NETBUILDER II® ETHERNET MODULE INSTALLATION GUIDE

A member of the NETBuilder® family

ABOUT THIS GUIDE

Introduction

This guide provides the information necessary to install, cable, maintain, and troubleshoot the Ethernet I/O module for the NETBuilder II® base system. The NETBuilder II system is available with a 4- and 8-Slot chassis. Information applies to both chassis whenever the generic NETBuilder II system name is used in a description. References to the 4-Slot or 8-Slot chassis are specifically identified.

For more information on the NETBuilder II base system, refer to the *NETBuilder II Base System Installation Guide.*

This guide is intended for the system administrator, network equipment installer, or network manager who is responsible for installing and managing the network hardware. It assumes a working knowledge of network operations, but does not assume prior knowledge of 3Com® internetworking equipment.

If the information in the release notes shipped with your product differs from the information in this guide, follow the release notes.

Conventions

Table 2 and Table 1 list conventions that are used throughout this guide.

Table 1   Notice Icons

Icon	Type	Description
	Information Note	Information notes call attention to important features or instructions.
	Caution	Cautions alert you to personal safety risk, system damage, or loss of data.
	Warning	Warnings alert you to the risk of severe personal injury.

Table 2 Text Conventions

Convention	Description
"Enter" vs. "Type"	When the word "enter" is used in this guide, it means type something, then press the Return or Enter key. Do not press the Return or Enter key when an instruction simply says "type."
"Syntax" vs. "Command"	When the word "syntax" is used in this guide, it indicates that the general form of a command syntax is provided. You must evaluate the syntax and supply the appropriate port, path, value, address, or string; for example:
	Enable RIPIP by using the following syntax:
	`SETDefault !<port> -RIPIP CONTrol = Listen`
	In this example, you must supply a port number for !<port>.
	When the word "command" is used in this guide, it indicates that all variables in the command have been supplied and you can enter the command as shown in text; for example:
	Remove the IP address by entering the following command:
	`SETDefault !0 -IP NETaddr = 0.0.0.0`
	For consistency and clarity , the full form syntax (upper- and lowercase letters) is provided. However, you can enter the abbreviated form of a command by typing only the uppercase portion and supplying the appropriate port, path, address, value, and so forth. You can enter the command in either upper- or lowercase letters at the prompt.
Text represented as `screen display`	`This typeface` is used to represent displays that appear on your terminal screen, for example:
	`NetLogin:`
Text represented as **`commands`**	**`This typeface`** is used to represent commands that you enter, for example:
	`SETDefault !0 -IP NETaddr = 0.0.0.0`
Keys	When specific keys are referred to in the text, they are called out by their labels, such as "the Return key" or "the Escape key," or they may be shown as [Return] or [Esc].
	If two or more keys are to be pressed simultaneously, the keys are linked with a plus sign (+), for example:
	Press [Ctrl]+[Alt]+[Del].
Italics	*Italics* are used to denote *new terms* or *emphasis*.

1

OVERVIEW

This chapter describes the Ethernet module for the NETBuilder II base system and gives a brief summary of its features.

Ethernet Module Components

The NETBuilder II base system is a modular internetworking platform. The Ethernet module board provides one Ethernet interface for the NETBuilder II base system.

