SD89X™ Series
Disk Drive
User's Guide

SM9050904-00, Rev B
September 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.

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The above statement applies to products marketed in the 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.

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

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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.

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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.

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About This Manual

This manual describes the operation of the Emulex SD89X series disk drive. The SD89X is a series of high-performance eight-inch disk drives that incorporate a native Standard Disk Interconnect (SDI) interface. Each drive features a 16-character front-panel display, which can show messages in French, German, Spanish, and Japanese, as well as English.

NOTE: Appendix E lists the display messages in each language. If you enter the wrong language, see subsection 3.5.2 to return to the language of your choice.

This manual consists of the following sections:

- **Section 1 (Introduction)** describes the SD89X disk drive and its models in general terms.
- **Section 2 (Installation)** covers FCC compliance, Inspection, Mounting, SDI cabling, Sequential Spin-up of Multiple Drives, and the User Panel.
- **Section 3 (Operation)** discusses power-up, internal diagnostics, setting the unit ID number, selecting both the language and the type of error code reporting, troubleshooting, and service.
- **Appendix A (Switch Settings)** gives a table of spin-up delays for sequential spin-up, and it provides the required settings for the I/O Switch and the Control Board switches and jumpers.
- **Appendix B (Specifications)** provides the general, electrical, environmental, and performance specifications of the respective models of the SD89X series disk drive.
- **Appendix C (Menu Charts)** provides a logical flow chart for each of the six menus (Main Menu, Test Selection, Repetition Count, Set/Show Selection, Language Selection, and Error Reporting Selection).
- **Appendix D (Error Code List)** interprets the error messages indicated on the front panel display.
- **Appendix E (Language Displays)** lists the messages that appear in the LCD display, in each language that you can select.

An index of terms and abbreviations follows the appendices.

Audience

This manual is intended for system operators and administrators, responsible for the routine operation and file maintenance of the system. Maintenance procedures that require disassembly of the unit should not be performed by the operator.

Product Support

Emulex products are backed by a broad range of educational and technical support services. These services are available to you so that you can maximize your system performance and use Emulex products effectively.

For assistance in the continental United States, Alaska, or Hawaii, contact Emulex as follows:

Emulex Corporation
3545 Harbor Boulevard
Costa Mesa, California 92626
Telephone: (714) 662–5600
Outside California: (800) 854–7112

You may also use the following fax and telex numbers:

For ordering accessories:
FAX (714) 241–0792, Attention: Order Administration
TLX 183627, Attention: Order Administration

For technical assistance:
FAX: (714) 966–1299

Related Documentation

For related documentation see the Emulex *DA01 Disk Data Channel Card User's Manual,* P/N DA0150901-00. For details about the related DEC diagnostic and utilities protocol and controllers, 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

HSC50/70 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

Section 1
INTRODUCTION

1.1 General Description

As a native SDI disk drive, the SD89X implements the full functionality of DEC's Digital Storage Architecture (DSA), with no operating system modifications required. SD89X drives work with all DSA controllers, such as the HSC40/50/70, UDA50, and KDA50, and KDB50. They are fully compatible with HSC software, version 370 or above.

SD89X drives have two error reporting modes. The standard one provides error reporting that can be used with such programs as DECs VAX SIM+. The extended one provides more definitive error reporting, for fixing hardware faults faster.

Physically the drive consists of the following:

1. An eight-inch Head Disk Assembly (HDA) with associated control electronics
2. A high-capacity power supply
3. An Emulex SM90 interface PCB
4. An intelligent User Control Panel

These components are packaged in a quarter-rack drive pan (for specifications, see Appendix B). Table 1-1 lists the models in the SD89X series.

Table 1-1. SD89X Disk Drives

Disk Drive Model	Part Number	Formatted Capacity
SD890	SM9020101-01	663 MB
SD891	SM9020101-02	873 MB
SD892	SM9020101-03	960 MB
SD893	SM9020101-05	1803 MB
SD894	SM9020101-04	1950 MB

1.2 Optional Accessories

You may need additional rack mounting tray kits, filler plate kits, and external SDI cables. Table 1-2 lists these items.

Table 1-2. Optional Accessories

Model Number	Description
SDR89	Rack Mounting Tray Kit
SDF89	Filler Plate Kit
SDI-12	External SDI Cable, 12-foot
SDI-25	External SDI Cable, 25-foot
SDI-50	External SDI Cable, 50-foot

If you need external SDI cables, it is recommended that you obtain them from Emulex to be sure that the connector screws do not damage the PCB or its components.

For ordering information, contact Emulex Order Administration at the following address and telephone number:

Emulex Corporation
3545 Harbor Boulevard
Costa Mesa, CA 92626

California Telephone: (714) 662-5600
Outside California: (800) 854-7112
FAX: (714) 241-0792 Attention: Order Administration
TLX: 183627 Attention: Order Administration

1.3 Drive Formatting

SD89X disk drives come preformatted from the factory. Reformatting SD89X in the field is not recommended because Manufacturing Defect List (MDL) information could be lost. If reformatting is performed without MDL, Emulex recommends running multiple verify passes to ensure that all bad sectors are revectored prior to operation.

Section 2
INSTALLATION

2.1 Overview

To prepare you for powering up and running diagnostics, this section describes FCC compliance, inspecting and mounting the drive, SDI cabling, sequential spin-up of multiple drives, and the user panel.

2.2 FCC Compliance

The Federal Communications Commission (FCC) has established technical standards regarding radiation of electromagnetic interference (EMI) emitted by computing devices. The SD89X 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 SD89X 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 STI port devices using a shielded STI bus cable. Emulex offers shielded cables, compatible with the SD89X, in various lengths.

The SD89X equipment generates and uses radio frequency energy. If it is not installed and used in strict accordance with Emulex's instructions, it may cause Electromagnetic Interference (EMI) with radio and television reception. The user is responsible for proper installation, including maintaining the shield built into equipment cabinet. The routing of cables to the SD89X 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 SD89X.

If the SD89X 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 containing the SD89X 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

2.3 The Inspection Procedure

When you receive the drive, inspect the shipping carton, the drive, and the Voltage Selection Switch. The following subsections detail the inspection procedures.

2.3.1 Inspecting the Shipping Carton

The SD89X is shipped in a special carton designed to provide full protection under normal shipping conditions. Immediately upon receipt, inspect the shipping carton for evidence of possible damage incurred in transit. Any obvious damage to the carton, 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 carton.

2.3.2 Visually Inspecting the Drive

When you unpack the drive, 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 drive for bent or broken connector pins or any other visual evidence of physical damage. Confirm that there are no cracks or dents in the cabinet.

These verifications are important to confirm warranty. If you find evidence of either physical damage or identify mismatch, notify an Emulex representative immediately.

2.3.3 Checking the Voltage Selection Switch

Before applying AC power, make sure that the Voltage Selection Switch indicates the appropriate setting (either 100–120 VAC or 220–240 VAC). This switch is located on the right side of the power supply, as you face the drive (see Figure 2–1). A Voltage Selection Plate locks the switch into the correct voltage setting when it leaves the factory.

WARNING!! Improper AC voltage selection may result in personal injury and permanent damage to equipment. The factory setting is 100–120 VAC.

AVERTISSEMENT Une mauvaise sélection de la voltage c.a. peut provoquer des blessures et endommager irrémédiablement l'équipement. La sélection de la voltage initiale départ usine est 100–120 V c.a.

WARNUNG Die Wahl der falschen Wechselspannung kann zu Verletzungen des Bedienungspersonals und dauerhaften Schäden am Gerät führen. Die werksseitige Einstellung ist 100–120 V Wechselstrom.

ADVERTENCIA La selección inadecuada del voltaje c.a. puede resultar en lesiones personales y daño permanente al equipo. La calibración inicial de fábrica es 100–120 V c.a.

警告!! 誤った電源電圧の設定は、人体にも危険であり、また装置に害を与えるおそれがあります。工場出荷時は、100－120 Vに設定してあります。

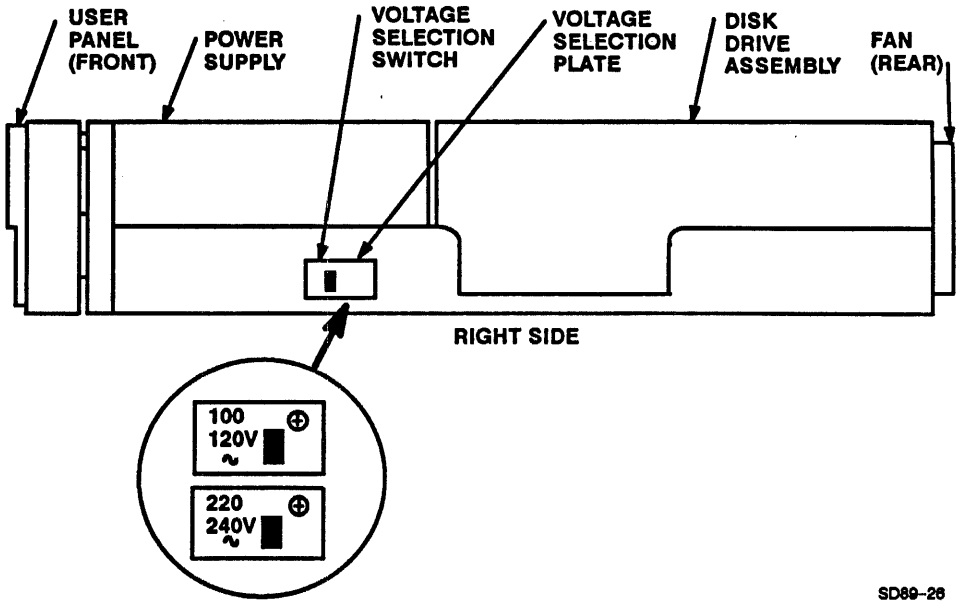


Figure 2–1. Voltage Selection Switch

If you must change the setting, set the switch and, with the back facing outward, put the plate back , so that its cutout locks the switch into the new position.

