

DECrepeater 900FP

Installation and Configuration

Part Number: EK-DEFMM-IN. A01

August 1994

This document describes how to install and configure the DECrepeater 900FP module.

Revision/Update Information: This is a new manual.

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Read the instructions for correct handling.

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Warning!

This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

Achtung!

Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.

Attention!

Ceci est un produit de Classe A. Dans un environnement domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilisateur de prendre les mesures spécifiques appropriées.

Contents

Safety

Introduction	1
Features	1
Front Panel	3
Back Panel	4
Installing the Module	5
Removing the Module	9
Configuring the Module	10
Setup Port Description	10
Setup Port Device Cabling	10
Accessing the Setup Port	10
Start Redirect Mode	13
DECrepeater 900FP Installation Menu (DEChub ONE Options)	14
DECrepeater 900FP Installation Menu (DEChub 900 Options)	15
Description of Menu Options	16
LED Descriptions	36
Problem Solving Using the LEDs	38
Normal Powerup	38
Redundant Fiber-Optic Link Configuration	41
Redundant Fiber-Optic Link Overview	41
Redundant Fiber-Optic Link Components	41
Redundant Fiber-Optic Link Operation	43
Simple Redundant Link Configuration	44
Complex Redundant Link Configuration	45
Partial Fault Detection	46

Contents (Cont.)

Full Fault Detection	47
Recommendations for Redundant-Link Configuration	48
Fiber-Optic Loss Budget	49
10BaseFL Loss Budget	49
FOIRL Compatibility	50
Connector Pin Assignments	52
H8571-J Adapter	52
H8575-A Adapter	52
Product Specifications	53
Associated Documents	55
Tables	
1 DLU Process Description	27
2 Module LEDs	36
3 Port LEDs	37
4 Problem Solving Using the LEDs	38
5 Partial Fault Detection Verses Full Fault Detection	48
6 10BaseFL Worst-Case Loss Budget	49
7 FOIRL Worst-Case Loss Budget	50
8 DECrepeater 900FP Best-Case Maximum Launch Power	51
9 DECrepeater 900FP Operating Specifications	53
10 Acoustical Specifications	54

Safety

Any warning or caution that appears in this manual is defined as follows:

WARNING	Contains information to prevent personal injury.
CAUTION	Contains information to prevent damage to equipment.

VORSICHT	Enthält Informationen, die beachtet werden müssen, um den Benutzer vor Schaden zu bewahren.
ACHTUNG	Enthält Informationen, die beachtet werden müssen, um die Geräte vor Schaden zu bewahren.

DANGER	Signale les informations destinées à prévenir les accidents corporels.
ATTENTION	Signale les informations destinées à prévenir la détérioration du matériel.

AVISO	Contiene información para evitar daños personales.
PRECAUCIÓN	Contiene información para evitar daños al equipo.

Safety (Cont.)

The cautions that must be observed for the hardware described in this manual are listed below in English, German, French, and Spanish. The pages on which these safety messages appear are also listed.

WARNING

Some fiber optic equipment can emit laser or infrared light that can injure your eyes. Never look into an optical fiber or connector port. Always assume the cable is connected to a light source. [Pages 8 and 9.]

VORSICHT

Bestimmte Lichtleitergeräte können für die Augen gefährliches Laser- oder Infrarotlicht abstrahlen. Vermeiden Sie es daher unter allen Umständen, direkt in ein Lichtleiterkabel oder einen Lichtleiteranschluß zu schauen. Gehen Sie immer davon aus, daß Lichtleiterkabel mit einer Lichtquelle verbunden sind.

DANGER

Certains équipements à fibre optique peuvent émettre un rayonnement laser ou infra-rouge pouvant provoquer des troubles oculaires. Ne regardez jamais à l'intérieur d'une fibre optique ou d'un port de connecteur. Considérez que le câble est connecté en permanence à une source lumineuse.

AVISO

Ciertos equipos de fibras ópticas pueden emitir luz láserica o infrarroja con riesgos de lesiones en los ojos. No se debe nunca mirar en una fibra óptica o una puerta de conexión. Siempre hay que suponer que el cable está conectado a una fuente luminosa.

Safety (Cont.)

CAUTION

This action deletes all configured settings and replaces them with factory default values. All configuration settings will be lost. [Page 17.]

ACHTUNG

Bei diesem Vorgang werden alle Konfigurationseinstellungen gelöscht und die Werkseinstellungen wieder eingesetzt. Alle Konfigurationsdaten gehen verloren.

ATTENTION

Cette action supprime tous les paramètres de configuration et les remplace par des valeurs prédéfinies. Tous les paramètres de configuration seront perdus.

PRECAUCIÓN

Esta intervención borrará todos los parámetros de configuración y los sustituirá por valores por defecto definidos de fábrica. Se perderán todos los parámetros de configuración.

Safety (Cont.)

CAUTION

If power is interrupted during Stage 3 of the DLU process, the firmware image can become corrupted. Do not turn off power to the unit or perform any action that can cause the unit to lose power during Stage 3 of the DLU process. [Pages 26, 28, and 31.]

ACHTUNG

Sollte während der Phase 3 des DLU-Prozesses eine Unterbrechung der Stromversorgung eintreten, kann das Firmwareprogramm zerstört werden. Aus diesem Grunde wird dringend empfohlen, Vorkehrungen zu treffen, daß während der Durchführung dieser Phase 3 die Systemeinheit weder ausgeschaltet noch die Stromversorgung unterbrochen werden kann.

ATTENTION

L'image du microprogramme risque d'être corrompue, en cas de coupure de courant au cours de l'étape 3 du processus DLU. Ne mettez pas l'unité hors tension et n'exécutez aucune action risquant d'entraîner une coupure d'alimentation au cours de cette étape.

PRECAUCIÓN

Si se interrumpe el suministro eléctrico durante la Etapa 3 del proceso DLU, puede dañarse la imagen del firmware. No se debe apagar la unidad ni realizar ninguna operación que pueda causar una interrupción del suministro de la unidad durante la Etapa 3 del mencionado proceso.

Introduction

The DECrepeater 900FP (also referred to in this manual as the module) is a 12-port, 10BaseFL, fiber-optic, Ethernet repeater.

In this manual, the term 10BaseFL refers to the International Standards Organization (ISO) 8802-3/ANSI/IEEE 802.3 fiber-optic local area network (LAN) standards.

In this manual, the term Ethernet is Digital's term for its product compatibility with the ISO 8802-3/ANSI/IEEE 802.3 standards and the Ethernet standards for Carrier Sense Multiple Access with Collision Detection (CSMA/CD) LANs.

To give your workgroup LAN media flexibility and connectivity, the module can be configured into a DEChub 900 MultiSwitch (also referred to in this manual as the DEChub 900). One or more DECrepeater 900FP modules (up to 8) can be installed into the DEChub 900. The module can also serve as a standalone unit when configured with a DEChub ONE docking station (see the *DEChub ONE Installation* manual).

When the module is installed into a DEChub 900 or into a DEChub ONE, the module's hot-swap capability allows you to install or remove the module without turning off power.

The front panel of the DECrepeater 900FP provides 12 fiber-optic ports that can operate on one LAN or can operate as (up to) 6 separate port pairs. The port pairs can be assigned independently to any of six backplane LANs. In addition, using HUBwatch, you can assign the port pairs as redundant links to other devices.

The front panel also contains light-emitting diodes (LEDs) that indicate the status of the module, the ports, and the network.

Features

Your DECrepeater 900FP module includes the following features:








- Access to ThinWire 10Base2 segment in the DEChub 900 MultiSwitch or to the AUI port in the DEChub ONE docking station that is also assignable to any LAN that is mapped to a fiber-optic port.
- Backplane access to multiple LANs through one of six flexible channels in the DEChub 900.
- Automatic module self-test at powerup.
- Port-level packet address security.

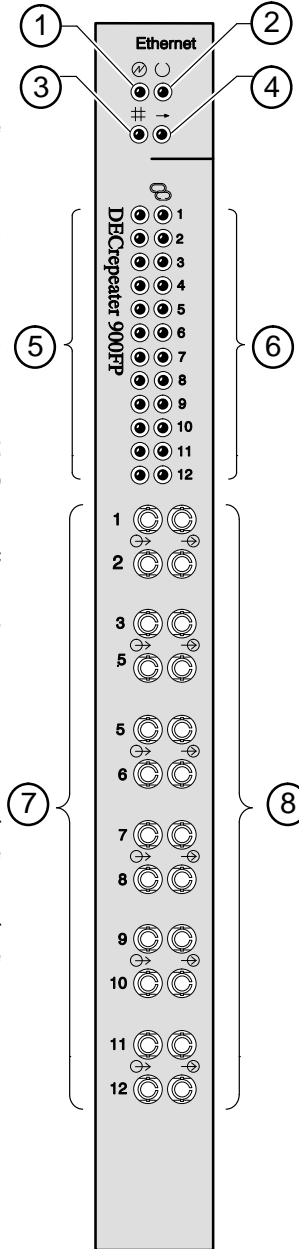
Introduction (Cont.)

Features (Cont.)

- In-band Simple Network Management Protocol (SNMP) management.
- Out-of-band management (OBM) using SNMP over Serial Line Internet Protocol (SLIP) through the OBM connector on the DEChub 900 or DEChub ONE docking station in addition to normal in-band management.
- Built-in SNMP agent supports the following management information bases (MIBs):
 - Internet Engineering Task Force (IETF) Repeater MIB (RFC 1516)
 - Ethernet-like Interface Type MIB (RFC 1398)
 - Digital Extended Repeater MIB
 - DEChub 900 Public Common MIB
 - MIB II (RFC 1213)
- Manageability using any generic SNMP management application that supports the MIBs listed above.
- Upgradeable device firmware (in nonvolatile Flash memory) using Trivial File Transfer Protocol (TFTP) with Digital's Network Device Upgrade (DECndu) Plus utility or through the setup port with any TFTP server.
- User-friendly advanced Graphical User Interface (GUI) manageability with Digital's HUBwatch Network Management Station (NMS) application.

