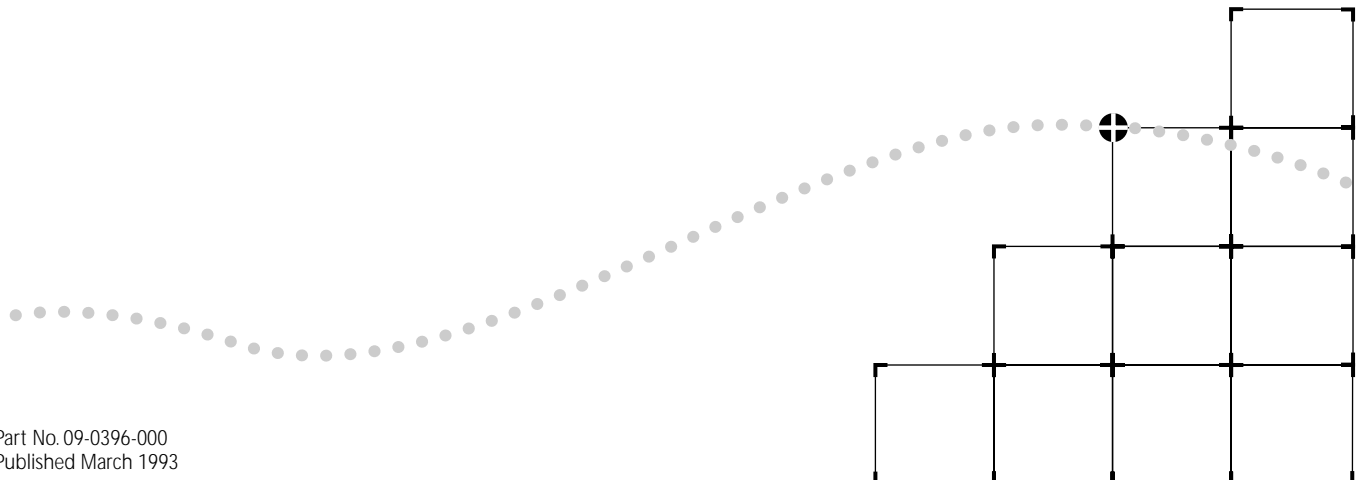




NETBUILDER II[®] HIGH-SPEED SERIAL G.703 MODULE INSTALLATION GUIDE

A member of the NETBuilder family



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 **NOTE:** *The following advice and subsequent warnings are given to satisfy the requirements of the United Kingdom's BABT approval of the NETBuilder II HSS G.703 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, 1989, 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 G.703 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.

 **NOTE:** *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 G.703 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 G.703 port on the HSS G.703 board is defined as a 5c port in accordance with the United Kingdom OfTel specification OTR 001.

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

The frequency 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.

ABOUT THIS GUIDE

Introduction

This guide describes how to install, cable, maintain, and troubleshoot the High-Speed Serial (HSS) G.703 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"	<p>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:</p> <p>Enable RIPIP by using the following syntax:</p> <pre>SETDefault !<port> -RIPIP CONTrol = Listen</pre> <p>In this example, you must supply a port number for !<port>.</p> <p>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:</p> <p>Remove the IP address by entering the following command:</p> <pre>SETDefault !0 -IP NETaddr = 0.0.0.0</pre> <p> 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.</p>
Text represented as screen display	<p>This <code>typeface</code> is used to represent displays that appear on your terminal screen, for example:</p> <pre>NetLogin:</pre>
Text represented as commands	<p>This typeface is used to represent commands that you enter, for example:</p> <pre>SETDefault !0 -IP NETaddr = 0.0.0.0</pre>
Keys	<p>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].</p> <p>If two or more keys are to be pressed simultaneously, the keys are linked with a plus sign (+), for example:</p> <p>Press [Ctrl]+[Alt]+[Del].</p>
<i>Italics</i>	<i>Italics</i> are used to denote <i>new terms</i> or <i>emphasis</i> .

1

OVERVIEW

This chapter describes the High-Speed Serial G.703 (HSS G.703) module for the NETBuilder II base system and provides a brief summary of its features. The HSS G.703 module, as it is referred to in this guide, contains the interfaces to the NETBuilder II, the G.703 service equipment, the functional operating components of the board, and the interfaces to a modem or other serial device.

HSS G.703 Module Description

The NETBuilder II system is a modular internetworking platform. The HSS G.703 module board provides one HSS G.703 interface per module for the NETBuilder II base system.