2.4 Mounting the Drive

You must mount the drive in an enclosure. You may choose a pedestal, as in Emulex model number SDA2, or a 19-inch standard Retma rack, as in Emulex model numbers SDA4 (42-inch enclosure) or SDA6 (60-inch enclosure). If you have an odd number of drives in a half rack, you may order a filler kit from Emulex (model number SDF89).

If you need additional rack-mount kits, you may order Emulex model number SDR89. Follow the instructions of the manufacturer of your mounting hardware. Table 1-2 lists the optional accessories, and the tables in Appendix B give the drive size, weight, and other specifications.

Mount the filter, front bezel, and user panel as follows:

1. When you are mounting drives side-by-side, orient the front bezel so that its front faces you, and its wide edge is toward the side wall of the cabinet (see Figure 2-2).

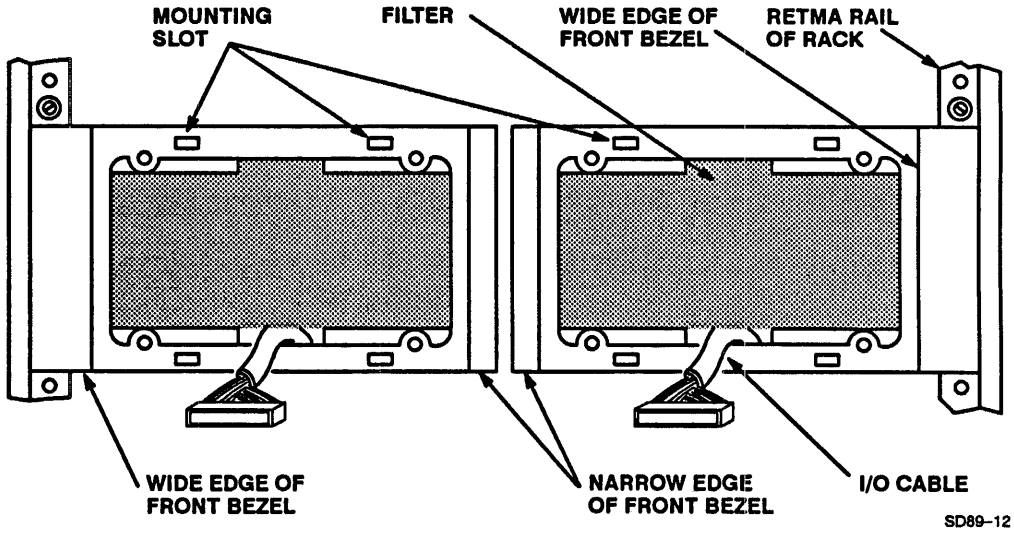


Figure 2-2. Orientation of the Front Bezel

2. Use the four screws provided to attach the front bezel to the drive chassis (see Figure 2–3).

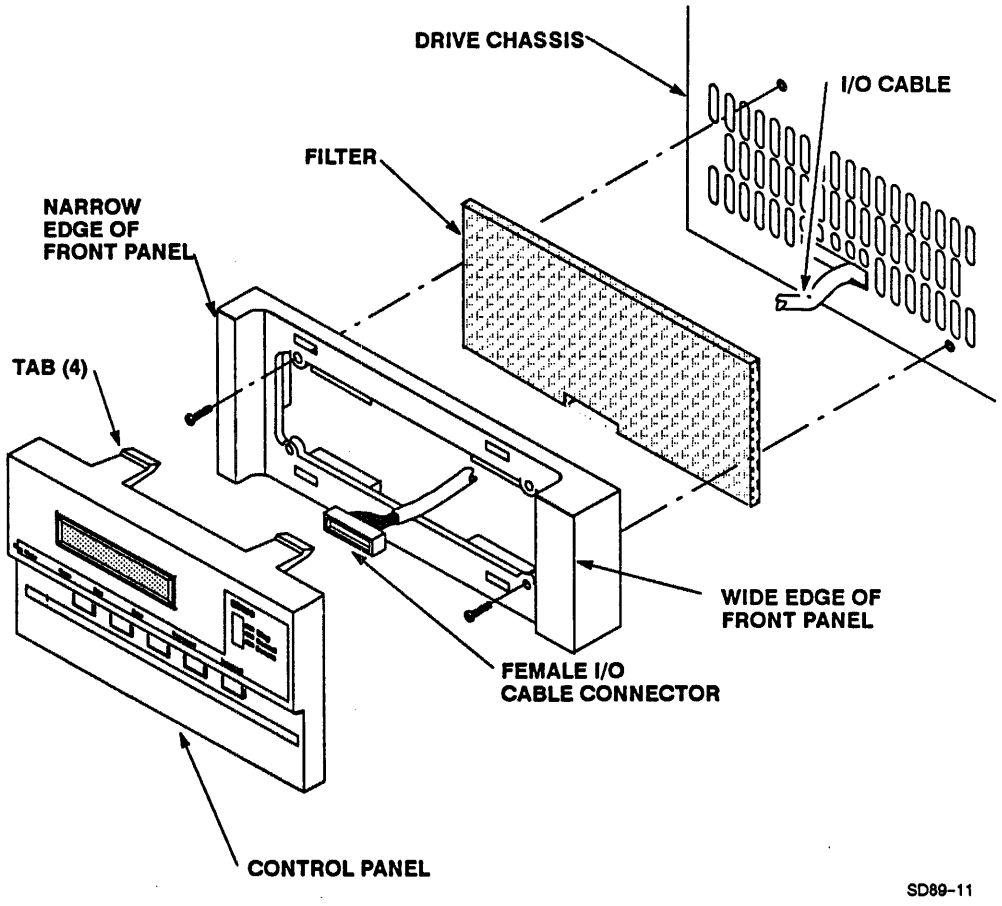


Figure 2–3. Mounting the Filter, Front Bezel, and User Panel

3. Insert the filter neatly behind the front bezel. Make sure that the I/O cable protrudes from the drive chassis through both the cutout at the bottom of the filter and the front bezel.
4. Carefully plug the male I/O cable connector, which is located on the back of the user panel, into the female I/O cable connector that protrudes from the drive chassis.
5. Press the user panel into the front bezel until its four tabs snap into the locked position.

2.5 Connecting the SDI Cables

The SD89X requires external SDI cabling to your SDI controller. The rear panel of the SD89X contains two ports (A and B). These may be cabled to separate controllers in order to provide a convenient method of switching controllers in case of a system crash.

CAUTION! To prevent damage when using SDI cables that were not provided by Emulex, make sure that the cable-mounting screws do not protrude more than 0.25 inches (6 mm) from the housing.

If you use both the A and B ports, attach them to similar but separate controllers (for example, two HSC50/70 controllers) on a cluster or system that supports automatic failover. If you do, enable both ports by pressing the Port A switch and the Port B switch. The SD89X fully supports DEC DSA dual porting features. Only one port can be active at a time. The drive indicates which port, if any, is active, by showing *A* or *B* in the Liquid Crystal Display (LCD) on the user panel.

You may connect SDI cables to the rear panel of the drive in either of two ways. Most users have standard SDI cables, and may simply connect them directly into Port A and/or B. If you have an SDA9X6-XX subsystem, however, connect the internal SDI cables via the cable-grounding assemblies that are provided with the drive.

If you need to connect the cable-grounding assemblies, refer to Figure 2–4, and use the following procedure:

1. Use two 4-40 x 3/8-inch machine screws to attach the cable-bracket assembly to the rear panel of the drive.
2. Place the two internal SDI cables, for Port A and Port B, respectively, on the cable bracket. Confirm that the cables are right-side-up (as shown in Figure 2–4, the large notch must face down).
3. Ensure the SDI cable connector is fully seated. Then place the cable clamp across the two cables, and attach them to the cable bracket with the 4-40 x 3/8-inch machine screw.

External SDI cables between the SD89X and the controller are not standard equipment with the drive. However, you may order them as options from Emulex, in various lengths to suit your needs. See Table 1–2 for a list of available cables from Emulex, and see DEC documentation when connecting the other end of the SDI cable to the controller.

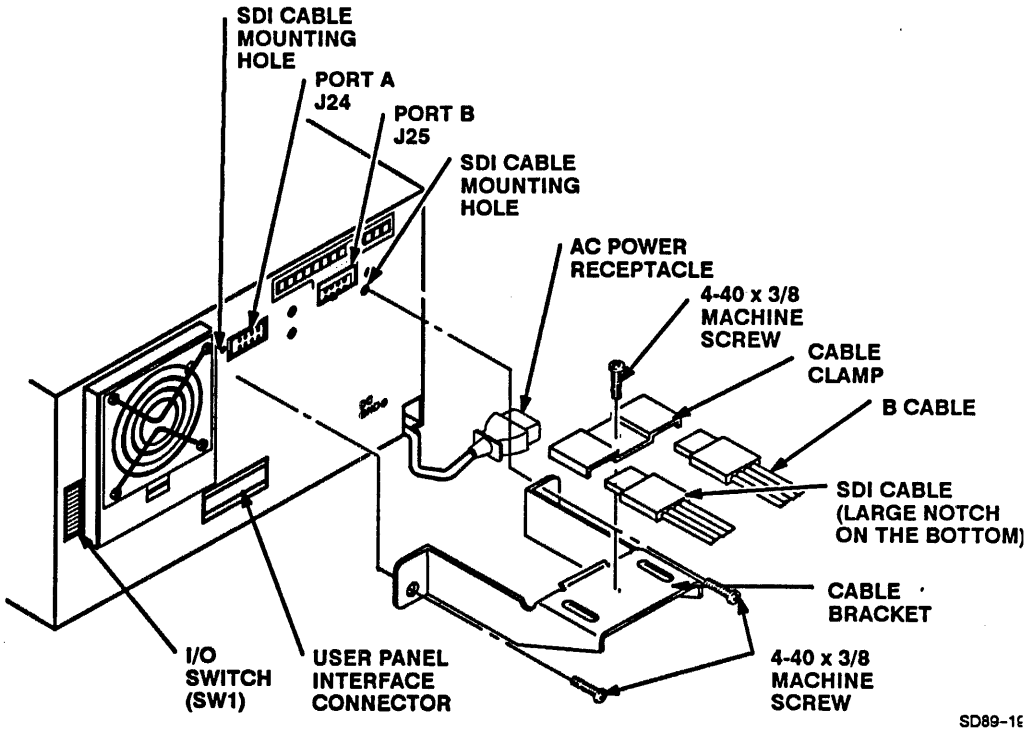


Figure 2–4. Rear Panel

2.6 Sequential Spin-up of Multiple Drives

If you have multiple drives in a rack, you can avoid the power surge of simultaneous spin-up by setting the four Logical Address Switches (2^0 through 2^3) on the Control Board and SW1–8 through SW1–10 on the I/O Board. Table A–1, in Appendix A, gives the switch settings that enable the drives to spin up in sequence, at five-second intervals.

