

**SS4X™**  
**SCSI SUBSYSTEM**  
**USER'S GUIDE**



PE1450901-00, Rev A  
July 1991

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Effective: October 15, 1990

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**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.

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

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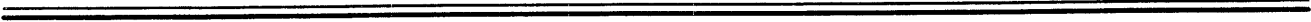
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**1.1 Overview**

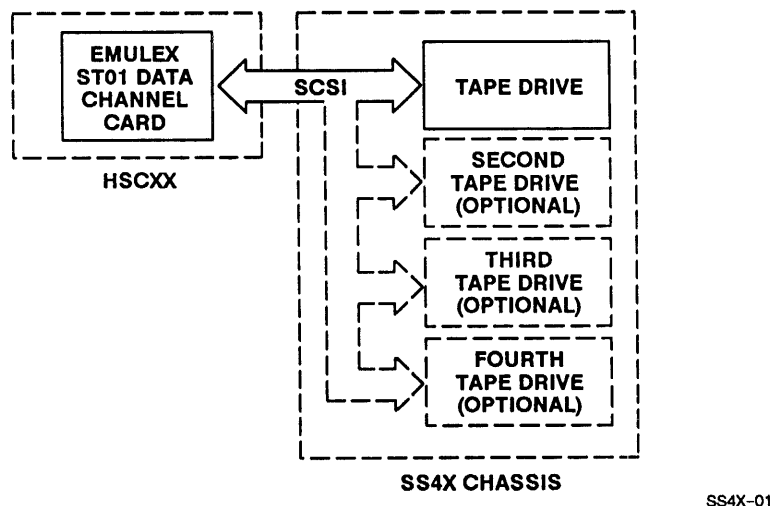
This manual provides the user with the information necessary to operate the SS4X Subsystem. The SS4X is a Digital Audio Tape (DAT) rack-mount subsystem that provides up to four tape drives with a Digital Data Storage (DDS) compatible format. It operates as a Small Computer System Interface (SCSI) tape mass storage device in conjunction with the Emulex ST01 data channel card in the DEC HSC. Each drive provides approximately 2 gigabytes of unattended tape backup storage with the 90-meter cassette (5 gigabytes, nominal, with data compression).

The manual consists of the following sections:

- **Section 1, Introduction**, gives an overview of the SS4X, including models, accessories, specifications, and FCC compliance.
- **Section 2, Operation**, describes the power-on self-test, cassette operation, setting the write-protect tab, maintenance, and service.

The manual concludes with an index of terms and abbreviations and a Reader Comment Card. After you read the manual, please take a moment to fill out and return the card so that your feedback can be included in the next revision.

Figure 1-1 is a logical block diagram of the subsystem.



*Figure 1-1. The SS4X Subsystem (Logical Block Diagram)*

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## 1.2 Related Documentation

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The Emulex *SS4X Installation and Maintenance Manual*, P/N PE1450501-00, tells how to install and maintain your subsystem.

The Emulex *ST01 Utilities User's Guide*, P/N ST0150802-00, provides configuration information and other data about the Tape Data Channel Card.

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

*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

*TU81/TA81 Tape Subsystem User Guide*, P/N TK-TUA81-UG



## 1.3 Models and Accessories

All SS4X subsystem models are shipped with a cleaning cassette and a blank cassette. In addition, the respective models (see Table 1-1) contain some or all of the following:

- One, two, three, or four cassette tape drives
- Rack-mount chassis with power supply
- Rack-mount hardware
- Emulex ST01 Kit

At a minimum, the SSX cabinet contains an SS4X subsystem, plus a 42-inch RETMA rack with power controller or a 60-inch RETMA rack with power controller. The 42-inch cabinet is model SS4, and the 60-inch cabinet is model SS6.

*Table 1-1. Models of the SS4X Subsystem*

Model	Description
<b>Single-Ended Subsystems</b>	
SS41/SE	One single-ended subsystem, which includes one drive, one rack-mount enclosure, one ST01 kit, one 3-foot SCSI cable, and SCSI terminator
SS42/SE	Same as above but with two drives
SS43/SE	Same as above but with three drives
SS44/SE	Same as above but with four drives
<b>Differential Subsystems with Standard Drive</b>	
SS41	One differential subsystem, which includes one 4-mm drive, one rack-mount enclosure, one ST01 kit, one 25-foot SCSI cable, and SCSI terminator
SS42	Same as above but with two drives
SS43	Same as above but with three drives
SS44	Same as above but with four drives
<b>Differential Subsystems with Data Compression</b>	
SSC41	One differential subsystem, which includes one 4-mm drive with data compression, one rack-mount enclosure, one ST01 kit, one 25-foot SCSI cable, one SCSI terminator
SSC42	Same as above but with two drives
SSC43	Same as above but with three drives
SSC44	Same as above but with four drives

Table 1-2 lists optional accessories that are available for the subsystem.

