EtherWORKS Switch 8T

Installation and Configuration

Part Number: EK-DELDE-IN. A01

June 1996

This manual describes how to install and configure the EtherWORKS Switch 8T module.

Revision/Update Information: This is a new manual.

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This equipment generates, uses, and may emit radio frequency energy. 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 when operated in a commercial environment. Operation of this equipment in a residential area may cause interference; in which case, measures taken to correct the interference are at the user's expense. Any alteration of equipment can/will nullify FCC compliance.
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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 environment domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilisateur de prendre les mesures spécifiques appropriées.

Contents

EtherWORKS Switch 8T

Preface

This manual describes how to install an EtherWORKS Switch 8T, hereafter referred to as the Switch 8T. It also describes how to configure networks using the Switch 8T. The manual is for personnel who will install and use the Switch 8T.

Switch 8T Features

The main features of the Switch 8T are as follows:

- IEEE 802.3-compliant switch with eight ports and nine connectors

  — Seven ports with 8-pin MJ twisted pair, crossover-wired connectors, using Category 3 or better unshielded twisted pair (UTP) or screened twisted pair (ScTP) cable

  — An eighth port that can be used through either the 8-pin MJ crossover-wired connector or the attachment unit interface (AUI) connector. You can not use these connections simultaneously. (See the Front Panel Description section.)

- Store and forward switch at line speed

- Conforms to IEEE 802.3 and the IEEE 10BaseT standard

- Eight addresses per port for a total of sixty-four addresses per system

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NOTES

If more than eight stations are connected to a switch port, only the eight most recently seen addresses will be present in that port's address database at any time. Communication with those stations whose addresses are not in the address database at any given time will be unreliable. See the bullet item, Enable or disable flood mode, for additional information.

When broadcast storm protection is enabled on a port, only seven station addresses may be stored in that port's address database.

- Light emitting diode (LED) panel includes power, module OK, activity, and port status indicators

- Easy desktop installation

- External 20-VAC, 900 mA, power adapter

- Transmits and receives data at 10 Mb/s

Built-in firmware

Built-in firmware provides a simple terminal-based user interface that supports the following features:

- Enable or disable each port.

- Configure security for each port.

  The EtherWORKS Switch 8T provides a simple security mechanism that may be enabled and disabled on any port. When enabled, this mechanism allows traffic received on that port to be propagated only if its source address has previously been authorized by the Switch 8T administrator.

  When the security mechanism is enabled on a port, each learned address displayed in the SHOW PORT screen is followed by either a '+' character if the address has been validated, or a '-' character if it has not.

  Related commands are as follows: (See the Switch Commands and Examples section for additional information.)

  ```
  SET PORT <n> SECURITY ENABLED

  SET PORT <n> SECURITY DISABLED

  SET PORT <n> ADDDB ADD 11-22-33-44-55-66

  SET PORT <n> ADDDB CLEAR
  ```

- Enable or disable a port's broadcast storm protection.

  A broadcast storm is a self-sustaining condition that happens when broadcast packets are received at a greater than normal rate on a port. If allowed to propagate, this traffic would interfere with the proper operation of a local area network.

  When broadcast storm protection is enabled on a port, that port stops propagating broadcast traffic as long as the storm persists. You can read the current status of this feature in the SHOW PORT screen.

- Enable or disable flood mode for each port.

  Flood mode is a configuration in which a port passes all packets that have a unicast destination address that is not recognized by any other port. If more than eight source addresses are to be recognized by a single port, flood mode must be enabled on that port in order to ensure reliable connectivity to all connected nodes. Flood mode should be used sparingly. If it is enabled on more than one port, it results in unnecessary forwarding of traffic and an attendant waste of network bandwidth. As shipped, the Switch 8T assigns port 8 with flood mode enabled.

- Enable or disable full duplex mode for each port.

  Full duplex enables simultaneous transmission and reception of packets, yielding up to 20 Mbits per second bandwidth. Note that both ends of the link must be set to the same duplex mode.

- Show status, counters, and valid addresses associated with the port.

- Direct the switch's port 8 to its AUI connector or its Twisted Pair (TP) connector.

- Direct the switch's port 8 to Auto detected (AUTO) switch mode.

  In addition to port 8's 10BaseT connector or its AUI connector, you can direct the port to an automatic switching mode (AUTO). In AUTO mode, the 10BaseT connector is used unless its link fails. If that happens, the port switches automatically to its AUI connector until the 10BaseT connector's link is restored. Note that there is no way to detect the condition of the AUI connection.