NOTE: If you wish to set these switches, you must do so on both the I/O Switch (SW1) and the Control Board Switches.

2.7 User Panel

The User Panel at the front of the SD89X contains an LCD and six switches (see Figure 2–5). The LCD is a 16-character display at the upper left of the User Panel. It indicates operational status, error status, and diagnostic information. To the right of the LCD is a Mode Selection Switch, for choosing the mode of operation. Filling the bottom half of the panel are five pushbutton switches. Their function depends upon the setting of the Mode Selection Switch. Also, the user panel has controls to adjust the LCD contrast and back light (see Figure 2–9).

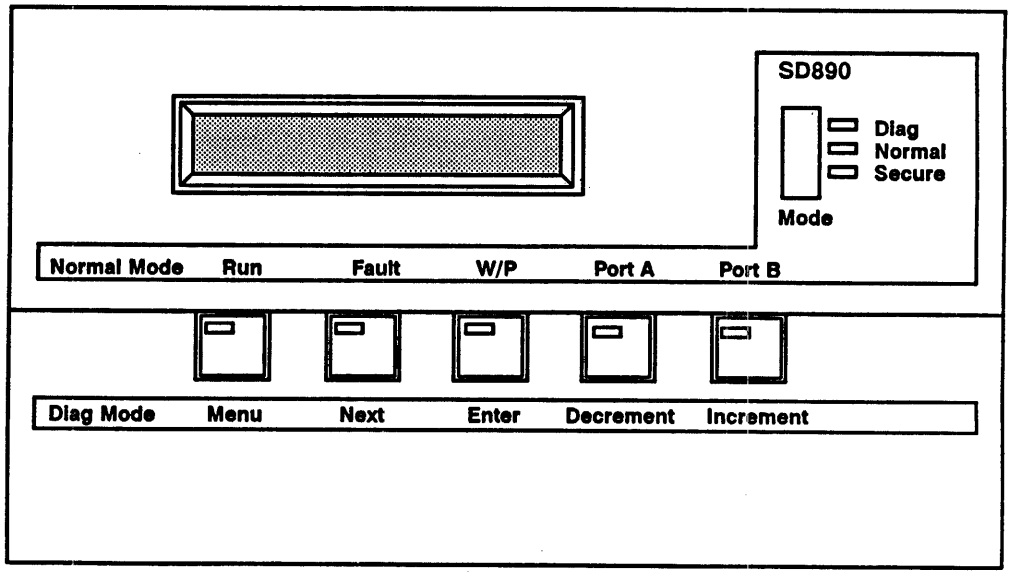


Figure 2–5. User Panel

2.7.1 Liquid Crystal Display (LCD)

The type of information that appears on the LCD depends upon the current operating mode of the drive. During power-up the LCD shows a series of test numbers. In Diagnostic Mode (DM) the yellow *Diag* LED is lit, and the LCD indicates the number and name of each menu item, such as *1a Run Tests*, or the status of the current Diagnostic Mode function, such as current test number and count, and error, if any.

In Normal Mode (NM), the green *Normal* LED is lit, and the LCD indicates the current operating state, for example, *STOPPED, READY*, or *SPINUP*. For the various menus that appear on the LCD, see Appendix C. For a complete list of messages displayed in each language, see Appendix E. Figures 2–6 through 2–8 show sample displays.

Figure 2–6. Sample Display of a READY Message

Table 2–1 gives the locations and functions of the respective fields in the LCD when the drive is in Normal Mode.

Table 2–1. LCD Fields in Normal Mode

Column No.	Field Name	Field Function
1–4	Unit ID	Indicates the Unit ID Number of the drive. In Figure 2–6 the Unit ID Number is 23.
6	Active Port	Indicates whether the active port is *A* or *B*. When this field is blank, neither port is active. In Figure 2–6 the active port is *B*.
8	Write Protection Status	Indicates whether the drive is Write Protected (*P*), as in Figure 2–6. When this field is blank, the drive is not write protected.
10-16	Drive Status	If the drive is ready, this field will indicate either *READY*, as in Figure 2–6, or the current cylinder number. If the drive is not ready, this field will indicate the reason, such as *STOPPED, SPINUP*, or *SPINDOWN*. If there is an error, the Fault LED lights, and the Drive Status Field shows *ERR #* and indicates the error number. To interpret the error number, see Appendix D (Error Code List).

Figure 2-7 shows another sample display. In this case the Unit ID number is 202, the active port is *A*, and Error Number 69 indicates SDI Transmission Timeout (perhaps caused by a cable becoming disconnected, see Appendix C).

Figure 2-7. Sample Display of an Error Message

Figure 2-8 shows a sample display with a cylinder number. In this case the Unit ID Number (2210) fills the four-digit field, the Active Port is *A*, the drive is not write protected, and the Cylinder Number is 1,257. The letter *S* will appear when the drive is seeking to a cylinder.

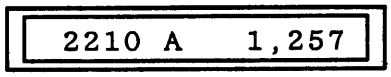


Figure 2-8. Sample Display of a Cylinder Number

2.7.2 Mode Selection Switch

The Mode Selection Switch has three positions. The top position enables the Diagnostic Mode. The middle position enables Normal operation, and allows full use of User Panel switches. The bottom position also allows Normal operation, but, in addition, *Secures* the settings of the Run, Write Protect (W/P), and Port switches. This prevents inadvertent changes during operation.

2.7.3 Pushbutton Switches

A row of five pushbutton switches fills the lower half of the User Panel. Each of these switches contains an LED. The row has legends both above and below it, to indicate Normal or Diagnostic operation. The appropriate legend depends upon the current operating mode. In Normal Mode the functions of the switches are, from the left, <Run>, <Fault>, <Write Protect (W/P>, <Port A>, and <Port B>, respectively. In Diagnostic Mode their functions are <Menu>, <Next>, <Enter>, <Decrement>, and <Increment>, respectively.

In Normal Mode the LED is lit to indicate that the switch is on, with the exceptions noted in the following discussions of the **Run**/Menu Switch and the **Fault**/Next Switch. In Diagnostic Mode the switches control menu selection and data entry. The <Increment> and <Decrement> switches have an autorepeat feature when pressed for more than .5 seconds.

The following list details the function of the respective pushbutton switches (**bold print** indicates the function under discussion).

1. **The Run/Menu Switch**

   In the Normal Mode, the **Run**/Menu Switch functions as an alternate-action switch that spins the drive up or down. When the drive is spinning up or down, the Run LED flashes on and off until the sequence is complete. It flashes off during seek operations initiated by the host system. When the LED is on steadily, the switch is on. When the Mode Selection Switch is in the *Secure* position, pressing the **Run**/Menu Switch has no effect. A host-system DISMOUNT command may "unload" a drive. In this case the LCD display reports the current state of the drive (SPIN DN or STOPPED), and the Run LED remains lit to indicate that the Run Switch is on. A subsequent MOUNT command from a host system can "load" the drive, as indicated by SPIN UP and READY state displays in the LCD.

   In the Diagnostic Mode, the Run/**Menu** Switch functions as a momentary switch that returns the drive to the previous menu.

2. **The Fault/Next Switch**

   In the Normal Mode, the **Fault**/Next Switch functions as a momentary switch as follows:

   a. If a fault occurs in the drive, it is indicated in the right half of the LCD, and the red **Fault** LED lights. To attempt to clear the fault condition, press the switch.

   b. As an alternate special function, this switch enables toggling the display between the *READY* screen and a display of the current cylinder location.

   c. Even when the Mode Selection Switch is in the *Secure* position, the **Fault**/Next Switch is fully functional.

   In the Diagnostic Mode, the Fault/**Next** Switch functions as a momentary switch that advances to the next menu item. Pressing it at the last item in a menu will wrap to the first item.

3. **The Write Protect/Enter Switch**

   In the Normal Mode, the **Write Protect**/Enter Switch functions as an alternate-action switch to enable the Write Protect function. The LED indicates that the switch is on, and the LCD displays a *P* for *Protected*. When the Mode Selection Switch is in the *Secure* position, pressing the **Write Protect**/Enter Switch has no effect.

   In the Diagnostic Mode, the Write Protect/**Enter** Switch functions as a momentary switch that selects the displayed menu item.

4. **The Port A/Decrement Switch**

   In the Normal Mode, the **Port A**/Decrement Switch functions as an alternate-action switch to enable Port A. The LED indicates that the switch is on. When the Mode Selection Switch is in the *Secure* position, pressing the **Port A**/Decrement switch has no effect.

   In the Diagnostic Mode, the Port A/**Decrement** Switch functions as a momentary switch that reduces the displayed number by one.

5. **The Port B/Increment Switch**

   In the Normal Mode, the **Port B**/Increment Switch functions as an alternate-action switch to enable Port B. The LED indicates that the switch is on. When the Mode Selection Switch is in the *Secure* position, pressing the **Port B**/Increment Switch has no effect.

   In the Diagnostic Mode, the Port B/**Increment** Switch functions as a momentary switch that increases the displayed number by one.

Table 2–2 summarizes the functions of the pushbutton switches.

Table 2–2. Summary of Pushbutton Switches

Switch	Function
NORMAL MODE	
<Run>	Spins the drive up or down
<Fault>	Clears a fault, if it can be cleared. In its special function, the switch enables toggling the display between READY and current cylinder.
<W/P>	Enables the Write Protect function
<Port A>	Enables Port A
<Port B>	Enables Port B
DIAGNOSTIC MODE	
<Menu>	Returns to a previous menu.
<Next>	Advances to the next menu item. Pressing <Next> at the last item in a menu wraps to the first item
<Enter>	Selects the displayed menu item
<Decrement>	Reduces the displayed number by one
<Increment>	Increases the displayed number by one

2.7.4 LCD Contrast and Backlight Adjustments

You can adjust the User Panel for contrast and backlight to enhance the readability of the LCD display. The controls are located on the back of the User Panel (see Figure 2–9).