The HSS G.703 module must be used with NETBuilder software version 6.0 or later.

Board

Figure 1-1 shows the surface of the HSS G.703 module board with the major components and the connector/LED panel with the connectors and the LED indicator lights.

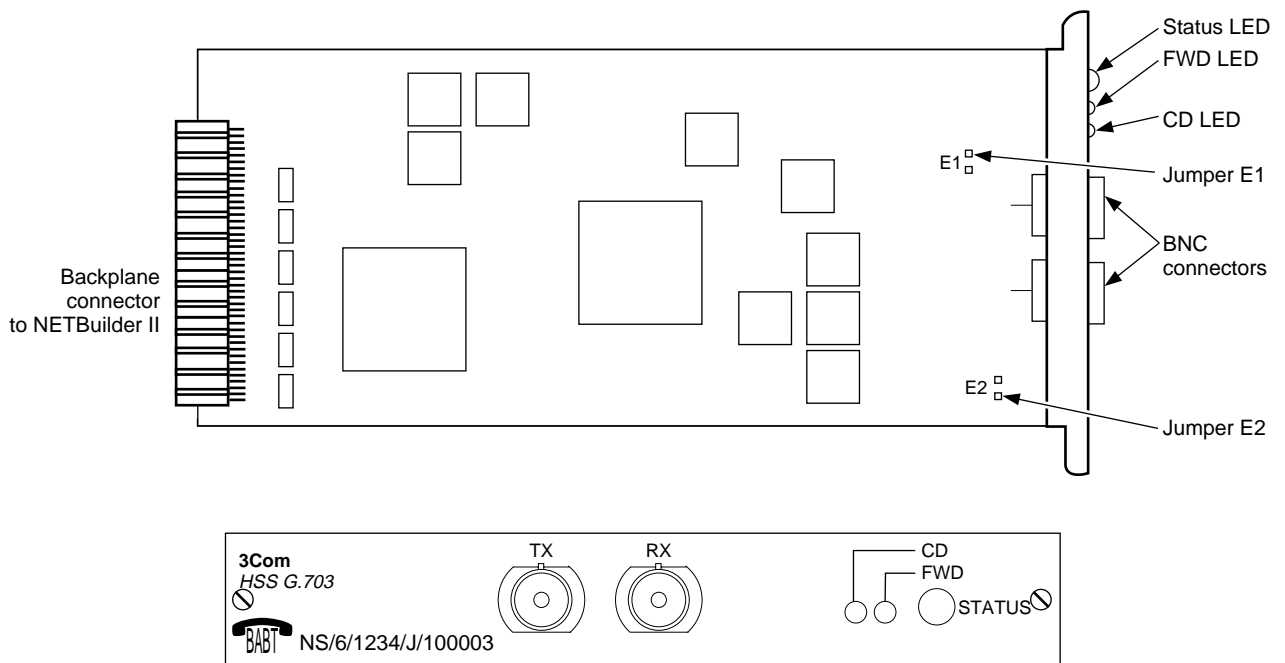


Figure 1-1 Module Board and Connector/LED Panel

Table 1-1 and Table 1-2 briefly describe the HSS G.703 module's internal and external components.

Table 1-1 HSS G.703 Module External Components

Component	Description
CD LED	Indicates acceptable receive signal quality
FWD LED	Indicates transmit data packet forwarded to G.703 line
STATUS LED	Indicates startup, operational, and self-test diagnostic status
Interface board	HSS G.703 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 G.703 interface with dual BNC coaxial connectors

Table 1-2 HSS G.703 Module Internal Components

Component	Description
Channel Service Unit (CSU)	Supports G.703 service attachment
Controller	Provides the basic data link controller functions
Core memory peripheral interface (CMPI)	Interfaces between the controller and the NETBuilder II backplane or core bus
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 LEDs

The HSS G.703 has one tricolor LED (STATUS) that indicates the operations status, and two green LEDs (CD and FWD) that indicate transmit data and receive signal quality. The LED is located on the HSS G.703 module's connector/LED panel. Table 1-3 lists the different LED states and their meanings.