Front Panel

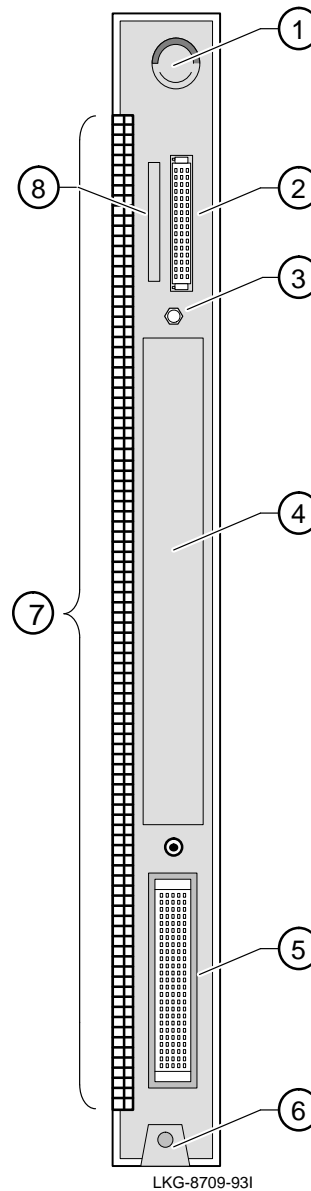
- 1) **Power**  **LED** — Lights when the module has power.
 - 2) **Module OK**  **LED** — Lights when the module passes self-test. If the module fails self-test, the Module OK  LED remains off.
 - 3) **Network OK #** **LED** — Indicates status of the backplane ThinWire port on the DEChub 900 or of the AUI port on the DEChub ONE docking station.
 - 4) **Network Activity**  **LED** — Indicates network traffic level of the backplane ThinWire port on the DEChub 900 or the AUI port on the DEChub One.
 - 5) **Port State LEDs** — The LEDs (labeled 1 through 12 show the attachment status of the associated port to a LAN.
 - 6) **Port Link**  **LEDs** — Light when the fiber-optic cables of the associated port are properly connected to a functional remote fiber-optic device, and traffic is present.
- NOTE:** Refer to the section titled LED Descriptions for more information about LED operation.
- 7) **Fiber-optic TX**  **port ST-type connectors** — Connect fiber-optic cables to the receive ports of the remote fiber-optic device.
 - 8) **Fiber-optic RX**  **port ST-type connectors** — Connect fiber-optic cables to the transmit ports of the remote fiber-optic device.



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Back Panel

- 1) **Locking tab** — Locks the module into a DEChub 900 backplane or into a DEChub ONE docking station. It also contains the hot-swap switch lever.
- 2) **48-pin connector** — Provides network and power connections to the module when the module is installed into a DEChub 900 or DEChub ONE docking station.
- 3) **Grounding bolt** — Provides a chassis grounding connection between the module and a DEChub 900 or a DEChub ONE docking station.
- 4) **Manufacturing label** — Lists the module part number, serial number, revision level, and power requirements.
- 5) **160-pin connector** — Provides network and power connections to the module when the module is installed into a DEChub 900 or a DEChub ONE docking station.
- 6) **Mounting tab** — Secures the module to the backplane when the module is installed into a DEChub 900 or a DEChub ONE docking station.
- 7) **Grounding fingers** — Provide additional chassis grounding between the module and a DEChub 900 or DEChub ONE docking station.
- 8) **Address label** — Contains the module's 48-bit Ethernet hardware address.

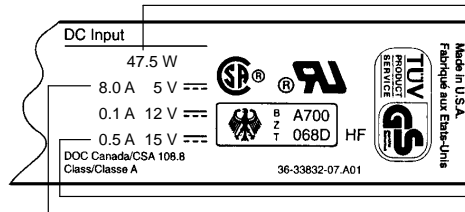


Installing the Module

The DECrepeater 900FP hot-swap feature allows you to install the module into the DEChub 900 or DEChub ONE without turning off power. Seating the module initiates the powerup sequence if enough power is available.

- 1 Compare your module's power requirements with the values shown in the Hub Manager status display (see examples).

Module's Manufacturing Label (Example)



If any of the module's power requirements exceed the values shown in the status display, add another power supply (see the *DEChub 900 MultiSwitch Owner's Manual*).

Hub Manager Status Display (Example)

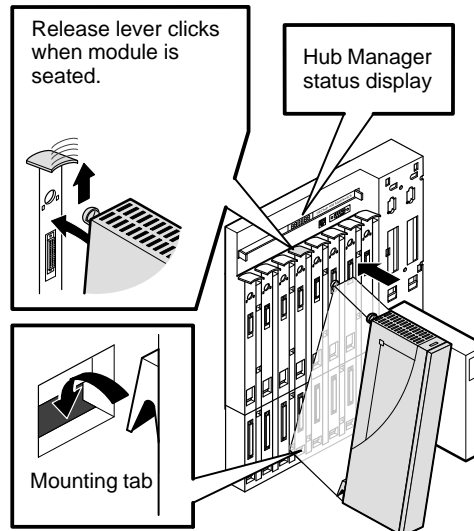
Available: 90.5 W
5V: 13.0 A, 15V: 3.5 A

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NOTE: The 12-volt power in the DEChub 900 is derived from the 15-volt power source. Although it is listed separately in the product specifications, the 12-volt requirements are included in the 15-volt power total.



- 2 Seat the module into the DEChub 900.



- a. Place the module's mounting tab into a mounting slot on the DEChub 900.
- b. Pivot the module on the mounting tab and align the connectors.
- c. Firmly push the module onto the backplane connectors until the release lever clicks.
- d. Press down on the release lever to ensure that it is locked.



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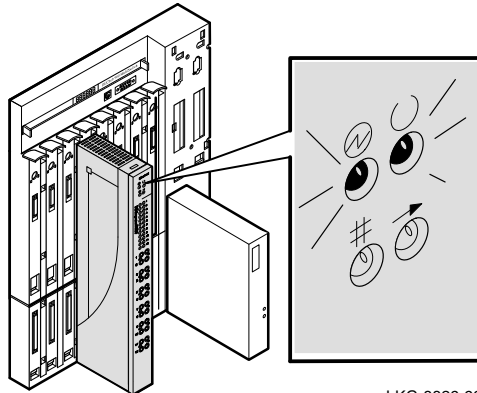
Installing the Module (Cont.)

3 Verify that the module's Power  LED lights immediately and that the Module OK  LED lights within 1 minute.

- a. The Power  LED lights when power is applied, then the module performs a self-test.
- b. After the module completes self-test, the Module OK  LED lights and remains lit, then the Hub Manager status display shows:

DECrepeater 900FP
up.

NOTE: If the LEDs do not operate as described, refer to the section titled Problem Solving Using the LEDs.



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Installing the Module (Cont.)

4 Determine the fiber-optic port configuration

Before connecting the fiber-optic cables, determine whether the ports are to be configured as (up to) six redundant pairs or as separate independent ports. The default configuration is separate independent ports.

Refer to the section titled Redundant Fiber-Optic Link Configuration for more information. (Refer also to *HUBwatch Online Help*.)

If you are configuring the fiber-optic ports as:

- Redundant pairs, go to step 5.
 - Separate independent ports, go to step 6.
-

5 Connect the fiber-optic cables for redundancy

NOTE: You must configure the ports using HUBwatch before connecting the cables. Failure to do so can create a LAN loop which could bring down that segment of the network.


- a. Select the module and ports to use as the master and the modules and ports to use as the responders or non-responders.
- b. Using HUBwatch, assign the master ports and the responder ports.
- c. Following the procedure in step 6, connect the master's primary port cables to the master's primary port.
- d. Connect the other end of those cables to the remote primary port.
- e. Connect the master's secondary port cables to the master's secondary port.
- f. Connect the other end of those cables to the remote secondary port.

After all cables are installed, go to the section titled Configuring the Module.



Installing the Module (Cont.)

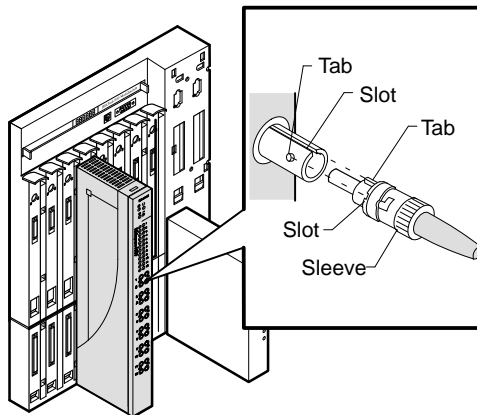
6 Connect the fiber-optic cables.

If your site is prewired, the fiber-optic cables are labeled with information on size and attenuation characteristics. Digital recommends that you use 62.5/125-micron multimode graded index fiber-optic cable with the DECrepeater 900FP. If the fiber-optic cables that you are using are not the recommended size, refer to the section titled Fiber-Optic Loss Budget for more information.

WARNING  Some fiber-optic equipment can emit laser or infrared light that can injure your eyes. Never look into an optical-fiber or connector port. Always assume the cable is connected to a light source.

NOTE: To prevent damage to the cables, avoid making sharp bends and kinks.

- a. Remove the dust caps from the ST-type connectors on the ports that you are connecting.
- b. Align the tab and slot of the transmit cable plug with the slot and tab of the transmit port connector (labeled ).
- c. Insert the plug, then push the plug sleeve in and turn it to the right, locking it into place.
- d. Connect the receive cable, in the same way, to the receive port connector (labeled ).




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NOTE: To disconnect the cables, push the plug's sleeve in and turn it to the left, then disconnect the cable.

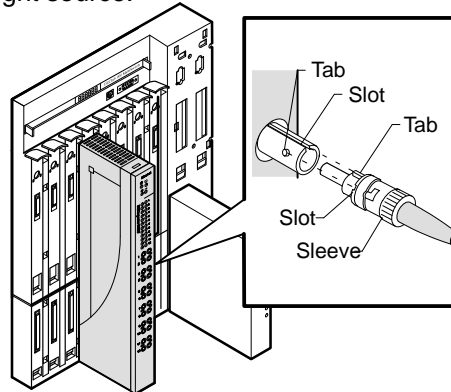
After all cables are installed, go to the section titled Configuring the Module.

Removing the Module

WARNING  Some fiber-optic equipment can emit laser or infrared light that can injure your eyes. Never look into an optical-fiber or connector port. Always assume the cable is connected to a light source.