CAUTION! Use a nonmetallic adjustment tool when making adjustments to the User Panel.

To gain access to the controls, grip the top of the User Panel, press it down, and pull it out. To adjust the contrast or backlight, rotate the appropriate control.

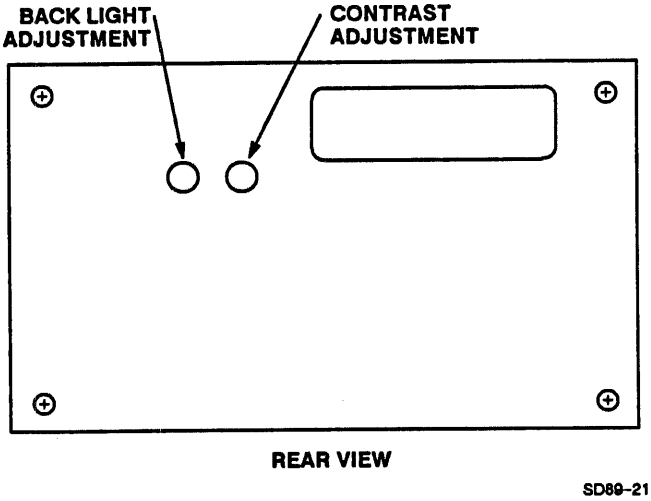


Figure 2–9. User Panel Adjustment Locations

Section 3
OPERATION

3.1 Overview

This section discusses power-up, internal diagnostics, setting the Unit ID number, and language selection (for the corresponding menu charts, see Appendix C).

3.2 The Initial Power-Up Procedure

Emulex recommends the following procedure for initial power-up.

1. Confirm that the Mode Selection Switch is in the *Secure* position.
2. Connect one end of the AC power cord to the AC power cable that protrudes from the rear panel of the drive (see Figure 2–4). Plug the other end into an available AC socket.
3. Reach above and behind the front panel, and make sure that the On/Standby rocker switch (see Figure 3–1) is in position 1 (ON).

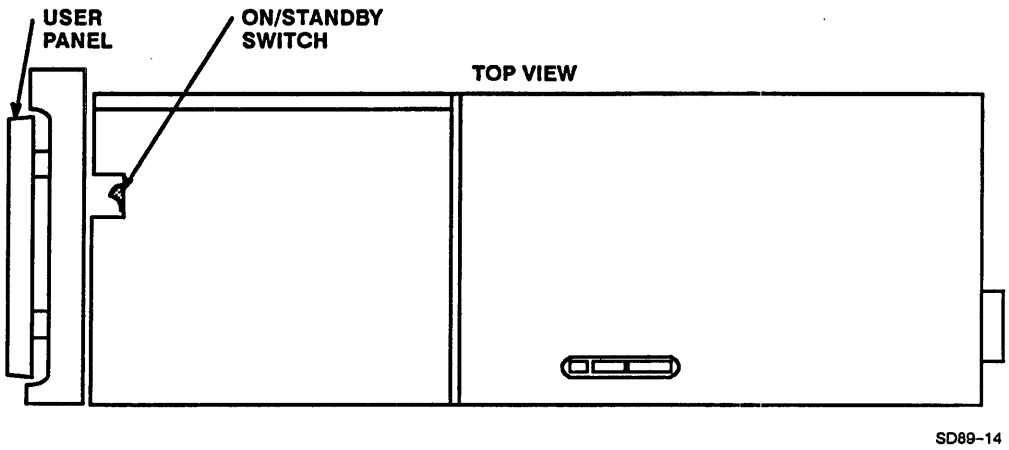


Figure 3–1. On/Standby Switch

4. The drive performs it power-up self-test. The LEDs on the user panel should flash for a few seconds and then go off. A self-test failure will give one of the following situations:
   a. All LEDs remain on or all remain off.

b. The Fault LED lights, and the display shows an error code. The error code list in Appendix D interprets the error code numbers.

5. If the drive passes its power-up self-test, it will display a unit ID number, in the range of 0-4095, and the word *STOPPED*. The unit ID number contains from one to four digits (leading zeros are suppressed).

3.3 Internal Diagnostics

Before bringing the SD89X online, run the internal diagnostics. Refer to the Menu Charts in Appendix C as you perform the following step-by-step procedures. If you must run more than these basic internal diagnostics, see subsection

3.3.1 Preparing for Internal Diagnostics

Prepare to run internal diagnostics as follows:

NOTE: When running Internal Diagnostics, select the Emulex extended error reporting. See subsection 3.6.

1. Set the Mode Selection Switch to *Normal.*
2. Depress the Run Switch, and wait for the drive to spin up and the LCD to show *READY.* During spin-up the LCD displays a *SPIN-UP* message. At the conclusion of spin-up, the LCD displays the unit number and either the word *READY* or a cylinder number of *0.*
3. Ensure that both Port Select Switches are off.
4. Install the loopback plugs, which are provided, in the respective SDI ports. If a port is cabled to a controller, remove the cable from the controller, and install the loopback plug onto the cable with the double male adapter, which is provided. If the port does not have an SDI cable, install the loopback plug directly at the port.
5. Make sure that no errors are posted on the LCD. If any errors are pending, or if you are not sure what the display means, press the Fault Switch to clear the error condition.
6. Set the Mode Selection Switch to *Diag.* The Diagnostic LED will light up, and the LCD will momentarily show the messages *Enter Diag. Mode* and *Select Menu Item,* before steadily displaying the message *1a Run Tests* (see Figure C–1).

3.3.2 The Diagnostic Procedure

Perform the diagnostic according to the following procedure:

1. When the LCD displays *1a Run Tests,* you may begin the diagnostics. Press the <Enter> switch, and the LCD will display *2a Default Sequence.*
2. Press <Enter>, and you will receive Menu Chart 3 (Repetition Count), which offers a choice of four items. You may select *3a* to start the default sequence, *3b* to run a single pass of a particular test or sequence, *3c* to run

the test or sequence continuously, or *3d* to set a particular number of passes of the test or sequence.

3. Emulex recommends running one pass of the default sequence, by pressing <Enter> when the LCD displays *3a Start Test(s)*. If you have not selected *3c Continuous* or *3d Set # Passes* since your last power up, the default will be *Single Pass*. The default sequence tests the user panel, drive, and Emulex SM90 board.

   The number of the test currently running appears in the LCD. It should change frequently. The number at the right of the LCD indicates the number of times that the test sequence has been repeated (this field is blank the first time).

4. If the diagnostics complete successfully, the LCD displays *Tests Passed* briefly, and then menu selection *3a Start Test(s)*.

3.3.3 Error Codes

If a test fails, the Fault LED lights up, and the LCD displays an error code (see Appendix D for the Error Code List). Most error codes indicate hardware failures that are not user-serviceable; if one of these error codes is displayed, call Emulex Technical Support at (800) 854–7112 outside California or (714) 662–5600 inside California, for instructions.

Some of the error codes indicate easily corrected problems (for example, bad cables, drive not spun up, loopback connector not installed).

3.3.4 Other Diagnostic Tests

The SD89X provides a series of diagnostic self-tests. The number of each test appears on the display while that test is running. Table NO TAG lists them. If you wish to test just the user panel or disk drive, or to run another single test, press <Next> to advance from *2a Default Sequence* to *2b Panel Test, 2c Drive Tests*, and *2d Single Test*, respectively. To complete one of these tests, refer to Menu Chart 2 in Appendix C.

If you have selected the Panel Test, the LCD will display *Set NM*, to prompt you to set the Mode Selection Switch to the *N*ormal *M*ode. You can then press each of the panel switches in turn to confirm that its LED lights up. These switches toggle, except for the Fault Switch, which is a momentary switch. Test the Mode Selection Switch by moving it, but when you move it to *Diag*, you end the test.

Table 3–1. SD89X Diagnostic Self-Tests

Test	Function
1	PROM Verification
2	Front Panel LED Display
3	Sector Counter Port
4	Read/Write Controls
5	Clock Controls
6	Max Sector Number Output Port
7	HDA Interface Ports
8	Operator Panel Controls
9	Timer 5.5
A	Timer 6.5
B	Interrupt 7.5 Status A and B
C	SDI Output Port
D	SDI Command/Response - Data I/O
E	SDI Cable Loopback - Both Ports
F	Diagnostic Data I/O Ports
10	Disk Data Read/Write Verification
11	Seek Error and Fault Error Recovery
12	Interlock Status
13	Interrupt Control Port

3.3.5 Completing the Internal Diagnostics

If the diagnostics complete successfully, the LCD displays *Tests Passed*, and returns to the message *3a Start Tests*.

To end the diagnostics, remove the loopback plugs, and set the Mode Selection Switch to *Normal*. In place of the loopback plugs, connect the SDI cable to the DEC DSA controller of the host computer. Select one or both ports, depending upon your system setup. If the loopbacks are inadvertently left in place, the LCD will prompt you to remove them, and the SD89X will not enter the Normal Mode until they are removed. If the message persists when no loop backs are installed, press <Enter> to complete the transition to Normal Mode.

3.4 Setting the Unit ID Number

To set the unit ID number, perform the following procedure:

1. Confirm that both ports are offline. Set the Mode Selection Switch to *Diag*, and you will receive Menu Chart 1: Main Menu (see Appendix C). The LCD will display *Enter Diag.* Mode momentarily, then *Select Menu Item*, also momentarily, before continuously displaying *1a Run Tests.*
2. To advance to the next menu item, press the <Next> switch, and receive the screen *1b Show/Set.*
3. Press <Enter> to advance to *4a Unit Number.*
4. Press <Enter> to advance to *Set Unit # XXXX.*
5. A cursor appears under the rightmost digit of the four unit number that was set at the factory. You may change this digit by pressing <Increment> or <Decrement>.
6. Advance to the next digit by pressing the <Next>. At any time you may press <Menu> to return to *4a Unit Number* without altering the previous unit number.
7. After you have completed entering the desired unit ID number, save this number by pressing <Enter>. This records the new number in the NOVRAM, and returns you to *4a Unit Number.* Note that only numbers in the range 0 to 4094 are valid. If you attempt to save a number higher than 4094, you will receive the warning, *Invalid Unit No.*, and will return to step 5 with the invalid value displayed.
8. You may confirm the number either by pressing <Enter> or by returning to Normal Mode (by setting the Mode Selection Switch to *Normal*).

