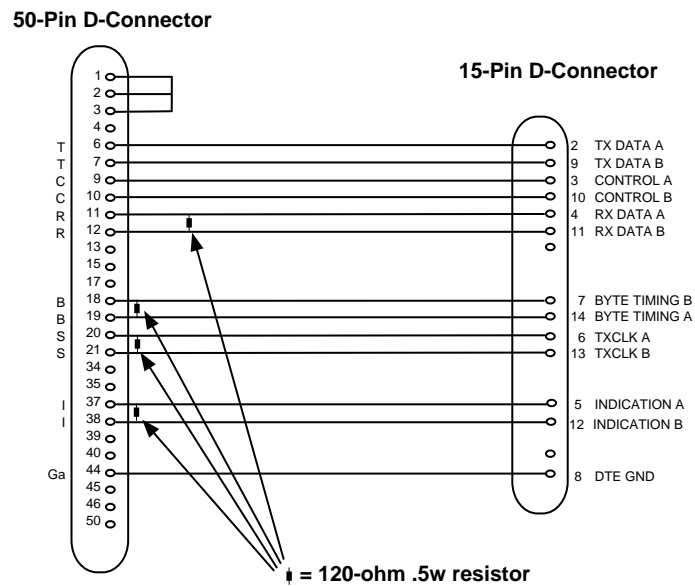
Figure A-7 BC22X-02 Adapter Cable Wiring



A.2.7 BC19C-02 Adapter Cable (X.21 leased lines)

Use the BC19C-02 adapter cable to connect the MUXserver 90 50-pin D-connector to X.21 leased lines. The BC19C-02 is a 7-wire cable with a 50-pin female, D-connector on one end and a 15-pin male D-connector on the other end. The figure below shows the wiring diagram.

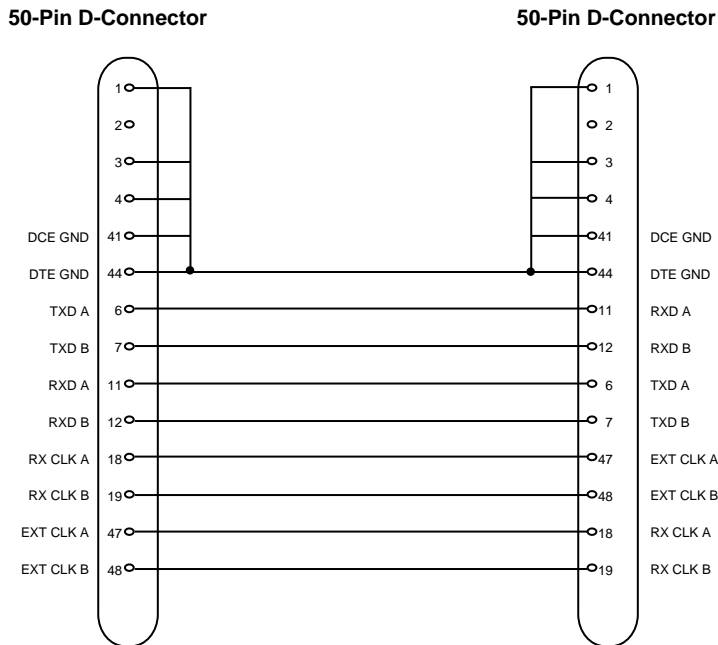
Figure A-8 BC19C-02 Adapter Cable Wiring



A.2.8 BC19Y-10 Null Modem Cable

Use the BC19Y-10 Null Modem cable to connect the MUXserver 90 50-pin D-connector to the DECMux 300 50-pin D-connector. This figure shows the wiring diagram.

