ST01™ SCSI TAPE DATA CHANNEL CARD

INSTALLATION GUIDE

EMULEX

ST0150802–00, Rev A
June 1991

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WARNING: This equipment generates, uses, and can radiate radio frequency energy. If it is not installed and used in accordance with the instruction manual, it may cause interference to radio communications. This equipment has been type tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of the Federal Communications Commission (FCC) Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

Shielded cables must be used between the board and attached peripherals to prevent radio frequency interference from this source.

The above statement applies to products marketed in the U.S.A.

WARNING: This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications.

The above statement applies to products marketed in Canada.

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Printed in U.S.A.

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EMULEX STATEMENT OF WARRANTY

Effective: October 15, 1990

BASIC WARRANTY - In the absence of any optional warranty or continuing provisions extended by formal agreement, Emulex warrants its products in accordance with the schedules listed below.

CONTROLLERS - DATA COMMUNICATIONS PRODUCTS - Emulex warrants for a period of five (5) years from the date of shipment, that each product shall be free of defects in material and workmanship. These products include all disk and tape controllers, communication multiplexers, and communication servers.

SUBSYSTEMS - Emulex warrants for a period of twelve (12) months from the date of shipment, that each product shall be free of defects in material and workmanship. These products include magnetic disk and tape drives.

SOFTWARE WARRANTY - Emulex warrants for a period of ninety (90) days, from the date of shipment, that each software package supplied shall be free from defects and shall operate according to Emulex specifications under those Digital Equipment Corporation (DEC), IBM, Intel, and Unix, operating system versions supported by Emulex. Emulex does not warrant its software products under any operating system that has not been specifically identified. This warranty covers distribution media only; it does not cover on-site installation or integration.

MEDIA WARRANTY - Emulex warrants all media to be free of defects in material for a period of thirty (30) days from date of shipment.

CABLE WARRANTY - All Emulex-provided cables are warranted for ninety (90) days from date of shipment.

WARRANTY PROCEDURES - Warranty claims must be received by Emulex within the applicable warranty period. During the warranty period, if the customer experiences difficulties with an Emulex product and is unable to resolve the problem via phone with Emulex Technical Support, a Return Materials Authorization (RMA) number will be issued. No material will be accepted without an RMA number. The RMA number should be noted on the outside of the package. The customer is responsible for returning the product to Emulex, freight prepaid. Emulex, upon verification of warranty, will, at its option, either repair or replace the product in question, and return it to the customer freight prepaid. A returned product, or part thereof, for which Emulex provides a replacement, shall become the property of Emulex.

In the event product(s) returned under the provisions of this Warranty are subsequently determined by Emulex to be functionally operational and in accordance with its published specifications, i.e. "No Defect Found" (NDF), Purchaser will be charged an NDF fee and the product shall be returned to Purchaser freight collect.

ON-SITE SERVICES ARE NOT INCLUDED AS A PART OF THESE WARRANTIES.

GENERAL TERMS - The above warranties shall not apply to expendable components such as fuses, bulbs, and the like, nor to connectors and other items not a part of the basic product. Nor does the foregoing warranty extend to experimental or developmental products, or to products that have been subject to misuse, neglect, accident, improper media usage or abuse; have been improperly wired, repaired, or altered by anyone other than Emulex; have been used in material violation of Emulex's operating instructions; or have had their serial numbers removed, defaced or altered. Emulex shall have no obligation to make repairs or to provide replacement for normal wear and tear, or necessitated in whole or in part by catastrophe, fault or negligence of the user; or improper or unauthorized use of the product; or use of the product in a manner for which it was not designed; or by causes external to the product, such as, but not limited to, power failure or air conditioning malfunction. Emulex's sole obligation hereunder shall be to repair or replace items covered under the above warranties. Purchaser shall provide for removal of the defective product, shipping charges for return to Emulex, and installation of its replacement. Above warranties are subject to change without notice.

THE EXPRESSED WARRANTIES SET FORTH IN THIS AGREEMENT ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND ALL SUCH OTHER WARRANTIES ARE HEREBY DISCLAIMED AND EXCLUDED BY EMULEX. THE STANDARD EXPRESSED WARRANTIES ARE IN LIEU OF ALL OBLIGATIONS OR LIABILITIES ON THE PART OF EMULEX FOR DAMAGES, INCLUDING BUT NOT LIMITED TO SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THE PRODUCT.

Customer's sole and exclusive remedy for any breach of this warranty, whether in contract, tort, strict liability, or otherwise, shall be Emulex's obligation to repair or replace as set forth above.

Section 1
INTRODUCTION

1.1 Overview

This manual gives the procedure for installing the ST01 in the HSC cabinet and verifying that it is operating properly.

CAUTION! To maintain your warranty, Field Service personnel authorized by Emulex must perform the installation, and must do so according to the procedures given in this manual.

The Emulex ST01 is a combined channel card and formatter that emulates the DEC K.sti tape data channel card and attached TA78 tape formatters. It is intended for use with the DEC HSC40/50/70 mass storage server and the Emulex SS3X or SS4X tape subsystem. The ST01 plugs into a requestor slot of the DEC HSC40, HSC50, or HSC70 (it must receive the lowest priority in the chain).

Internal cabling in the HSC connects SCSI cables from the external transition panel to the backplane for each requestor slot. Externally, each ST01 supports a single bus, which may be either single-ended or differential. Within the HSC cabinet, the ST01 is identified by its requestor slot number. It can support a maximum of eight SCSI addresses, including the requestor.

Certain subsystems, like the Emulex SS3X, can have up to four drives associated with a single SCSI address. Others, like the Emulex SS4X, have one drive per SCSI address. In any configuration, the maximum number of drives is sixteen. Device-type code is TU78.

If there is only one HSC in the configuration, the environment is *single-port* (see Figure 1-1).

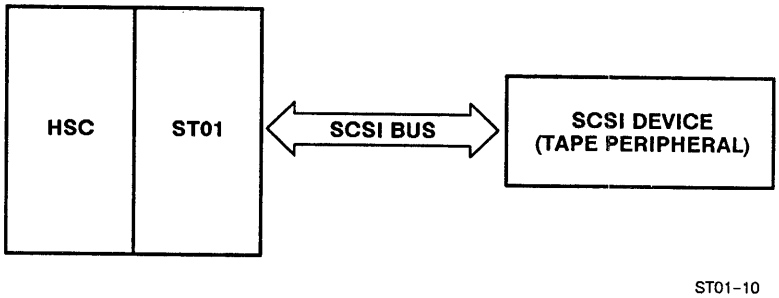

Figure 1-1. The Single-Port Configuration (Logical Block Diagram)

To allow two channels to access the same device, you can set up a *dual-port* environment. In this environment a SCSI bus connects two ST01s in separate HSCs. Figure 1-2 shows the minimal conditions necessary for dual porting.