3.5 Language Selection

This subsection tells you how to select the language you desire, and how to return to that language if you accidentally enter the wrong language.

3.5.1 Selecting the Desired Language

The display can show your messages in English, French, German, Spanish, or Japanese. To select your language, perform the following procedure:

1. Confirm that both ports are off-line. Set the Mode Selection Switch to *Diag* and you will receive Menu Chart 1: Main Menu (see Appendix C). The LCD will display *Enter Diag. Mode* momentarily. Then the LCD will display *Select Menu Item.* Once these messages have been displayed momentarily, the LCD then continuously displays *1a Run Tests.*
2. To advance to the next menu item, press the <Next> switch, and the screen will read as follows: *1b Show/Set.*
3. Press <Enter> to advance to the following screen: *4a Unit Number.*
4. Press <Next> until the LCD display shows: *4e Languages.*
5. Press <Enter> and the display shows: *5a Deutsch.*
6. Press <Next> to cycle through all the languages. At any time you may press <Menu> to return to *4e Languages* without altering the previous language selected.
7. Press <Enter> when the display shows the name of the desired language.

3.5.2 Returning to the Desired Language

This subsection tells you how to return to the desired language in case you accidentally enter the wrong language. If loopback plugs are installed in the rear panel of the drive, remove them. To return to your language, perform the following procedure:

1. Move the Mode Selection Switch to *Normal,* and wait for the Normal LED to illuminate. If the Fault LED is illuminated, record the flashing error code number, and press the Fault switch to clear the fault.
2. Move the Mode Selection Switch to *Diag* (Diagnostics), and wait for the display to show *1 a* at the beginning of the message.
3. Press <Next> to advance to the display *1 b.*
4. Press <Enter> to advance to the display *4 a.* Press <Next> repeatedly to advance to the display that begins *4 e.*
5. Press <Enter> to advance to the display that begins *5 a.*
6. Press <Next> to display the language options. Press <Enter> on the desired language. This returns you to *1 a* in the top level menu.
7. Move the Mode Selection Switch to *Normal* to continue normal operations.

3.6 Selecting the Type of Error Code Reporting

You may select either of two types of error code reporting (Standard Error Code or Emulex Extended Error Code) by performing the following procedure:

1. Confirm that both ports are off-line. Set the Mode Selection Switch to *Diag.* and you will receive Menu Chart 1: Main Menu (see Appendix C). The LCD will display *Enter Diag. Mode* momentarily, then *Select Menu Item,* also momentarily, before continuously displaying *1a Run Tests.*
2. To advance to the next menu item, press the <Next> switch, and receive the screen *1b Show/Set.*
3. Press <Enter> to advance to *4a Unit Number.*
4. Press <Next> until the LCD display reads *4f Err Reporting.*
5. Press <Enter> to display *6a Std Report.*
6. Press <Next> to cycle to the next selection. At any time you may press <Menu> to return to *4f Err Reporting* without altering the previously selected type of error reporting.
7. Press <Enter> when you have selected the appropriate type of error reporting .

3.7 Installation with the HSCXX

NOTE: Do not attempt to format the drives; they come formatted from the factory. HSC software must be version 370 or higher. Older versions use a Replacement Block Number (RBN) that is represented by a maximum 15-bit word, and will not recognize the higher RBNs required for drives larger than 1.2 GB.

To install the drive with the HSCXX perform the following steps:

1. Display the drive unit numbers of existing SDI disks by running <SETSHO> SHO DISKS. Select unused unit numbers for your SDI disks, making sure that no two units have the same numbers. Enter the numbers on the user panel (see subsection 3.4).

2. Verify that you have hardware REV 34 or higher of the DEC channel card. Do this by entering <SETSHO> SHO REQ.

NOTE: Below hardware REV 37, SERDES overrun errors can be reported when ILEXER is running in the user area.

3. On the HSC, run SHO DISKS again, as you did in step 1. New disk units should show up in the list.

4. Log into VMS, and perform INITIALIZE, MOUNT, and BACKUP/VERIFY on each drive. You can abbreviate these commands as INIT, MOU, and BAC/VER, respectively.

   SD891, SD892, SD893, and SD894 require special parameters with the VMS INIT command. This is to accommodate the large capacity of each unit. SD891 through SD894 require the parameter "/CLUSTER SIZE = 4" to override the default ("/CLUSTER SIZE = 3"). This is optional for the SD890 disk drive.

5. Check Dual Port Failover by deselecting the port switch that has the illuminated LED (Select).

3.8 Installation with the KDA50, KDB50, or UDA50

NOTE: Do not try to format the drives; they come formatted from the factory.

To install the drive with the KDA50, KDB50, or UDA50, do the following:

1. If necessary, display the controller mnemonic with the VMS utility MCR SYSGEN SHO/CON.
2. Display the drive unit numbers for the SDI disks by logging into VMS and performing SHO DEV D<CR>. Be sure that no two units have the same number. Enter the numbers on the user panel (see subsection 3.4).
3. Connect the external SDI cable from the SD890X chassis, port A or port B, to the cable panel for the appropriate controller on the back of the SD890X.
4. On SD890X depress the Port Select Switch, either A or B.
5. With VMS, perform SHO DEV D. New disk units should shown up in List.
6. With VMS, perform INITIALIZE, MOUNT, and BACKUP/VERIFY on the disk drive (you can abbreviate these commands as INIT, MOU, and BAC/VER, respectively). Diagnostics are not necessary.

   SD891, SD892, SD893, and SD894 drives require special parameters with the VMS INIT command. This is to accommodate the large capacity of these drives. SD891 through SD894 require the parameter "/CLUSTER SIZE=4" to override the default ("/CLUSTER SIZE=3"). This is optional for SD890 disk drive.

3.9 Troubleshooting

The SD89X disk drive is formatted and tested at the factory.

CAUTION! The drive contains no user-serviceable parts. For service refer to an authorized service technician.

In case of problems with your drive, review Sections 2 and 3 and Appendix D (Error Code List), and confirm the following:

1. Switches and jumpers are set correctly. Refer to Appendix A for the correct settings.
2. SDI cabling is correct.
3. No connector pins are bent.
4. The controller has successfully completed the self-test.

3.10 Service

If you have a problem with your SD89X, 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, 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 SD89X was initially purchased.

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

Appendix A
SWITCH SETTINGS

A.1 Overview

This appendix gives a table of spin-up delays for sequential spin-up, and it provides the required settings for the I/O Switch and the Control Board switches and jumpers. *Do not change the factory settings,* with the possible exception of the three switches on the I/O Board and four Logical Address Switches on the Control Board.

A.2 Sequential Spin-up Switch Settings

If you wish to enable sequential spin-up of multiple drives in a cabinet, consult subsection 2.6 and Table A–1, below, for the appropriate switch settings (for the locations of these switches, see Figure A–1 through Figure A–5). Table A–1 shows factory switch settings in boldface type. To record your switch settings, circle the spin-up sequence number that you have chosen in column one.

Table A–1. Spin-up Delays

Spin-up Sequence Number	I/O Switch (SW1) 8	9	10	Control Board Logical Address Switch 2^0	2^1	2^2	2^3	Spin-up Delay (seconds)
0 (factory)	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**0**
1	1	0	1	0	1	1	1	5
2	1	1	0	1	0	1	1	10
3	1	0	0	0	0	1	1	15
4	0	1	1	1	1	0	1	20
5	0	0	1	0	1	0	1	25
6	0	1	0	1	0	0	1	30
7	0	0	0	0	0	0	1	35

A.3 Required Switch and Jumper Settings

Figure A–1 through Figure A–5 show the factory switch and jumper settings for the respective drive models.