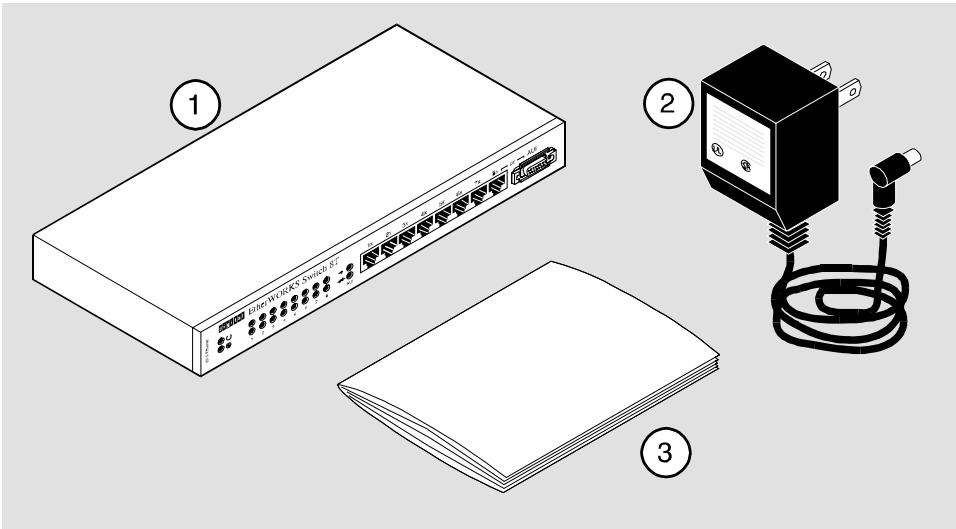- Reset the switch with current settings or factory default settings.

- Show switch-level information.

Package Contents

The following figure shows the items in the Switch 8T's package.

NPB-0426-96F

The package contents are as follows:

Number	Item
1	Switch 8T
2	Power adapter
3	This manual

Front Panel Description

The following figure shows the Switch 8T's front panel.
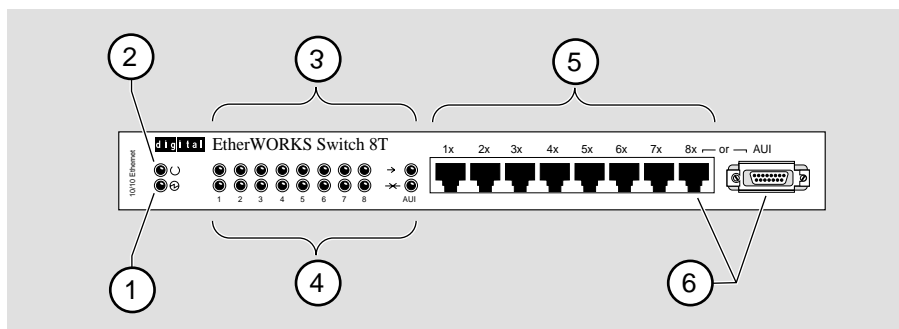
NPB-0427-96F

The following items are on the front panel:

Number	Function
1	Power LED
2	Module OK LED
3	Port activity LEDs
4	Port status LEDs
5	Crossover-wired 8-pin MJ connectors
6	Port 8 TP and the AUI port (can not be used simultaneously)

When the Switch 8T is powered up, all the LEDs light momentarily.

Back Panel Description

The following figure shows the Switch 8T's back panel.
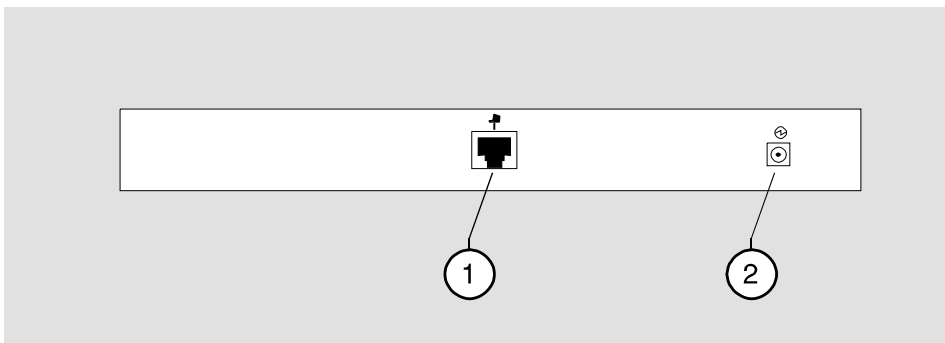
NPB-0428-96F

The following items are on the back panel:

Number	Function
1	Console port
2	Power connector

In order to configure the Switch 8T, the console port should be connected to a VT100-compatible terminal. The terminal should be set up as follows:

- 9600 baud

- 8 bits per character

- 1 stop bit

- No parity

Connecting the Power Adapter

Perform the following steps to connect the power adapter:

Step	Action
1	Connect the barrel plug end of the power adapter cord to the power receptacle on the back panel.
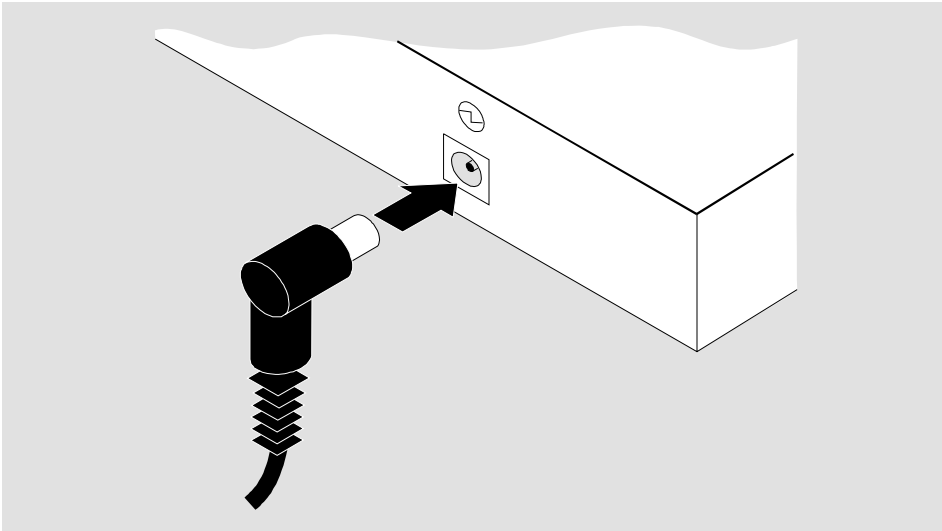
NPG-0378-95F

NOTE

Ensure that the environment in which you are using the Switch 8T conforms to the
specifications, including the specifications for your electric power source, listed
in the Product Specifications section.

Step	Action
2	Connect the body of the power adapter into an electric outlet.

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Rules for Switch Configurations

Observe the following rules for all network configurations using the Switch 8T.

- The maximum length of a UTP segment is 100 meters.

- AUI drop cables can be no longer than 50 meters.

- Each switch port has a maximum of 8 addresses, unless flood mode is enabled for that port.
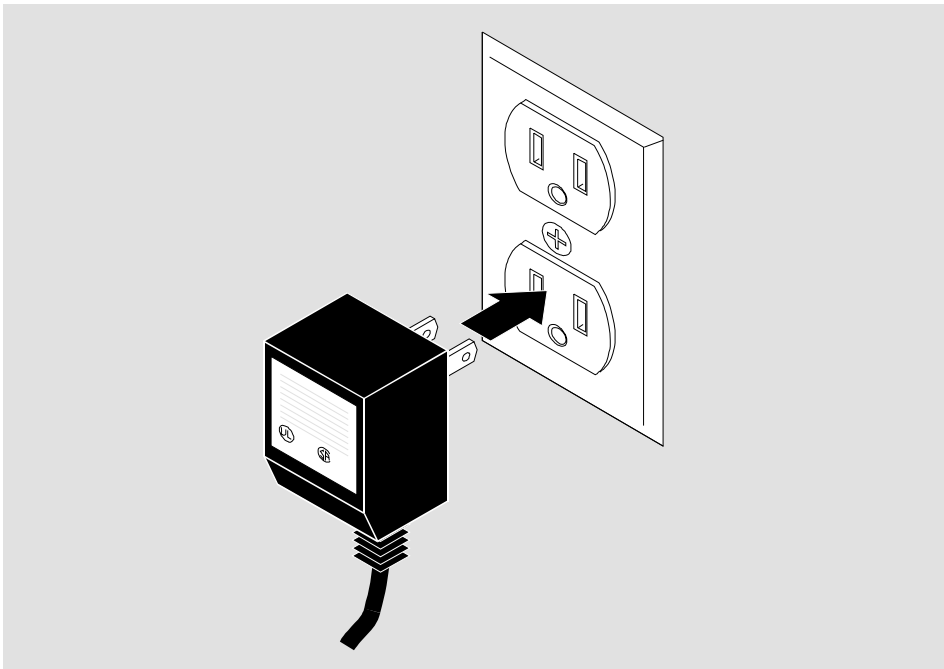
Single-Switch Configurations

You can attach an Ethernet station directly to the 8-pin MJ connectors using straight-wired cable.