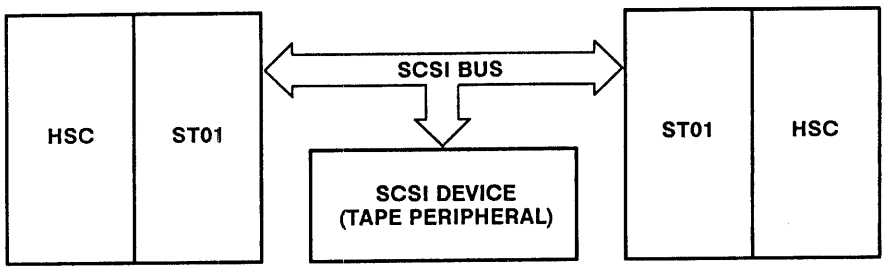

Figure 1–2. Minimum Conditions for Dual Porting (Logical Block Diagram)

ST01 installation requires the following hardware internally in the HSC:

- ST01 Data Channel Card and associated cabling
- Shroud (card guide)
- Paddleboard
- Interface Panel(s)
- Interface Cables

In addition, you will need the ST01 Installation Kit (Emulex P/N ST01-IK). It consists of a test board and grounding cable for shroud alignment as well as this manual.

This manual consists of the following sections:

- **Section 1 (Introduction)** describes the ST01 and the accessories available for it, in addition to listing related (HSC) documentation.
- **Section 2 (Installation)** describes the inspection and unpacking procedures, maintaining FCC compliance, mechanical installation, and automatic power-up self-test. It also introduces the Firmware Resident Utilities (FRU), but for their full description, see the *ST01 Utilities User's Guide.*
- **Section 3 (Operation)** describes HSC diagnostics (ILEXER and ILTAPE), operation, troubleshooting, and service.

The manual concludes with an index of terms and abbreviations.

1.2 Related Documentation

For information about Emulex tape subsystems, see the manuals for the respective subsystems. For the FRU, see the *ST01 Utilities User's Guide* (Emulex P/N ST0150901-00). A glossary at the back of the User's Guide defines some of the terms used in these manuals.

If you wish details about the related DEC diagnostic and utilities protocol, controllers, and tape subsystems, see the following DEC publications:

Storage System Diagnostic and Utilities Protocol, P/N AA-L620A-TK

HSC50/70 Hierarchical Storage Controller
User Guide, P/N AA-GMEAA-TK
Installation Manual, P/N EK-HSC-IN
Service Manual, P/N EK-HSCMA-SV

HSC50 Storage Controller
Installation Manual, P/N EK-HSC50-IN
Service Manual, P/N EK-HSC50-SV

HSC70 Storage Controller
Installation Manual, P/N EK-HSC70-IN
Service Manual, P/N EK-HSC70-SV

1.3 Accessories

Table 1–1 lists the accessories required for installation. They are included with the ST01.

Table 1–1. ST01 Accessories

Model Number	Description
P0005M	RJ12-to-25-pin adapter (male)
P0005F	RJ12-to-25-pin adapter (female)
P0006/25	RJ12 terminal cable, 25-foot (the *ST01 Utilities User's Guide* provides the connector pinout)

Additional cables available from Emulex are described in the Emulex subsystem manual. For ordering information, contact Sales Support as follows:

Emulex Corporation
3545 Harbor Boulevard
Costa Mesa, CA 92626

Telephone: (714) 662-5600
Outside California: (800) EMULEX-3
FAX: (714) 241-0792

Section 2
INSTALLATION

2.1 Overview

This section covers inspection and unpacking, maintaining FCC Class A compliance, HSC installation considerations, mechanical installation, and automatic power-up self-test. It also introduces the HSC diagnostics and Firmware Resident Utilities. The HSC diagnostics are detailed in subsection 3.2. The FRU is detailed in a separate manual (*ST01 Utilities User's Guide*, Emulex P/N ST0150901-00).

2.2 Inspecting and Unpacking the ST01

Emulex products are shipped in special containers designed to provide full protection under normal shipping conditions. Immediately upon receipt, inspect the shipping container for evidence of possible damage incurred in transit. Any obvious damage to the container, or indications of actual or probable equipment damage, should be reported to the carrier company in accordance with instructions on the form included in the container.

Verify that the model or part number (P/N) designation, revision level, and serial numbers agree with those on the shipping invoice and purchase order. Visually inspect the ST01 for bent or broken connector pins, damaged components, or any other visual evidence of physical damage. These verifications are important to confirm warranty. If you find evidence of either physical damage or identity mismatch, notify an Emulex representative immediately.

2.3 Maintaining FCC Class A Compliance

The Federal Communications Commission (FCC) has established technical standards regarding radiation of Electromagnetic Interference (EMI) emitted by computing devices. The ST01 has been type tested and found to comply with the EMI emission limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules.

There is no guarantee that interference will not occur in any particular installation. If the ST01 interferes with radio or television reception, as determined by turning the equipment on and off, take the following measures:

- Reorient the receiving antenna.
- Relocate the compliant subsystem (that contains the ST01) with respect to the receiver.
- Move the compliant subsystem away from the receiver.
- Plug the compliant subsystem into a different outlet so that the subsystem and receiver are on different branch circuits.
- Verify that the mounting screws and grounding wires on the compliant subsystem are tightly secured.

If necessary, consult the dealer or an experienced radio/television technician for additional suggestions. You may find the following FCC booklet helpful: *How to Identify and Resolve Radio-TV Interference Problems,* Stock No. 004-000-00345-4, U.S. Government Printing Office, Washington, D.C. 20402.

2.4 HSC Installation Considerations

The ST01 does not require the HSC to have any additional shielding, site preparation, or power beyond the HSC requirements. Like any data channel card, it must have a slot available. If adding an ST01 takes the HSC beyond its number of available slots, you will need an upgrade kit from DEC.

For the HSC40 this upgrade kit consists of power supply, firmware, and HSC70 logo. It upgrades the HSC40 to an HSC70, with the capacity for eight data channel cards. You can upgrade the HSC50 as well. It has slots for six data channel cards, but if you wish to fill more than three of them, you will need an upgrade kit (power supply) from DEC.

2.5 The Mechanical Installation Procedure

CAUTION! To foresee possible pitfalls, read the entire manual before beginning the installation. Observe proper anti-static grounding procedures: use a grounded wrist strap, and remove wristwatch and rings. To avoid possible damage to the circuitry, power down the HSC by switching OFF the power switch before inserting or removing cards. The installation is sensitive; *be careful not to bend pins or break connections.*

The mechanical installation procedure requires a flashlight. The following subsections detail the procedure.

2.6 Selecting a Slot at the Front of the HSC

Select a slot for the ST01; an ST01 must have a priority lower than any other type of disk or tape requestor. A label on the shield above the HSC backplane identifies the requestor number *(Req)* of each slot (see Figure 2–1).