Board Figure 1-1 provides a surface view of the Ethernet module board showing major components and a view of the connector/LED panel showing the connectors and the LED indicator lights.
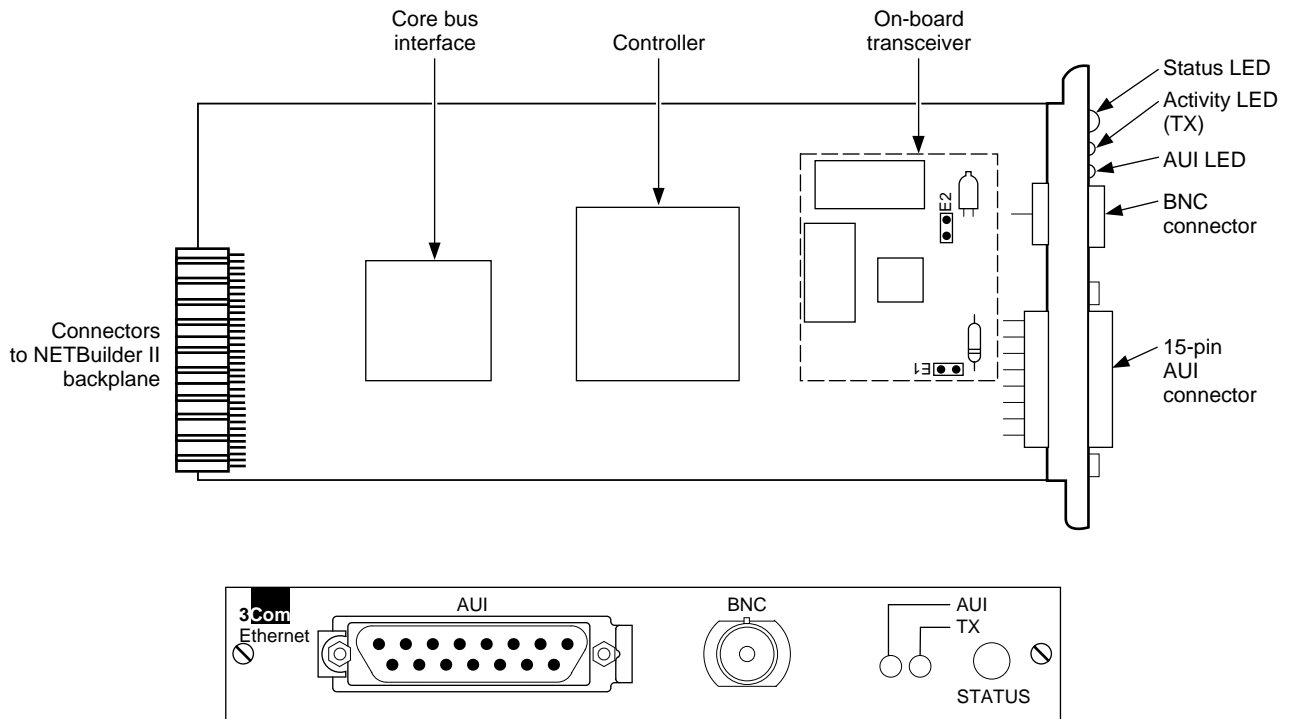
Figure 1-1   Ethernet I/O Module Board and Connector/LED Panel

Table 1-1 and Table 1-2 briefly describe the Ethernet module external and internal components.

Table 1-1 Ethernet Module External Components

Component	Description
Interface board	IEEE 802.3 Ethernet Version 2 interface board with its own bus.
I/O bus interface and connectors	The connector, miscellaneous discretes, and the core memory peripheral interface (CMPI).
External transceiver and connectors	Bayonet Neill-Concelman (BNC) connector and a 15-pin Attachment Unit Interface (AUI) connector.
Line interface and connectors	Includes the on-board transceiver for a BNC connector. The 15-pin AUI connector requires an external transceiver.
LEDs	Status indicators for the Ethernet module.

Table 1-2 Ethernet Module Internal Components

Component	Description
Core memory peripheral interface (CMPI)	Interface between the controller chip to the NETBuilder II high-speed bus.
Controller	Provides the basic data link controller functions.
Electrically erasable programmable read only memory (EEPROM)	Contains product information and repair data on the Ethernet module. Refer to the *NETBuilder II Base System Installation Guide* for details on accessing EEPROM information.
Soft-start circuit	Supports the hot-swap feature (described in Table 1-4).

LEDs

The Ethernet module's connector/LED panel has three LEDs for displaying status information: Activity (TX), AUI /BNC, and STATUS.

The AUI/BNC LED is active when the AUI connector is selected as the active Ethernet interface. When the BNC connector is selected, the LED is not active.

Table 1-3 lists the states for each LED and their meanings.

Table 1-3 Ethernet Module LED Assignments

LEDs	State	Indicates
STATUS	Off	Module is not functioning; for example, it is disabled, or there is no power to the system.
	Red	Reset, error condition, or self-test failure (red light appears to be blinking when self-test fails, as system intermittently checks the status)
	Green	Module is functioning normally
	Yellow	Module is in self-test mode
ACTIVITY	Off	No activity on the network
	Green	Network activity; module is functioning normally (the green light appears intermittently, whenever data is transmitting)
AUI/BNC	Off	BNC connector selected
	Green	AUI connector selected

Connectors   The two connectors on the Ethernet module's connector/LED panel (shown in Figure 1-1) provide access to the Ethernet network. The AUI connector, which supports thick cable, is routed to a transceiver. The BNC connector, which supports thin cable, is directly connected to the thin cable. Either the AUI or the BNC connector can be used, but not both. See Table 2-1 in Chapter 2, *Installation*, for the AUI connector pin assignments.