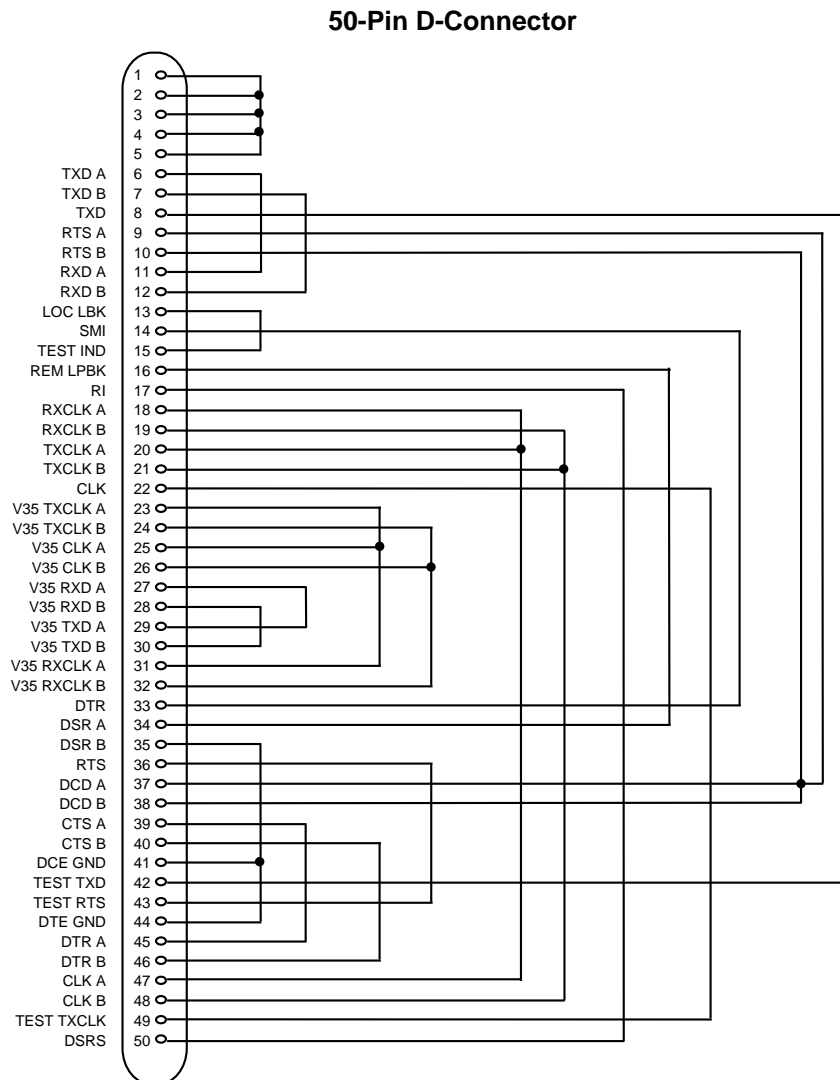
Figure A-9 BC19Y-10 Null Modem Cable Wiring



A.2.9 H3199 Universal, 50-pin Loopback Connector

Use the H3199 universal, 50-pin loopback connector to test the 50-pin D-connector driver and receiver circuits. The figure below shows the wiring diagram.

Figure A-10 H3199 Universal Loopback Connector Wiring



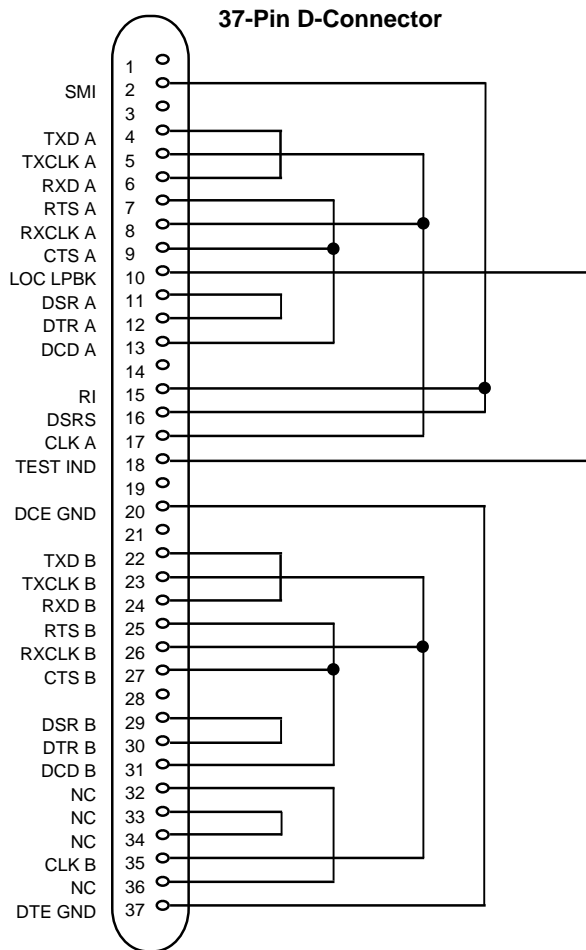
A.2.10 H3198 37-pin Loopback Connector

Use the H3198, 37-pin loopback connector to test:

- V.36 and V.10 interfaces on the 50-pin D-connector
- V.36 and V.10 adapter cables.