1 Disconnect all the cables from the module.

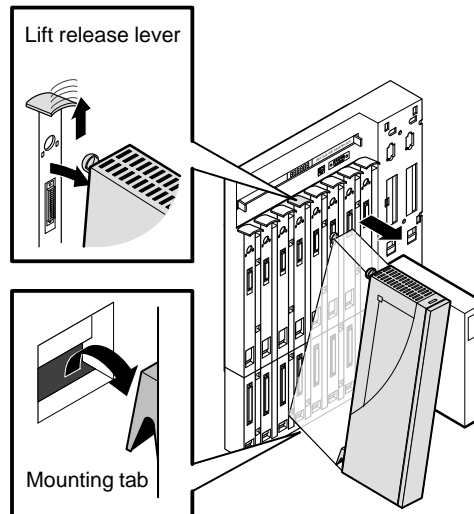
- a. To disconnect the cables, push the plug's sleeve in and turn it to the left.
- b. Disconnect the cable.



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2 Unseat the module from the DEChub 900.

- a. Lift the release lever located on the top of the DEChub 900 slot.
- b. Pivot the module back on its bottom mounting tab, and disengage the module from the backplane.



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Configuring the Module

Setup Port Description

The setup port (on the DEChub 900 MultiSwitch or the DEChub ONE docking station) allows you to access and set DECrepeater 900FP parameters. This section describes how to access the module from either port and how to set those parameters.

NOTE: The setup port screen displays illustrated in this manual may vary slightly from the actual screen displays on your setup port device.

The signals from the DEChub 900 Hub Manager setup port and from the DEChub ONE docking station setup port conform to the EIA-232D signaling standard at 9600 baud. To the user, the port appears as a data terminal equipment (DTE) device.

NOTE: Devices that use the EIA-423 signaling standard are compatible with the DEChub 900 Hub Manager setup port.

Setup Port Device Cabling

The setup port on the DEChub 900 MultiSwitch or the DEChub ONE docking station can be connected to a setup port device (a terminal or personal computer), using the following cables and adapters.

Cable/Adapter Type	Connecting Device
BN24H-xx ¹	A terminal with a 6-pin MMJ connector
BN24H-xx ¹ /H8575-A	A terminal with a 25-pin D-Sub connector
BN24H-xx ¹ /H8571-J	A PC with a 9-pin D-Sub communications port

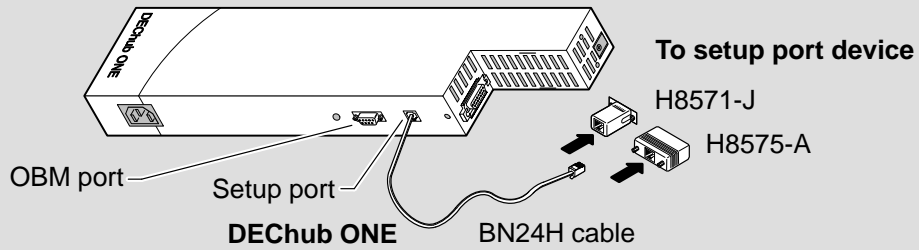
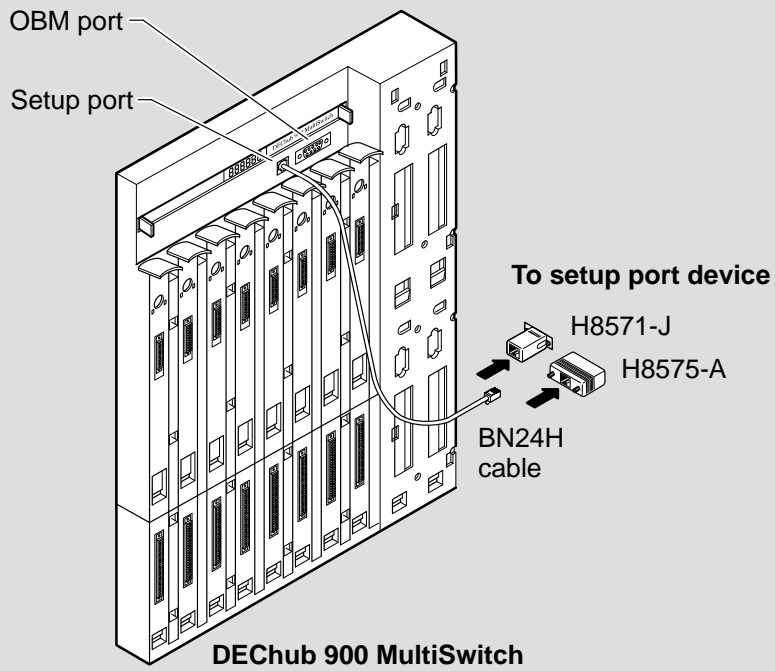
¹ xx indicates cable length in meters.

Accessing the Setup Port

To access the setup port on the DECrepeater 900FP module, do the following:

1. Ensure that the transmit and receive baud rates on the setup port device are set to 9600 baud.
2. Connect the setup port device to the setup port connector on either the DEChub 900 or the DEChub ONE docking station (see illustration).

Configuring the Module (Cont.)



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Configuring the Module (Cont.)

3. Press **Return** on the setup port device a few times until a menu appears.
 - a. If the module is connected to the setup port on the DEChub ONE docking station, the DECrepeater 900FP INSTALLATION MENU appears. Go to the section titled DECrepeater 900FP Installation Menu (DEChub ONE Options).
 - b. If the setup port device is connected to the Hub Manager setup port on the DEChub 900, the DEChub 900 MultiSwitch INSTALLATION MENU appears (see following example).

The following is an example of the DEChub 900 MultiSwitch INSTALLATION MENU:

```
DEChub 900 MultiSwitch
=====
DEChub 900 MultiSwitch INSTALLATION MENU

[1] Reset with Factory Defaults
[2] Reset with Current Settings
[3] Show Current Settings
[4] Set SNMP Read/Write Community
[5] Add SNMP Trap Addresses
[6] Delete SNMP Trap Addresses
[7] Dump Error Log
[8] Set In-Band Interface IP Address
[9] Downline Upgrade
[10] Set Out-of-Band Interface IP Address
[11] Set Out-of-Band Interface Port Speed
[12] Start Event Display Mode
[13] Start Redirect Mode
```

Enter selection : **13** **Return**

Choose option 13, then go to the section titled Start Redirect Mode.

The DECrepeater 900FP does not support Option [9] Downline Upgrade from this menu. You must choose Option [13] Start Redirect Mode to perform a downline upgrade to this module.

- c. Choose option 13, then go to the section titled Start Redirect Mode.

Configuring the Module (Cont.)

Start Redirect Mode

The `Start Redirect Mode` option redirects the DEChub 900 Hub Manager setup port to the setup port of any network module that supports this function (such as the DECrepeater 900FP) that is installed into the DEChub 900. Choosing this option allows you to configure or obtain status of an installed network module by accessing the specified network module's installation menu.

After you choose the `Start Redirect Mode` option from the DEChub 900 MultiSwitch INSTALLATION MENU, the screen prompts you for a slot number as shown in the following example.

The following example shows how to select a slot number (user response is shown in **boldface type**):

```
Enter selection: 13
=====
Enter the slot number for redirection (1-8): 3 
Setup port redirected to 3: DECrepeater 900FP
Attempting to connect ...
=====
Connection successful!
```

Enter the number of the slot where the module is installed.

After you press , the DECrepeater 900FP INSTALLATION MENU appears on your screen. Go to the section titled DECrepeater 900FP Installation Menu (DEChub 900 Options).

Configuring the Module (Cont.)

DECRepeater Installation Menu (DEChub ONE Options)

This section shows the options available from the DECRepeater 900FP INSTALLATION MENU when the module is installed into the DEChub ONE docking station.

The following is an example of the DECRepeater 900FP INSTALLATION MENU:

```
DECRepeater 900FP
=====
      DECRepeater 900FP INSTALLATION MENU

[1]  Reset with Factory Defaults
[2]  Reset with Current Settings
[3]  Show Current Settings
[4]  Set SNMP Read/Write Community
[5]  Add SNMP Trap Addresses
[6]  Delete SNMP Trap Addresses
[7]  Dump Error Log
[8]  Set In-Band Interface IP Address
[9]  Set In-Band Interface Default Gateway Address
[10] Downline Upgrade
[11] Set Out-of-Band Management (OBM)Interface IP Address
[12] Set Out-of-Band Management (OBM) Port Speed

-----
Enter selection : 1 
```

Choose an option, then go to the section titled Description of Menu Options.

If you need to assign an IP address to the module, choose this option.

Configuring the Module (Cont.)

DECRepeater Installation Menu (DEChub 900 Options)

This section shows the options available from the DECRepeater 900FP INSTALLATION MENU when the module is installed into the DEChub 900.

The following is an example of the DECRepeater 900FP INSTALLATION MENU:

```
DECRepeater 900FP slot 3
=====
DECRepeater 900FP INSTALLATION MENU

[1] Reset with Factory Defaults
[2] Reset with Current Settings
[3] Show Current Settings
[4] Set SNMP Read/Write Community
[5] Add SNMP Trap Addresses
[6] Delete SNMP Trap Addresses
[7] Dump Error Log
[8] Set In-Band Interface IP Address
[9] Set In-Band Interface Default Gateway Address
[10] Downline Upgrade

[Ctrl/C] Return to DEChub 900 MultiSwitch INSTALLATION MENU
=====
Enter selection : 1 Return
```

Indicates the DEChub 900 slot number where the module is installed.

Choose an option, then go to the section titled Description of Menu Options.

If you need to assign an IP address to the module, choose this option.

Configuring the Module (Cont.)

Description of Menu Options

This section describes the menu options that are available from the `DECRepeater 900FP INSTALLATION MENU`. Note that the out-of-band menu options apply to the module only when it is in standalone mode (configured in a `DEChub ONE` docking station).

[1] Reset with Factory Defaults

This option resets the module, causing **most** of the module's configured NVRAM parameters to be initialized to factory default values.

Following are some examples of the module's configured NVRAM parameters that are reset to factory defaults:


- SNMP read/write community — this name is reset to `PUBLIC`.
- SNMP trap addresses —all SNMP trap addresses are deleted.
- In-band interface IP address — this address is deleted.
- In-band interface default gateway address — this address is deleted.
- Out-of-band interface IP address — this address is deleted.
- Out-of-band interface port speed — reset to 9600.

Following are the **only** parameters that are **not** reset:

- Serial number
- Reset count
- Error log data

Configuring the Module (Cont.)

[1] Reset with Factory Defaults (Cont.)

CAUTION  This action deletes all configured settings and replaces them with factory default values. All configuration settings will be lost.

NOTE: Allow approximately 1 minute for the module to reset and complete self-test.