**Table 1-2. Optional Accessories of the SS4X Subsystem**

<b>Model</b>	<b>Description</b>
<b>Drive Accessories</b>	
CK4 CT49	4-mm Head Cleaning Kit 4-mm Tape Cartridge, 90 meters, 2 gigabytes (5 gigabytes, nominal, with data compression)
<b>RETMA Cabinets</b>	
SS4 SS6	Standard 42-inch RETMA cabinet with power controller Standard 60-inch RETMA cabinet with power controller
<b>Single-Ended Cables to ST01*</b>	
SS30-C3/SE	Three-foot cable with a 50-pin, high-density connector and a 50-pin cinch connector for connecting the ST01 to the cartridge tape controller in the SS3X subsystem, or for daisy-chaining to an SS4X
<b>Differential Cables to ST01**</b>	
SS30-C3	Three-foot cable with a 50-pin, high-density connector and a 50-pin cinch connector for connecting the ST01 to the cartridge tape controller in the SS3X subsystem, or for daisy-chaining between the SS3X subsystem and the first SS4X subsystem
SS30-C25	Same as above but 25 feet long
SS30-C50	Same as above but 50 feet long
SS30-C75	Same as above but 75 feet long
SS30-H3	Three-foot cable with 50-pin, high-density connectors on each end for connecting an ST01 to an SS4X, or for daisy-chaining to additional SS4Xs
SS30-H25	Same as above, but 25 feet long
SS30-H50	Same as above, but 50 feet long
SS30-H75	Same as above, but 75 feet long
<b>Differential Daisy-chain Cable to Cartridge Tape Controller in the SS3X Subsystem**</b>	
SS30-D12	Twelve-foot cable with 50-pin cinch connector on each end for daisy-chaining cartridge tape controllers in the SS3X subsystem together
<p>* Single-ended cable is not to exceed 19.5 feet (6 meters).  ** Differential cable is not to exceed 82 feet (25 meters).</p>	

For ordering information, contact Emulex Sales Support at the following address and telephone number:

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 3545 Harbor Boulevard  
 Costa Mesa, California 92626  
 (714) 662-5600  
 FAX (714) 241-0792  
 TLX 183627

## 1.4 Specifications

The following tables list specifications of the subsystem, drive, and cabinet, respectively.

*Table 1-3. Specifications of the SS4X Subsystem*

Parameter	Description
<b>Dimensions</b>	19 x 5.25 x 18 inches
<b>Weight</b>	30 pounds
<b>Environmental</b>	
Operating Temperature	10° to 45°C (50° to 113°F)
Storage Temperature	- 40° to 65°C (- 40° to 149°F)
Humidity	20% to 80%, non-condensing
Altitude	0-15,000 ft (0 - 4,575 meters)
<b>Vibration</b>	
Peak-to-peak Displacement	0.9-mm (1-17 Hz)
Peak Acceleration (sweep rate less than 1 octave/min.)	Operational: 0.73 g (17 - 500 Hz) Non-operational: 1.5 g (5 - 500 Hz)
Shock (1/2 sine wave)	Operational: 10 g peak, 11 msec Non-operational: 50 g peak, 11 msec
<b>Input</b>	
100-240 VAC, 47-63 Hz	Autoranging; no voltage switch settings required
<b>Power Consumption</b>	
115 VAC	1.8 A, 100 W nom., 342 BTU / hr
230 VAC	0.9 A, 100 W nom., 342 BTU / hr

**Table 1-4. Specifications of the Tape Drive**

<b>Parameter</b>	<b>Description</b>
<b>Data Handling</b>	
Data Transfer Rate	5 MBytes / sec, burst, 183 KBytes / sec sustained 366 KBytes with data compression
Data Buffer	512 KBytes
Tape Speed	Nominal: 0.32 inches/sec Search/Rewind: 200 times nominal speed
Average Access Time	Less than 30 seconds for a 90-meter tape
Head-to-Tape Speed	123 inches/second
Drum Rotation Rate	2000 RPM
Linear Recording Density	Flux: 76,250 FR / inch.
Packing Density	Bit: 61,000 bits / inch
Track Density	1869 tracks / inch
Areal Density	114 Mbits / inch
Error Correction Code	C1, C2, C3 (Reed Solomon)
<b>Reliability</b>	
MTBF	40,000 hours, 30% duty cycle
MTTR	30 minutes
Data Reliability	$1.0 \times 10^{-15}$ bits