The following figure illustrates a typical single-switch configuration.
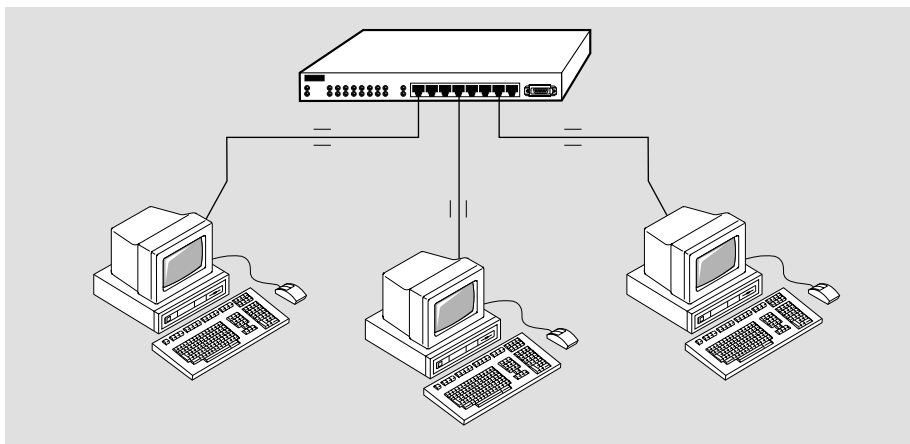
NPB-0429-96F

Legend

The following conventions apply to all the illustrations showing configuration examples.

- Crossover-wired cables are marked with x.

- Straight-wired cables are marked with =.

Tree Configurations

You can connect up to eight repeater hubs or switches to a Switch 8T in a tree configuration. In addition, you can connect up to eight personal computers to a repeater hub or switch. Use straight-wired UTP cables to connect crossover-wired connectors on the Switch 8T to straight-wired connectors on the other repeaters.

The following figure illustrates a tree configuration.
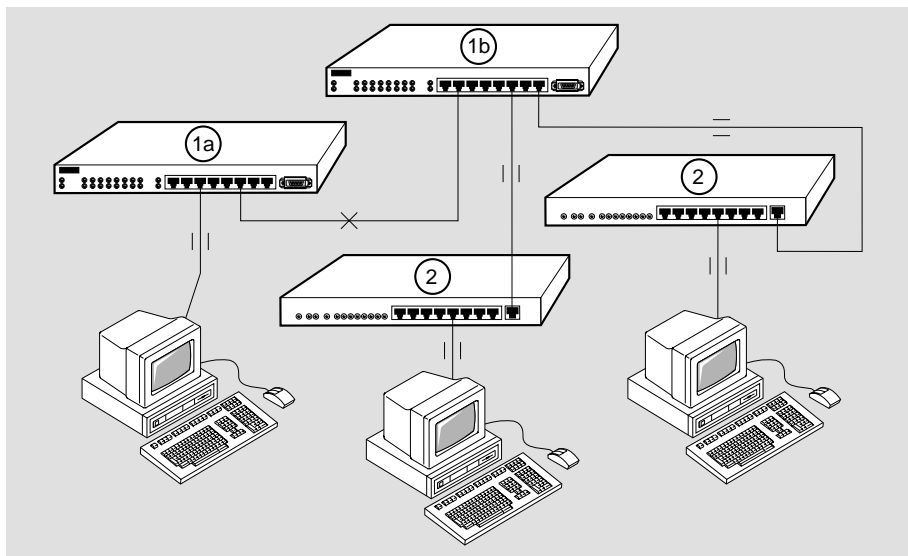
NPB-0446-96F

The components of this configuration are as follows:

Number	Component
1a	Switch
1b	Switch **Note**: When connecting two Switch 8T devices together, the connecting switch-to-switch ports, on both switch 1a and switch 1b, must be in flood mode.
2	Repeater hub

Backbone Configurations Using the AUI Port

You can connect the AUI port to an AUI drop cable. Using AUI connections, you can interconnect switches through a backbone network connection.

The following figure illustrates a typical backbone configuration using the AUI port.

NOTE

See the Firmware Commands section for information on how to set up the Switch 8T to enable the AUI port and enable flood mode when necessary.
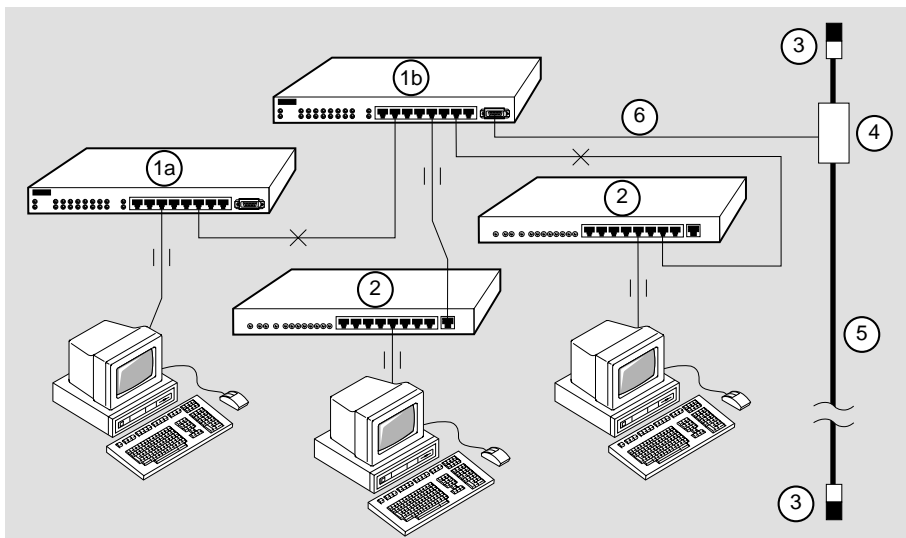
NPB-0447-96F