The following is an example of the dialog associated with this option (user response is shown in **boldface type**):

```
Enter selection : 1
DECrepeater 900FP - slot 3
=====
                        RESET WITH FACTORY DEFAULTS
* * * * *
*   IMPORTANT!           IMPORTANT!           IMPORTANT!   *
* * * * *
* This selection will delete the current configuration      *
* settings and reset the system with the factory default   *
* settings. All configuration settings will be lost.       *
* * * * *
=====

Press Y to confirm [N] : Return
Press Return for Main Menu ...
```

Configuring the Module (Cont.)

[2] Reset with Current Settings

This option resets the module but leaves the module's configured NVRAM parameters at their current values.

NOTE: Allow approximately 1 minute for the module to reset and complete self-test.

The following is an example of the dialog associated with this option (user response is shown in **boldface type**):

```
Enter selection : 2
DECrepeater 900FP - slot 3
=====:

                RESET WITH CURRENT SETTINGS

This selection will reset your system with the
current configuration settings.

=====:

Press Y to confirm [N] : Return
Press Return for Main Menu ...
```

Configuring the Module (Cont.)

[3] Show Current Settings

This option shows the module's current settings.

NOTE: If the module is being configured for the first time, some fields will be blank.

The following is an example of the display associated with this option:

```
Enter selection : 3
DECrepeater 900FP - slot 3
=====
DECrepeater 900FP, 12 port FO Ethernet Rptr SNMP, HW=v1,RO=v1,SW=v1.1
SysUpTime           : 01:39:11    14 resets
SNMP Read/Write Community : public
SNMP Trap Addresses  : Not Configured
Status of Last Downline Upgrade : No Status
                                00:00:44  28 resets
In-Band Interface Hardware Address : 08-00-2B-A3-4C-70
In-Band Interface IP Address       : 16.20.216.181
In-Band Interface Default Gateway Address : Not Configured
SNMP Port Traps                : Enabled
=====
Press Return for Main Menu ...
```

Configuring the Module (Cont.)

[4] Set SNMP Read/Write Community

This option prompts you to enter the module's read/write community name.

The format for a community name is a string consisting of 4 to 31 printable ASCII characters. This community name can be used by SNMP managers for read/write access control.

The following is an example of an SNMP read/write community name: `kathy1965`

The following is an example of the dialog associated with this option (user response is shown in **boldface type**):

```
Enter selection : 4
DECrepeater 900FP - slot 3
=====
                SET SNMP READ/WRITE COMMUNITY

Format: The format for a community name is a string,
        consisting of four to thirty-one printable ASCII
        characters, that describes the relationship between an
        SNMP agent and one or more SNMP managers. The string
        defines the authentication mechanism that is employed
        to validate the use of the community by the sending
        SNMP entity.
=====

Enter the community string [public] : kathy1965 
                SNMP Read/Write community string set.

                Press Return for Main Menu ...
```

Configuring the Module (Cont.)

[5] Add SNMP Trap Addresses

This option prompts you to enter IP addresses to which SNMP traps will be sent from the DECrepeater 900FP module.

The format for an SNMP trap address is the standard 4-octet dotted decimal notation, where each octet of the address is represented as a decimal value, separated by a decimal point (.).

The following is an example of an SNMP trap address: 16.20.54.156

The following is an example of the dialog associated with this option (user response is shown in **boldface type**):

```
Enter selection : 5
DECrepeater 900FP - slot 3
=====
      ADD SNMP TRAP ADDRESSES

Format: The standard 4 octet dotted decimal notation in which
        each octet of the address is represented as a decimal
        value, separated by a '.' character.

        example: 16.20.54.156

=====
Configured SNMP Trap Addresses: 16.20.216.81
Trap address [ ] : 16.20.54.156 Return
Trap address added! Add another? [none] : Return
      Press Return for Main Menu ...
```

Enter the SNMP trap address that you have chosen, then press Return.

Appears only if the module has been previously configured.

Configuring the Module (Cont.)

[6] Delete SNMP Trap Addresses

This option prompts you to select SNMP trap addresses for deletion.

The format for an SNMP trap address is the standard 4-octet dotted decimal notation, where each octet of the address is represented as a decimal value, separated by a decimal point (.).

The following is an example of an SNMP trap address: 16.20.54.156

The following is an example of the dialog associated with this option (user response is shown in **boldface type**):

```
Enter selection : 6
DECrepeater 900FP - slot 3
=====
          DELETE SNMP TRAP ADDRESSES
Format: The standard 4 octet dotted decimal notation in which
        each octet of the address is represented as a decimal
        value, separated by a '.' character.
        example: 16.20.40.156
=====
Configured SNMP Trap Addresses: 16.20.216.81
        Trap address [ ] : 16.20.216.81 
        Trap address deleted. Delete another? [ ] : 
        Press Return for Main Menu ...
```

Enter the SNMP trap address that you have chosen for deletion, then press Return.

Appears only if the module has been previously configured.

Configuring the Module (Cont.)

[7] Dump Error Log

This option displays error log dumps for use by Digital support personnel when analyzing system faults. Up to four error log dumps can be stored, and the most recent dump is displayed first.

The following is an example of the display associated with this option:

```
Enter selection : 7
DECrepeater 900FP - slot 3
=====
                DUMP ERROR LOG
            CURRENT RESET COUNT: 14
=====
Entry #      = 3
Timestamp    =  0  0  791
Reset Count  = 13
Trap @315 in console_cfg.c   Backplane clock failure
Dump another entry Y/[N]? N 
=====
No more Error Log entries.

                Press Return for Main Menu ...
```

Configuring the Module (Cont.)

[8] Set In-Band Interface IP Address

This option prompts you to enter the module's IP address.

The format for an IP address is the standard 4-octet dotted decimal notation, where each octet of the address is represented as a decimal value, separated by a decimal point (.).

The following is an example of an IP address: 16.20.54.156

The following is an example of the dialog associated with this option (user response is shown in **boldface type**):

```
Enter selection : 8
DECrepeater 900FP - slot 3
=====
          SET IN-BAND INTERFACE IP ADDRESS
Format: The standard 4 octet dotted decimal notation in which
        each octet of the address is represented as a decimal
        value, separated by a '.' character.
        example: 16.20.40.156
To delete the IP address, enter 0 in the appropriate
address field.
=====
IP address [16.20.216.179] : 16.20.54.156 
          IP Address set
          Press Return for Main Menu ...
```

This cell data represents a previously set IP address. During the initial setup, this cell default will appear as [].

Enter the module's IP address, then press Return.

Configuring the Module (Cont.)

[9] Set In-Band Interface Default Gateway Address

This option prompts you for a default gateway IP address. The default gateway address is needed only to deliver traps to a management station that is not on the local subnet.

NOTE: The module does **not** need to be configured with a subnet mask for SNMP communications with a management station that is located on any subnet in the IP network.

The following is an example of a default gateway IP address: 16.07.80.156

The following is an example of the dialog associated with this option (user response is shown in **boldface type**):

```
Enter selection : 9
DECrepeater 900FP - slot 3
=====
SET IN-BAND INTERFACE DEFAULT GATEWAY ADDRESS
Format: The standard 4 octet dotted decimal notation in which
each octet of the address is represented as a decimal
value, separated by a '.' character.
example: 16.20.40.156
To delete the IP address, enter 0 in the appropriate
address field.
=====
Default Gateway address [] : 16.07.80.156 
Default Gateway Address set
Press Return for Main Menu ...
```

Enter the module's default gateway IP address, then press Return.

Configuring the Module (Cont.)

[10] Downline Upgrade

This option allows you to upgrade the module firmware (in nonvolatile Flash memory). It prompts you to enter the load image file name and the IP address of your Trivial File Transfer Protocol (TFTP) load host.

Before initiating this option, be sure that the module that you are upgrading has been configured with an IP address. If the module is not configured with an IP address, select the `Set In-Band Interface IP Address` option (option [8]) from the `DECrepeater 900FP INSTALLATION MENU` to set an IP address.

Do not use the DEChub 900 MultiSwitch Hub Manager's IP address to upgrade the DECrepeater 900FP.

NOTE: The module's IP address is retained at the completion of the downline upgrade.


The following is an example of an image file name and an IP address:

`defmm110.bin` and `16.20.54.156`

When the screen prompts you to `Enter the Load Filename`, do the following:

- If the file is located in the default TFTP directory, enter only the filename.
- If the file is **not** located in the default TFTP directory, enter the complete pathname along with the filename.

The format of the firmware image load filename is specified according to the conventions used by your TFTP load host.

CAUTION  If power is interrupted during Stage 3 of the DLU process, the firmware image can become corrupted. Do not turn off power to the unit or perform any action that can cause the unit to lose power during Stage 3 of the DLU process.

The Downline Upgrade (DLU) Process

The DLU process consists of four stages:





- Stage 1 — Transferring Firmware Image
- Stage 2 — Verifying Firmware Image
- Stage 3 — Writing New Firmware Image into Nonvolatile Storage
- Stage 4 — Module Reset and Self-Test

The following table explains what happens during each stage of the DLU process:

Configuring the Module (Cont.)

[10] Downline Upgrade (Cont.)






Table 1 DLU Process Description

Stage	What Happens
1	<p>The new firmware image from the TFTP load host is transported across the network, and placed into a temporary storage buffer in the module.</p> <p>Indications that this stage is in progress include:</p> <ul style="list-style-type: none">• Module status — functional, but not manageable.• Module cannot respond to management requests.• LED display — the Power  LED remains on. The Module OK  LED and the Network OK  LED turn off. The #2 Port State LED lights.• HUB Manager display — DECrepeater 900FP unknown• Typical time to complete this stage — normally 1 minute. However, due to variances in network configurations (load path, bit rate, and traffic levels), this stage of the DLU process can take up to 10 minutes to complete.
2	<p>The module verifies that the firmware image is correct after Stage 1 is complete.</p> <p>Indications that this stage is in progress include:</p> <ul style="list-style-type: none">• Module status — functional, but not manageable.• Module cannot respond to management requests.• LED display — The Power  LED remains on. The #2 Port State LED turns off. The #3 Port State LED lights.• HUB Manager display — DECrepeater 900FP unknown• Typical time to complete this stage — normally 5 seconds. <p>(continued on next page)</p>

Configuring the Module (Cont.)

[10] Downline Upgrade (Cont.)