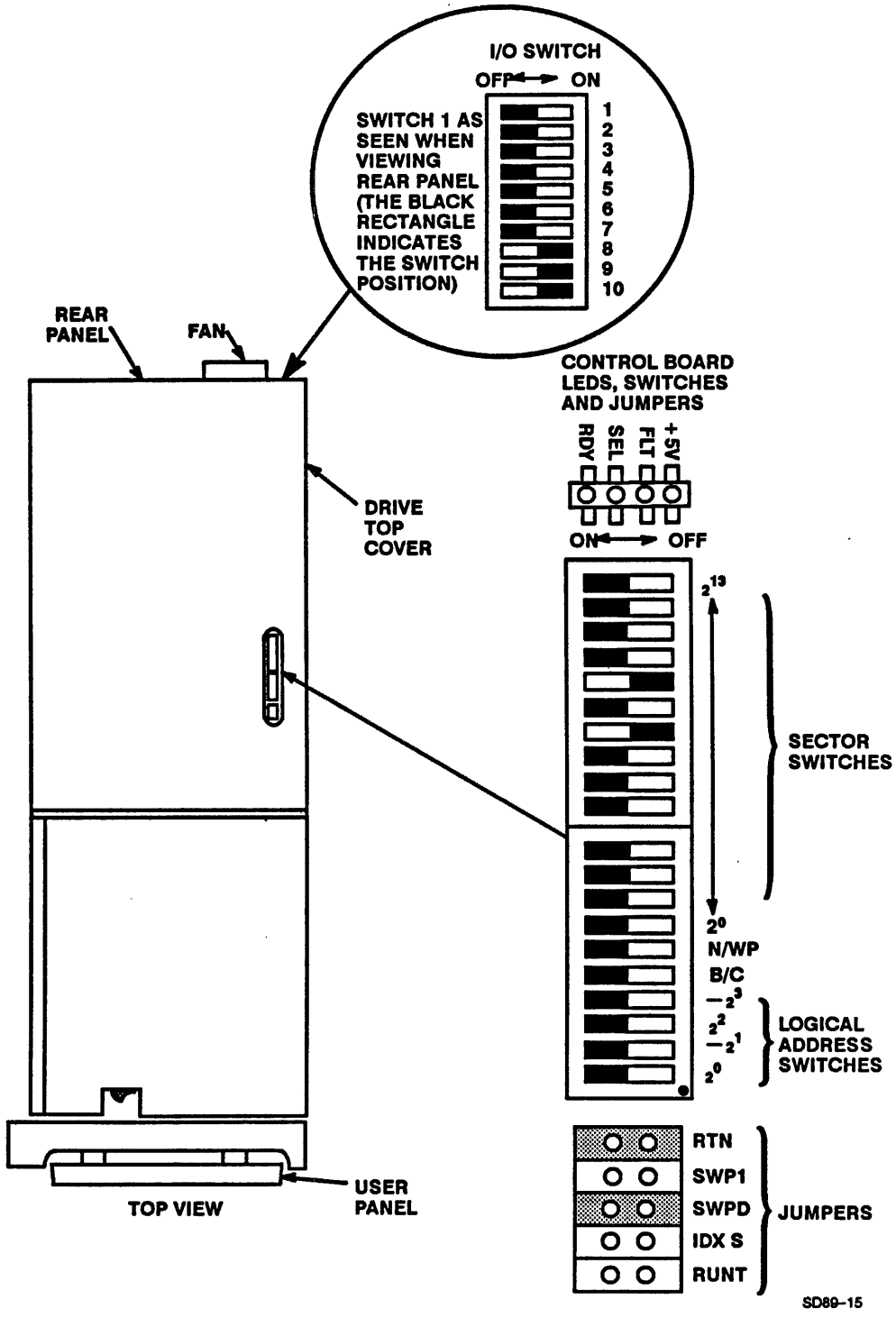


Figure A–1. SD890 Switch and Jumper Settings

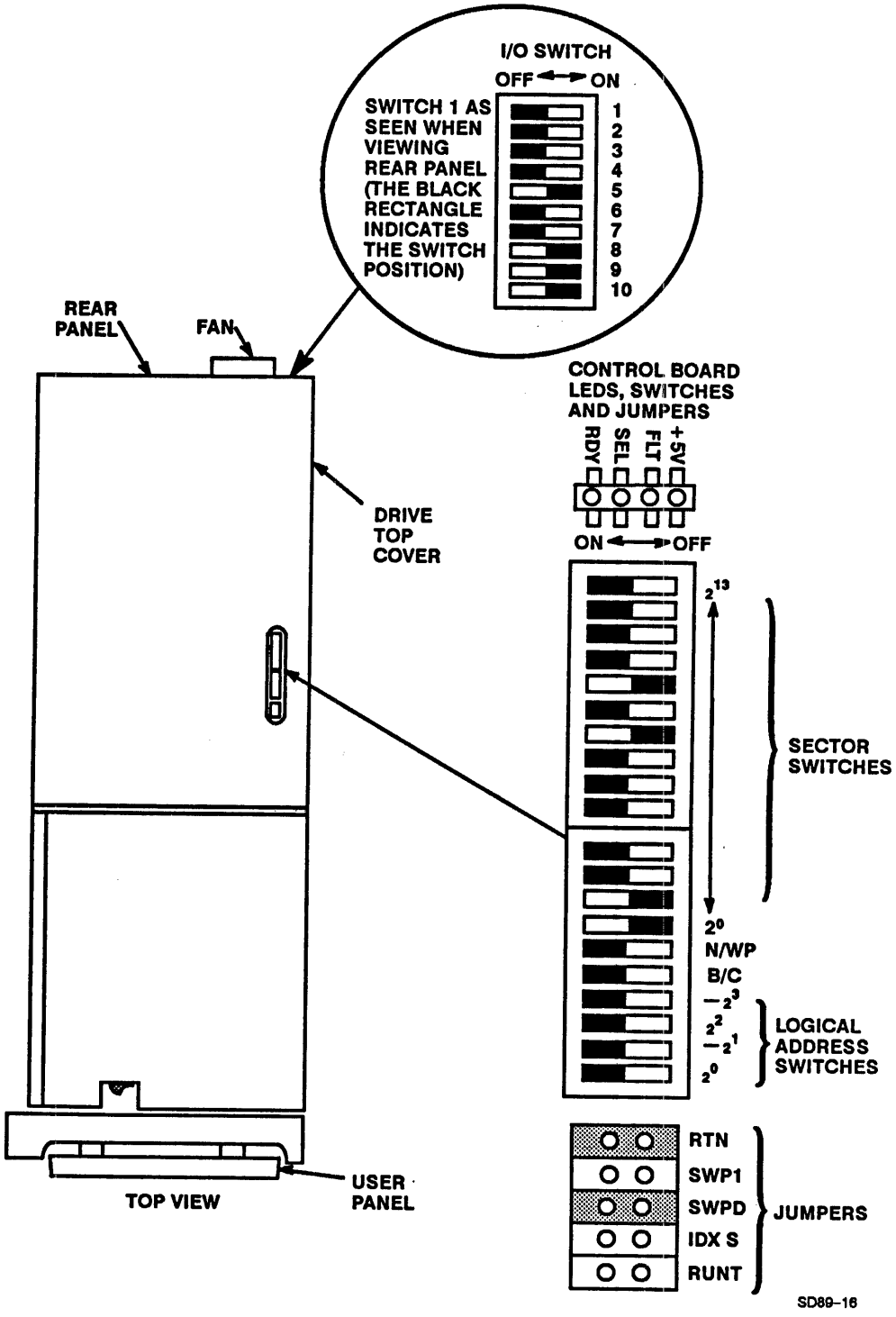


Figure A–2. SD891 Switch and Jumper Settings

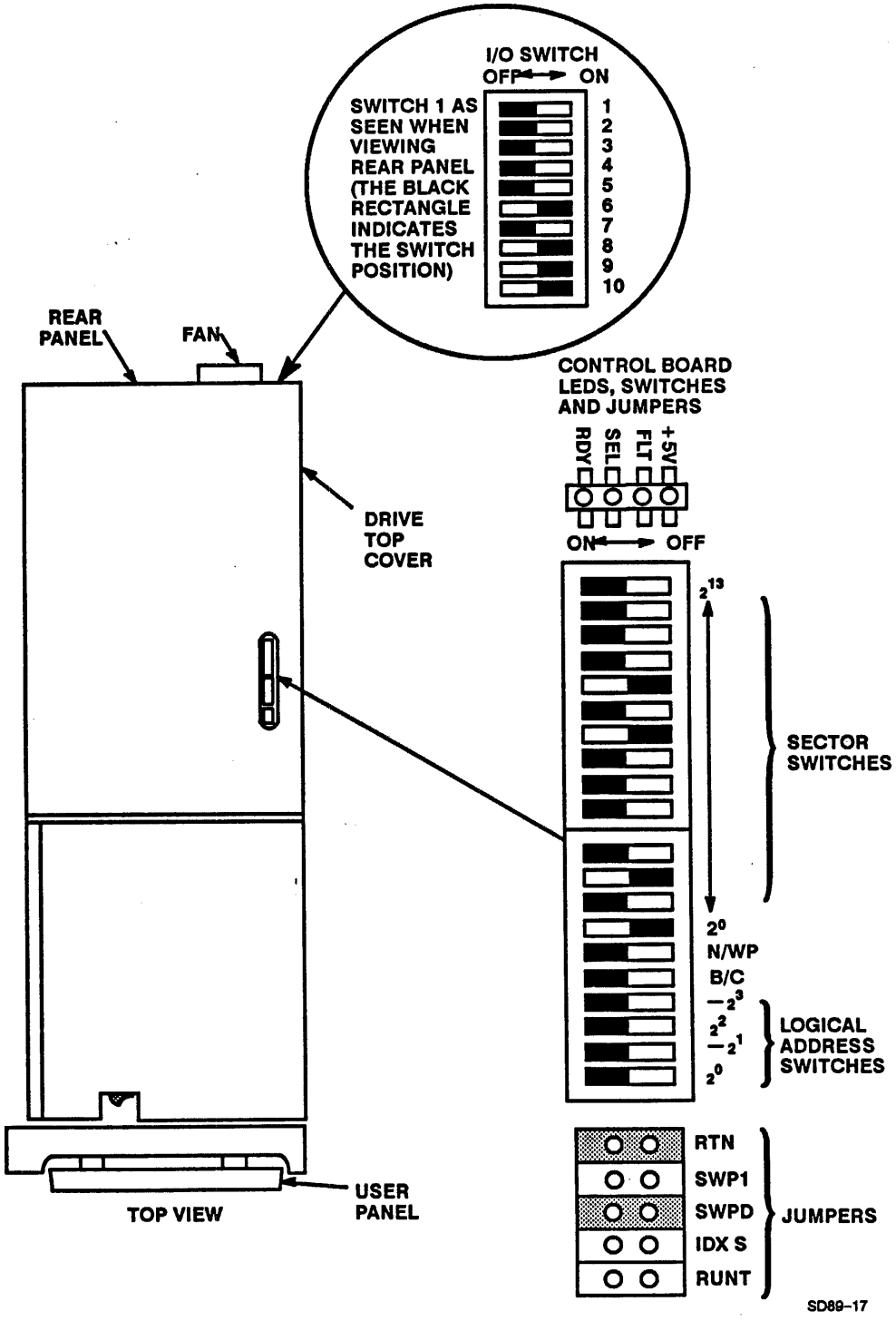


Figure A–3. SD892 Switch and Jumper Settings

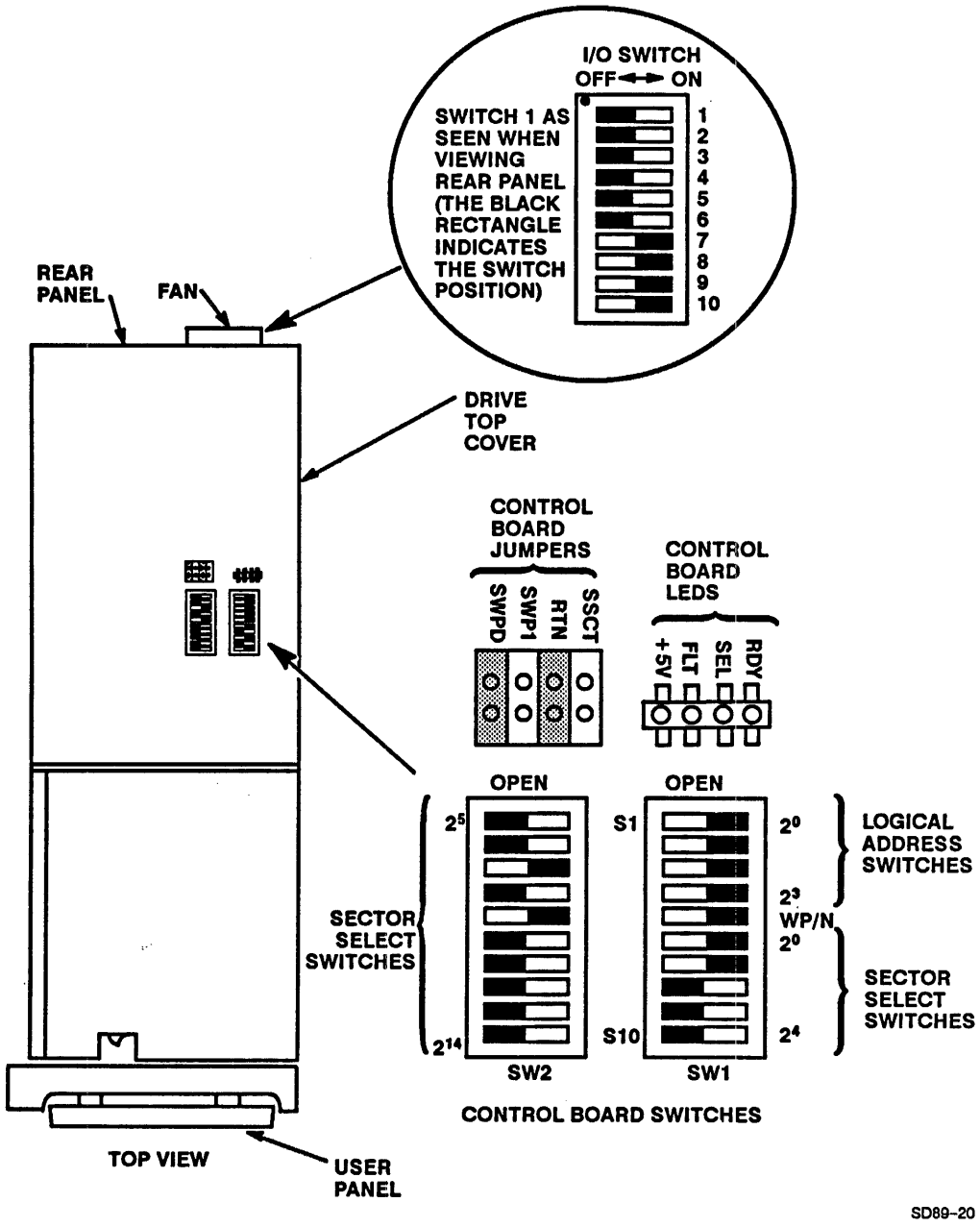


Figure A–4. SD893 Switch and Jumper Settings

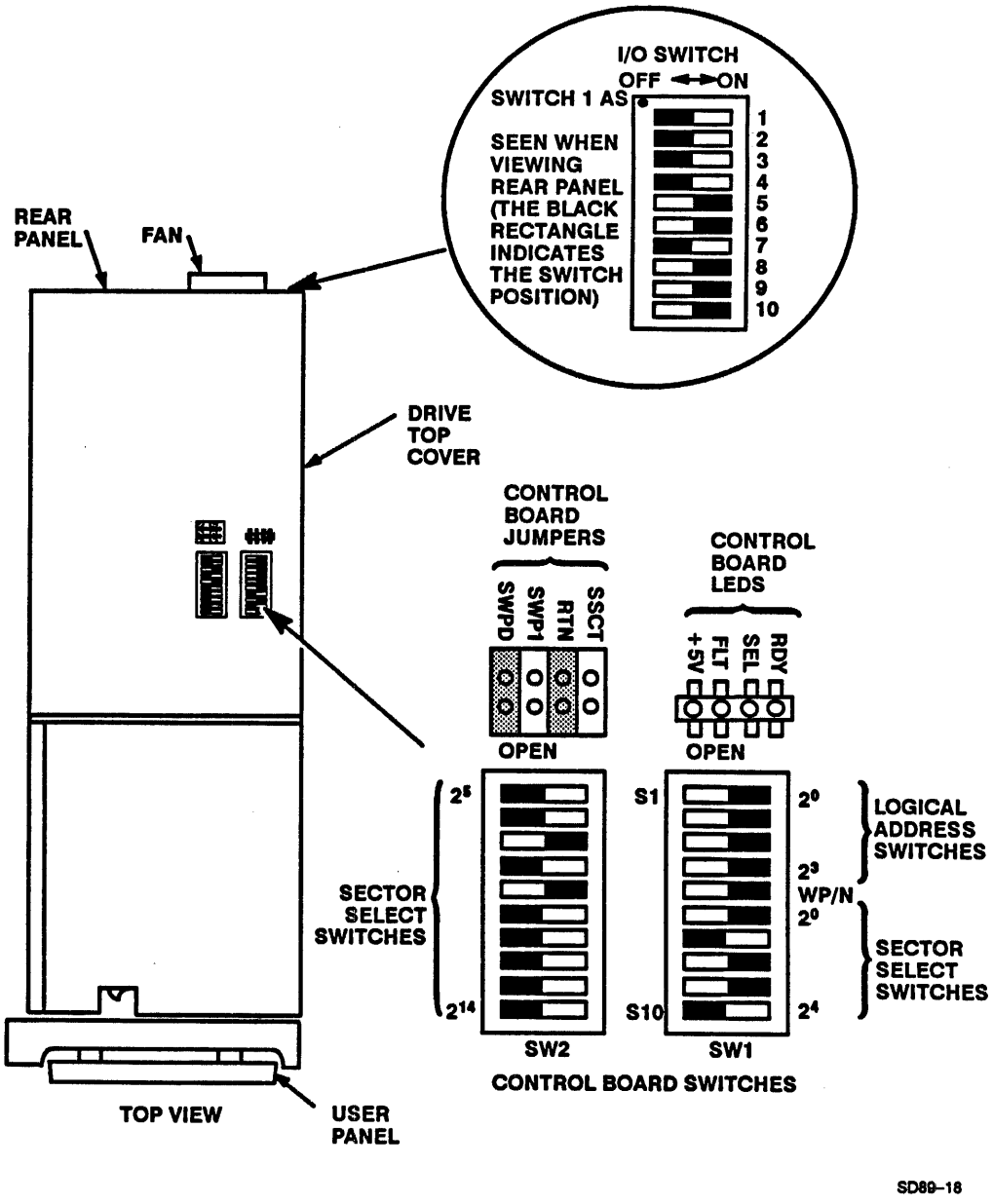


Figure A–5. SD894 Switch and Jumper Settings

Appendix B
SPECIFICATIONS

B.1 Overview

Tables B–1 through B–4, respectively, provide general, electrical, environmental, and performance specifications of the drive.

Table B–1. General Specifications of the Drive

Parameter	Description
Languages Displayed	English, French, German, Spanish, Japanese (see subsection 3.5 and Appendix E)
Controllers Supported	DEC KDA50 DEC KDB50 DEC UDA50 DEC HSC40 cluster controller DEC HSC50 cluster controller DEC HSC70 cluster controller
HSC Software	Version 370 or above
Physical Dimensions	
Height	5.0 inches (127 mm)
Width	9.25 inches (235 mm)
Length	25.5 inches (648 mm)
Weight	42 pounds (18.9 kg)

Table B–2. Electrical Specifications of the Drive

Parameter	Description
Power Requirements	
Domestic	115 VAC, single phase, 15 A
International	230-240 VAC, single-phase, 12 A
Power Receptacle Requirements	
Domestic	NEMA 5-15, standard plug
International	As per local requirements
Current Requirements	
Domestic	
Startup	3 A
Operational	1.7 A
International	
Startup	2 A
Operational	1 A

Table B–3. Environmental Specifications of the Drive

Parameter	Description
Temperature	
Operating	53 to 113°F (10 to 45°C). Max. temperature is reduced 1°F per 1000 feet (1.8°C per 1000 meters) altitude