⚠️ **CAUTION:** *To eliminate cable noise emission in excess of FCC Part 15, subpart J, VDE specification 0871 for Class A devices, all device cables should have connectors with metallic backshells*

Transceiver Jumper   For systems using thin Ethernet cables, the Ethernet module's on-board transceiver supports line termination. The Ethernet module is shipped with the transceiver jumper at the E1 position. This is the default setting, which *does not* support on-board termination with a BNC connection. To achieve on-board termination with a BNC connection, you must move the transceiver jumper to E2. See Figure 2-2 for the location of jumpers E1 and E2.

Because on-board line termination provides direct connection to the Ethernet line, you do not need T connectors and plug terminators. When on-board line termination is not implemented, you must terminate the line manually.

Figure 1-2 shows BNC network connection with and without on-board line termination.
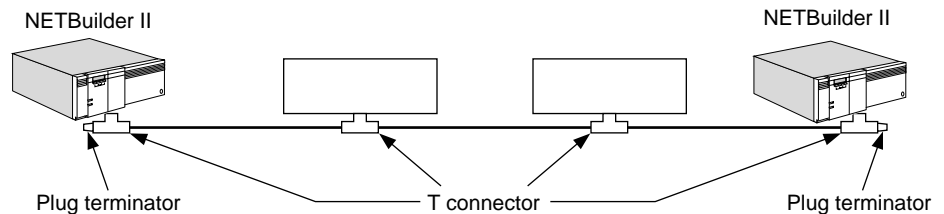
Figure 1-2   Ethernet Connection with and without On-board Termination

Ethernet Module Features

Table 1-4 summarizes the Ethernet module features.

Table 1-4   Ethernet Module Features

Feature	Summary
Hot-swap capability	Can be inserted or removed without turning off or rebooting the NETBuilder II base system.
Cable support	Supports all Ethernet media through an external transceiver.
Compatibility	Uses a BNC connector that supports network segments of up to 305 meters (1000 feet) for thin Ethernet coaxial cable (RG58 C/U or A/U when using all 3Com transceivers). An AUI connector supports network segments of up to 1000 meters (3280 feet) for thick Ethernet cable.
Self-test and diagnostic capability	Monitors network and signals status via LEDs.
Accessible information on the EEPROM	Provides Ethernet module product information and repair data that can be accessed via the monitor utility. Refer to the *NETBuilder II Base Installation Guide* for details on accessing EEPROM information.

2

INSTALLATION

This chapter contains information and procedures for installing the Ethernet module into the NETBuilder II base system.

Refer to the NETBuilder II Base System Installation Guide to determine configurations supported by the NETBuilder II base system.

Before Installing the Module

Before you install the module, follow these preliminary steps:

1 Observe appropriate ESD precautions.

Electrostatic discharge (ESD) can damage circuit board components. Failures resulting from ESD may not be covered under your warranty. To prevent this, follow these handling procedures:

- Keep the Ethernet module in its antistatic shielded bag until you are ready to install it.

- Do not touch pins, leads, or solder connections on the board.

- Handle the board by the edges only.

- Store or ship the Ethernet module in static-protective packaging.

- Observe proper grounding techniques when handling the Ethernet module. These techniques include using a foot strap and grounded mat or wearing a grounded static discharge wrist strap.

2 Inspect the Ethernet module for shipping damage.

If you find any damage, contact the shipping company to file a report. If the module must be returned to your network supplier, ship it in its original antistatic bag and shipping carton. If the original carton was damaged in shipment, repack the system in a carton that provides equivalent protection.

3 Verify that you have received a board and a manual.

If any item is missing from an undamaged carton, contact your network supplier.

4 Write down the serial number and the Media Access Control (MAC) address shown on the solder (back) side of the Ethernet board (see Figure 2-1).

Serial number example: S/N :1AF12345

MAC address example: 080002 1A2B3C (hexadecimal)

You will need this information if you have to contact your network supplier.