Table 1-3 HSS G.703 Module LED States

LED	State	Indicates
CD	Off	Receive signal is either too low, nonexistent, or noisy so that reception is unacceptable
	Green/On	Receive signal is acceptable
FWD	Off	Transmission is in idle state or module is disabled/inactive
	Green/Flashing	Module is actively sending data packets to the G.703 line
STATUS	Off	Module is not functioning; it is either disabled or there is no power to the system
	Green/On continuously	Module is functioning normally
	Red/Off	Error condition
	Yellow/Off	Module is in self-test mode

Serial Interface Connector

The HSS G.703 module's connector/LED panel has two BNC connectors for access to the G.703 service. The connection is usually made to a network interface unit (NIU). Figure 1-2 shows an example of a typical HSS G.703 and NETBuilder II network.

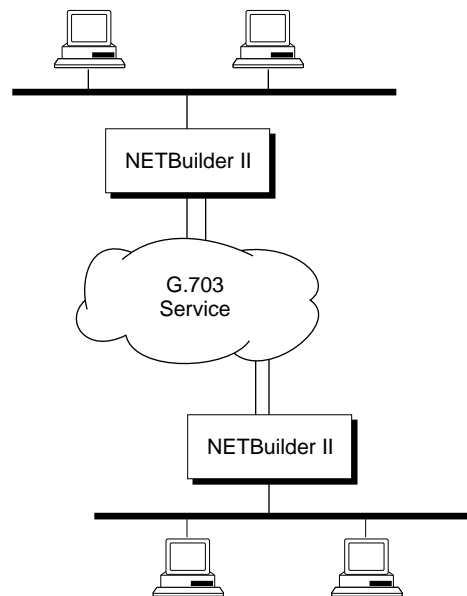


Figure 1-2 Typical HSS G.703 and NETBuilder II Network

HSS G.703 Module Features

Table 1-4 summarizes the HSS G.703 module features.

Table 1-4 HSS G.703 Module Features

Feature	Description
Hot-swap capability	Allows you to install or remove and reinstall an HSS G.703 module without powering down the NETBuilder II base system.
Cable support	Supports user-provided 75-ohm coaxial cable connection for the G.703 service.
Line speed	2.048 Mbps.
Clocking	Internal or external transmit clock; software selectable.
Interface	G.703, unbalanced, unframed.
Self-test and diagnostic capability	Monitors network and signals status via the LEDs: STATUS, FWD, and CD; loopback cable is provided.
Accessible information on the EEPROM	Provides HSS G.703 module product information and repair data that can be accessed via the monitor utility. Refer to the <i>NETBuilder II Base System Installation Guide</i> for details on accessing HSS G.703 module EEPROM information.
Loopback	DTE loopback with external cable (provided). Network loopback available.

2

INSTALLATION

This chapter describes how to install the HSS G.703 module into the NETBuilder II base system.



Refer to the release note for 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 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 G.703 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 G.703 module in static-protective packaging.

Observe proper grounding techniques when handling the HSS G.703 module. These techniques include using a foot strap and grounded mat, or wearing a grounded static discharge wrist strap.

- 2 Inspect the HSS G.703 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 plus a loopback cable.

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 G.703 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.

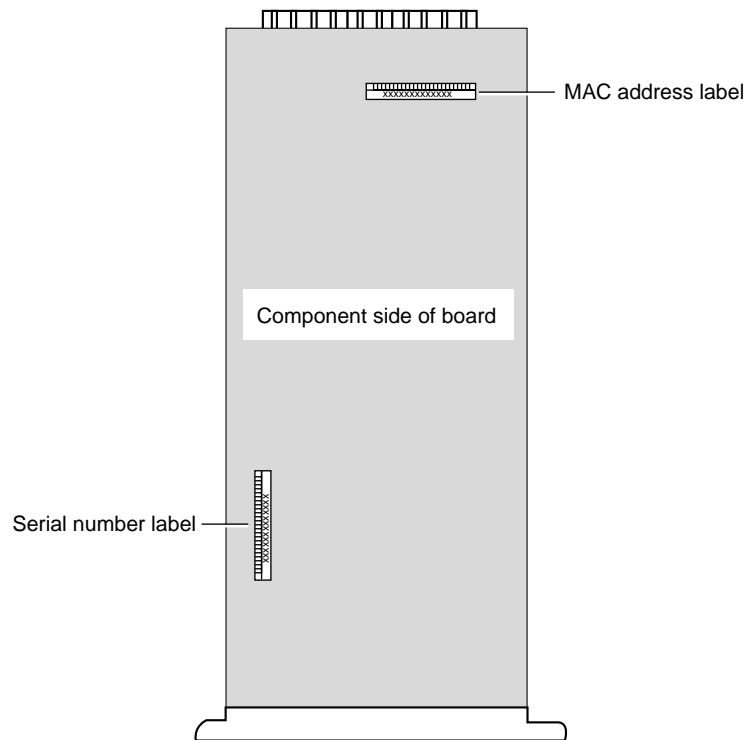


Figure 2-1 Serial Number on the HSS G.703 Module

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 Using a jumper shunt, set jumpers E1 and E2.

