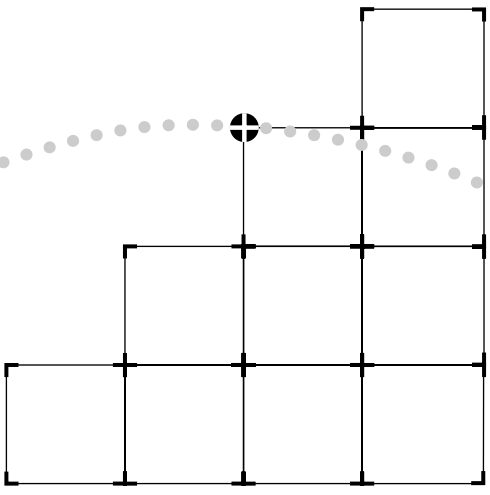
NETBUILDER II® HIGH-SPEED SERIAL RS-449 MODULE INSTALLATION GUIDE

A member of the NETBuilder® family



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The following advice and subsequent warnings are given to satisfy the requirements of the United Kingdom's BABT approval of the NETBuilder II HSS RS-449 module as a host independent module.

This module is approved only for installation in a host and with host attachments, which are either type-approved for such apparatus, or, if supplied after March 1, 1993, are marked with or supplied with a statement that the host is supplied over General Approval Number NS/G/1234/J/100003.

This module has been designed to comply specifically with BABT and all the 3Com NETBuilder family of modules for use in the NETBuilder chassis. These considerations are outlined herein.

Except at the edge connector, which plugs into the host's expansion slot, clearance and creepage distances of Xmm and Ymm, as listed below, must be maintained between this module and other parts of the host, including any other additional modules fitted therein.

Clearance	Creepage	Voltage used or generated by other parts of the host expansion board
4.0 mm	5.0 (8.0) mm	up to 250 Vrms/Vac

The creepage distances apply when installed in a normal office environment. The creepage distances shown in parentheses apply where the normal office environment within the host is subject to conductive pollution or dry ?non-conductive pollution, which could become conductive due to condensation.

If in doubt, advice should be sought from a competent telecom safety engineer.

Users must ensure that the power drawn by the 3Com NETBuilder II HSS RS-449 module (as described in Appendix A) together with any auxiliary apparatus, lies within the rating of the host power supply.

Failure to install the module in accordance with these instructions, invalidates the approval.

The NETBuilder II chassis are supplied in the United Kingdom under the General Approval Number NS/G/1234/J/100003 and do not hold a BABT license in their own right. In view of this, users are reminded that when the HSS RS-449 module is installed in a chassis, it is still only the module that is approved and so the BABT license label must not be moved so that it is attached to the chassis itself.

The network connector RS-449 is a TNV connection point as defined by EN 41 003. The bus connectors J1, J2, and J3 are SELV connections as defined by EN 60 950.

The maximum attenuation of the G.703 connecting cable must not exceed 6 dB when measured at 1024 kHz.

The frequence attenuation characteristic of the connecting cable should follow a root f law.

The edge connector on the HSS G.703 module into the NETBuilder II chassis does not provide isolation sufficient to satisfy the relevant parts of BS 6301 when the jumper E1 and/or E2 has been fitted. Therefore, apparatus connected to this port must have been evaluated against British Telecom (Post Office) Technical Guides 2 or 26 and given permission to attach. Other usage will invalidate any approval given to the apparatus.

Interconnection directly, or by way of other apparatus of ports marked "SAFETY WARNING - See Instructions for Use," with ports marked or not so marked may produce hazardous conditions on the network and advice should be obtained from a competent engineer before such a connection is made.

CAUTION: *This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules, VDE specification 0871, CISPR22 (EN55022). These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio*

communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case, the user will be required to correct the interference at the user's own expense.

Changes or modifications not expressly approved by 3Com could void the user's authority to operate this equipment.