MAC address label
Serial number label

Reviewers, where are the
MAC address and serial
number labels now located?
Front or back side,
and where on board?
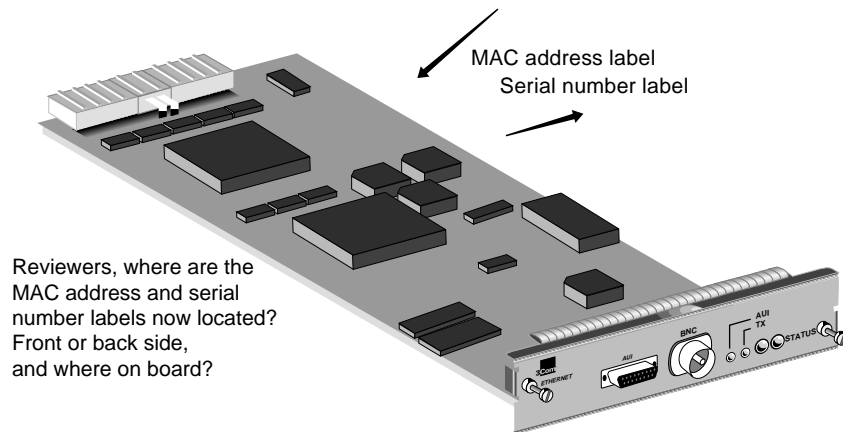
Figure 2-1   Serial Number and MAC Address on the Ethernet Module

5 Check the transceiver jumper position on the board.

If you are setting up a thin cable (BNC) network and want to use on-board termination, you may have to move the jumper. If the jumper is installed at E1, move it to position E2 to implement on-board termination.

Figure 2-2 shows the transceiver jumper and the E1 and E2 mounting sites.
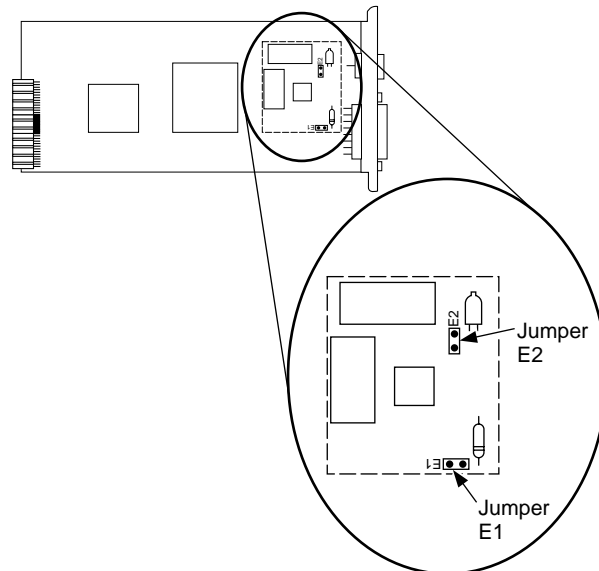
Jumper
E2

Jumper
E1

Figure 2-2   Transceiver Jumper and E1, E2 Mounting Locations for BNC Connection

6 Verify that you have the appropriate cable and connector for use with an AUI network connection. (This cable is not provided with the board.)

Table 2-1 lists the pinouts for AUI connectors.

Table 2-1   AUI Connector Pin Assignments

Pin Number	Function
1	Collision shield
2	Collision +

Table 2-1   AUI Connector Pin Assignments

3	Transmit +
4	Receive shield
5	Receive +
6	Power return
7	Not used
8	Not used
9	Collision -
10	Transmit -
11	Transmit shield
12	Receive -
13	+12 volts
14	Voltage shield
15	Not used

7 Select the slot for the Ethernet module.

You can install the module into any available I/O slot in the rear of the NETBuilder II system. The wide top slot is designated for the CEC module only.

8 Obtain a small flathead screwdriver, if necessary, to clear a slot for the module installation.

9 Obtain the thin or thick coaxial cables required for connecting the network to the Ethernet module.

Once you have performed all the preinstallation steps, you are ready to install the Ethernet module.

Installing the Ethernet Module

Complete Ethernet module installation involves inserting the module into the NETBuilder II base system to connect with the backplane, and then connecting to the network using thin or thick coaxial cables.

Inserting the Ethernet Module

Insert the Ethernet module into the NETBuilder II chassis by performing the following steps:

1 Remove the blanking plate (if one is in place) from the slot you have selected for the Ethernet module (see Figure 2-3).

Loosen the captive screws (use a screwdriver if necessary), push the ejector clips apart, and slide the planking plate from the slot.