The components of this configuration are as follows:

Number	Component
1a	Switch
1b	Switch **Note**: When connecting two Switch 8T devices together, the connecting switch-to-switch ports, on both switch 1a and switch 1b, must be in flood mode.
2	Repeater hub
3	Terminator
4	802.3 transceiver
5	Backbone Ethernet cable
6	AUI drop cable

Flexible Backbone Media Connections

Connection Using MAU

You can connect the AUI port of the Switch 8T to an Ethernet media attachment unit (MAU). The following illustration shows a typical configuration using MAU to connect two Switch 8T devices.

NPB-0448-96F

The components of this configuration are as follows:

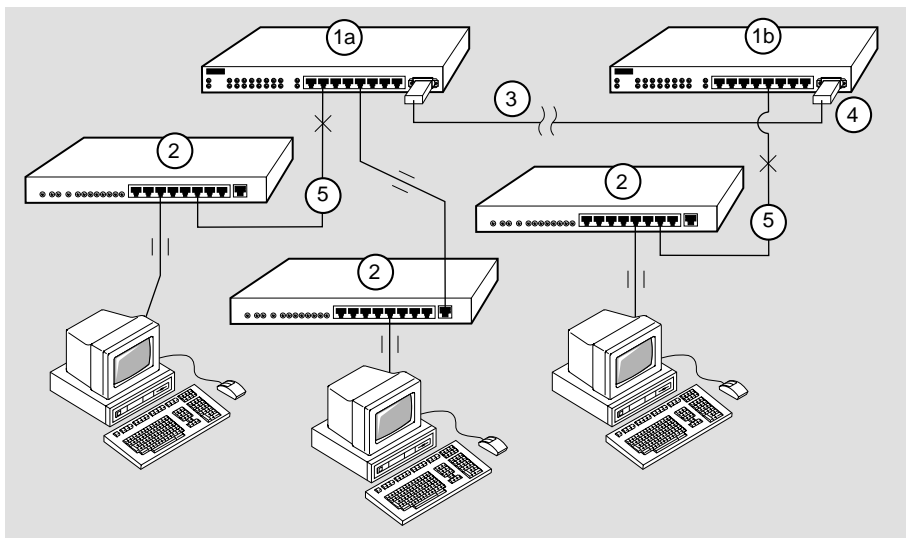| Number	Component
1a	Switch
1b	Switch **Note**: When connecting two Switch 8T devices together, the connecting switch-to-switch ports, on both switch 1a and switch 1b, must be in flood mode.
2	Repeater hub
3	Fiber-optic, ThinWire coaxial cable, or twisted pair cable
4	MAU
5	Crossover cables. If the MAUs are twisted pair, a crossover cable should be used in item #3.

Switch Commands and Examples

After you connect the console terminal cable to the console port, turn on the power to the Switch 8T. The following screen display appears:

```
Checking NVRAM validity...done
Initializing switch configuration from NVRAM...done

EtherWORKS Switch 8T Firmware Rev. 1.000

Command:
```

To access the Help menu that contains a list of firmware commands, type **help** at the Command: prompt on this screen. The Help menu appears on your screen.

Examples of Commands

The following table lists the firmware commands as they appear on the Help menu. The table also describes the command functions and gives examples of using the commands. You can abbreviate a command if the abbreviation is not ambiguous, for example **h** for **help**.

Options for each command appear in brackets in the first column of the table. Examples of using each option appear in the second column. Because they are examples only, the displays can vary slightly from the actual screens on your set-up port device. Boldface type indicates user input. The Command: prompt appears when the module is ready to accept a command.

Command and Options	Example	Function
RESET PORT *<port>*	Command: **RESET PORT <port #>** The Command: prompt appears.	Clears counters and the address database of the specified port

RESET SWITCH [ ]
 [CURRENT]
 [FACTORY]
	Command: **RESET SWITCH**
	 or
	 Command: **RESET SWITCH current**
	 The following screen appears:
	
	 ```Checking NVRAM validity...done.```
	 ```Initializing switch configuration from```
	 ```NVRAM...done.```
	
	 ```EtherWORKS Switch 8T Firmware Rev. 1.000```
	