Table 1 (Cont.) DLU Process Description

Stage	What Happens
3	<p>The new firmware image is transferred from the module's temporary storage buffer to the Flash RAM, overwriting the old firmware image.</p> <p>CAUTION  If power is interrupted during Stage 3 of the DLU process, the firmware image can become corrupted. Do not turn off power to the unit or perform any action that can cause the unit to lose power during Stage 3 of the DLU process.</p> <p>Indications that this stage is in progress include:</p> <ul style="list-style-type: none">• Module status — functional, but not manageable.• Module cannot respond to management requests.• LED display — the Power  LED remains on. The # 3 Port State LED turns off. The #4 Port State LED lights.• HUB Manager display — DECrepeater 900FP unknown• Typical time to complete this stage — normally 30 seconds.
4	<p>The module resets, runs self-test, and then begins executing the new firmware image.</p> <p>Indications that this stage is in progress include:</p> <ul style="list-style-type: none">• Module status — not functional during reset and self-test.• Module cannot respond to management requests.• LED display — the Power  LED remains on. The #4 Port State LED turns off. The #5 Port State LED lights. All LEDs light momentarily. Then, all, except the Power  LED, turn off.• HUB Manager display — DECrepeater 900FP unknown• Typical time to complete this stage — normally 1 minute. <p>After the successful completion of self-test, the Module OK  LED turns on and the module becomes fully operational and manageable. Note also that the HUB Manager display indicates:</p> <p>DECrepeater 900FP up</p>

Configuring the Module (Cont.)

[10] Downline Upgrade (Cont.)

The following section explains how to use the DLU process. An expanded example of the setup screen display follows the description.

Using the DLU Process

Before initiating this option, be sure that the module that you are upgrading has been configured with an IP address. If the module is not configured with an IP address, select the `Set In-Band Interface IP Address` option (option [8]) from the `DECrepeater 900FP INSTALLATION MENU` to set an IP address.

Do not use the `DEChub 900 MultiSwitch Hub Manager's` IP address to upgrade the `DECrepeater 900FP`.

When you select the `Downline Upgrade` option (option [10]) from the `DECrepeater 900FP INSTALLATION MENU`, the initial setup screen display appears (see the following example display). This screen identifies the option and alerts users not to interrupt power during the downline load.

```
Enter selection : 10
DECrepeater 900FP

=====
                        DOWNLINE UPGRADE

This process upgrades the device's firmware (in
nonvolatile Flash memory). Enter the IP address of
your TFTP (Trivial File Transfer Protocol) load host
and the image file name when prompted.

* * * * *
*   IMPORTANT!           IMPORTANT!           IMPORTANT!   *
* * * * *
* If power is interrupted during the downline load, the   *
* firmware image can be corrupted. Do not turn off power  *
* to the unit or perform any action that can cause the   *
* unit to lose power during a downline upgrade.          *
* * * * *

=====

... Press Return Key to Continue ...
```

Configuring the Module (Cont.)

[10] Downline Upgrade (Cont.)

When you press , the screen prompts you to Enter the Load Filename. Do the following:

- If the file is located in the default TFTP directory, enter only the filename.
- If the file is **not** located in the default TFTP directory, enter the complete pathname along with the filename.

The following example shows the dialog associated with this option using a file that is located in the default directory (user response is shown in **boldface type**):

```
Enter the Load Filename [] defmm110.bin 
```

After you enter the firmware image load filename and press , the screen prompts you to enter the IP address of the TFTP server (load host):

```
Enter the Load Host IP Address [] :16.20.54.156 
```

After you enter the load host IP address, the following screen and dialog appear:

```
Load will be initiated over the Ethernet Port network
interface.
The device becomes nonfunctional for up to 10 minutes
during the time that the flash load is in progress.
When the load is complete the screen displays the message:
(Device Not Responding!) This is normal.
... Press Return Key to Start Load [Ctrl/C to abort]...
```

NOTE: The DECrepeater 900FP is nonfunctional only during reset and self-test (about 1 minute of Stage 4) of the DLU process. During the first three stages of the process, the module continues to function as a repeater.

When you press , the DLU process is initiated over the Ethernet port network interface.


Configuring the Module (Cont.)

[10] Downline Upgrade (Cont.)

After you initiate the DLU process, the screen displays the following message:

```
DLU process started!
```

NOTE: Because of variances in network configurations (load path and traffic levels), this initial stage of the DLU process can take up to 10 minutes to complete.

CAUTION  If power is interrupted during Stage 3 of the DLU process, the firmware image can become corrupted. Do not turn off power to the unit or perform any action that can cause the unit to lose power during Stage 3 of the DLU process.

If your module is installed into a DEChub ONE, go to the section titled DLU Process Completion.

If your module is installed into a DEChub 900, the screen displays the following message:

```
Module not responding! Connection closed!
```

This is normal.

The Hub Manager status display indicates the following:

Hub Manager Status Display


```
4: DECrepeater 900FP  
unknown
```

The Hub Manager status display continues to display this message until the DLU process is complete. This is normal.

Configuring the Module (Cont.)

[10] Downline Upgrade (Cont.)

DLU Process Completion

When the DLU process is complete, the module resets and initiates self-test. After self-test completes successfully, the module exits from the DLU process and begins the execution of the new firmware image. The Module OK  LED turns on and the module becomes fully operational.

The screen displays one of the following:

- If the module is installed into a DEChub ONE docking station, the screen displays the DECrepeater 900FP INSTALLATION MENU.
- If the module is installed into a DEChub 900, the screen displays the following message:

```
Press Return for Main Menu ...
```

When you press , the screen displays the DECrepeater 900FP INSTALLATION MENU.

Configuring the Module (Cont.)

[10] Downline Upgrade (Cont.)

The following illustration shows an (expanded) example of the setup screen displays:

```
=====
Enter the Load Filename [ ] : defmm110.bin
Enter the Load Host IP Address [ ] : 16.20.54.156

Load will be initiated over the In-Band network interface.

The device becomes nonfunctional for up to 10 minutes during
the time that the flash load is in progress.

When the load is complete the screen displays the message:
(Device Not Responding!) This is normal.

... Press Return Key to Start Load [Ctrl/C to abort]...

DLU process started!

Module Not Responding! Connection closed!

=====
Press Return for Main Menu ...
```

Module communications suspended during load process. This is normal.

Enter the firmware image load filename, then press Return.

Indicates that the downline upgrade loading process has been initiated.

Enter the IP address of the TFTP server, then press Return.

The module is nonfunctional only during reset and self-test (about 1 minute of Stage 4) of the DLU process. During the first three stages of the process, the module continues to function as a repeater.

Configuring the Module (Cont.)

[11] Set Out-of-Band Management (OBM) Interface IP Address

NOTE: This selection is operational only when the module is in standalone mode (for example, when it is installed into a DEChub ONE docking station).

This option prompts you to enter the IP address of your out-of-band management interface.

This option allows you to manage your module through the OBM port located on the DEChub ONE docking station. You can enable out-of-band management in addition to normal in-band management. To enable out-of-band management, you need to assign an OBM IP address (use this option [11]) and select an OBM port speed (use option [12]) from the DECrepeater 900FP INSTALLATION MENU. See *DEChub ONE Installation* for OBM cabling information.

The following is an example of the dialog associated with this option (user response is shown in **boldface type**):

```
Enter selection : 11
DECrepeater 900FP
=====
SET OUT-of-BAND MANAGEMENT (OBM) INTERFACE IP ADDRESS
Format: The standard 4 octet dotted decimal notation in which
       each octet of the address is represented as a decimal
       value, separated by a '.' character.

       example: 16.20.40.156

To delete the IP address, enter 0 in the appropriate
address field.

=====
IP address [none] : 16.20.54.156 Return
Press Return for Main Menu ...
```

Enter the module's OBM IP address, then press Return.

Configuring the Module (Cont.)

[12] Set Out-of-Band Management (OBM) Port Speed

NOTE: This selection is operational only when the module is installed into a DEChub ONE docking station.

This option prompts you to select and enter the speed of your out-of-band management (OBM) port.

NOTE: The port speed at each end of the communications link must be identical.

The following is an example of the dialog associated with this option (user response is shown in **boldface type**):

```
Enter selection : 12
DECrepeater 900FP
=====
          SET OUT-OF-BAND (OBM) PORT SPEED
          [1] 1200 baud
          [2] 2400 baud
          [3] 4800 baud
          [4] 9600 baud
          [5] 19200 baud
          [6] 38400 baud
=====
Enter selection [2] (9600) : 2 
OBM port speed set.
Press Return for Main Menu ...
```

The OBM port speed you select must match the speed of your OBM port device.





LED Descriptions

The module LEDs provide dynamic indications of module status.

Table 2 shows the static states that are possible for four of the module LEDs: Power, Module OK, Network OK, and Network Activity.

Table 3 shows the static states that are possible for the combination of the two Port LEDs: Port State and Port Link.

Table 2 Module LEDs


LED Name	Icon	Off	On	Flashing
Power		No power to the module.	Module receiving power.	Faulty power connection or insufficient power.
Module OK		After 1 minute, self-test failed.	Module passed self-test.	Fan failure.
Network OK		Module is not connected to a properly terminated and operational LAN through the ThinWire Ethernet port on the DEChub 900 or through the AUI port on the DEChub ONE.	Module is connected to a properly terminated and operational LAN through the ThinWire Ethernet port on the DEChub 900 or through the AUI port on the DEChub ONE.	Network connection is disabled by network management.
Network Activity		No network activity.	The network has heavy traffic. ¹	Flashes more rapidly and appears brighter as network traffic increases. ¹

¹ The Network Activity LED continues to indicate network traffic levels even when the port is disabled or partitioned.

LED Descriptions (Cont.)

Table 3 shows the static states that are possible for the combination of the two Port LEDs: Port State and Port Link.

Table 3 Port LEDs

Port State	Port Link 	Condition
Off	Off	Associated port connection is faulty. There is no link.
On	Off	Associated port is properly connected to another operational network device, but there is no network traffic.
On	On	Associated port is connected to another operational network device. The network has heavy traffic.
Off	Flashing	Associated port is auto-partitioned. The link is good. There is traffic on the network to which the associated port is connected, but traffic is not being received on that port. The Link LED flashes more rapidly and appears brighter as network traffic increases.
On	Flashing	Associated port is properly connected to another operational network device. The Link LED flashes more rapidly as network traffic increases.
Flashing	Off	Associated port is disabled by network management, or (if operating as a redundant pair) the associated port is operating as a standby port. There is no traffic on the network to which the associated port is connected.
Flashing	Flashing	Associated port is disabled by network management, or (if operating as a redundant pair) the associated port is operating as a standby port. There is traffic on the network to which the associated port is connected, but the traffic is not being transmitted on the associated port. The Link LED flashes more rapidly and appears brighter as network traffic increases.