CAUTION: *Remove the blanking plate only from I/O slots that will house an I/O module. All unused I/O slots require the blanking plate covers to maintain proper cooling of the unit and regulatory compliance. Failure to cover open slots can result in overheating of the NETBuilder II base system and voiding of the warranty.*
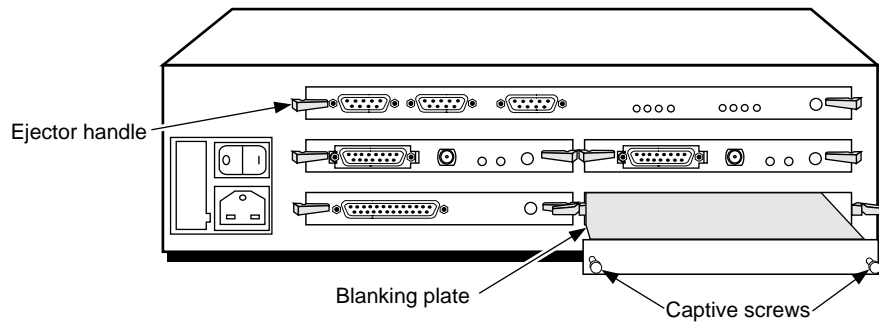
Figure 2-3 Removing a Blanking Plate

All NETBuilder II chassis are shipped with two open slots. It is recommended that you use these open slots for your first installations. Leave the blanking plates on the other slots in place until the slots are needed for additional module installation.

2 Insert the Ethernet module into the uncovered I/O slot as follows:

  a Make sure the slot ejector handles are in an open position, as shown in Figure 2-4.

  b With the connector end toward the backplane and the board panel facing you, grasp the left and right sides of the front panel and fit the board into the I/O slot opening.

  The board fits in only one way, but to be sure the correct side is facing up, check that the label imprints on the connector/LED panel are right side up.

  c Slide the module in until the I/O panel edges just engage with the notches in the ejector handles.

3 Press the ejector handles on both sides of the I/O slot forward and together (toward the connector/LED panel) to engage the module and backplane connectors and secure the module board in the slot.

  Figure 2-4 shows ejector handles in open and closed positions.
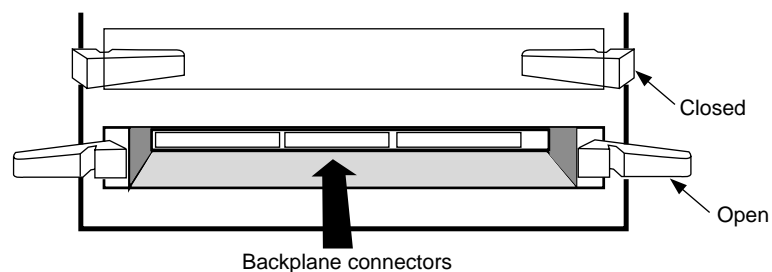
Figure 2-4 View of Open and Closed I/O Slot Ejector Handles

You will feel a slight resistance as you press these handles into the closed position; it will be the connectors engaging.

CAUTION: *If the resistance is too great, it may mean that the module and backplane connectors are not aligned. Forcing the module forward can damage board or backplane connectors. If necessary, remove and reinsert the module, making sure the connectors are properly aligned.*

4 Check that the connector/LED panel of the newly inserted module is flush with the NETBuilder II chassis, and is aligned with the connector/LED panel(s) of any other installed module(s) to verify that the board is seated correctly (see Figure 2-5).

5 Use your fingers to attach the two captive screws and tighten them "finger tight" only.

A solid connection of the I/O panel to the chassis is required for proper operation, but the screws should *not* be used to force the board into place.
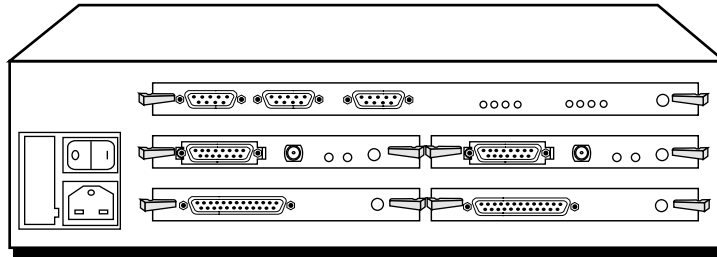
Figure 2-5   Ethernet Module Board Installed

When the module is inserted and secured in the slot, you are ready to attach the cabling and connect the module to the network.

Cabling the Ethernet Module for Network Connection

To cable and connect the Ethernet module, connect the appropriate network cable to the appropriate Ethernet module connector, as illustrated in Figure 2-6 (this cable is not provided with the module).