	 ```Command:```
		Resets the switch to current settings. The default is the current or last saved screen.

	Command: **RESET SWITCH factory**
	 The following screen appears:
	
	 ```Checking NVRAM validity...done.```
	 ```Initializing switch configuration to factory```
	 ```defaults...done.```
	 ```Saving switch configuration to NVRAM...done.```
	 ```Initializing switch configuration from```
	 ```NVRAM...done.```
	
	 ```EtherWorks Switch 8T Firmware Rev. 1.000```
	
	 ```Command:```
		Resets the switch to factory default settings

SAVE	Command: **SAVE**
	 The following screen appears:
	
	 ```Saving switch configuration to NVRAM..done.```
	
	 ```Command:```
		Saves the current switch configuration to NVRAM

SET PORT <port> *[ENABLED]* *[DISABLED]*	Command: **SET PORT <port #> ENABLED** The Command: prompt appears.	Enables the specified port
	Command: **SET PORT <port #> DISABLED** The Command: prompt appears.	Disables the specified port

Command and Options	Example	Function
SET PORT *<port>* ADDDB *[CLEAR]*	Command: **SET PORT *<port #>* ADDDB CLEAR** The Command: prompt appears.	Clears the address database of the specified port
SET PORT *<port>* ADDDB ADD *<address>*	Command: **SET PORT *<port #>* ADDDB ADD 11-22-33-44-55-66** The Command: prompt appears.	Adds the specified address to the address database of the specified port
SET PORT *<port>* FULLDUP *[ENABLED]* *[DISABLED]*	Command: **SET PORT *<port #>* FULLDUP ENABLED** The Command: prompt appears.	Enables full duplex operation on the specified port
	Command: **SET PORT *<port #>* FULLDUP DISABLED** The Command: prompt appears.	Disables full duplex operation on the specified port
SET PORT *<port>* STORM PROTECT *[ENABLED]* *[DISABLED]*	Command: **SET PORT *<port #>* STORMPROTECT ENABLED** The Command: prompt appears.	Enables broadcast storm protection on the specified port. (See Switch 8T Features section.)
	Command: **SET PORT *<port #>* STORMPROTECT DISABLED** The Command: prompt appears.	Disables broadcast storm protection on the specified port
SET PORT *<port>* SECURITY *[ENABLED]* *[DISABLED]*	Command: **SET PORT *<port #>* SECURITY ENABLED** The Command: prompt appears.	Enables security on the specified port
	Command: **SET PORT *<port #>* SECURITY DISABLED** The Command: prompt appears.	Disables security on the specified port continued on next page

Command and Options	Example	Function
SET PORT *<port>* *[RXONLY]* *[RXTX]*	Command: **SET PORT *<port #>* RXONLY** The Command: prompt appears.	Selects receive-only on the specified port
	Command: **SET PORT *<port #>* RXTX** The Command: prompt appears.	Selects normal operation on the specified port
SET PORT *<port>* FLOOD *[ENABLED]* *[DISABLED]*	Command: **SET PORT *<port #>* FLOOD ENABLED** The Command: prompt appears.	Enables flood mode on the specified port
	Command: **SET PORT *<port #>* FLOOD DISABLED** The Command: prompt appears.	Disables flood mode on the specified port
SET PORT 8 *[AUI] [TP]* *[AUTO]*	Command: **SET PORT 8 AUI** The Command: prompt appears.	Specifies an AUI connector for Port 8 only
	Command: **SET PORT 8 TP** The Command: prompt appears.	Specifies a TP connector for Port 8 only