If another channel card is already installed in the slot with the lowest number, you must move both it and its associated cabling so that you can install the ST01 in the slot with the lowest requestor number. Emulex recommends installing ST01s beginning with requestor number 2 and proceeding upward.

2.7 Installing the Hardware at the Rear of the HSC

The following subsections detail the procedures for installing the Emulex shroud, paddleboard, and mounting bracket with its interface panel(s) and associated cabling for the HSC40/70 and HSC50, respectively. Subsection 2.7.1 covers the HSC40/70, and subsection 2.7.2 covers the HSC50.

2.7.1 Installing the Hardware at the Rear of the HSC40/70

To install the Emulex hardware at the rear of the HSC40/70, perform the following procedure:

1. Open the rear of the HSC. To enable removal of the exhaust duct, see Figure 2–1 and disconnect the following:
   a. Quick-release latch, located on the right side of the exhaust duct
   b. Two quarter-turn fasteners located inside the exhaust duct lid
   c. Air-flow sensor power connector
2. Taking care not to damage the DEC CI cables, remove the exhaust duct.

   CAUTION! In some configurations, you may have to remove the upper section of the HSC transition panel and/or the CI cable transition panel. Use caution when removing these panels and their associated cabling. The CI cables are fragile and they are in the path of the exhaust duct as you remove it from the cabinet. Do not stress the internal cabling. Mark the location of cables so you can reassemble them correctly.

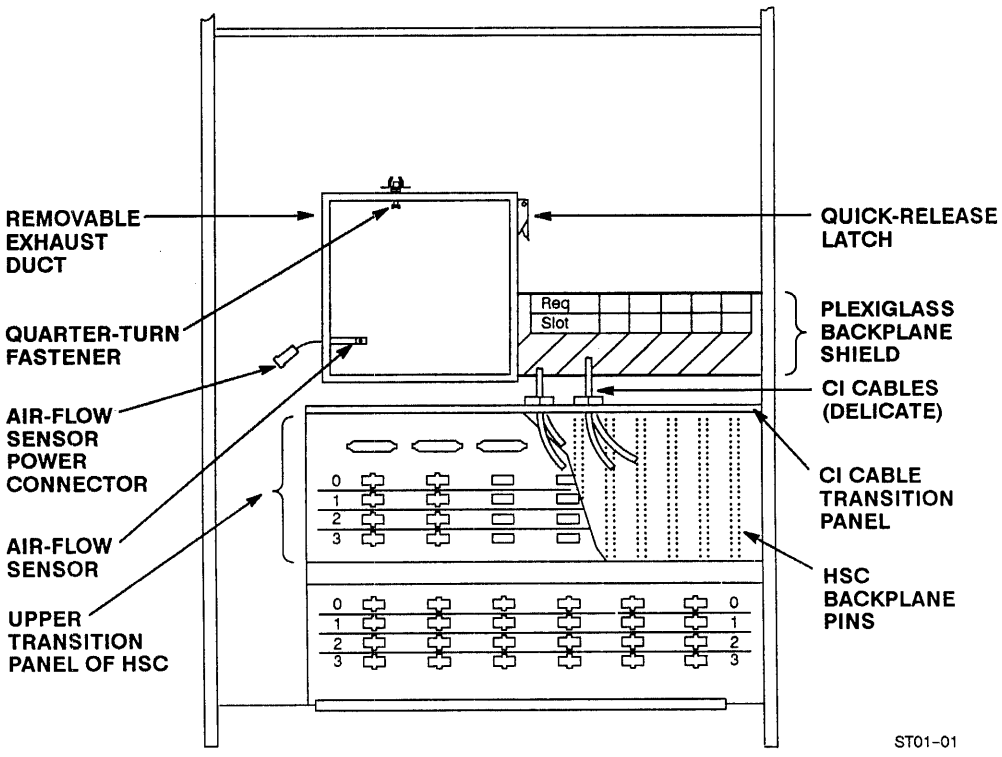

Figure 2–1. The Open HSC40/70 Cabinet (Rear View)

3. Remove the existing DEC SDI/STI cable from the selected slot. Wrap the cable end with insulating tape to prevent inadvertent short circuits. Fold it back to keep it out of the way.

4. Remove the DEC shrouds (connector shells), carefully, with needlenose pliers. Alternate between pulling the top and bottom of the DEC shrouds in order to remove them without bending or breaking any pins.

5. Making sure that the top two pairs of pins on the HSC backplane (four pins in all) do not enter the Emulex shroud, install the Emulex shroud onto the rows of pins from which you removed the DEC cables (see Figure 2–2). With proper pin alignment, the shroud should slide onto the backplane easily. If it does not, remove the shroud, and check the pin alignment.

6. Once the Emulex shroud is installed, use your flashlight to look inside it and make sure that one, and only one, pin protrudes through each of its holes.

CAUTION! Failure to align the shroud properly will damage the backplane, and may damage the HSC as well.