CAUTION: *To eliminate cable noise emission in excess of FCC regulations, Part 15, subpart J, VDE specifications 0871, and specification CISPR22 (EN55022) for Class A devices, all interconnection cables should be equipped with shielded connectors, the backshells of which must completely surround the cable shield*

The connector on the right as you are facing the connector/LED panel is the BNC thin Ethernet cable connector. Connect one end of the cable to the Ethernet module with the on-board transceiver and the other end to the thin cable.

CAUTION: *The Ethernet module will not support thick and thin Ethernet connections simultaneously. Do not attempt to connect both types of Ethernet cable to a single module..*

External termination
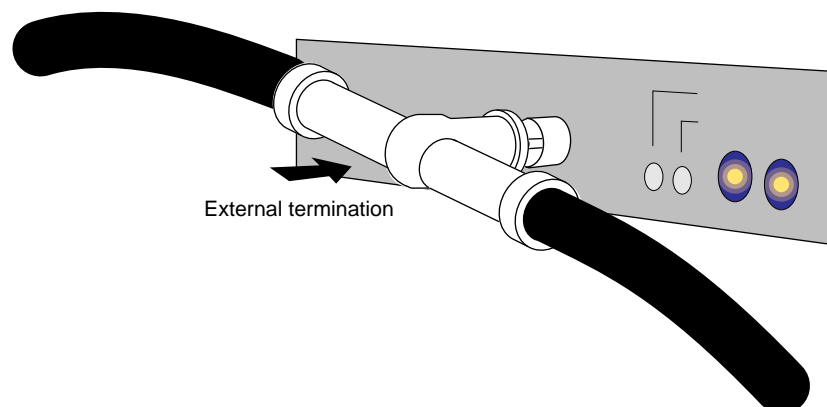
Figure 2-6 Internally and Externally Terminated Thin Ethernet Connections

The connector on the left is the AUI thick Ethernet cable connector. Connect one end of the cable to the Ethernet module (see Figure 2-7) and the other end to the network transceiver box. Secure the cable connector to the I/O connector with the sliding latch.

Thick Ethernet termination
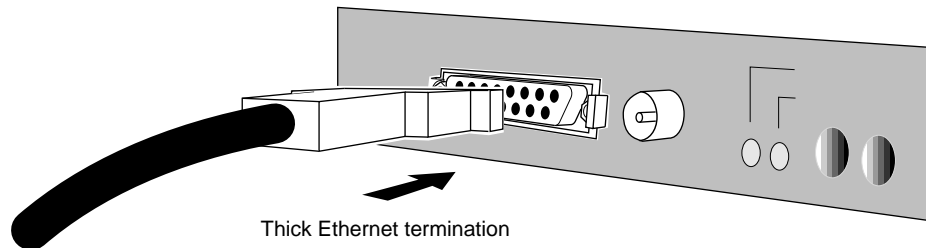
Figure 2-7 AUI Thick Ethernet Connection

Install and cable any other I/O modules, referring to the appropriate I/O module installation guide.

When you have finished installing all I/O modules, refer to the *NETBuilder II Base System Installation Guide* to complete the NETBuilder II base system installation steps.

A

TROUBLESHOOTING AND MAINTENANCE

This chapter describes how to troubleshoot and replace the Ethernet module. Possible malfunctions that can occur include:

- Nonfunctional module
- Self-test failure at startup
- AUI or BNC transmission failure

This following sections describe the symptoms of a malfunction and the suggested corrective action to take.

Troubleshooting Startup Problems

The following symptoms indicate a self-test failure at startup, or at Reset if parameters are set to run a self-test.
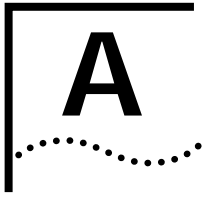
Symptoms The Status LED, normally yellow when the module self-test is running, changes to a blinking red.

A self-test failure message is displayed on the LCD, as shown in Figure A-1.
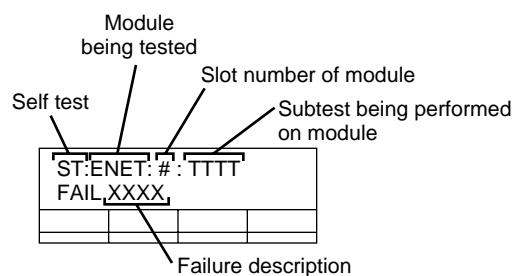
Figure A-1   LCD Self-Test Failure Message

The message format also identifies the subtest performed on the module that failed, and the nature of the failure.