CAUTION: *The connector port on the HSS RS-449 module does not provide isolation sufficient to satisfy the requirements of the relevant parts of BS 6301. Apparatus connected to it must have been approved to the relevant parts of BS 6301 or have previously been evaluated against British Telecom (Post Office) Technical Guides 2 or 26 and given permission to attach. Other usage will invalidate any approval given to the apparatus.*

Interconnect directly, or by way of other apparatus, of ports marked "SAFETY WARNING - See Instructions for Use" as indicated above, with ports marked or not so marked may produce hazardous conditions on the network and advice should be obtained from a competent engineer before such a connection is made.

About This Guide

Introduction

This guide describes how to install, cable, maintain, and troubleshoot the High-Speed Serial (HSS) RS-449 module for the NETBuilder® II base system with a 4- or 8-Slot chassis. Information applies to both chassis whenever the generic NETBuilder II system name is used in a description. References to the four-port or eight-port chassis are specifically identified.

For more information on the NETBuilder II base system installation or bridge/router software, 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 High-Speed Serial (HSS) RS-449 module for the NETBuilder® II base system and provides a brief summary of its features. The HSS RS-449 module, as it will be referred to in this guide, contains the interfaces to the NETBuilder II I/O bus, the functional operating components of the board, and the interfaces to a modem or other serial device.

HSS RS-449 Module Components

The NETBuilder II system is a modular internetworking platform. The HSS RS-449 module board provides one HSS RS-449 interface for the NETBuilder II base system.

The HSS RS-449 module must be used with NETBuilder software version 5.2 or later.

Board

Figure 1-1 shows the surface of the HSS RS-449 module board with the major components and shows the connector/LED panel with the connector and the LED indicator light.

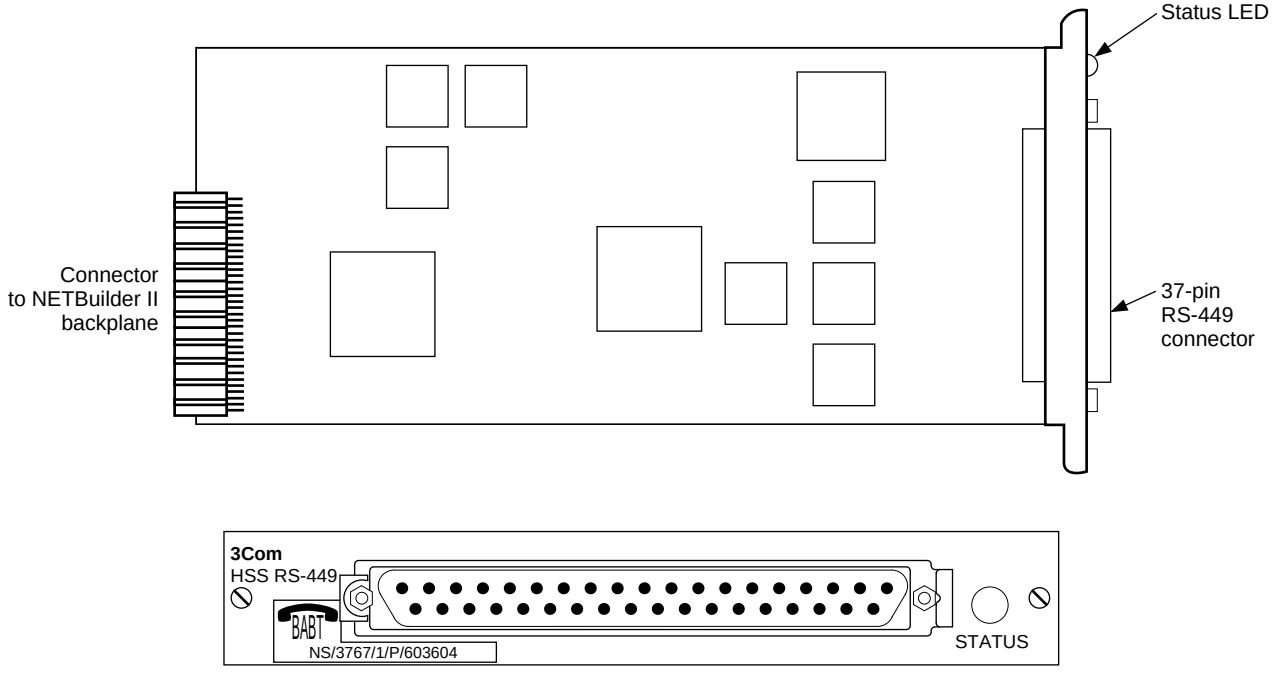


Figure 1-1 HSS RS-449 I/O Module Board and Connector/LED Panel

Table 1-1 and Table 1-2 briefly describe the HSS RS-449 module's internal and external components.