	Command: **SET PORT 8 AUTO** The Command: prompt appears.	Specifies auto-select mode for Port 8 only. (See Switch 8T Features section.)

Command and Options	Example	Function
SHOW PORT *<port>*	Command: **SHOW PORT 1** The following screen is updated about every two seconds. PORT 1 COUNTERS ``` ------RECEIVE------ -------TRANSMIT------- Packets: 0 Packets: 0 Multicast: 0 Multicast: 0 Broadcast: 0 Broadcast: 0 Total Octets: 0 Total Octets: 0 FCS Errors: 0 Collisions: 0 Dribble Errors: 0 1 Collision: 0 Runts: 0 Multiple Collisions: 0 Oversized Packets: 0 Excessive Collisions: 0 Fragments: 0 Late Collisions: 0 Filtered Packets: 0 Initially Deferred: 0 Flood Packets: 0 Lost Packets: 0 Lost Packets: 0 ----------------ADDRESS DATABASE------------- ***EMPTY*** Port disabled Half duplex Security disabled Link down Flood Mode disabled StormProtect disabled Uptime: 1:18:48 ``` To exit from this screen and return to the `Command:` prompt, Press Ctrl-C.	Displays counters, address database, and characteristics for the specified port
SHOW SWITCH	Command: **SHOW SWITCH** The following screen appears: ``` Uptime: 1:33:34 Command: ```	Displays switch-level information

Cable Configurations

A crossover function must be implemented in every twisted pair link. The crossover function (internal or external) allows the transmitter of one device to connect to the receiver of the device at the other end of the twisted pair link.

The following illustrations show straight-wired (1) and crossover cables (2) for connecting crossover (3) and straight-wired (4) types of devices. The EtherWORKS Switch 8T uses crossover connectors and a shared AUI port.

Straight-Wired and Crossover UTP Cable

Use straight-wired cable to connect a PC or workstation to a crossover-wired port. The Digital order number for the industry-standard, straight-wired UTP cable required by the Switch 8T is BN25G. The Digital order number for the crossover UTP cable is BN24F. Contact your Digital representative for more information.
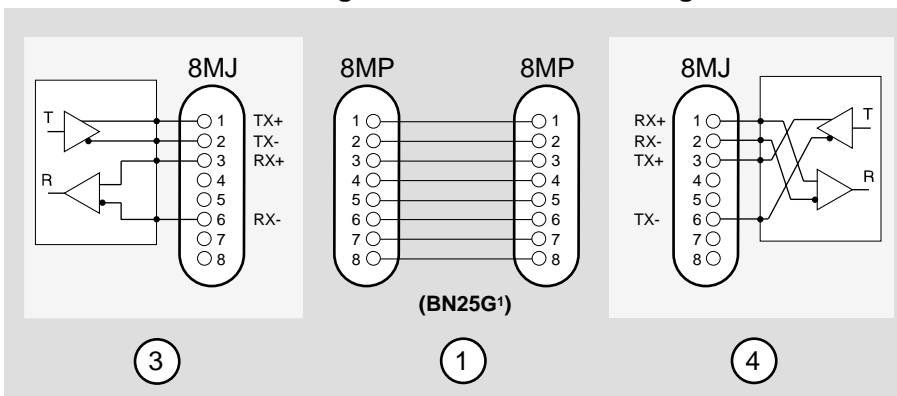
External crossover to crossover connection configuration:
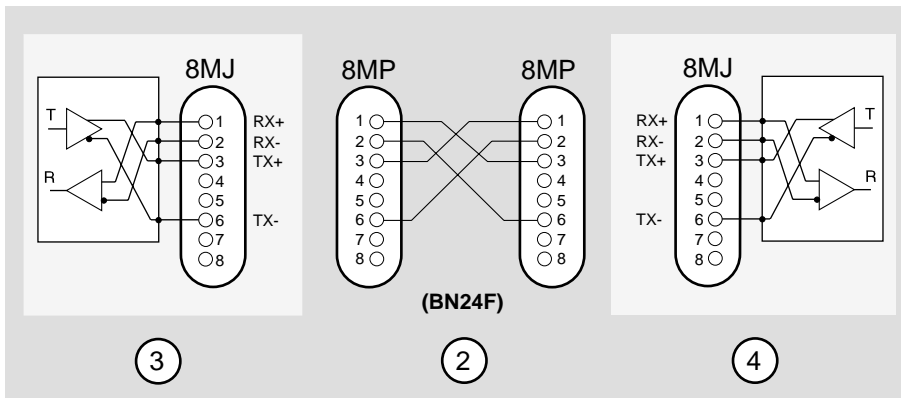
NPB-0502-96F

Internal crossover to straight-wired connection configuration:

NPB-0503-96F

[1] If screened cabling is required, use the BN26M cable.

Number	Item
1	Straight-wired (=) cable
2	Crossover (x) cable
3	Device (repeater) straight-wired (=) connector
4	Repeater device in external crossover is cross-wired. Repeater device in internal crossover is straight-wired.

8-pin MJ Port Pin Assignments

The EtherWORKS Switch 8T uses industry-standard crossover-wired 8-pin MJ ports. For your reference, crossover-wired and straight-wired connectors have the following pin assignments:

Pin	Crossover-wired Signaling (X)	Straight-wired Signaling (//)
1	RX +	TX +
2	RX -	TX -
3	TX +	RX +
4	Not used	Not used
5	Not used	Not used
6	TX -	RX -
7	Not Used	Not used
8	Not used	Not used

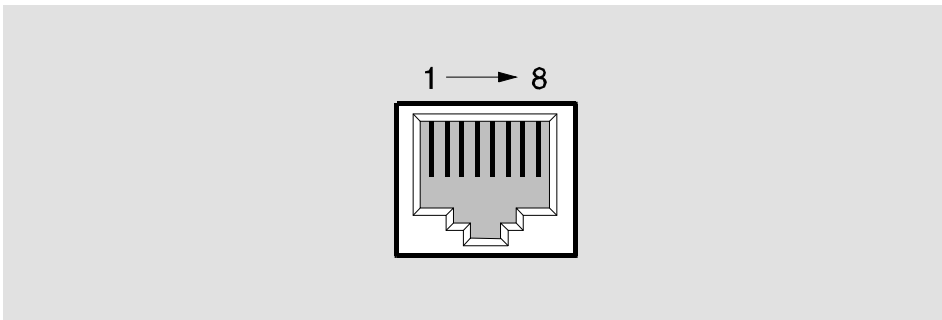**NOTE**

Transmit = TX
Receive = RX

The 8-pin MJ connector pin locations are as follows:

NPG-8719-95F

AUI Connector Pin Assignments

Industry-standard AUI pin assignments are as follows:

Pin	Assignment
1	Ground
2	CI +
3	DO +
4	Ground
5	DI +
6	Power rtn
7	NC
8	Ground
9	CI -
10	DO -
11	Ground
12	DI -
13	Power (12V)
14	Ground
15	NC

The AUI pin locations are as follows:
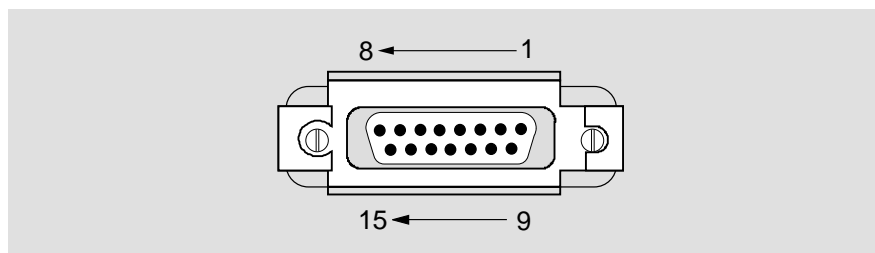
NPB-0373-95F

Operating Specifications

The following table lists the product specifications for the module.

Parameter	Specifications
Environment	
Operating Temperature [1]	$10^{o}C$ to $40^{o}C$ ($50^{o}F$ to $104^{o}F$)
Relative Humidity	10% to 95% noncondensing
Altitude	
• Operating	Sea level to 2400 m (8,000 ft)
• Non-operating	Sea level to 4900 m (16,000 ft)
Power	6.6 W, total power
	0.83 A, 5Vdc
	0.20 A, 12Vdc
	0.0 A, 15Vdc
Physical	
Height	3.30 cm (1.3 in)
Width	27.3 cm (10.75 in)
Depth	13.5 cm (5.3 in)
Weight	1.16 kg (2.55 lb)
Shock (Class A/B for products weighing under 100 lbs)	
10 G / 10 ms half sine pulse in three orthogonal axes	
Vibration (Class C)	
5 to 2000 Hz sine sweep @ 0.25 G limited by 0.02" (0.5mm) displacement DA* 200 to 500 Hz sine sweep @ 0.10G	
Certification	CE, CSA, FCC,TÜV, UL, VCCI

[1] For sites above 4900 m (16,000 ft), decrease the operating temperature specification by $1.8^{o}C$ for each 1000 m or $3.2^{o}F$ for each 3200 ft.

Acoustical Specifications

The following table lists the acoustical specifications for the module.

Declared values per ISO 9296 and ISO 7779[1]

Product	Sound Power Level L_{WAd}, B	Sound Pressure Level L_{pAm}, dBA (bystander positions)
	Idle/Operate	**Idle/Operate**
DELDE	No measureable noise emissions	No measureable noise emissions

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

Schallemissionswerte - Werteangaben nach ISO 9296 und ISO 7779/DIN EN27779[2]

Produkt	Schalleistungspegel L_{WAd}, B	Schalldruckpegel L_{pAm}, dBA (Zuschauerpositionen)
	Leerlauf/Betrieb	**Leerlauf/Betrieb**
DELDE	keine meßbaren Schallemissionen	keine meßbaren Schallemissionen

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

Correspondence

Documentation Comments

If you have comments or suggestions about this document, send them to the Network Products Engineering Organization.

Attn: Documentation Project Manager
FAX: (508) 486-6093
E-MAIL: doc_feedback@lkg.mts.dec.com

Online Services

To locate product specific information, refer to the following online services:

BBS   To read the Bulletin Board System, set your modem to 8 bits, no parity, 1 stop bit and dial 508-486-5766 (U.S.)

WWW   The Digital Equipment Corporation Network Products Business Home Page on the World Wide Web is at the following addresses:

North America: http://www.networks.digital.com

Europe: http://www.networks.europe.digital.com

Australia: http://www.digital.com.au/networks

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	Alaska, New Hampshire, and Hawaii: 1-603-884-6660
	Canada: 1-800-267-6215
Electronically (USA. only)	Dial 1-800-DEC-DEMO (For assistance, call 1-800-DIGITAL)
By Mail (USA and Puerto Rico)	DIGITAL EQUIPMENT CORPORATION P.O. Box CS2008 Nashua, New Hampshire 03061 (Place prepaid orders from Puerto Rico with the local Digital subsidiary: 809-754-7575)
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