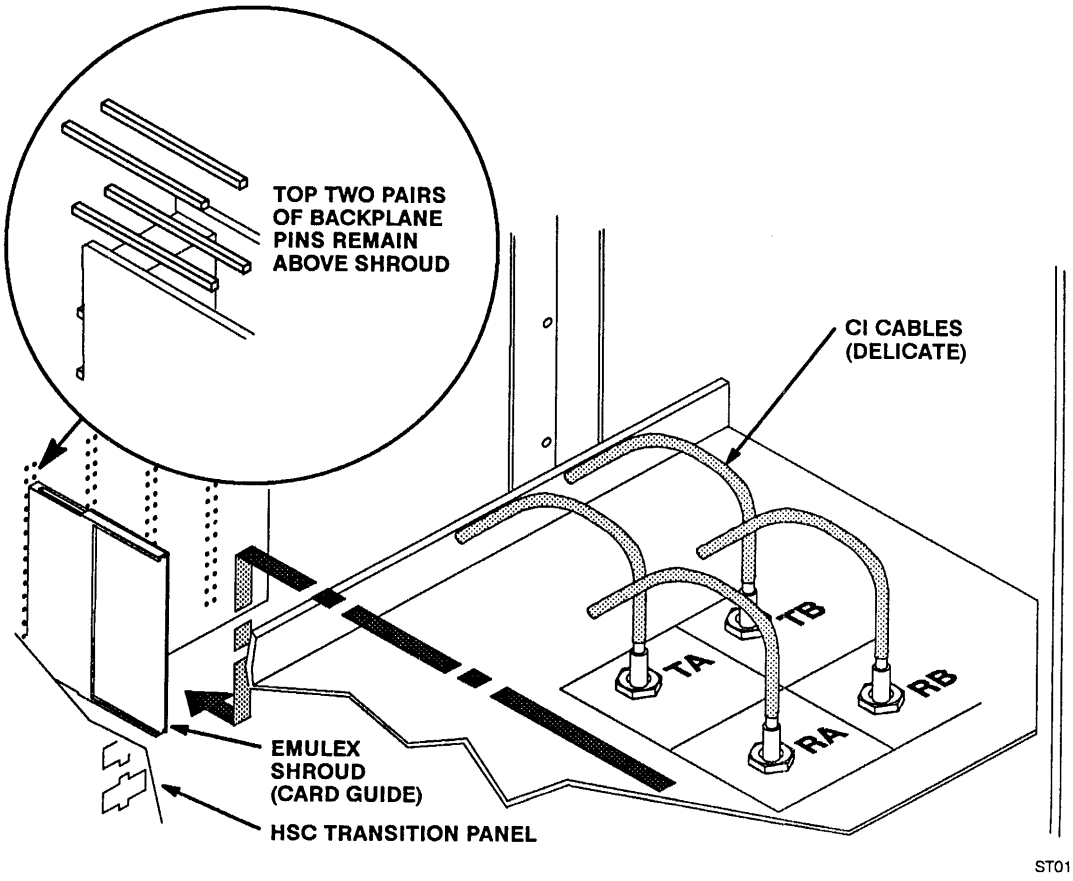

Figure 2–2. Installing the Emulex Shroud in the HSC40/70

7. Slide the test board into the shroud (see Figures 2–3 and 2–4) (the Installation Kit, available from Emulex, includes a test board, with grounding cable, to verify correct alignment of the shroud).

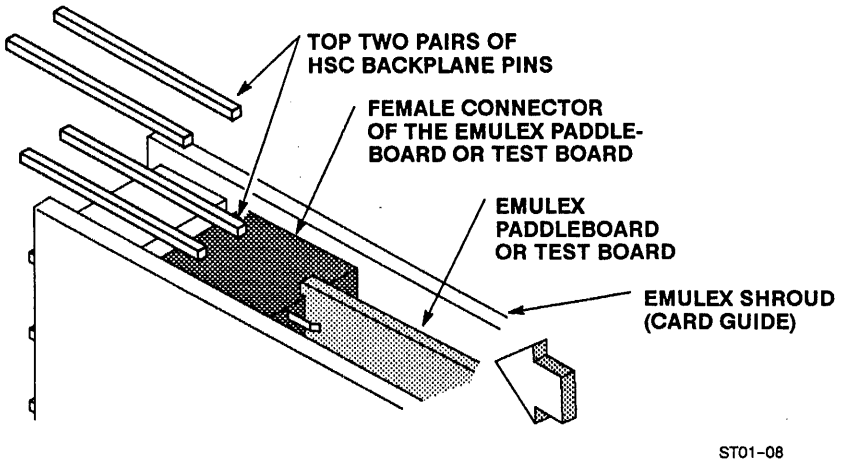

Figure 2–3. Sliding the Test Board or Paddleboard into the Shroud

8. Use the grounding cable from the Installation Kit to connect the test point (TP1) at the top of the test board to the HSC chassis (see Figure 2–4).
9. Apply power to the HSC. A properly installed shroud is indicated by the lighting of the three green pass LEDs (LEDs 5-7) on the test board (see Figure 2–4). No other LEDs on the test board should light.

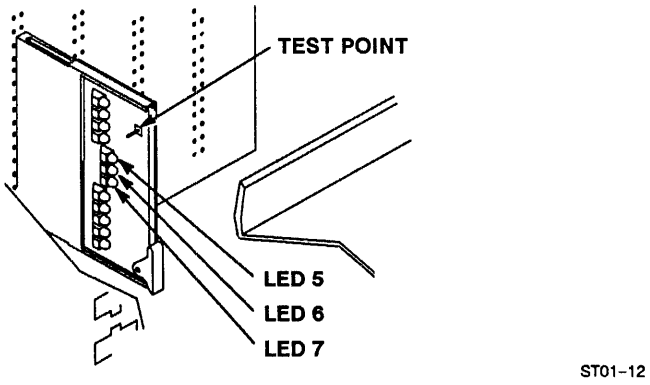

Figure 2–4. The Test Point and Pass LEDs on the Test Board

CAUTION! Be careful not to disturb the shroud; no mechanical restraints hold it in place.

10. When the shroud passes the alignment test, remove power from the HSC. Pull out the test board by gently pulling the extractor handle at its base while leaving the shroud in place. Use the test board each time you install or adjust the shroud.
11. Plug the Terminal Port cable and either a SCSI differential cable or a SCSI single-ended cable from the rear of the Interface Panel(s) into the corresponding connectors on the paddleboard (see Figure 2–5).