Table 1-1 HSS RS-449 Module External Components

Component	Description
Interface board	HSS RS-449 interface board with its own bus
I/O bus interface and connectors	Includes the connector, miscellaneous discretes, and the core memory peripheral interface (CMPI)
Line interfaces and connectors	Supports RS-449 interface with a 37-single-pin connector
LED	Indicates startup, operational, and self-test diagnostic status

Table 1-2 HSS RS-449 Module Internal Components

Component	Description
Core memory peripheral interface (CMPI)	Interfaces between the controller and the NETBuilder II backplane
Controller	Provides the basic data link controller functions
Electrically erasable programmable read-only memory (EEPROM)	Contains status and configuration information
Soft-start circuit	Supports the hot-swap feature (described in Table 1-4).

Status LED

The HSS RS-449 has one tricolor LED that indicates STATUS. The LED is located on the HSS RS-449 module's connector/LED panel. Table 1-3 lists the different states of the STATUS LED and their meanings.

Table 1-3 HSS RS-449 Module STATUS LED States

LED	State	Normal Behavior	Indicates
STATUS	Off	Off	Module is not functioning; it is either disabled or there is no power to the system
	Red	Off	Error condition
	Green	On continuously	Module is functioning normally
	Yellow	Off	Module is in self-test mode

Serial Interface Connector

The HSS RS-449 module's back panel has one connector for access to the modem or data service unit (CSU/DSU) interfaces. Cabling and pin assignments for an RS-449 interface (X.21 or RS-530) are described in Chapter 2, *Installation*.

Figure 1-2 shows an example of a typical HSS RS-449 and NETBuilder II network using RS-449 connections.

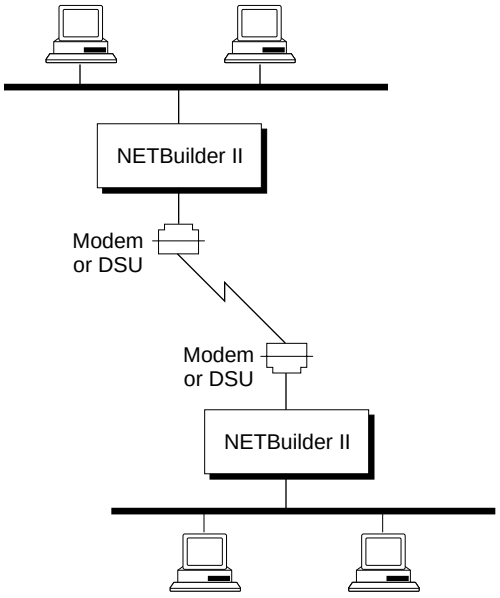


Figure 1-2 Typical HSS RS-449 and NETBuilder II Network

HSS RS-449 Module Features

Table 1-4 summarizes the HSS RS-449 module features.

Table 1-4 HSS RS-449 Module Features

Feature	Summary
Hot-swap capability	Allows you to install or remove and reinstall an HSS RS-449 module without powering down the NETBuilder II base system.
Cable support	Supports RS-449; user-provided cables required to support X.21 and RS-530 interfaces.
Line speeds	Range: 9.6 kbps to 9.2 Mbps.
Clocking	Internal or external.
Interface	RS-449.
Self-test and diagnostic capability	Monitors network and signals status via the LED.
Accessible information on the EEPROM	Provides HSS RS-449 module product information that can be accessed via the monitor utility. Refer to the *NETBuilder II Base System Installation Guide* for details on accessing HSS RS-449 module EEPROM information.

Line speeds, clocking, and interfaces are selected via software. Refer to the manuals that shipped with your product.

2 INSTALLATION

This chapter describes how to install the HSS RS-449 module into the NETBuilder II base system.