This figure shows the wiring diagram for the H3198 loopback connector.

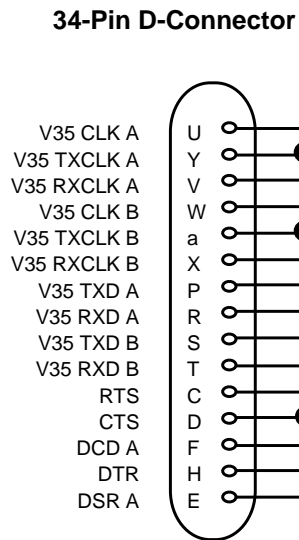
Figure A-11 H3198 37-pin Loopback Connector Wiring



A.2.11 H3250 34-pin Loopback Connector

Use the H3250 34-pin loopback connector to test the V.35 interface on the 50-pin D-connector and the BC19F-02 adapter cable. This figure shows the wiring diagram.

Figure A-12 H3250 34-pin Loopback Connector Wiring

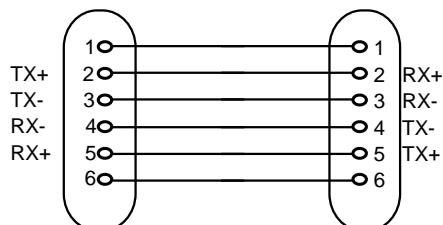


A.2.12 BC16E-xx 6-Conductor DEC Office Cable

Use the BC16E cable to connect a terminal to the console port. The BC16E is an unshielded 6-conductor flat cable. This cable is terminated at both ends with an MMP. Figure A-13 shows the Wiring Diagram for BC16E-xx Cable

Figure A-13 BC16E-xx Cable Wiring

6-Pin MMP Connector 6-Pin MMP Connector



B

How to Order the MUXserver 90

This Appendix lists order codes for the MUXserver 90, including optional items and cables. See your Digital Sales Representative to purchase equipment.

For a listing of software options, see the *MUXserver 320/380/90 Software Product Description, AE-PESGA-TE*.

B.1 Models and Variants

There is only one model of the MUXserver 90, but this model has several variants, depending on whether the unit is intended for:

- insertion into the DEChub 90 backplane,
- stand-alone installation, or
- installation in either mode in a particular country or group of countries.

The variants of the MUXserver 90 are:

- DSRZF-ME — for insertion into a DEChub 90 backplane installed in any European country
- DSRZF-MA — for insertion into a DEChub 90 backplane in non-European countries.
- DSRZF-** — for stand-alone configurations, where ** refers to the unique country code that specifies the type of external power supply and cord shipped with the MUXserver 90.

(For example, DSRZF-AE refers to a stand-alone version for the U.K. and Eire, and DSRZF-AI refers to a version for Italy.)

A detailed list of the stand-alone version codes is provided in Table B-1, page B-2.

B.1.1 MUXserver 90 for installation in DEChub 90 Backplane

As a minimum, the MUXserver 90 hardware shipment consists of :

- MUXserver 90 (without a back cover)
- *MUXserver 90 Hardware Installation Manual* (this document)
- MUXserver Network Identification Card
- Software Licence.

The order number for this option is DSRZF-ME for European countries, and DSRZF-MA for all other countries.

B.1.2 MUXserver 90 for Stand-Alone Use

When ordering a MUXserver 90 for stand-alone use, you should expect to receive the following in your hardware shipment:

- MUXserver 90, including snap-on back cover
- *MUXserver 90 Hardware Installation Manual* (this document)
- MUXserver Network Identification Card
- Software Licence
- External power supply
- Power cord appropriate to the country or countries covered by the order code. (Not required or supplied in U.S., Canada or Japan.)

Table B-1 below gives the order codes for this shipment.

Table B-1 Country Codes — Stand-alone MUXserver 90

Country	Order Code
United States, Canada, Japan	DSRZF-AA
Finland, Belgium, France, Germany, Holland, Norway, Sweden, Spain, Austria	DSRZF-AX
Italy	DSRZF-AI
Israel	DSRZF-AT
Australia, New Zealand	DSRZF-AZ
Switzerland	DSRZF-AK
United Kingdom, Eire	DSRZF-AE
India, South Africa	DSRZF-BJ
Denmark	DSRZF-AD

B.2 MUXserver 90 Accessories

Table B-2 below describes the MUXserver accessories and gives their order codes. Generally, you would only order these accessories when switching from a DEChub 90 backplane configuration to a stand-alone configuration.