When the jumper shunt is installed, the jumper is on; when the jumper shunt is removed, the jumper is off.

These settings depend on the jumper requirements of your local G.703 service provider of your geographical region.



CAUTION: *Jumpers E1 and E2 must be set for your specific locality. Other usage (other jumper settings) invalidates the approvals given to this device if, as a result, it ceases to comply with the regulations of your local G.703 service.*

Jumper E1 connects the receive channel cable shield to earth ground. Jumper E2 connects the transmit channel cable shield to earth ground (see Table 2-1).

Table 2-1 Cable Jumper Settings

Cable	Jumper	Installed	Removed
Receive	E1	Shield connected to earth ground	Shield floating*
Transmit	E2	Shield connected to earth ground	Shield floating*

* Factory default setting.



In general, the CCITT Recommendation G.703 recommends that you tie the transmit cable shield to earth ground (jumper E2 installed), and in some cases you may tie the receive cable shield to earth ground (jumper E1 installed).

For example, it is common in the United Kingdom to have E2 installed and not have E1 installed. For Australia, it is common for both E1 and E2 to be installed. To determine the exact jumper setting contact your service provider.

6 Select the slot for the HSS G.703 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 G.703 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: *Only remove the blanking plate from an I/O slot that will house an I/O module. All unused I/O slots require 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.*

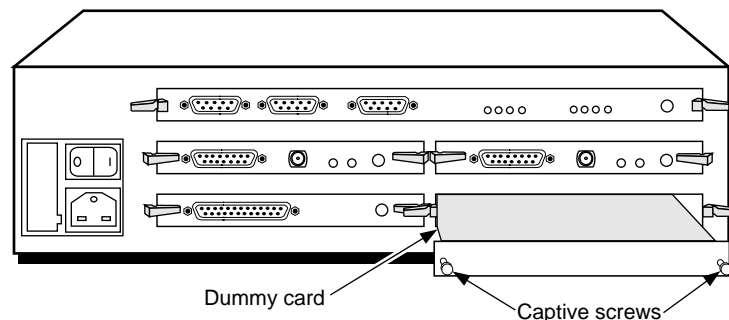


Figure 2-2 Removing a Blanking Plate

Once you have performed all the preinstallation steps, you are ready to install the HSS G.703 module.

Installing the HSS G.703 Module

Complete HSS G.703 module installation involves inserting the module into the NETBuilder II base system to connect with the backplane, and then connecting to the network.



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.

Inserting the Module Insert the HSS G.703 module by performing the following steps:

- 1 Insert the HSS G.703 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 backplane-connector end toward the backplane and the LED 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 backplane-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 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.

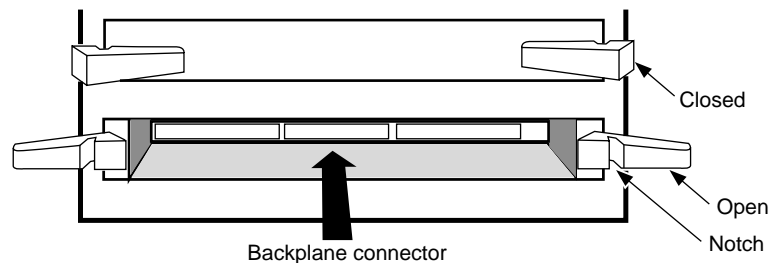


Figure 2-3 View of Open and Closed I/O Slot Ejector Handles

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).

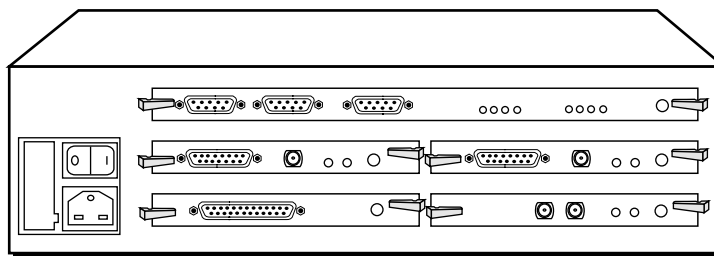


Figure 2-4 HSS G.703 Module Board Installed

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

Connecting the Module to the G.703 Service

The interface operates electrically as a DTE attached to a CSU.