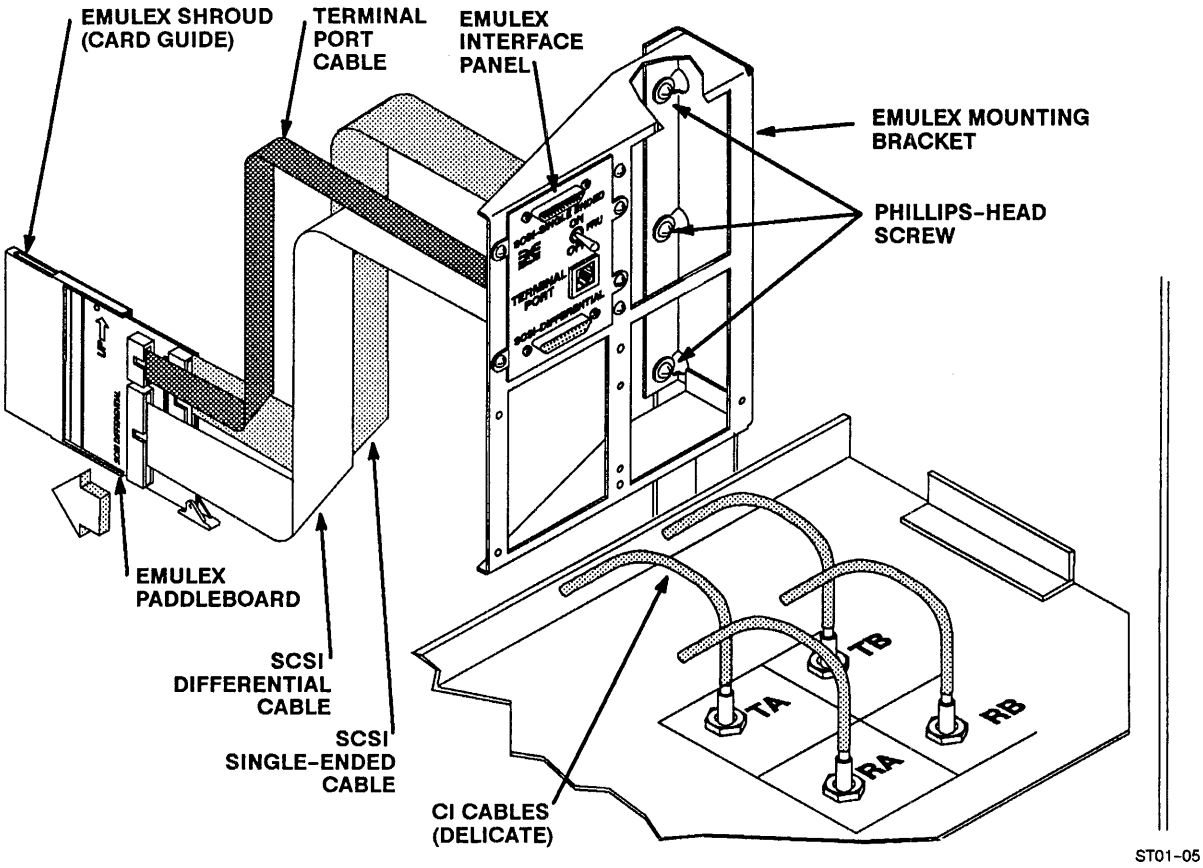

Figure 2–5. Installing the Paddleboard and Mounting Bracket in the HSC40/70

12. Hold the paddleboard so that its arrow points up.

    CAUTION! Insert the paddleboard, gently, straight into the shroud. Its female connector should slide under the top two pairs of backplane pins (see Figure 2–3) without bending any pins.

13. Attach the Emulex Mounting Bracket, with its Interface Panel, to the HSC cabinet (see Figure 2–5) as follows:

    a. Loosen the three Phillips-head screws on the right side of the HSC cabinet without removing them (to gain access to them, remove the two right-hand panels from the Mounting Bracket).

    b. Fit the three large holes that are located on the rear of the Mounting Bracket over the three Phillips-head screws. Push firmly where necessary to engage the screws, and re-tighten them.

    c. Attach the Interface Panel to the Mounting Bracket, and re-attach the two right-hand panels to the Mounting Bracket.

    d. Affix the appropriate Emulex requestor ID label (A, B, C, or D) under the Emulex logo of the Interface Panel.

14. Reassemble each of the following HSC cables and panels that you may have removed:

    a. CI Cable Transition panel

    b. Cabling from the HSC Transition Panel(s)

    c. The upper Transition Panel of the HSC

15. Before inserting the main ST01 card, test the installation of the paddleboard and Interface Panel(s) by powering up the HSC and observing the LEDs on the DEC cards.

    CAUTION! If no LEDs on the DEC cards illuminate when you power up the HSC, immediately turn power OFF and check the installation.

16. To connect a SCSI device or Emulex subsystem to the Emulex Interface Panel, refer to the manual that accompanies the particular device or subsystem.

This concludes the procedure for installing the Emulex hardware at the rear of the HSC40/70. Continue with subsection 2.8 to insert the main ST01 card at the front of the HSC.

2.7.2 Installing the Hardware at the Rear of the HSC50

To install the Emulex hardware at the rear of the HSC50, perform the following procedure:

1. Open the rear of the HSC. To enable removal of the exhaust duct, see Figure 2–6 and disconnect the following:
   a. Air-flow sensor power connector
   b. Quick-release latch (on the right and left sides of the exhaust duct)
2. Taking care not to damage the cables from the DEC relay and power filters, remove the exhaust duct.

CAUTION! The cables from the DEC relay and power filters are fragile, and they are in the path of the exhaust duct as you remove it from the cabinet.

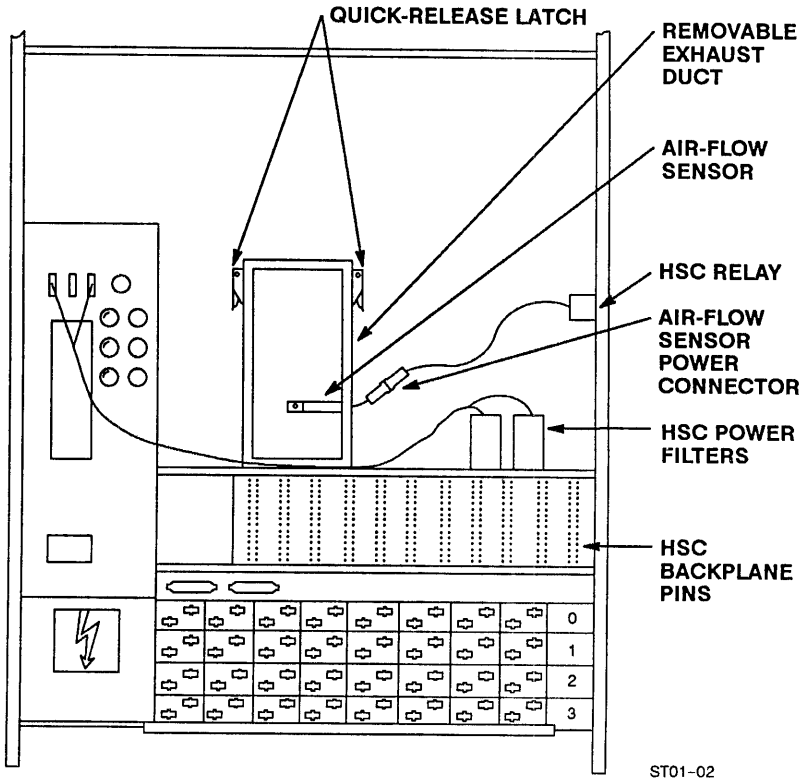

Figure 2–6. The Open HSC50 Cabinet (Rear View)

3. Remove the existing DEC SDI/STI cable from the selected slot. Wrap the cable end with insulating tape to prevent inadvertent short circuits. Fold it back to keep it out of the way.

4. Remove the DEC shrouds (connector shells), carefully, with needlenose pliers. Alternate between pulling the top and bottom of the DEC shrouds in order to remove them without bending or breaking any pins.

5. Making sure that the top two pairs of pins on the HSC backplane (four pins in all) do not enter the Emulex shroud, install the Emulex shroud onto the rows of pins from which you removed the DEC cables (see Figure 2–7). With proper pin alignment, the shroud should slide onto the backplane easily. If it does not, remove the shroud, and check the pin alignment.

   CAUTION! Failure to align the shroud properly will damage the backplane, and may damage the HSC as well.

6. Once the Emulex shroud is installed, use your flashlight to look inside it and make sure that one, and only one, pin protrudes through each of its holes.