**Table 1-5. Specifications of the SSX Cabinet**

<b>Parameter</b>	<b>Description</b>
<b>Weight (including power controller)</b>	SS4: 195 pounds (89 kg) SS6: 245 pounds (112 kg)
<b>Electrical Power Requirements</b>	
Domestic (30 A service line required)	SS4: 115 VAC SS6: 115 VAC
International (12 A service line required)	SS4: 230 VAC SS6: 230 VAC
<b>Power Receptacle Requirements</b>	
Domestic	NEMA L5-30R
International	As per local requirements

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## 1.5 FCC Compliance

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The Federal Communications Commission (FCC) has established technical standards regarding radiation of electromagnetic interference (EMI) emitted by computing devices. The SS4X 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. However, there is no guarantee that interference will not occur in a particular installation.

The SS4X was tested for FCC compliance in a compliant system that was properly shielded (enclosed so that no electromagnetic radiation escapes). The subsystem was connected to other SCSI port devices via a shielded SCSI bus cable. Emulex offers shielded cables in various lengths (see Table 1-2).

The SS4X equipment generates and uses radio frequency energy. If it is not installed and used in strict accordance with Emulex's instructions, it may cause EMI with radio and television reception. The user is responsible for proper installation, including maintaining the shield that has been built into equipment cabinets. The routing of cables to the SS4X can have a major impact on the amount of EMI that is radiated by the system. Emulex is not responsible for any radio or TV interference caused by unauthorized modifications to the SS4X.

If the SS4X 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 SS4X 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 booklet prepared by the FCC 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.



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## **2.1 Overview**

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This section describes basic operation, including the power-on procedure, checkout and verification, loading and unloading the cassette, maintenance, and service. The following procedures are for operating the SS4X. For complete checkout and verification of the SS4X with the ST01 SCSI Tape Data Channel Card, refer to the Emulex *ST01 SCSI Tape Data Channel Card Installation Guide* (P/N ST0150802) and the Emulex *ST01 Utilities User's Guide* (P/N ST0150901).

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## **2.2 Power-on and Self-test**

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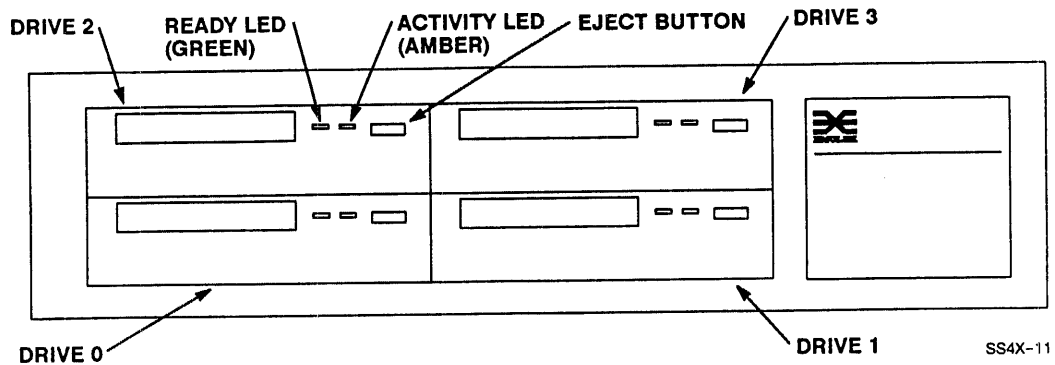
When power is applied, the drive runs a self-test. For normal operation after the self-test completes, use Table 2-1 to interpret the LED status display. If the self-test fails, remove and re-apply power to the SS4X. If the error persists, see subsection 2.6 for service.

***Table 2-1. Interpreting the LED Status Display***

<b>LED Color</b>	<b>LED Activity</b>	<b>Definition</b>
Amber	ON (lit)	The drive is reading or writing the tape.
Amber	Flashing rapidly	A hardware fault has occurred, or the drive's humidity sensor has detected dew.
Green	ON (lit)	A cassette is inserted and does not generate excess errors.
Green	Flashing slowly	A cassette is inserted but generates errors beyond a predefined DDS error threshold (warning only).
Green	Flashing slowly (with amber LED ON)	A prerecorded cassette is in the drive and is reading the data.
Green	Flashing rapidly	The drive could not write the cassette correctly (error).