Rate of change	27°F (15°C) per hour, max.
Storage (packaged)	14° to 122°F (–10 to 50°C)
Rate of change	27°F (15°C) per hour, max.
Transit (packaged)	–40 to 140°F (–40 to 60°C)
Rate of change	36°F (20°C) per hour, max.
Relative humidity	
Operating (no condensation allowed)	20% to 80% relative humidity with a maximum wet bulb of 82°F (28°C) and a minimum dewpoint of 36°F (2°C)
Storage (packaged)	5% to 95%
Transit (packaged)	5% to 95%, relative humidity
Barometric Pressure	(Standard Day)
Operating	–1000 ft. to 10,000 ft. (–305 to 3,000 m) 30 to 20 inches Hg (104 to 69 kPa)
Storage (packaged)	–1000 ft. (–305 m) to 10,000 ft. (3,000 m) 30 to 20 inches Hg (104 to 69 kPa)
Transit (packaged)	–1000 ft. (–305 m) to 10,000 ft. (3,000 m). 30 to 20 inches Hg (104 to 69 kPa)

Table B–4. Performance Specifications of the Drive

Parameter	Description
Formatted Capacity	
SD890	663 MB
SD891	873 MB
SD892	960 MB
SD893	1803 MB
SD894	1950 MB
Transfer Rate	
SD890	20 MHz (2.5 MB/s)
SD891	22 MHz (2.8 MB/s)
SD892	24.MHz (3.0 MB/s)
SD893	22 MHz (2.8 MB/s)
SD894	24 MHz (3.0 MB/s)
Average Latency	8.33 milliseconds (disk rotates at 3600 rpm)
Seek Time for SD890, SD891, SD892	
Full	35 milliseconds maximum
Average	15 milliseconds
Single Track	5 milliseconds maximum
Seek Time for SD893	
Full	26 milliseconds maximum
Average	13 milliseconds
Single Track	3 milliseconds maximum
Seek Time for SD894	
Full	26 milliseconds maximum
Average	13 milliseconds
Single Track	3 milliseconds maximum

Appendix C
MENU CHARTS

C.1 Overview

Figures C–1 through C-6 show the menus that appear on the display. Refer to them as you read about the User Panel in Section 2.