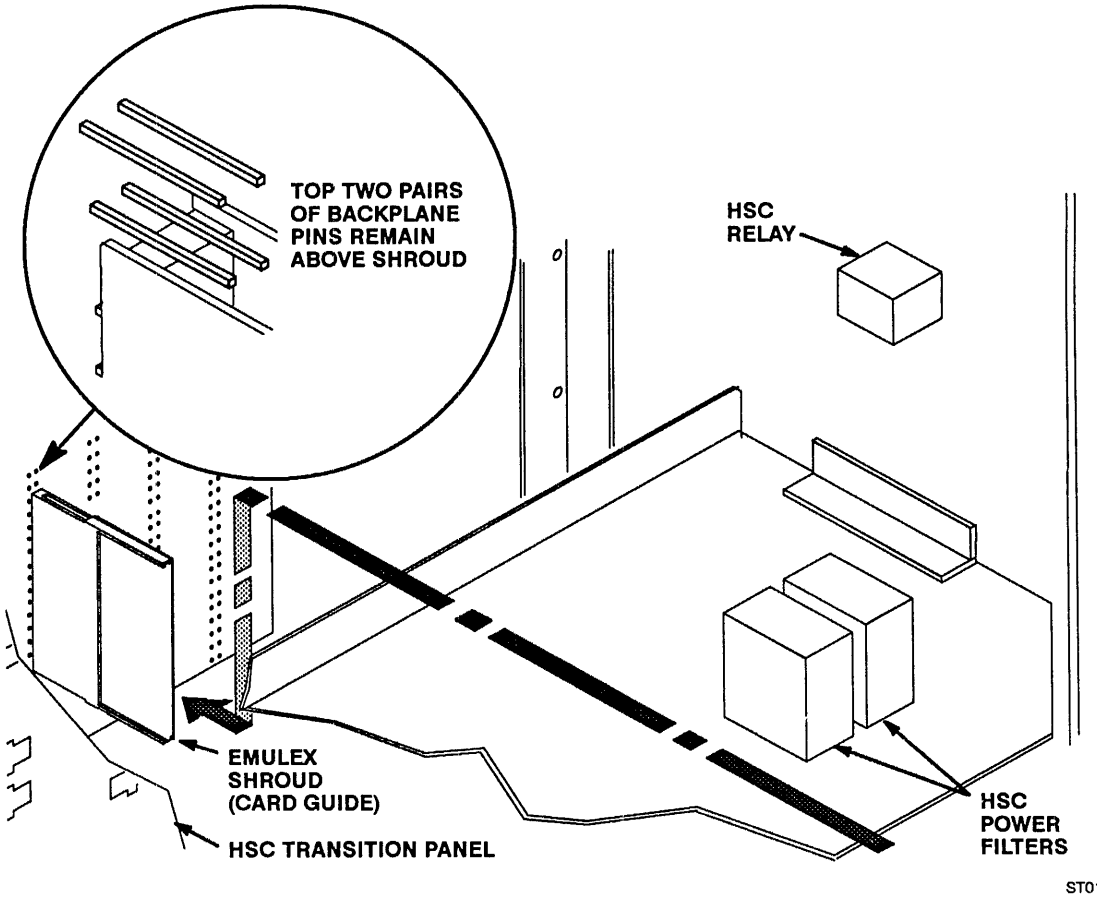

Figure 2–7. Installing the Emulex Shroud in the HSC50

7. Slide the test board into the shroud (see Figures 2–3 and 2–4, the Installation Kit, available from Emulex, includes the test board, with grounding cable, to verify correct alignment of the shroud).
8. Use the grounding cable from the Installation Kit to connect the test point (TP1) at the top of the test board to the HSC chassis (see Figure 2–4).
9. Apply power to the HSC. A properly installed shroud is indicated by the lighting of the three green pass LEDs (LEDs 5-7) on the test board (see Figure 2–4). No other LEDs on the test board should light.

   CAUTION! Be careful not to disturb the shroud; no mechanical restraints hold it in place.

10. When the shroud passes the alignment test, remove power from the HSC. Pull out the test board by gently pulling the extractor handle at its base while leaving the shroud in place. Use the test board each time you install or adjust the shroud.
11. Hold the paddleboard so that its arrow points up.

    CAUTION! Insert the paddleboard, gently, straight into the shroud. Its female connector should slide under the top two pairs of backplane pins (see Figure 2–7) without bending any pins.

12. Plug the Terminal Port cable and either a SCSI differential cable or a SCSI single-ended cable from the rear of the Interface Panel(s) into the corresponding connectors on the paddleboard (see Figure 2–8).

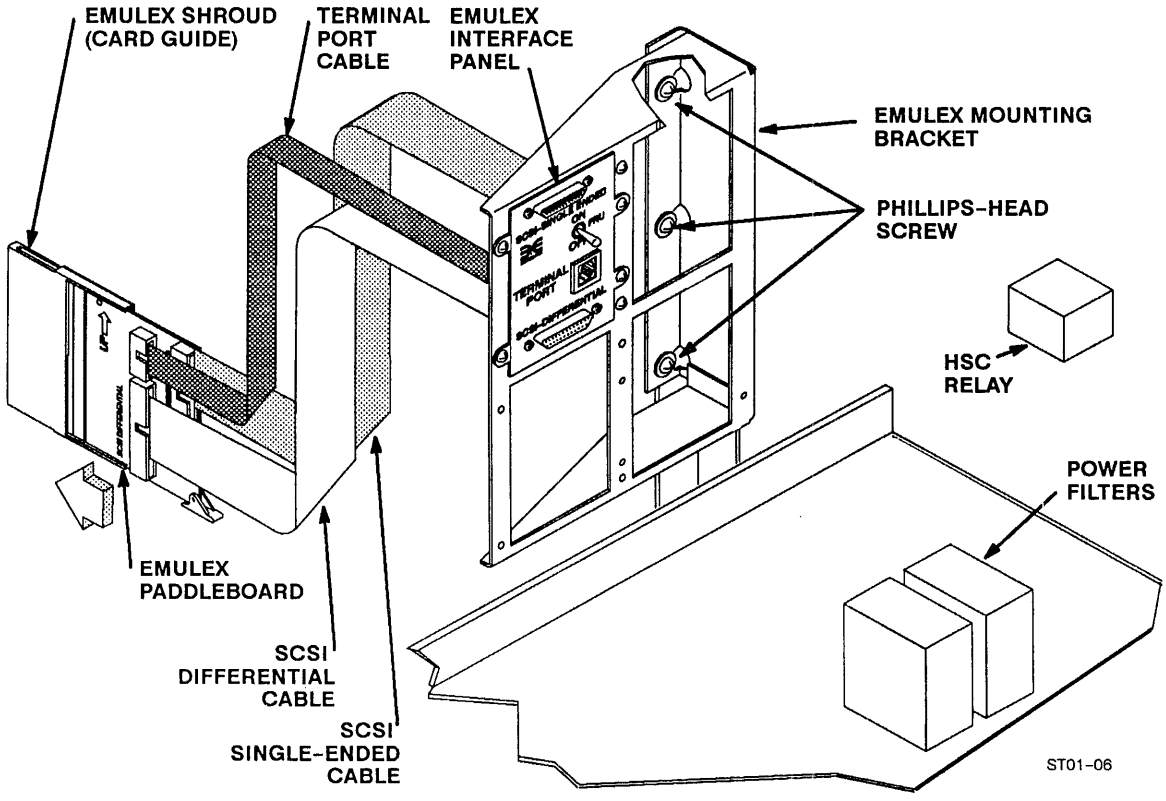

Figure 2–8. Installing the Paddleboard and Mounting Bracket in the HSC50

13. Attach the Emulex Mounting Bracket, with its Interface Panel(s), to the HSC cabinet (see Figure 2–8) as follows:

    a. Loosen the three Phillips-head screws on the right side of the HSC cabinet without removing them (to gain access to them, remove the two right-hand panels from the Mounting Bracket).