Before Installing the Module

Before you install the module, follow these preliminary steps:

1 Observe appropriate electrostatic discharge (ESD) precautions.

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 HSS RS-449 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 HSS RS-449 module in static-protective packaging.
- Observe proper grounding techniques when handling the HSS RS-449 module. These techniques include using a foot strap and grounded mat, or wearing a grounded static discharge wrist strap.

2 Inspect the HSS RS-449 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 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 labeled HSS RS-449.

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

4 Write down the serial number and the MAC address from the labels on the component side of the HSS RS-449 board (see Figure 2-1).

Serial number example: S/N:1AJ12345

MAC address example: 080002 1A4B5C

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

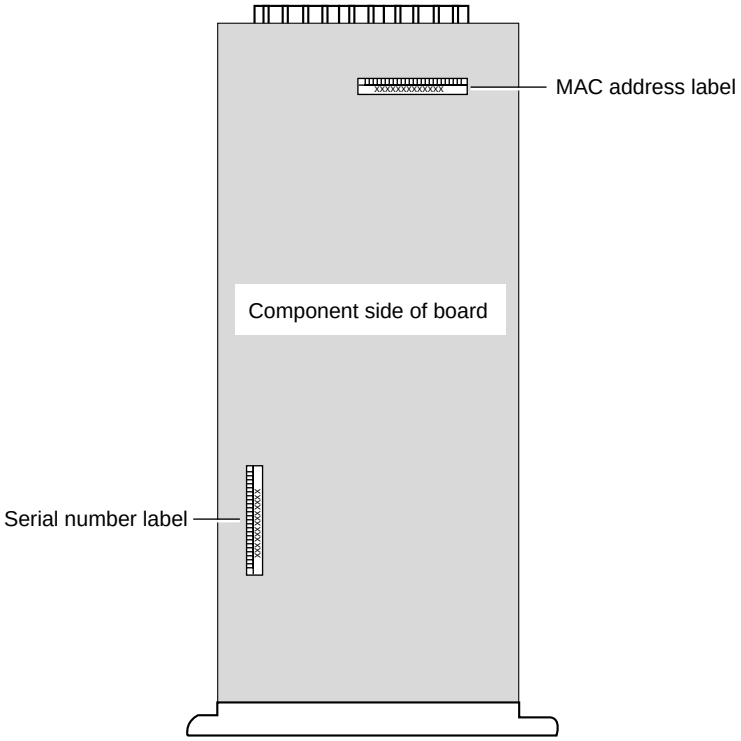


Figure 2-1 Serial Number on the HSS RS-449 Module

To access this information, use the monitor utility. The MAC address is also encoded in the HSS module's EEPROM. Refer to the *NETBuilder II Base System Installation Guide* for instructions on accessing the MAC address encoded in the EEPROM.

5 Verify that you have the appropriate serial interface cable and connector (RS-449, RS-530, or X.21) for connecting the HSS RS-449 module to the serial device.

6 Select the slot for the HSS RS-449 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.

7 Using a flathead screwdriver (if necessary), remove the blanking plate from the selected I/O slot for the HSS RS-449 module (see Figure 2-2).

a Loosen the captive screws.

b Push the ejector clips apart and slide the blanking 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.*

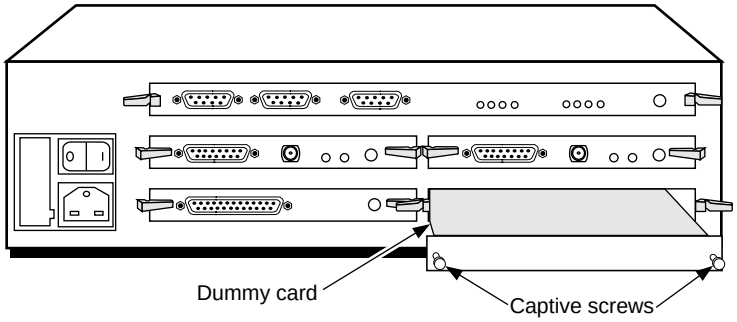


Figure 2-2 Removing a Blanking Plate

All NETBuilder II chassis are shipped with two open slots. 3Com recommends that you use these open slots for your first installations. Leave the other blanking plates in place until the slots are needed for additional module installation.

Once you have performed all the preinstallation steps, you are ready to install the HSS RS-449 module.