The cables for the G.703 interface use BNC connectors. The cable and connectors must have a 75-ohm impedance.



The maximum attenuation of the G.703 connecting cable must not exceed 6 dB when measured at 1024 kHz. The frequency attenuation characteristic of the cable should follow a root f law.

To connect the HSS G.703 module to the network:

- Connect the appropriate cables from the G.703 system to the HSS G.703 module TX and RX connectors (see Figure 2-5).

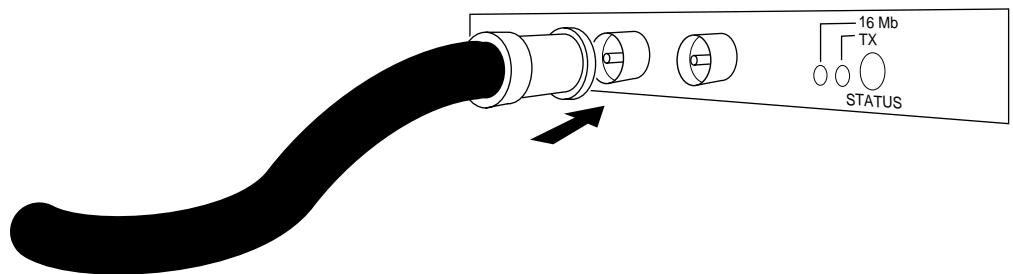


Figure 2-5 HSS G.703 Cable Connection to BNC Connector Ports

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.

3

TROUBLESHOOTING AND MAINTENANCE

This chapter describes how to troubleshoot and replace the HSS G.703 module. Malfunctions that can occur include:

- Self-test failure at startup
- Inappropriate network connection (TX to RX)
- Nonfunctional module

The following sections describe the symptoms of malfunctions and suggest the corrective actions.