    b. Fit the three large holes that are located on the rear of the Mounting Bracket over the three Phillips-head screws. Push firmly where necessary to engage the screws, and re-tighten them.

    c. Attach the Interface Panel to the Mounting Bracket, and re-attach the two right-hand panels to the Mounting Bracket.

    d. Affix the appropriate Emulex requestor ID label (A, B, C, or D) under the Emulex logo of each Interface Panel.

14. Reassemble each of the HSC cables or panels that you may have removed.

15. Before inserting the main ST01 card, test the installation of the paddleboard and Interface Panel(s) by powering up the HSC and observing the LEDs on the DEC cards.

    CAUTION! If no LEDs on the DEC cards illuminate when you power up the HSC, immediately turn power OFF and check the installation.

16. To connect a SCSI device or Emulex subsystem to an Interface Panel, refer to the manual that accompanies the particular device or subsystem.

This concludes the procedure for installing the Emulex hardware at the rear of the HSC50.

2.8 Inserting the Main ST01 Card at the Front of the HSC

Count the backplane slots at the rear of the HSC in order to be sure which slot holds the paddleboard. Confirm that you have selected the slot with the lowest requestor number (see subsection 2.6). Return to the front of the cabinet, and find the same slot.

Using the following procedure, insert the ST01 main card into the slot:

1. Make sure that the components are oriented in the same direction as on the other data channel cards. Open the extractor handles.
2. Slide the card into the slot until it is properly positioned in the throat of the bus connectors.
3. Push the extractor handles down until they are flush with the board edge, and the ST01 is firmly seated in the connectors.
4. If you are installing more than one ST01, install the next one in the next lowest numbered slot.

The shield above the backplane contains a row labeled *Mod* for *Module*. It has been left blank so that you can fill it in with a label for each card that you insert.

2.9 Retaining the Factory Settings

When you insert an ST01 into a slot, it automatically receives a requestor number. You need not set any switches or jumpers. Do not change any of the jumper blocks; they contain no user options.

If you wish to verify that the jumper positions match the factory settings, refer to Table 2–1 and Figure 2–9.

Table 2–1. Factory Jumper Settings

Jumper	Factory Setting
JP1	IN
JP2	IN
JP3	OUT
JP4	OUT
JP5	OUT
JP6	OUT
JP7	OUT
JP8	IN
JP9	IN
JP10	OUT
JP11	IN (between pins 1 and 2: see Figure 2–9)
JP12	IN (see Figure 2–9)
JP13	OUT

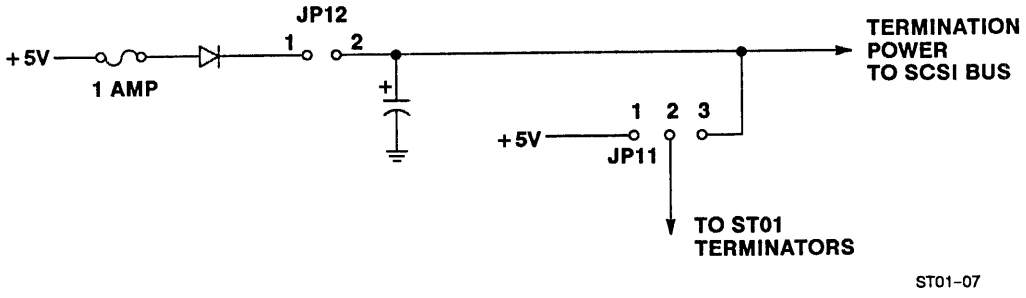

Figure 2–9. Jumpers 11 and 12 (SCSI Termination Power)

2.10 Automatic Power-up Self-test and LED Indicators

After you have installed and cabled the ST01, turn on power to the HSC. Verify that the ST01 runs its automatic power-up self-test. The ST01 contains six LEDs: one red, one green, and four amber. The red and green LEDs function like the LEDs on a DEC data channel card. The red LED indicates that the ST01 is held in reset. If the red LED remains on after the HSC has completed booting, the ST01 has failed the self-test or the HSC has disabled it. The green LED indicates normal operating mode.

At power up, the HSC goes through a sequence that brings all the controllers online. When the automatic power-up self-test has completed successfully, the four amber LEDs turn off within 10 seconds. The red LED turns off and the green LED turns on when the HSC has successfully initialized the ST01. Once the green LED is on, the four amber LEDs become activity indicators.

2.11 Introduction to the Firmware Resident Utilities (FRU)

The Firmware Resident Utilities (FRU) consist of the Configuration Utility, Virtual Formatter Monitor Utility, Virtual Formatter Switch Settings Utility, and Tape Exercise Utility. Use the respective utilities as follows:

- Configuration Utility: to assign MSCP Device Numbers so the host computer can identify devices.
- Virtual Formatter Monitor Utility: to keep track of the activity of the virtual formatter.
- Virtual Formatter Switch Settings Utility: to show or change the settings of the Virtual Formatter Switches.
- Tape Exercise Utility: to test the basic functionality of the ST01 and tape subsystem.

For instructions on executing the utilities, see the *ST01 Utilities User's Guide*, Emulex P/N ST0150901-00.

To complete the testing procedure, run the HSC diagnostics (see Section 3.2).

Section 3
OPERATION

3.1 Overview

This section briefly describes HSC diagnostics, troubleshooting, and service.

CAUTION! Incorrect installation can damage the data channel card. Before powering-up your subsystem, review this manual to confirm mechanical installation, and review the *ST01 Utilities User's Guide* to confirm configuration and testing of both the ST01 and the subsystem.

The ST01 requires no operational instructions. It is ready for initialization as soon as its drives are integrated and tested. It powers up when you power up the HSC.

3.2 HSC Diagnostics

The HSC diagnostics verify that the system has integrity, i.e., that the subsystem recognizes the ST01 and its associated drives. You may run the HSC diagnostics any time that your system is experiencing problems.