Problem Solving Using the LEDs

When diagnosing a problem with the module, note that the problem is often indicated by the states of the module LEDs. Table 4 lists the states of the LEDs for various error conditions that can occur during initial installation of the device, along with probable causes and corrective actions to take.

Normal Power Up

When the module is initially powered up, the following events occur:







1. The Power  LED lights and stays on. All other LEDs light for a few seconds, then turn off. This verifies that the individual LEDs are operational (defective LEDs do not light).
2. The module initiates its built-in self-test.
3. After the successful completion of self-test (within one minute), the Module OK  LED turns on, and remains on.
4. The remaining LEDs indicate their operational status.

Table 4 Problem Solving Using the LEDs

Symptom	Icon	Probable Cause	Corrective Action
All LEDs are off.		The module does not have power.	<p>If installing the module into a DEChub 900, check the Hub Manager Status Display.</p> <p>If enough power is available, lift the release lever, and reseat the module.</p> <p>If installing the module into a DEChub ONE, ensure that the locking L-bracket screw is locked securely.</p> <p>Remove the module and inspect the module's 48-pin and 160-pin connectors for bent, broken, or dirty pins.</p> <p>If any pins are broken or bent, replace the module.</p> <p>(continued on next page)</p>

Problem Solving Using the LEDs (Cont.)

Table 4 (Cont.) Problem Solving Using the LEDs

Symptom	Icon	Probable Cause	Corrective Action
All LEDs are off.		The module does not have power.	If no pins are broken or bent, reinstall the module. If the problem persists, replace the module.
Power LED is off.		Faulty power LED.	Replace the module.
Power LED is flashing.		Faulty power LED. Faulty DEChub 900 slot connection. DEChub 900 or DEChub ONE power supply is faulty.	Replace the module. Reinstall the module into another slot. Replace the DEChub 900 power supply or the DEChub ONE.
Module OK LED is off.		Module does not have sufficient power. Self-test is in progress. Self-test failed.	Ensure Power LED is on. Wait up to 1 minute for self-test to complete. If the LED does not light after 1 minute, reseal the module to repeat the self-test. If self-test fails again, replace the module.
Module OK LED is flashing.		Fan is faulty.	Contact your Digital services representative to replace the fan.

(continued on next page)

Problem Solving Using the LEDs (Cont.)

Table 4 (Cont.) Problem Solving Using the LEDs

Symptom	Icon	Probable Cause	Corrective Action
Port State LED is off.		Associated port is not properly connected to another operational network device.	Properly connect the associated port to network or station. Reseat the cable. If problem persists, replace the cable.
		Associated port is auto-partitioned.	N/A.
Port State LED is flashing about once per second.		Associated port is disabled by network management.	Enable the associated port, if necessary.
		Associated port is operating as a standby port in a redundant pair configuration.	N/A.

Redundant Fiber-Optic Link Configuration

This section describes the configuration and implementation of a redundant-link pair (RLP) of Ethernet 10BaseFL links.

NOTE: You must configure the fiber-optic ports using HUBwatch before connecting the cables.

Redundant Fiber-Optic Link Overview

Redundant ports are usually configured between two or more repeaters to provide a standby link in case the active link fails. If the active link fails, the standby link is automatically activated to handle traffic between the repeaters.

The basic redundant configuration consists of a pair of master ports and two remote ports. The master ports control which of the two lines is active and which is standby, therefore, the master ports are referred to as a master pair.

The master ports can be connected to two remote ports on the same repeater or on different repeaters, but the remote ports must be on the same LAN (or extended LAN).

NOTE: This redundant configuration does not result in a repeater loop, because only one of the links is active.

The remote ports can be one of two types: a responder port or a non-responder port. A responder port provides full fault detection because it signals the master if it detects a failure in its receive link. A non-responder port provides only partial fault detection because it does not signal the master if a failure occurs in its receive link.

NOTE: DECrepeater 900FP and DECrepeater 90FS are the only DECrepeaters that can be configured as redundant port repeaters.

Redundant Fiber-Optic Link Components

The following components make up redundant fiber-optic link configurations:

Redundant Fiber-Optic Link Configuration (Cont.)

- **Redundant-Link Pair**

The RLP is a pair of fiber-optic links that provide backup communication in the event of transmitter, receiver, or cable failures.

- **Master**

The master is the DECrepeater that contains the master control algorithm (MCA) for the ports in the RLP. This algorithm controls the Link Enable signal that goes to each of two ports in the RLP. The master uses this signal to enable the primary port until a failure is detected through the Link Status signal. When a failure is detected, the MCA disables the primary port and enables the secondary port.

- **Responder Port**

The RLP can contain two responder ports (referred to as responders) on the remote end of the links from the master ports. The responders are independent of each other, but reside on the same LAN (or extended LAN) as the master. A responder can signal the master when it detects a failure on its receive portion of the link. The responder does this by disabling the Link Idle signal on its transmit port until the receive portion of the link is operational again.

- **Non-Responder Port**

Any standard 10BaseFL device ports can be non-responder ports (referred to as non-responders). Unlike a responder, a non-responder cannot signal the master when there are receive link failures on its end of the link. If you define an RLP with non-responders, only partial fault detection is provided on the RLP.

- **Primary Link**

Defined at initialization time by the MCA, the primary link is initially the active link providing Ethernet communications. Activity defaults to the primary link after a reset condition.

- **Secondary Link**

The secondary link is the other link of the RLP to which the master fails over if there is a failure in the primary link.

Redundant Fiber-Optic Link Configuration (Cont.)

- **Active Link**

The active link is the link that is currently enabled by the master to carry Ethernet traffic.

- **Standby Link**

The standby link is the link that is currently disabled by the master and does not carry Ethernet traffic. This port is held in readiness as a backup link in case the active link fails. On a functional link, the responder can still place traffic on the link, but there is no traffic from the master on that link.

- **Master Control Algorithm**

The Master Control Algorithm (MCA) enables only one link of the RLP at any time and controls the RLP as follows:

1. The MCA enables the primary link at initialization time (assuming that there are no failures on that link). This causes the primary link to become active.
2. The MCA monitors the primary link status for failures.
3. When the MCA detects a failure of the active link, the MCA:
 - a. Disables the active link.
 - b. Enables the standby link.

The active link always remains enabled (active) until a failure is detected on that link.

Redundant Fiber-Optic Link Operation

When you initially configure the DECRepeater 900FP for redundant operation, the primary port is the active port and the secondary port is the standby port. In operation, the active port communicates with its remote responder port until the master detects a link failure or until the port is internally partitioned. If the standby port is operational, the primary port is disabled, and the secondary port is enabled as the active port. The failover typically occurs within 3 to 6 ms (10 ms maximum).

Once the primary link is repaired, it becomes the standby link. If the repeater detects a failure in the (now active) secondary link, or if the port is internally partitioned, failover occurs back to the primary port.

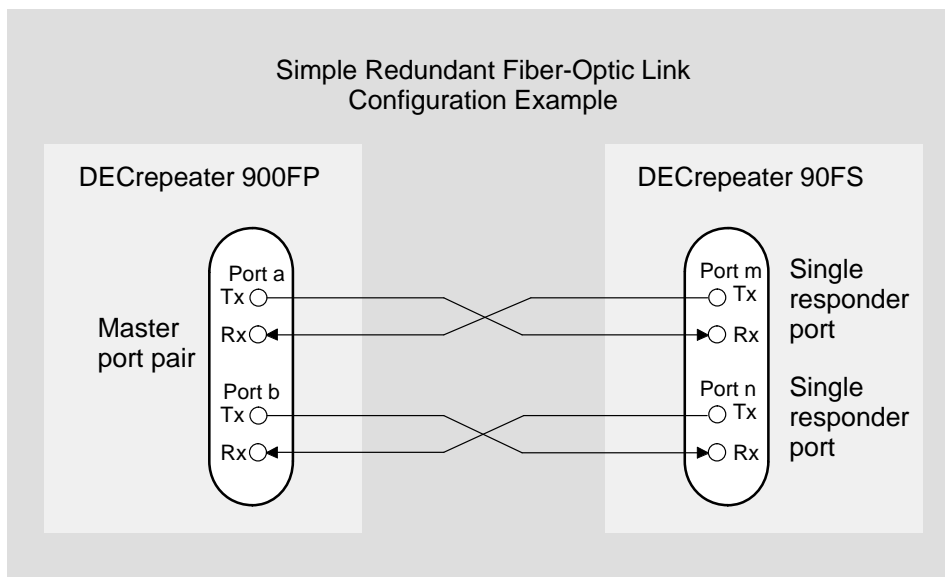
Redundant Fiber-Optic Link Configuration (Cont.)

A link failure can be caused by any of the following occurrences:

- Loss of carrier (light in a fiber-optic device)
- Auto-partitioning of the port

Simple Redundant Link Configuration

The DECreppeater firmware allows the configuration of a redundant fiber-optic Ethernet link from multiple ports. In its simplest form, a redundant link consists of a pair of master ports that reside on one module, each connected to independent ports on a remote module (see illustration). These remote ports may be responder ports or non-responder ports.



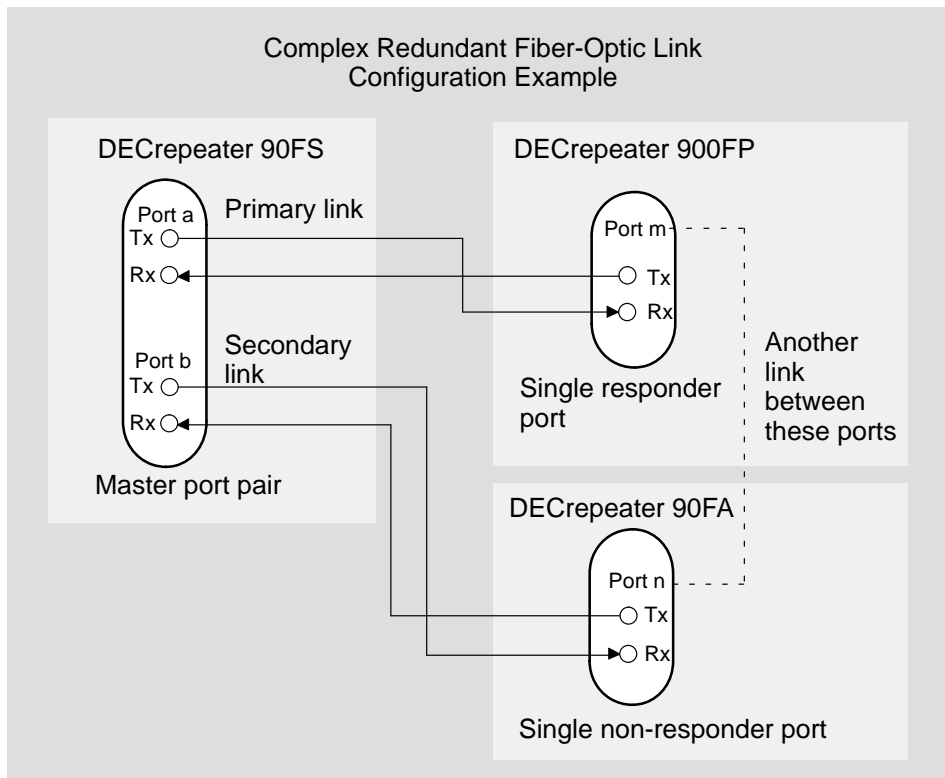
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Once these ports are properly configured using HUBwatch and connected together, one connection is the active link and the other is the standby link.