The following self-test failure message also appears on the connected terminal monitor:

```
Ethernet Controller - Self-Tests Failed - Slot X
```

The value of X can be 1 through 8, depending on which NETBuilder II chassis you have.

Action Observe the reason for failure described in the LCD message (FAIL =) and take the appropriate corrective action, if possible. If you cannot correct the problem, and the module fails after removing and reinstalling it, contact 3Com or your network supplier for assistance.

Troubleshooting Ethernet Module Failures

The LEDs on the connector/LED panel monitor Ethernet module performance and provide feedback for troubleshooting. Refer to Table 1-3 in Chapter 1, *Overview*, for a complete list of LED operating states. This section describes the symptoms of common module failures, and the recommended actions for solving the problem.

Symptom   The module's status LED is off when there is power to the system and other installed modules are operating.

Action   An unlit status LED when the system is operating usually indicates that the module itself is disabled. The module may not be properly connected to the NETBuilder II backplane. Remove and reinsert the module. If it is still nonfunctional, replace the module.

Symptom   The AUI/BNC LED is off when operating with an AUI connection, or the AUI/BNC LED is lit when operating with a BNC connection.

Action   The Ethernet module must be configured to specify AUI network connection or BNC connection with or without on-board termination. (See the "Connectors" section in Chapter 1 for detailed information on tranceiver jumper placement.)

First check to be sure the module is cabled correctly for AUI or BNC network connection. If this is not the problem, disconnect and remove the module as described in this chapter under "Replacing the Ethernet Module." Check the position of the transceiver jumper (E1 or E2) on the board and move it if it is not properly placed for your configuration. If the tranceiver jumper is correctly placed, and the module still does not function after being reinstalled, contact your network supplier for replacement.

Symptom   The Activity (TX) LED remains unlit when the module is connected to an operational local network.

Action   The module's Activity LED should be green (steady when data is in the channel) when the system is functioning, indicating network activity. Check that all connections are intact, and that the external tranceiver (if used) is operational, before contacting 3Com for module replacement.

Symptom   The module's Status LED is red.

Action   A red Status LED indicates an error condition. When this occurs, take the steps in the following checklist:

- Check that all cable connections are intact.

- Check that the NETBuilder II base system is operating correctly.

- Check the on-board termination setting if you are using thin net.

- Check that the Ethernet network you are connected to is operating correctly. Refer to your *NETBuilder II Base System Installation Guide* for information about system operation checks.

- Verify that your external transceiver (if used) is operational.

If none of these actions solve the problem, contact your network supplier for assistance.

Maintaining the Ethernet Module

This section describes preventive maintenance you can take and how to replace the Ethernet module.

Preventive Maintenance

3Com recommends the following procedures for preventive maintenance:

- Observe the guidelines listed in the *NETBuilder II Base System Installation Guide* for minimum and maximum electrical and environmental requirements.

- Keep the area around the NETBuilder II base system clean; avoid accumulated dust.

- Allow sufficient air space around the NETBuilder II base system for proper ventilation, so that the module is protected from excessively high temperatures.

- Observe ESD guidelines whenever handling the Ethernet module.

Refer to the *NETBuilder II Base System Installation Guide* for preventive maintenance tips that apply to the entire system.

Replacing the Ethernet Module

If any component in the Ethernet module fails, you will need to replace the entire module. The Ethernet module is hot-swappable, which means that you can safely remove and install a new one without powering down or rebooting the NETBuilder II base system.

To replace a module, follow these steps:

To perform the following procedure, you may need a small, flathead screwdriver.

1 Disconnect any network cabling from the Ethernet module, and remove the cable from the strain relief bracket (you do not need to remove the bracket itself.)

2 Loosen the two captive screws securing the board in the slot, by hand or with a flathead screwdriver.

3 Release the ejector handles on both sides of the Ethernet module by pressing on them firmly and evenly until they are in an open position.

The Ethernet module will disengage from the NETBuilder II backplane and partially eject from the slot.

4 Carefully slide the failed Ethernet module out of the slot.

5 Follow the procedures outlined in Chapter 2 to install a new Ethernet module.

CAUTION: *All empty slots require blanking plates to maintain proper cooling of the unit. Failure to replace a removed module with a blanking plate or another module may cause unit failure and will void the warranty. If no blanking plate or other module is available, reinsert the failed module until a replacement is obtained.*

6 Perform any software configuration or system restart as detailed in the *NETBuilder Series Bridge Operation Guide* or *NETBuilder Series Bridge/Router Operation Guide*.