The following is a simplified example of the HSC diagnostic procedure:

1. Make sure that the drives are online and the tape cartridges are installed.
2. Run <SETSHO> on the HSC as follows:

   HSC> SHO TAPES

   As in the following example, the list should show the Unit Numbers and Bus Requestor (Req) of the drives connected to the new ST01s. If you installed an ST01 in slot 10, for example, it will show up as *Req 2*.

   If the ST01 in the slot for Bus Requestor 2 is connected to drives configured in the ST01 as Unit Numbers 70 and 71, SETSHO will indicate drives at the following locations:

Unit	Req	Port
70	2	0
71	2	0

   The SETSHO utility does not indicate unused ports on your channel card. A port is activated only if a drive is connected.

If you wish further details, refer to the DEC documentation listed in subsection 1.2. Subsections 3.2.1 and 3.2.2 detail the ILEXER and ILTAPE diagnostics, respectively.

3.2.1 HSC ILEXER Diagnostic

The ILEXER (Inline Exercise) drive-reliability diagnostic can test multiple tape units simultaneously for a specified number of minutes on all of your drives. To run ILEXER for the above example, do the following:

```
^C
HSC> RUN ILEXER

ILEXER>D>11:02 Execution Starting

Drive Unit Number (U) []? T70
Is a Scratch Tape Mounted (YN) []? Y
Are You Sure (YN) [N]? Y
Data Pattern Number (16-22) (D) [21]?
Density (1=800, 2=1600, 3=6250) [3]?
Record Length in Bytes (2 to 12288) (D) [8192]?
Data Compare (YN) [N]? Y
Data Compare Always (YN) [N]?
Another Drive (YN) []? N    (For simplicity we are showing a one-drive example.)
Run Time in Minutes (1 to 32767) [10]? 1
Hard Error Limit (D) [20]?
Narrow Report (YN) [N]? Y  (For simplicity we are showing a narrow report. If you are
                            using a full 80-character display, select the wide report)
Enable Soft Error Reports (YN) [N]?
ILEXER>D>T070 Rewinding to Start, Restart, or Exit ILEXER
ILEXER>D>Per Sum

ILEXER>D>T070
SN 000000001464
P 00000032
R 00001819
W 00001548
HE 00000
SE 00000
CE 00000
ILEXER>D>Err Sum

ILEXER>D>T070
ME 00000
DF 00000
DR 00000
SF 00000
SR 00000
OA 00000
OB 00000
OC 00000
ILEXER>D>Per Sum

ILEXER>D>T070
SN 000000001464
P 00000056
R 00003301
W 00002646
HE 00000
SE 00000
CE 00000
ILEXER>D>Err Sum

ILEXER>D>T070
ME 00000
DF 00000
DR 00000
SF 00000
SR 00000
OA 00000
OB 00000
OC 00000
ILEXER>D>T070 Rewinding to Start, Restart, or Exit ILEXER

ILEXER>D>11:04 Execution Complete
```

ILEXER will begin execution, displaying a progress report every 30 seconds. This time period can be changed by pressing <Ctrl G>, and entering the number of seconds between progress reports. The test will run for the specified number of minutes, unless the hard error limit is reached. If it is, the drive will be dropped from testing, and all other drives will continue the test.

3.2.2 HSC ILTAPE Diagnostics

The HSC ILTAPE (Inline Tape) diagnostics test transport functions. When you plan to use more than one tape drive, run ILTAPE on each. Run two passes each of the HSC ILTAPE diagnostics, Test 1 and Test 5. These two tests begin in the same way, as follows:

1. Press <Ctrl C>. The HSC> prompt appears.
2. To initiate HSC diagnostic tests 1 and 5, begin by entering the following sequence at the prompt:

```
HSC> R ILTAPE

ILTAPE>D>hh:mm  Execution starting

DRIVE UNIT NUMBER (U) [ ]?  T70
EXECUTE FORMATTER DEVICE INTEGRITY TEST (Y/N) [Y]?  N
EXECUTE TEST OF TAPE TRANSPORT (Y/N) [N]?  Y
IS SCRATCH MEDIA MOUNTED (Y/N) [ ]? Y
```

At this point, tests 1 and 5 require different commands. To run Test 1, see subsection 3.2.2.1. For Test 5, see subsection 3.2.2.2.

3.2.2.1 HSC ILTAPE Diagnostic Test 1

Run two passes of ILTAPE test 1 by entering the following sequence at the prompt:

```
Functional Test Sequence Number (0 thru 5) [1]?  1
ENTER CANNED SEQUENCE RUN TIME IN MINUTES (D) [1]?  1
SELECT DENSITY (0=ALL, 1=1600, 2=6250) [0]?  0
DATA PATTERN NUMBER (1,2,3,4) [3]?  3
SELECT RECORD SIZE (greater than 0) (D) [8192]?  8192
ITERATIONS (D) [1]?  2
```

3.2.2.2 HSC ILTAPE Diagnostic Test 5

Run two passes of ILTAPE test 5 by entering the following sequence at the prompt:

```
Functional Test Sequence Number (0 thru 5) [1]?  5
SELECT DENSITY (1=800, 2=1600, 3=6250) [3]?  2
DATA PATTERN NUMBER (0,1,2,3,4) [3]?  3
ITERATIONS (D) [1]?  1
```

3.3 Troubleshooting

This subsection discusses problems with the basic installation procedure.

CAUTION! Neither the data channel card nor the subsystem contains user-serviceable parts. For service refer to a service technician authorized by Emulex.

If you have problems with the basic installation of your ST01, confirm the following:

1. The card and subsystem have passed their self-tests.
2. No connector pins are bent or broken.
3. Cables are connected and oriented correctly.
4. Terminators are installed properly.
5. All power sources are working.

For problems with dual-port configuration, see the *ST01 Utilities User's Guide.* If necessary, review this manual and your subsystem manual to make sure that you have installed, cabled, and configured the card and the subsystem correctly. If you still cannot solve the problem, see subsection 3.4.

3.4 Service

If you have a problem with your ST01 that you cannot solve by reviewing this manual, you can get help by calling Emulex Technical Support at the phone number given below. If the ST01 contains a defective component, return the component to an authorized Emulex repair center for service.

Do not return a component to Emulex without authorization. Before you return a product to Emulex, whether it is under warranty or not, you must contact the factory or the factory representative for return-shipment instructions and a Return Materials Authorization (RMA) number. A component returned for service without an authorization will be returned to the owner at the owner's expense.

In the continental United States, Alaska, and Hawaii contact:

Emulex Technical Support
3545 Harbor Boulevard
Costa Mesa, CA 92626

Telephone: (714) 662-5600
(1-800-854-7112 outside California)
FAX: (714) 966-1299

Outside the United States, contact the distributor from whom the ST01 was initially purchased.

After you have received an RMA, package the ST01 or peripheral device, preferably using the original packing material, and send it, *postage paid and insured,* to the address provided by the Emulex representative.

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