Redundant Fiber-Optic Link Configuration (Cont.)

Complex Redundant Link Configuration

The DECrepeater 900FP also supports a more complex redundant link topology. In general, the redundant link consists of a pair of master ports on one module, each connected to enabled remote ports. The remote ports must reside on the same LAN (or extended LAN), but can be on separate modules as shown in the following illustration. The remote ports can be responders, non-responders, or a combination of the two. If your configuration includes a combination of a responder and a non-responder, configure the responder as the primary link, and the non-responder as the secondary link.



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Redundant Fiber-Optic Link Configuration (Cont.)

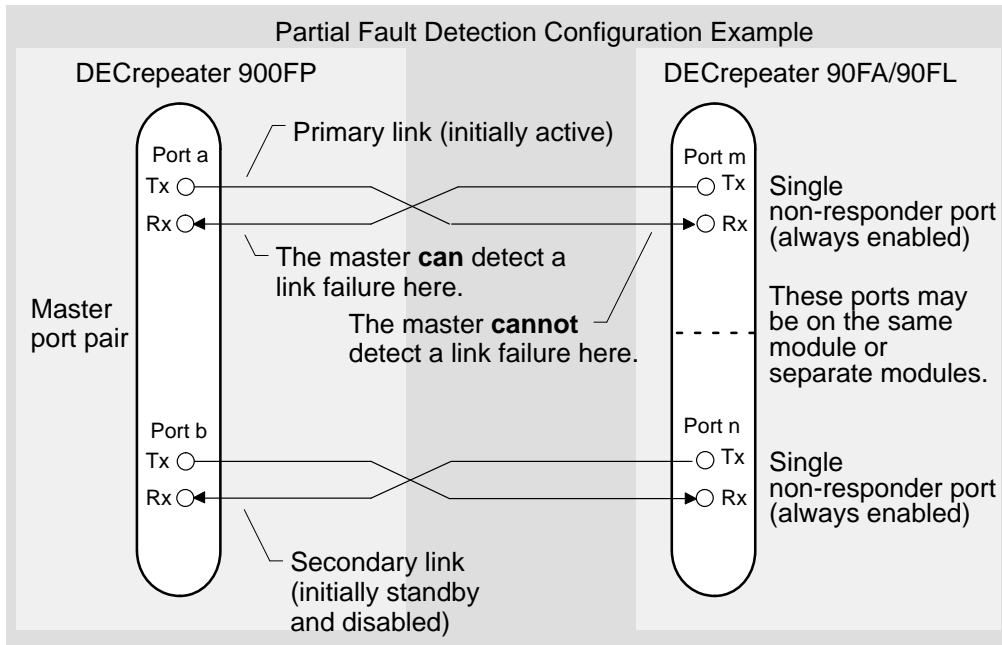
Partial Fault Detection

Partial fault detection causes the active master port to fail over to the standby port if the active port detects any of the following circumstances:

- A link failure in the receive portion of the active port
- An internally detected failure or partitioning of the active port
 - An excessive number of collisions
 - An excessively long collision
 - Received jabbering
 - Internally detected MAU failure

When the DECrepeater 900FP fiber-optic ports are connected to a non-responder repeater, such as the DECrepeater 90FL, 90FA (as shown in the following illustration), or to any IEEE 802.3 10BaseFL repeater port, partial fault detection is available.

Partial fault detection adequately detects most failure conditions, but cannot detect a failure in which the remote port cannot receive transmissions. That level of failure detection requires full fault detection.



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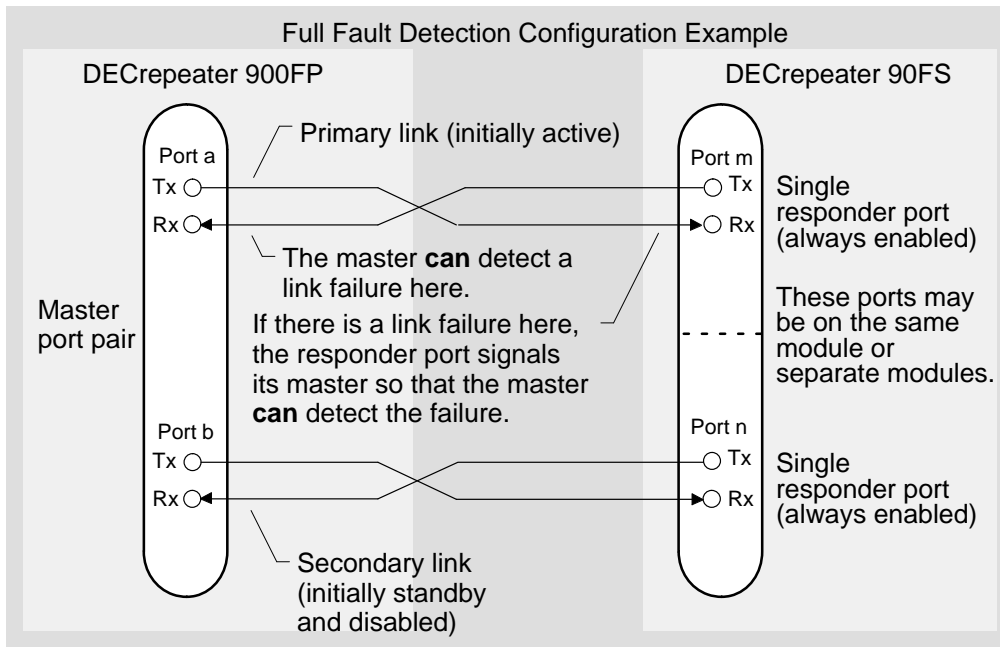
Redundant Fiber-Optic Link Configuration (Cont.)

Full Fault Detection

The DECrepeater 900FP supports full fault detection. This feature enables the master module to react to failures at either end of the receive or transmit media.

If a failure occurs in the responder's receive port, the responder signals its partner master port. This allows the master to switch over to the standby port.

When the DECrepeater 900FP fiber-optic ports are connected to another redundant fiber-optic repeater, such as the DECrepeater 90FS (as shown in the following illustration), full fault detection is available.



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Redundant Fiber-Optic Link Configuration (Cont.)

Table 5 shows the difference in failure detection between partial fault detection and full fault detection.

Table 5 Partial Fault Detection Versus Full Fault Detection

Link Failure from the Master Port's Perspective		Partial Fault Detection	Full Fault Detection
TX Link	RX Link		
Failure		Not detected	Detected
	Failure	Detected	Detected
Failure in	Both	Detected	Detected

Recommendations for Redundant-Link Configuration

Consider the following recommendations when configuring the DECrepeater 900FP for redundancy to increase fault detection and improve network reliability:

- Use responder ports (rather than non-responder ports) whenever possible.
- If you use a combination of responder ports and non-responder ports, assign the responder as the primary link, and the non-responder as the secondary link.
- Assign the remote ports to separate modules. This ensures that one of the two remote ports is functional in the event of a remote module failure.
- Whenever possible, configure primary and secondary link cables into separate pathways to avoid a single point of failure.

Fiber-Optic Loss Budget

This section describes the calculated fiber-optic loss budget for the DECrepeater 900FP.

Note the labeling on the fiber-optic cable that is being installed with the DECrepeater 900FP. Cables are tagged according to fiber type (for example, 50/125-, 62.5/125-, 85/125-, or 100/140-micron fiber) and the attenuation of each cable is also characterized and recorded.

10BaseFL Loss Budget

Table 6 shows the calculated loss budget for 10BaseFL fiber-optic segments used to interconnect the DECrepeater 900FP with the cable plant. These measurements account for the connectors at either end of the segment and are calculated using the transmit and receive optical power levels in decibels of optical power referenced to one milliwatt (dBm).

NOTE: When connecting the cables to other devices, take into account the transmit and receive optical power levels of the other devices.

Table 6 10BaseFL Worst-Case Loss Budget (0°C to 50°C, End of Life¹)

Measurement	Unit of Measure	Multimode, Graded Index Fiber Size (Microns)			
		50/125	62.5/125	85/125	100/140
Numerical aperture	NA	0.2	0.275	0.26	0.3
Minimum average transmit power ($P_{T(avg)}$)	dBm	-22.8	-19.0	-16.8	-13.5
Minimum average receive sensitivity ($P_{R(avg)}$)	dBm	-32.5	-32.5	-32.5	-32.5
10BaseFL loss budget ($P_{T(avg)} - P_{R(avg)}$)	dB	9.7	13.5	15.7	19.0

¹ No additional degradation is used. It is included in the vendor's specified power calculations.

NOTE: To ensure accurate measurements, do not measure optical power levels from cables connected to ports that are operating as responders in a redundant-link configuration. (Refer to the section titled Redundant Fiber-Optic Link Configuration.)

Fiber-Optic Loss Budget (Cont.)

FOIRL Compatibility

The IEEE 802.3 standard for fiber-optic interrepeater link (FOIRL) devices specifies *peak* power levels.

The standard specifies a -27.0 dBm minimum peak receive power ($P_{R(\text{avg})} = -30.0$ dBm). This power level represents a 2.5 dB lower receive sensitivity. The worst-case loss budget for FOIRL-compliant devices should include this decrease in receive sensitivity.

Table 7 shows the calculated loss budget, in peak levels, for FOIRL-compliant fiber-optic segments.