Table B-2 Accessory Codes

Description	Order Code
Back cover — used for stand-alone installations only	H3042-AA
External power supply — used for stand-alone installations only. There are two versions: * 120V power supply with integral power connector * 120V-240V power supply with IEC connection	H7082-AA H7082-AB

B.3 MUXserver 90 Device Cables and Adapters

Refer to Table A-4 on page A-7 for details of the cables and adapters available to connect devices (modems and locally-stationed DECmux units) to the MUXserver 90.

B.4 MUXserver 90 Field Replacement Unit (FRU)

Use the following order code to order a replacement unit if the MUXserver is found to be defective:

- DSRZF-M (for all DSRZF-MA and DSRZF-AA units)
- DSRZF-E (for all European units)

The replacement unit (FRU) consists of a single MUXserver 90. It does not include a Hardware Installation Manual, rear cover, loopback connectors, external power supply or any 50-pin connection cable. For information about ordering accessories, refer to Section B.2.

U.K. Required Information

This appendix provides important information required for all installations in the United Kingdom (U.K.). If you are installing the MUXserver 90 in the U.K., you must refer to this appendix before starting the installation.

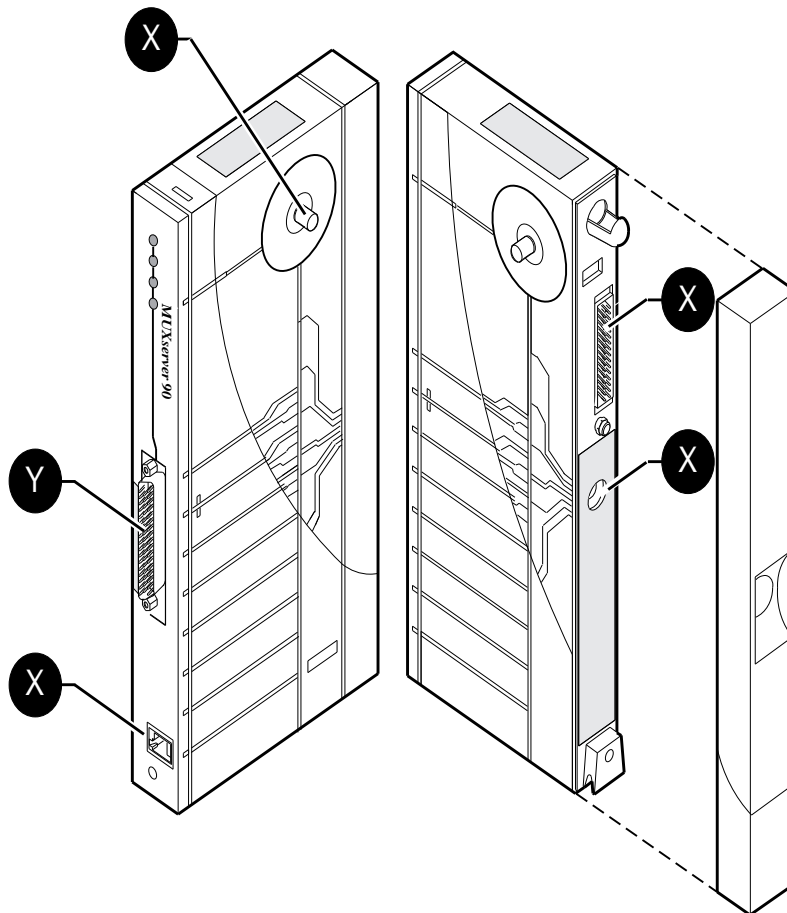
The following installation information is included below:

- Safety statement
- Service categories
- Cable information
- Module isolation
- Equipment between the approved module and a digital circuit

C.1 Safety Statement

Figure C-1 below shows the electrical interconnection points for the MUXserver 90. Interconnections marked "X" are S.E.L.V. connections. The interconnection marked "Y" is a T.N.V. connection to the communications network.