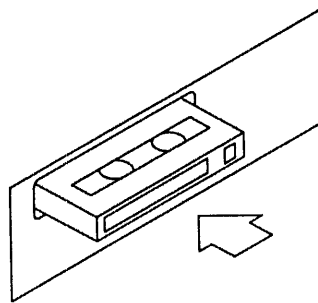
## 2.3 Cassette Operation

Figure 2-1 shows the front panel of the SS4X, indicating the drive number of each of the four drives as shipped from the factory.



*Figure 2-1. Drive Number of Each Drive (Front View of the SS4X Subsystem)*

To load a cassette, insert it with the arrow on the top of the cassette entering the slot first (see Figure 2-2). Then push the cassette into the slot until the drive-loading mechanism loads it. To unload a cassette, push the eject button; the drive will update the system log, rewind the tape, and partially eject the cassette. It can then be easily removed from the drive.



SS4X-16

*Figure 2-2. Cassette Loading*

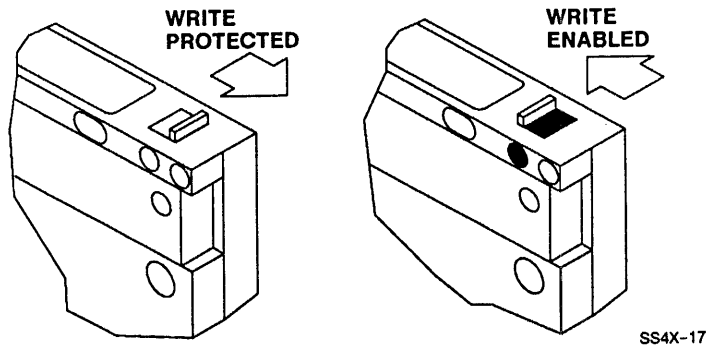


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## 2.4 Setting the Write-Protect Tab

Figure 2-3 shows the sliding write-protect tab on the cassette, with its positions for write-protect and write-enabled. When the tab is pushed into the closed position, it disables writing to the cassette tape.



*Figure 2-3. Setting the Write-Protect Tab*

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## 2.5 Maintaining Your Subsystem

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A regular maintenance schedule is important because excessive dust or debris on one or more of the heads or on the tape guides may make magnetic media unreadable. This condition is reported via the slowly flashing green *Cassette In Place* status LED on the front panel. Whenever the *Cassette In Place* status LED flashes, you should clean the drive heads.

**NOTE:** The flashing green LED may also refer to a damaged tape or a tape nearing the end of its life. If cleaning the head does not correct the flashing LED condition, replace the cassette. The flashing LED does not indicate a loss of data. It does not affect SCSI operation.

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### 2.5.1 The Cleaning Method

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The cleaning method given here is the only approved one. Other kits, even previous approaches used in the drive manufacturer's field tests, are unacceptable, and will void the warranty. Use only an approved DAT (Digital Audio Tape) cleaning cassette designed for DDS (Digital Data Storage) drives. You can order cleaning cassettes through Emulex (see Table 1-2). The cleaning cassette contains the correct recognition holes to allow the drive to recognize it as a cleaning cassette. Do not use an audio DAT cleaning cassette. It will not be properly recognized by the SS4X.

The drive will load the cleaning cassette, run it over an unused portion for 10 seconds, and eject it. When the tape has no more unused portions, it will not advance. It will eject the cleaning cassette, and a new one will be required. The drive will not rewind the cassette.

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### 2.5.2 Maintenance Precautions

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Take the following precautions on maintaining heads and cartridges in good working order:

1. Keep the tape cartridge in a controlled environment of 50–122 degrees F (10–50 degrees C) and 20–80% relative humidity.
2. Do not place the tape cassette near a magnetic field or in sunlight.
3. Do not touch the tape inside the cassette.

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## 2.6 Service

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If you have a problem that persists after you review Section 3 of this manual, you can get help by calling Emulex Technical Support at the phone number given below. If you determine that the subsystem contains a defective component, obtain authorization to 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. Outside the United States, contact the distributor from whom the subsystem was initially purchased. In the continental United States, Alaska, and Hawaii contact:

Emulex Technical Support  
3545 Harbor Boulevard  
Costa Mesa, CA 92626

Telephone: (714) 662-5600.  
Outside California: (800) 854-7112  
FAX: (714) 966-1299

After you have received an RMA, package the subsystem 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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 PE1450901-00, Rev A

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Your comments and suggestions will help us in our continuous effort to improve the quality and usefulness of our publications. Mail this form using the self-mailer, or send it by FAX, Attention: Technical Publications (714) 754-0731.

**Product Model Number** \_\_\_\_\_

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What improvements would you like to see? \_\_\_\_\_  
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