Installing the HSS RS-449 Module

Complete HSS RS-449 module installation involves inserting the module into the NETBuilder II base system to connect with the backplane, then connecting to the network.

Inserting the HSS RS-449 Module

Insert the HSS RS-449 module by performing the following steps:

1. Insert the HSS RS-449 module into the uncovered I/O slot.
   - **a** Make sure the slot ejector handles are in an open position, as shown in Figure 2-3.
   - **b** With the connector end toward the backplane and the board panel facing you, grasp the left and right sides of the 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 board in until the I/O panel edges just engage with the notches in the ejector handles.
2. 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 2-3 shows ejector handles in open and closed positions.

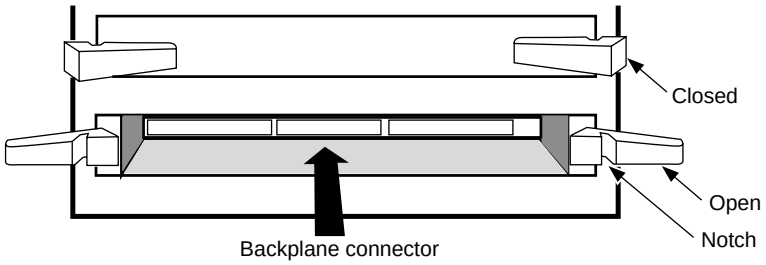


Figure 2-3 View of Open and Closed I/O Slot Ejector Handles

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

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

3 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 2-4).

4 Use your fingers to attach the two captive screws, then 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.

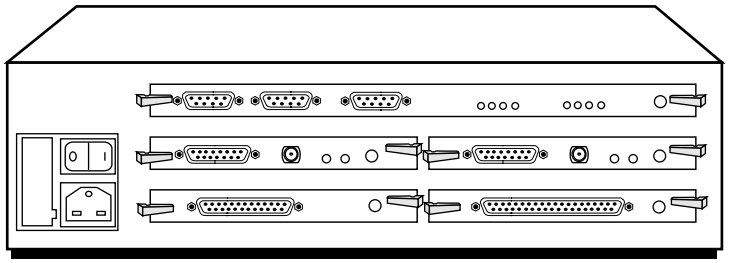


Figure 2-4 HSS RS-449 Module Board Installed

Connecting the Module to a Modem or Serial Device

To connect the HSS RS-449 module to the network, connect the appropriate cable from the modem or serial device to the HSS RS-449 module connector (Figure 2-5).

CAUTION: *To eliminate cable noise emission in excess of FCC regulations, Part 15, subpart J, and 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.*

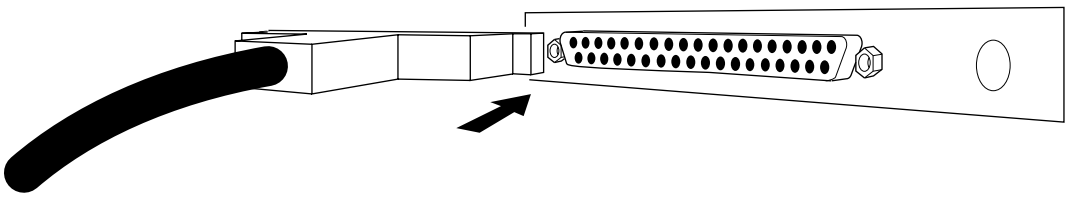


Figure 2-5 HSS RS-449 Cable Connection to 37-Pin Connector Port

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.

Connecting the Module with an X.21 Adapter Cable

The RS-449 cable connects the NETBuilder II HSS RS-449 DTE connector to an X.21 DCE device.

Table 2-1 describes the pin assignments for connecting an RS-449 37-pin female "D" connector and an X.21 15-pin male "D" transition cable.