Figure C-1 Port Safety Information



C.1.1 Connection of Power Supply

For stand-alone installations only, this apparatus is intended for use when powered by the H7082-AB external power supply unit. The MUXserver 90 is also fully compatible with DEChub 90 backplane, which provides power to the MUXserver when so installed. Other usage will invalidate any approval given to this apparatus if as a result it ceases to comply with the edition of EN41003 to which it was approved.

C.2 Service Categories

Table C-1 provides information about the service categories supported by the MUXserver 90.

Table C-1 Service Categories

Service Category	Interface Type	Data Rate	Public Telecommunications Operators ¹			Service Requirements	
			BT	Hull	MCL	Physical	Electrical
1	CCITT Recommendation X.21 bis	2.4 kbps	Yes	Yes	Yes	ISO 2110 BS 6623 part 1, 1985	V.24/V.28 Cables: ² BC19V-02 BC19D-02 BC22F-25
		4.8 kbps	Yes	Yes	Yes		
		9.6 kbps	Yes	Yes	Yes		
		19.2 kbps	No	No	Yes		
2	CCITT Recommendation X.21 bis	48 kbps	Yes	Yes	Yes	ISO 2593 BS 6623 part 4, 1986	V.35 Cables: ² BC19X-02 BC19F-02 BC19L-25
		56 kbps	Yes	No	Yes		
		64 kbps	No	No	Yes		

¹BT = British Telecommunications plc.
Hull = Kingston Communications (Hull) plc.
MCL = Mercury Communications Limited

²The total length of cable used must not exceed 27 feet, comprising:

Cat 1	V.24	2ft for adapter	BC19D-02/BC19V-02
		25ft for extension	BC22F-25
Cat 2	V.35	2ft for adapter	BC19F-02/BC19X-02
		25ft for extension	BC19D-25

Where two adapter cables are shown, they are electrically identical. The only difference is the angle at which the cable is projected off the 50-way connector.

C.3 Cables

Cables are not included with the MUXserver 90. Any MUXserver 90 installed in the United Kingdom must use only cables which meet OFTEL's General Approval NS/G/1235/100009 and any other special requirements.

C.3.1 Cables Supported

Digital supports all of the following cables. The approved module may not use all of these cables, so check the instructions for use to determine which interface types are supported (see Table A-4 on page A-7).

Table C-2 Cables Supported by the Approved Module

Interface	Cable Type	Name	Moulding	Pins
V.36	adapter	BC19B-02	45 degree	50-37
V.36	extension	BC55D-xx		
V.24	adapter	BC19D-02	45 degree	50-25
V.24	adapter	BC19V-02	straight	50-25
V.24	adapter	BC23V-02	straight	50-25
V.24	extension	BC22F-xx		
V.10	adapter	BC19E-02	45 degree	50-37
V.10	adapter	BC19W-02	straight	50-37
V.35	adapter	BC19F-02	45 degree	50-34
V.35	adapter	BC19X-02	straight	50-34
V.35	extension	BC19L-xx		
X.21	adapter	BC19C-02	45 degree	50-15
X.21	extension	BC22Z-xx		
Kilostream	adapter	BC22X-02		50-15

C.4 Module Isolation

Except at the connector that plugs into the host, clearance and creepage distances of Xmm and Ymm as listed in Table C-3 below must be maintained between the approved module and other parts of the host, including expansion cards.

Clearance is the shortest distance in air between two points.

Creepage is the shortest distance along a continuous surface between those same two points.

Table C-3 Clearance and Creepage Distances

Clearance Xmm	Creepage Ymm	Vrms or Vdc
2.0	2.4 (3.8)	Up to 50
2.6	3.0 (4.8)	Up to 125
4.0	5.0 (8.0)	Up to 250
4.0	6.4 (10.0)	Up to 300
NOTE: The distances shown in parentheses apply in an uncontrolled environment where heat, humidity and temperature may fluctuate.		

C.5 Equipment Between the Approved Module and a Digital Circuit

If any other equipment, including cables or wiring, is to be connected between the approved module and the point of connection to any particular digital circuit, that equipment must conform as follows:

- The overall transmission characteristics of all other equipment must not have any material effect on the electrical conditions between the equipment and the digital circuit.
- All other equipment must comprise only the following:
 - Approved equipment, which may be subject to limitations on its use, for the purpose of connection between it and a particular digital circuit.
 - Cable or wiring that complies with a code of practice for the installation of equipment covered by this standard or other requirements that may be applicable.