Although the Ethernet module can be added, removed, or replaced while the NETBuilder II system is operating, you may need to reconfigure the software or restart the system before the Ethernet module becomes functional.

B
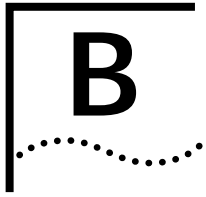
SPECIFICATIONS

Table B-1 lists the operating attributes and physical dimensions of the Ethernet module.

Table B-1 Physical Dimensions and Operating Attributes

Attribute	Description
Length	3.9 inches (9.9 cm)
Width	8.8 inches (22.4 cm)
Height	
Board	0.6 inches (1.52 cm)
Connector/LED panel	1.0 inches (25 cm)
Weight	0.75 lbs (0.34 kg)
External transceiver	15-pin AUI connector
Ethernet data rate	10 Mbps

Refer to the *NETBuilder II Base System Installation Guide* for a detailed list of minimum and maximum electrical and environmental requirements for the Ethernet module.

Table B-2 lists the maximum current consumption for the Ethernet module.

Table B-2 Maximum Current Consumption

+5 Volts	-5 Volts	+12 Volts	-12 Volts
1.0 amps	0.0 amps	0.5 amps	0.0 amps

C
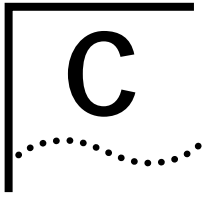
STARTUP MESSAGES

This appendix lists Ethernet module startup messages (both normal and error) that can appear on the LCD or the terminal. Startup messages appear on the two-line, 24-character LCD located on the front panel of the NETBuilder II base system and on the display of the terminal, which is attached to the console port on the CEC module's connector/LED panel.

The messages displayed on the terminal usually provide more detail than the messages displayed on the LCD. However, the self-test failure messages displayed on the LCD provide more detail than the messages displayed on the terminal.

There are only a few messages specific to the Ethernet module. You can determine most of the Ethernet module status by the LED status and activity lights on the Ethernet module's connector/LED panel. Chapter 1, "Overview of the Ethernet Module," describes the Ethernet LEDs.

Startup LCD Messages

This section describes Ethernet module-specific messages that can appear on the LCD.

Self-Test Initialization Message

Figure C-1 shows a sample LCD self-test initialization message and explains the format.
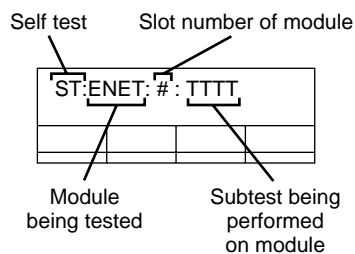

Figure C-1   Self-Test Initialization Message

The pound sign (#) represents the slot number of the module being tested, which can be 1 through 8, depending on the NETBuilder II chassis you have.

Self-Test Failure Message

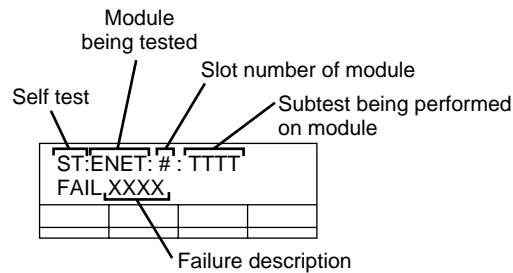Figure C-2 shows a sample LCD self-test failure message.

Figure C-2   Self-Test Failure Message

Refer to Chapter A, *Troubleshooting and Maintenance*, to determine what action you should take if the LCD displays a self-test failure message.

Startup Terminal Messages

The NETBuilder II base system's power-on terminal messages include a check of the Ethernet system. This section lists and describes only messages specific to the Ethernet module.

Ethernet Controller - Self-Tests Initiated - Slot X
Meaning: This message appears when the Ethernet controller tests are initiated. The value of X can be 1 through 8, depending on which NETBuilder II chassis you have.

Ethernet Controller - Self-Tests Passed - Slot X
Meaning: This message appears if no errors are encountered in the Ethernet controller tests. The value of X can be 1 through 8, depending on which NETBuilder II chassis you have.

Ethernet Controller - Self-Tests Failed - Slot X
Meaning: This message appears if an error is encountered in the Ethernet controller tests.
Action: When you see this message on the terminal screen, refer to the LCD. The LCD message provides detailed information, which will help you determine the specific self-test that failed and the nature of the failure. The value of X can be 1 through 8, depending on which NETBuilder II chassis you have.