Table 2-1 RS-449 37-pin and X.21 15-pin Adapter Cable Pinouts

RS-449			X.21	
Dir	**Name**	**Pin**	**Pin**	**Name**
	Shield	1	1	Shield
—>	SDA	4	2	TX Data A
	SDB	22	9	TX Data B
<—	RDA	6	4	RX Data A
	RDB	24	11	RX Data B
<—	STA	5	6	Clock A
	RTA	8		
<—	STB	23	13	Clock B
	RTB	26		
—>	RSA	7	3	Control A
	RSB	25	10	Control B
<—	RRA	13	5	Indicate A
<—	RRB	31	12	Indicate B
	SG	19	8	Zero volts

X.21 European Connector Compliances

For installations where compliance to the European standard NET 1 is required, the X.21 connector used to construct the RS-449-to-X.21 conversion cable should be an ISO 4903 connector. In addition, for compliance in Austria, Denmark, Finland, Germany, and the United Kingdom, M3-threaded, attaching screws should be used with this connector.

Connecting the Module with an RS-530 Adapter Cable

Table 2-2 describes the pin assignments for connecting an RS-449 37-pin female "D" connector and an RS-530 male transition cable.

Table 2-2 RS-449 37-pin and RS-530 Adapter Cable Pinouts

RS-449			RS-530		
Name	**Mnemonic**	**Pin**	**Pin**	**Mnemonic**	**Name**
Shield	–	1	1	–	Shield
Send Data	SDA	4	2	BA (A)	Transmitted Data
	SDB	22	14	BA (B)	
Receive Data	RDA	6	3	BB (A)	Received Data
	RDB	24	16	BB (B)	
Request to Send	RSA	7	4	CA (A)	Request to Send
	RSB	25	19	CA (B)	
Clear to Send	CSA	9	5	CB (A)	Clear to Send
	CSB	27	13	CB (B)	
Data Mode	DMA	11	6	CC (A)	DCE Ready
	DMB	29	22	CC (B)	
Terminal Ready	TRA	12	20	CD (A	DTE Ready
	TRB	30	23	CD (B)	
Signal Ground	SG	19	7	AB	Signal Ground
Receiver Ready	RRA	13	8	CF (A)	Received Line
	RRB	31	10	CF (B)	Signal Detector
Send Timing	STA	5	15	DB (A)	Transmit Signal
	STB	23	12	DB (B)	Element timing (DCE source)
Receive Timing	RTA	8	17	DD (A)	Receiver Signal
	RTB	26	9	DD (B)	Element Timing (DCE source)
Terminal Timing	TTA	17	24	DA (A)	Transmit Signal
	TTB	35	11	DA (B)	Element Timing (DTE source)

Use this cable to connect the NETBuilder II HSS RS-449 DTE to an RS-530 DCE device.

The cable should have a female 37-pin connector at one end and a 25-pin male connector at the other. The 25-pin male cable end will then behave like an RS-530 DTE device.

3 TROUBLESHOOTING AND MAINTENANCE

This chapter describes how to troubleshoot and replace the HSS RS-449 module. Malfunctions that can occur include:

- Self-test failure at startup
- Inappropriate network connection (RS-449, X.21, or RS-530)
- Nonfunctional module

The following sections describe the symptoms of malfunctions and the suggested corrective actions 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 All diagnostic displays are located on the monitor. The following self-test failure message appears on the connected terminal monitor:

```
HSS Self-Test - X - Path Failed
```

The value of X can be 1 through 4 or 1 through 8 depending on whether you have a four-port or eight-port NETBuilder II chassis.

Action Remove the RS-449 I/O panel and check for bent pins. Check the backplane slot connection. If you cannot correct the problem, and the module fails after removing and reinstalling it, contact your network supplier for assistance.

Troubleshooting HSS RS-449 Module Failures

The status LED on the connector/LED panel monitors HSS RS-449 module performance and provides feedback for troubleshooting. Refer to Table 1-3 for a complete list of LED operating states. The LED turns green following completion of the self-test during router initialization. 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 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 module's status LED is red.

Action A red 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 that the network you are connected to is operating correctly.
- Check that the connected serial device is operating correctly.
- Check that the HSS RS-449 is operating correctly by using the loopback testing procedure as described in Appendix C.

If none of these actions solve the problem, replace the module and/or contact your network supplier for assistance.

Maintaining the HSS RS-449 Module

This section describes preventive maintenance you can take and how to replace the HSS RS-449 module.