Glossary

This glossary defines terms used in the *MUXserver 90 Hardware Installation Manual*.

Asynchronous

A descriptive tag for a communication method in which event control is performed without reference to a timing signal. See also *Synchronous*.

CCITT

Comite Consultatif International Telegraphique et Telephonique. (International Telegraph and Telephone Consultative Committee) The international committee which sets international communications usage standards.

Console Port

A terminal port which allows the connection of a console terminal. On the MUXserver 90, all system status and error messages are logged on the supervisor port.

DEC423

DEC423 is an interface standard developed by Digital Equipment Corporation. It is electrically compatible with EIA Standard EIA-423-A.

DECconnect

A proprietary office networking and communication system. It is based on active networking equipment installed in a *Satellite Equipment Room* connected by radiating cables to wall faceplates in each office. It can include:

- Standard and ThinWire Ethernet connections
- DEC423 terminal wiring,
- Twisted pair telephone connections, and
- Coaxial cable video connections

EIA

Electrical Industries Association. A US standards organisation which specializes in electrical and functional characteristics of interface equipment. The letters "EIA" are used as a prefix in numbering its formal standards. (Hence "EIA-232-D" etc.)

EIA--232-D

EIA Registered Standards No. 232-D. This defines the connectors, cables and electrical characteristics for a serial communications interface between a computer and a modem. It is also widely applied to interfaces between computers and other terminal equipment.

EEPROM

Electrically-Erasable Programmable Read-Only Memory. This is memory which can be read from and written to but does not lose its information when power is removed.

Ethernet

A Xerox trade mark for a type of local area network based on carrier-sense multiple access/collision detection (CSMA/CD).

Ethernet Transceiver

A device which attaches to a standard Ethernet coaxial cable.

FCC

Federal Communication Commission of the USA.

Host

A primary or controlling computer on a multiple computer network.

IEEE

Institute of Electrical and Electronics Engineers.

IEC

International Electrotechnical Commission.

LAN

Local Area Network.

LED

Light Emitting Diode.

Link

A communication path between two stations in a MUXserver network which provides *statistical multiplexing* over a synchronous communication channel.

Load host

A *host* which can be used to load software into the MUXserver via the *LAN*.

MMJ

Modified Modular Jack.

MMP

Modified Modular Plug.

Modem

A word derived from the contraction of MOdulator DEModulator, used to describe equipment which interfaces a digital device to an analog data stream.

Node

An intelligent device on a network.

Port

An endpoint on the MUXserver network for user communications.

RS-232-C

An *EIA* standard replaced by *EIA-232-D*.

S.E.L.V

Safe Extra Low Voltage

Satellite Equipment Room

A centralised equipment area which is part of the DECconnect communications system.

Server

A hardware and/or software device which provides many users with access to a system.

Statistical Multiplexing

A multiplexing method in which each channel is allocated a variable portion of available transmission time depending on the amount of data it has to transmit. This results in optimum use of the available data transmission rate.

Synchronous

Pertaining to a communication method in which data bits are synchronised with a timing signal. See also *Asynchronous*.

T.N.V.

Telecommunications Network Voltage

Terminal

The generic name for computer peripheral devices that have keyboards and video screens or printers.

Terminal Server

An active device, such as a MUXserver network, used to attach peripheral devices to a host system through a network.

ThinWire

A Digital Equipment Corporation trade mark used to describe its IEEE 802.3 compliant Ethernet products used for local distribution of data communications.

ThinWire Ethernet

An IEEE 802.3 compliant Ethernet network composed of thin Ethernet cable as opposed to standard Ethernet cable.

ThinWire Segment

A length of coaxial cable made up of one or more cable sections connected together with BNC barrel connectors and BNC T-connectors.

V.24

A *CCITT* standard which defines interface circuits. In this document, refers to use with unbalanced lines (V.28) and with a 25-pin D connector, and includes a reference to *EIA-232-D*.

V.36

A *CCITT* standard which defines an interface using balanced lines and a 37-pin D connector. In this document, refers to use with lines conforming to V.11, and includes a reference to EIA-449 with lines conforming to EIA-422-A.

V.10

A *CCITT* standard which defines electrical characteristics for an unbalanced line interface. In this document, refers to use with V.36 interface circuits and a 37-pin D connector, and includes reference to EIA-449 with lines conforming to EIA-423-A.

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