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 - Failed - Path X
```

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 HSS G.703 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 G.703 Module Failures

The STATUS LED on the connector/LED panel monitors HSS G.703 module performance and provides feedback for troubleshooting. Refer to Table 1-3 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 module's STATUS LED is red.

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

- Make sure that the loopback cable is NOT installed.
- Check that the NETBuilder II base system is operating correctly.
- Check that the network you are connected to is operating correctly.
- Check that the HSS G.703 is operating correctly by using the loopback testing procedure (see Appendix C, *Loopback Test*).

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

Symptom The network is not working; FWD LED is off; and the STATUS LED is green. No data is being sent over the G.703 link to the remote.

Action Check the system configuration to see if the data is being forwarded or enabled to the HSS G.703 module. FWD LED flashes momentarily green to indicate traffic activity.

Symptom The network is not working; the CD LED is off; and the STATUS LED is green. The receive signal is nonexistent or of unacceptable quality.

Action

- Check the cabling for misconnections (switched cables) or breaks.
- Ensure usage of 75-ohm cables and connectors.
- Check remote stations for the proper installation and configuration.
- Check the G.703 service for correct operation and configuration (refer to Appendix C, *Loopback Test*, for the network loopback procedure).

Maintaining the HSS G.703 Module

This section describes preventive maintenance you can take and how to replace the HSS G.703 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 and cooling. 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 G.703 module.

Refer to the *NETBuilder II Base System Installation Guide* for additional preventive maintenance tips.

Replacing the HSS G.703 Module

If any component in the HSS G.703 module fails, you will need to replace the entire module. The HSS G.703 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 G.703 module and remove any cable strain relief bracket (you do not have to remove the bracket itself).
- 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 G.703 module by pushing the handles apart.

The HSS G.703 module will disengage from the NETBuilder II backplane and partially eject from the slot.

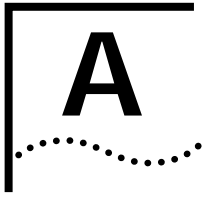
- 4 Carefully slide the HSS G.703 module out of the slot.
- 5 Follow the procedures outlined in Chapter 2 to install a new HSS G.703 module.



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 you can add, remove, or replace the HSS G.703 module while the NETBuilder II system is operating, you may need to reconfigure the software or restart the system before the HSS G.703 module becomes functional.



SPECIFICATIONS

Table A-1 lists the physical dimensions and operating attributes of the HSS G.703 module.

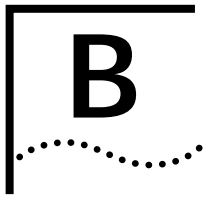
Table A-1 Operating Attributes and Physical Dimensions

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 lbs (0.34 kg)
Serial interface	CCITT G.703
HSS data rate	2.048 Mbps (full duplex)

Table A-2 lists the maximum current consumption for the HSS G.703 module.

Table A-2 Maximum Current Consumption

+5 Volts	-5 Volts	+12 Volts	-12 Volts
0.8 amp	0.0 amp	0.0 amp	0.0 amp



STARTUP MESSAGES

This appendix describes HSS G.703 module startup messages (both normal and error) that can appear on the display of the terminal, which is attached to the console port on the main processor module's connector/LED panel.

Only a few messages are specific to the HSS G.703 module. You can determine HSS G.703 module status by the STATUS LED on the module's connector/LED panel. Chapter 1, *Overview*, describes the HSS G.703 LEDs.

The NETBuilder II base system's power-on terminal messages include a check of the HSS G.703 system. This section describes only messages specific to the HSS G.703 module.

HSS Self-Tests - Initiated - Path X

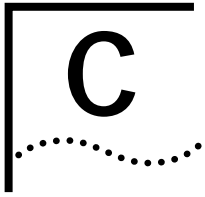
Meaning: This message appears when the HSS G.703 controller tests are initiated. The value of X can be 1 through 4 or 1 through 8 depending on whether you have a 4-Slot or 8-Slot NETBuilder II chassis.

HSS - Self-Tests Passed - Path X

Meaning: This message appears if no errors are found in the HSS G.703 controller tests. The value of X can be 1 through 4 or 1 through 8 depending on whether you have a 4-Slot or 8-Slot NETBuilder II chassis.

HSS - Self-Tests Failed - Path X

Meaning: This message appears if an error is found in the HSS G.703 controller tests. The value of X can be 1 through 4 or 1 through 8 depending on whether you have a 4-Slot or 8-Slot NETBuilder II chassis.



LOOPBACK TEST



To run the loopback testing procedures, it is assumed that HSS-G.703 software version 6.0 or higher is installed.

This appendix explains the procedures for local loopback and network loopback testing.

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 procedures listed below to isolate the problem. Refer to the flowchart shown in Figure C-1.

Performing a Loopback Test

To conduct a loopback test, complete the following steps at both sites (refer to the flowchart shown in Figure C-1).

- 1 Set the local HSS board to internal clock source.
For HSS settings, refer to the *NETBuilder Family Bridge/Router Guide*.
- 2 Disconnect the line cables from the local HSS G.703.
- 3 Connect one end of the provided coax loopback cable to the TX connector of the local HSS board; then connect the other end of the cable to the RX connector of the local HSS board.
- 4 Run the loopback testing procedure using the DLTest command as described in the *NETBuilder Family Bridge/Router Reference Guide*.

If the the loopback test fails, the problem is in the local HSS G.703 module. Contact your network supplier.

If the test passes, the problem is in the line; Contact your phone carrier.

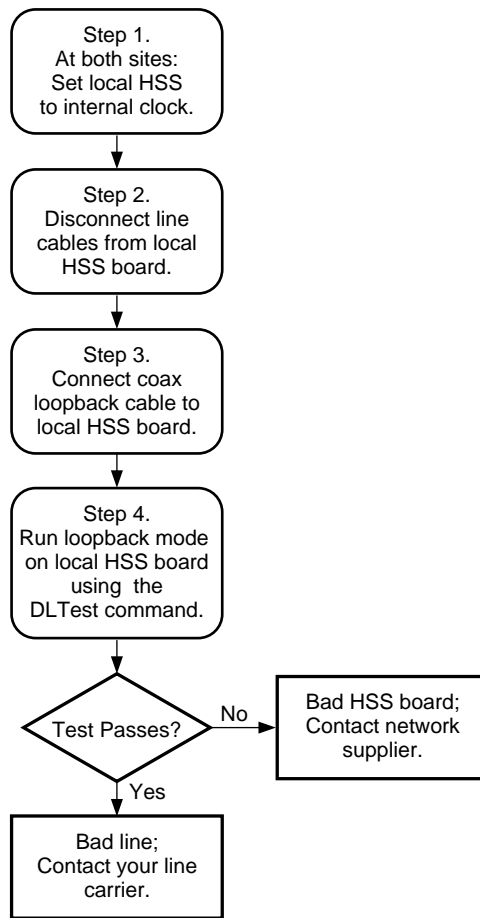


Figure C-1 HSS G.703 Troubleshooting Procedures