Preventive Maintenance

3Com recommends the following procedures for preventive maintenance:

- Observe the guidelines listed in Appendix A of 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. If mounted on a tabletop, leave at least three inches (7.5 cm) of free space on both sides for air intake and fan exhaust and approximately six inches (15 cm) of free space at the rear for cable clearance. Do not mount the system at an angle greater than 15 degrees in any direction.
- Observe ESD guidelines whenever handling the HSS RS-449 module.

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

Replacing the HSS RS-449 Module

If any component in the HSS RS-449 module fails, you will need to replace the entire module. The HSS RS-449 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 HSS RS-449 module.
2. Loosen the two captive screws securing the module in the slot, by hand or with a flathead screwdriver.

3 Release the ejector handles on both sides of the HSS RS-449 module by pushing the handles apart.

The HSS RS-449 module will disengage from the NETBuilder II backplane and partially eject from the slot.

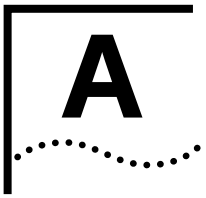
4 Carefully slide the HSS RS-449 module out of the slot.

5 Follow the procedures outlined in Chapter 2 to install a new HSS RS-449 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.*

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

If you want to run parameter settings other than the default settings, you do not need to reconfigure the software before the HSS RS-449 module becomes functional.



SPECIFICATIONS

Table A-1 lists the physical dimensions and operating attributes of the HSS RS-449 module.

Table A-1 Operating Attributes and Physical Dimensions

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 pounds (0.34 kg)
Serial interface	RS-449, X.21, or RS-530
HSS data rate:	
Generating clock rate	Up to 2.048 Mbps
Externally clocked	4.8 kbps – 9 Mbps

Table A-2 lists the maximum current consumption for the HSS RS-449 module.

Table A-2 Maximum Current Consumption

+5 Volts	-5 Volts	+12 Volts	-12 Volts
2.3 amps	0.0 amps	0.0 amps	0.0 amps

B

STARTUP MESSAGES

This appendix describes HSS RS-449 module startup messages (both normal and error) that can appear on the terminal. Only a few messages are specific to the HSS RS-449 module. You can determine HSS RS-449 module status by the STATUS LED on the module's connector/LED panel. Chapter 1, *Overview*, describes the HSS RS-449 STATUS LED.

The NETBuilder II base system's startup terminal messages include a check of the HSS RS-449 system. This section describes only messages specific to the HSS RS-449 module.

HSS Self test X - Successful

Meaning: This message appears if no errors are found in the HSS RS-449 controller tests. The value of X can be 1 through 8, depending on whether you have a 4-Slot or an 8-Slot NETBuilder II chassis.

HSS Self-Test - X - Path Failed

Meaning: This message appears if an error is found in the HSS RS-449 controller tests. The value of X can be 1 through 8, depending on whether you have 4-Slot or an 8-Slot NETBuilder II chassis.

C

LOOPBACK TEST

To run the loopback testing procedures, it is assumed that HSS RS-449 software version 6.0 or higher is installed.

Once you have set up and configured both WAN sites and find that you are unable to establish a connection between the two, complete the following procedures to isolate the problem (refer to Figure C-1 and Figure C-2).

Refer to the *NETBuilder Family Bridge/Router Reference Guide* for the following:

- DLTest command (a loopback mode in the 6.0 driver software)
- HSS software settings
- Internal clock source

Refer to the modem manufacturer's documentation for specific modem settings.

Performing a Local Loopback Test

To conduct a loopback test, complete the following steps:

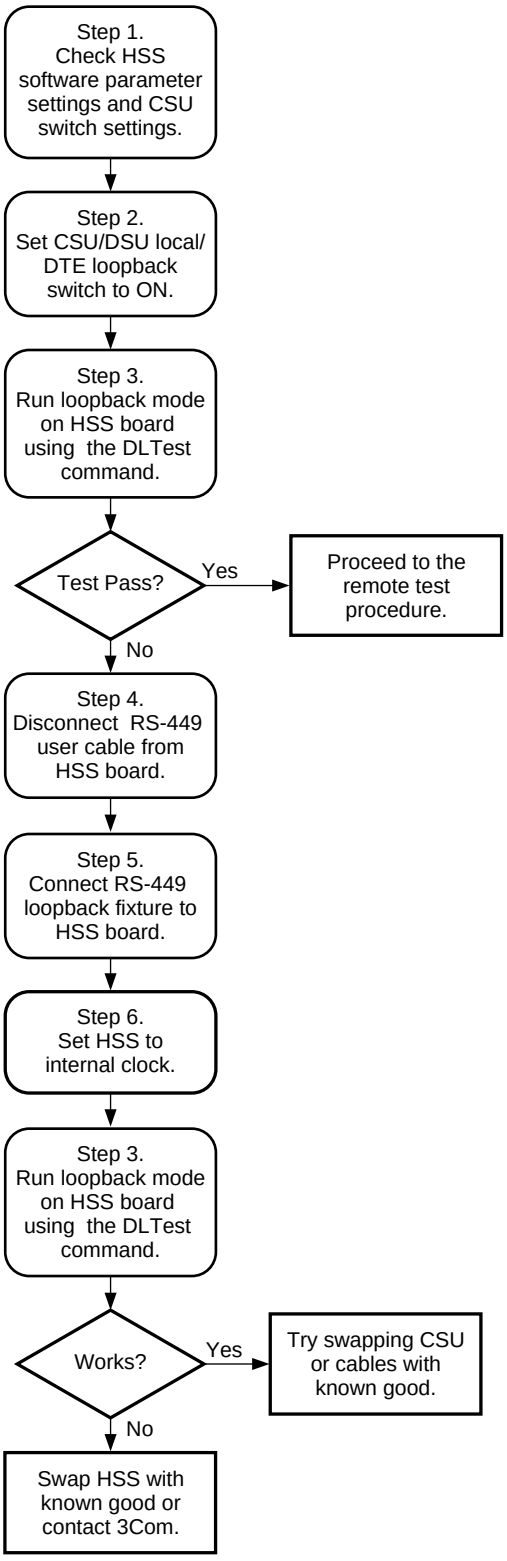


Figure C-1 HSS RS-449 Local Loopback Testing Flowchart

Performing a Remote Loopback Test

To perform a remote loopback test, complete the following steps:

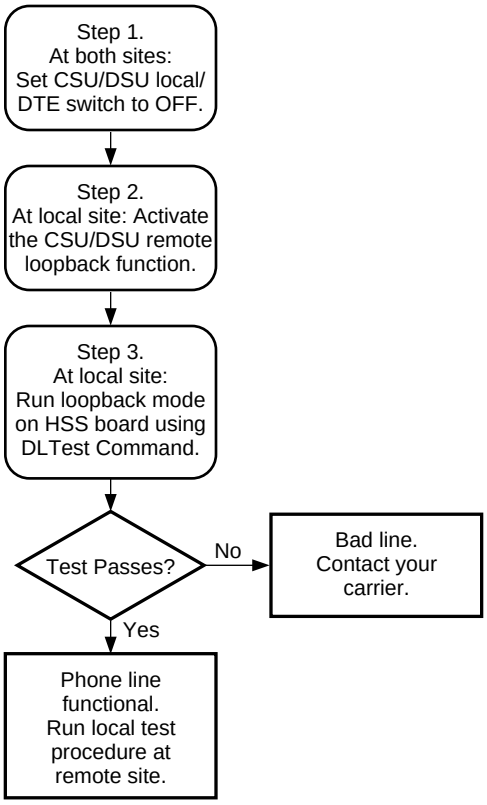


Figure C-2 HSS RS-449 Remote Loopback Testing Flowchart

Making the Loopback Fixture

To make the loopback fixture, complete the following steps:

Instead of making a custom fixture, you may use a break-out box.

1. Obtain a female RS-449 connector.
2. Wire the pins according to Table C-1.

Table C-1 Loopback Pin Assignments

Name	Pin	Name	Pin
TXD +	4	RXD +	6
TXD -	22	RXD -	24
RTS +	7	CTS +	9
RTS -	25	CTS -	27
DTR +	12	DSR +	11
		DCD +	13
DTR -	30	DSR -	29
		DCD -	31
SCT +	5	SCR +	8
SCT -	23	SCR -	26