Table 7 FOIRL Worst-Case Loss Budget (0°C to 50°C, End of Life¹)

Measurement	Unit of Measure	Multimode, Graded Index Fiber Size (Microns)			
		50/125	62.5/125	85/125	100/140
Minimum peak transmit power ($P_{T(\text{peak})}$)	dBm	-19.8	-16.0	-13.8	-10.5
Minimum peak receive power ($P_{R(\text{peak})}$)	dBm	-27.0	-27.0	-27.0	-27.0
FOIRL loss budget	dB	7.2	11.0	13.2	16.5

¹ No additional degradation is used. It is included in the vendor's specified power calculations.

The IEEE 802.3 standard specifies a maximum receive power level of -9.0 dBm peak or -12.0 dBm average for FOIRL and 10BaseFL devices, respectively.

When calculating the loss budget for fiber-optic devices, ensure that the higher output from the DECrepeater 900FP, in conjunction with the increased launch power into the two largest fiber sizes (85/125 and 100/140 microns), does not overload the receivers.

Fiber-Optic Loss Budget (Cont.)

The loss budget for fiber-optic devices should include the maximum launch power amounts as shown in Table 8.

Table 8 DECrepeater 900FP Best-Case Maximum Launch Power

Measurement	Unit of Measure	Multimode, Graded Index Fiber Size (Microns)			
		50/125	62.5/125	85/125	100/140
Maximum peak transmit power	dBm	-12.8	-9.0	-6.8	-3.5
Maximum average transmit power	dBm	-15.8	-12.0	-9.8	-6.5

When the DECrepeater 900FP is connected to short lengths of 85/125-micron or 100/140-micron fiber-optic cable, the connection might require additional attenuation to prevent exceeding the -9.0 dBm peak (-12 dBm average) received power level. To make that determination, do the following:

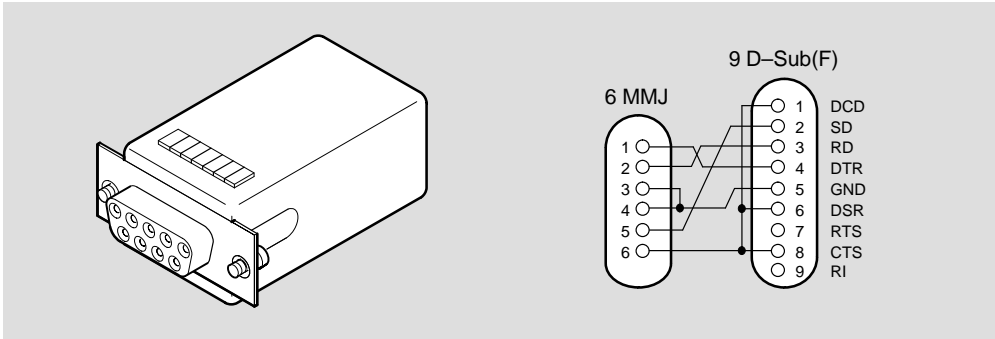
1. Subtract the cable's characterized attenuation value from the value listed in Table 8.
2. If the result of this calculation is less negative than -9.0 dBm peak (-12.0 dBm average), connect the fiber-optic cable to the DECrepeater 900FP and measure the actual power level at the opposite end of the cable to determine whether additional attenuation is required.

If required, attenuators (such as Fotec part number A-450-A) can be obtained from Fotec, Inc. in Charlestown, Massachusetts, or contact other fiber-optic vendors for an equivalent part.

Connector Pin Assignments

H8571-J Adapter

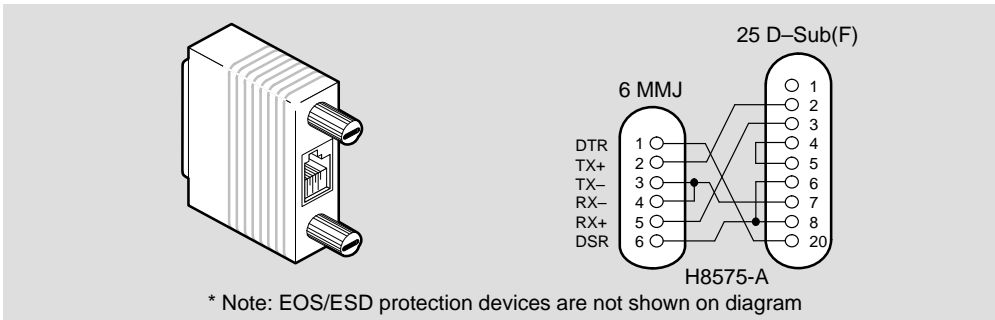
The following illustration shows the H8571-J adapter (6-pin MMJ to 9-pin D-Sub connector) and its pin assignments:



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H8575-A Adapter

The following illustration shows the H8575-A adapter (6-pin MMJ to 25-pin D-Sub connector) and its pin assignments:



LKG-8793-931

Product Specifications

Table 9 provides operating specifications for the DECrepeater 900FP module. Note the additional DEChub ONE parameters (listed in the tables) to consider when the module is installed into a DEChub ONE docking station.

Table 9 DECrepeater 900FP Operating Specifications

Parameter	Specification
Operating Environment	
Operating Temperature ¹	5°C to 50°C (41°F to 122°F)
Relative Humidity	10% to 95% noncondensing
Altitude	Sea level to 4900 m (16,000 ft)
Power	47.5 W, total power 8.0 A, 5Vdc, 0.1 A, 12Vdc ² 0.5 A, 15Vdc
Connectors	
Fiber-optic ST-type	
(DEChub ONE has 1 8-pin MJ, 1 DB-9, and 1 15-pin D-Sub AUI connector.)	
Physical	
Height	44.45 cm (17.5 in)
Width	4.45 cm (1.75 in)
Depth	15.25 cm (6 in); 25.40 cm (10.0 in) with a DEChub ONE docking station.
Weight	1.8 kg (4 lb); 3.4 kg (7.5 lb) with a DEChub ONE docking station.
Certification	
CE, CSA, FCC, TÜV, UL, VCCI	

¹ For sites above 4900 m (16,000 ft), decrease the operating temperature specification by 1.8°C for each 1000 m or 3.2°F for each 3200 ft.

² The 12V power in the DEChub 900 is derived from the 15V power source. Although it is listed separately in the product specifications, the 12V requirements are included in the 15V power total.

Product Specifications (Cont.)

Table 10 provides Acoustic specifications for the module.

Table 10 Acoustical Specifications

Acoustics — Declared values per ISO 9296 and ISO 7779¹

Product	Sound Power Level	Sound Pressure Level
	$L_{WA,d}$, B	L_{pAm} , dBA (bystander positions)
	<i>Idle/Operate</i>	<i>Idle/Operate</i>
DEFMM	5.1	37
DEFMM + DEHUA	5.4	40

Schallemissionswerte — Werteangaben nach ISO 9296 und ISO 7779/DIN EN27779²

Produkt	Schalleistungspegel	Schalldruckpegel
	$L_{WA,d}$, B	L_{pAm} , dBA (Zuschauerpositionen)
	<i>Leerlauf/Betrieb</i>	<i>Leerlauf/Betrieb</i>
DEFMM	5,1	37
DEFMM + DEHUA	5,4	40

¹ Current values for specific configurations are available from Digital Equipment Corporation representatives. 1 B = 10 dBA.

² Aktuelle Werte für spezielle Ausrüstungsstufen sind über die Digital Equipment Vertretungen erhältlich. 1 B = 10 dBA.

Associated Documents

The following documents provide related information about the module. Ordering information is provided at the back of this manual.

Title and Order Number	Description
<i>DEChub 900 MultiSwitch Owner's Manual</i> EK-DH2MS-OM	Provides installation, use, security, and troubleshooting information for the DEChub 900 MultiSwitch.
<i>DEChub ONE Installation</i> EK-DEHU2-IN	Provides installation and operation guidelines for standalone module configuration, including mounting options and cabling.
<i>HUBwatch Installation and Configuration</i> AA-QOFXB-TE	Provides information for installing and configuring HUBwatch for Open VMS V3.0 and HUBwatch for Windows V2.0.
<i>HUBwatch for Windows Use</i> AA-Q3S3A-TE	Provides network management and DEChub 900 functionality information for HUBwatch for Windows V2.0.
<i>Using DECndu Plus (MS-DOS)</i> AA-PYVVA-TE	Provides instructions to upgrade the firmware in an MS-DOS environment of selected network devices using Digital's Network Device Upgrade (DECndu) Plus utility.
<i>Using DECndu Plus (ULTRIX RISC)</i> AA-PYVTA-TE	Provides instructions to upgrade the firmware in an ULTRIX RISC environment of selected network devices using Digital's Network Device Upgrade (DECndu) Plus utility.
<i>Using DECndu Plus (OpenVMS VAX)</i> AA-PYVRA-TE	Provides instructions to upgrade the firmware in an OpenVMS VAX environment of selected network devices using Digital's Network Device Upgrade (DECndu) Plus utility.
<i>Open DECconnect Applications Guide</i> EC-G2570-42	Provides information to help plan and install networking systems based on Digital's OPEN DECconnect System and networking products.

HOW TO ORDER ADDITIONAL DOCUMENTATION

DIRECT TELEPHONE ORDERS

In Continental USA
call 1-800-DIGITAL
(1-800-344-4825)

In Canada
call 1-800-267-6215

In New Hampshire,
Alaska or Hawaii
call 1-603-884-6660

ELECTRONIC ORDERS (U.S. ONLY)

Dial 1-800-dec-demo with any VT100 or VT200
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If you need assistance, call 1-800-DIGITAL (1-800-344-4825)

DIRECT MAIL ORDERS (U.S. and Puerto Rico*)

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or approved distributor

Internal orders should be placed through U.S. Software Supply Business (SSB),
Digital Equipment Corporation, 10 Cotton Rd. Nashua, NH. 03063-1260

*Any prepaid order from Puerto Rico must be placed
with the Local Digital Subsidiary:
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DECrepeater 900FP Installation and Configuration
EK-DEFMM-IN. A01

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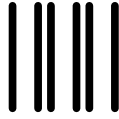
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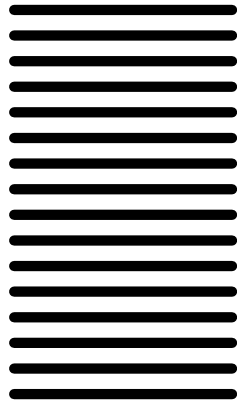
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