Menu items begin with a prefix that identifies both the menu and the item within the menu. Thus the items on Menu Chart 1 are prefixed *1a* and *1b*, items on Menu Chart 2 are prefixed *2a*, *2b*, and so forth.

This appendix employs the following typographical conventions.

1. *X*'s represent digits (the display may suppress leading zeros; this appendix shows the full field of *X*'s).
2. A double frame indicates `menu items`, to show how they appear in the display.
3. A single frame indicates **remarks**, which do not appear in the display.
4. Angle brackets indicate pushbuttons, for example, <Enter>, <Next>, or <Menu>.

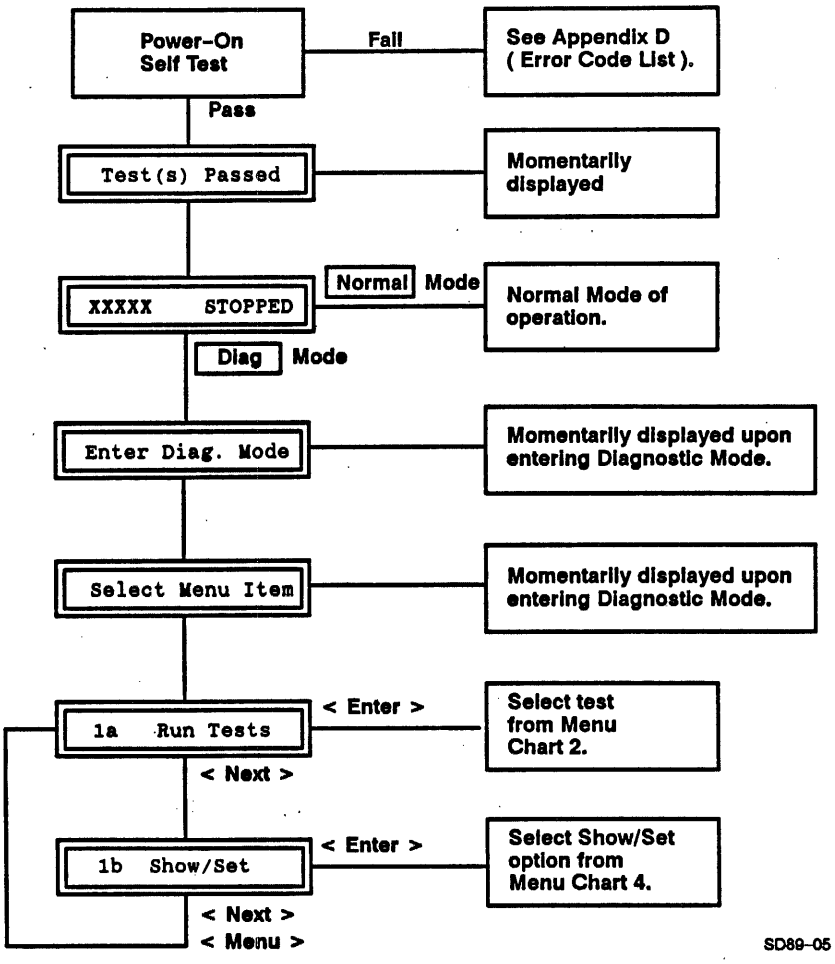
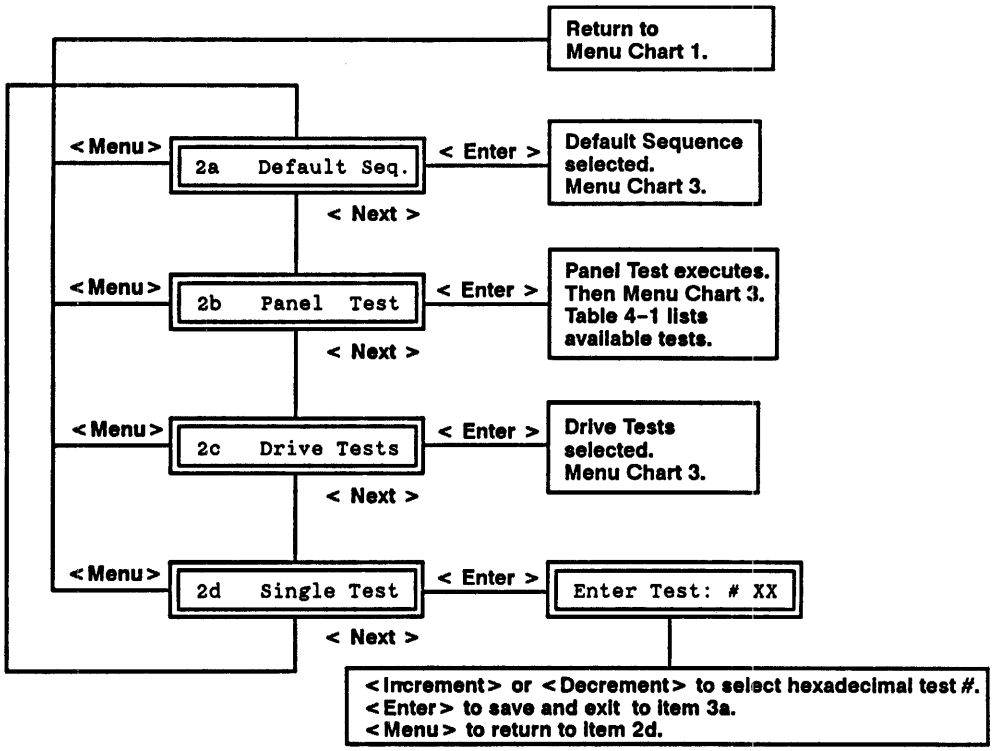


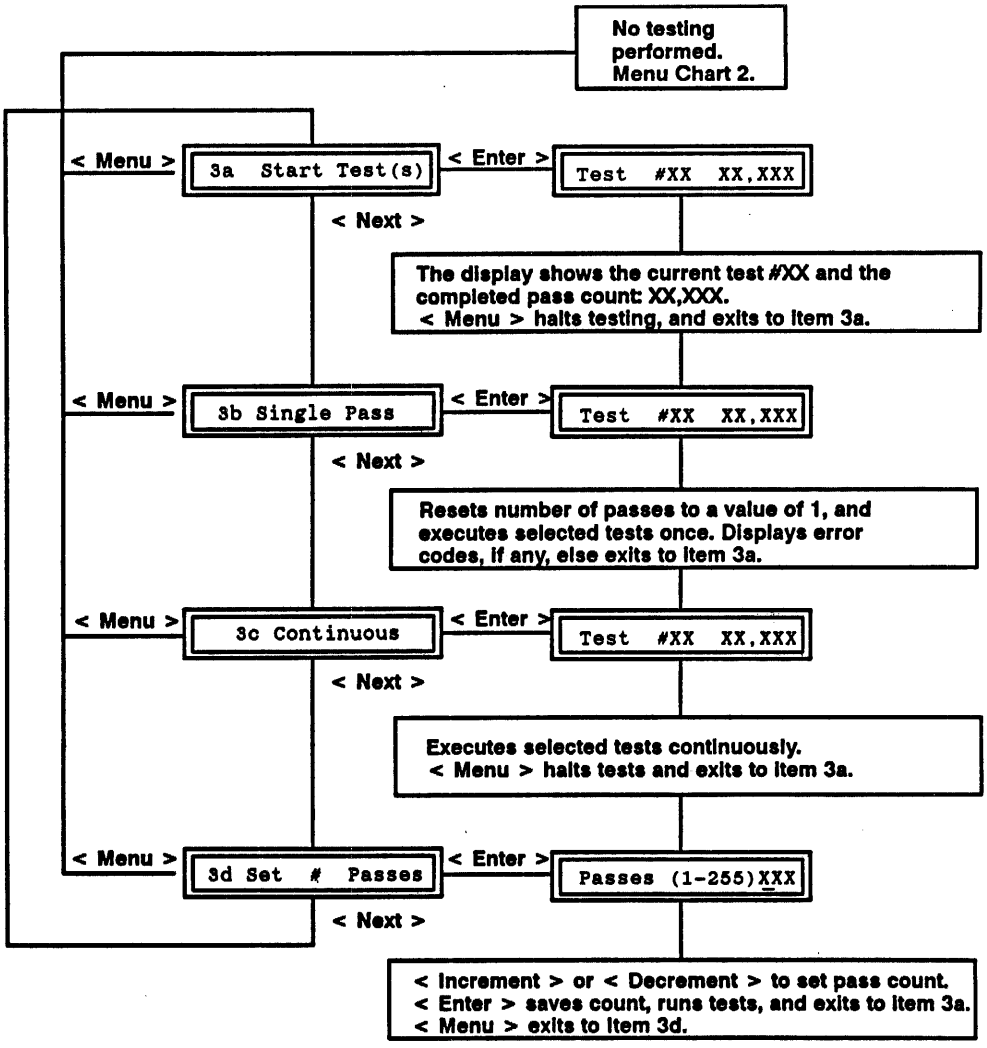
Figure C–1. Menu Chart 1: Main Menu



NOTE: **If a test selection has been made since powering the drive up, on entry to Menu 2 from Item 1a Run Tests, the previous selection is automatically redisplayed, i.e., Item 2a, 2b, or 2c or "Enter Test: # XX".**

SD89-06

Figure C–2. Menu Chart 2: Test Selection



NOTE: If a test reports an error, < Fault > clears the error and allows the execution of the next test or next pass, if any, or return to item 3a. If an error is being displayed, < Menu > or exit from diagnostic to Normal Mode is effective only after the error is cleared by pressing < Fault >.

SD89-07

Figure C–3. Menu Chart 3: Repetition Count

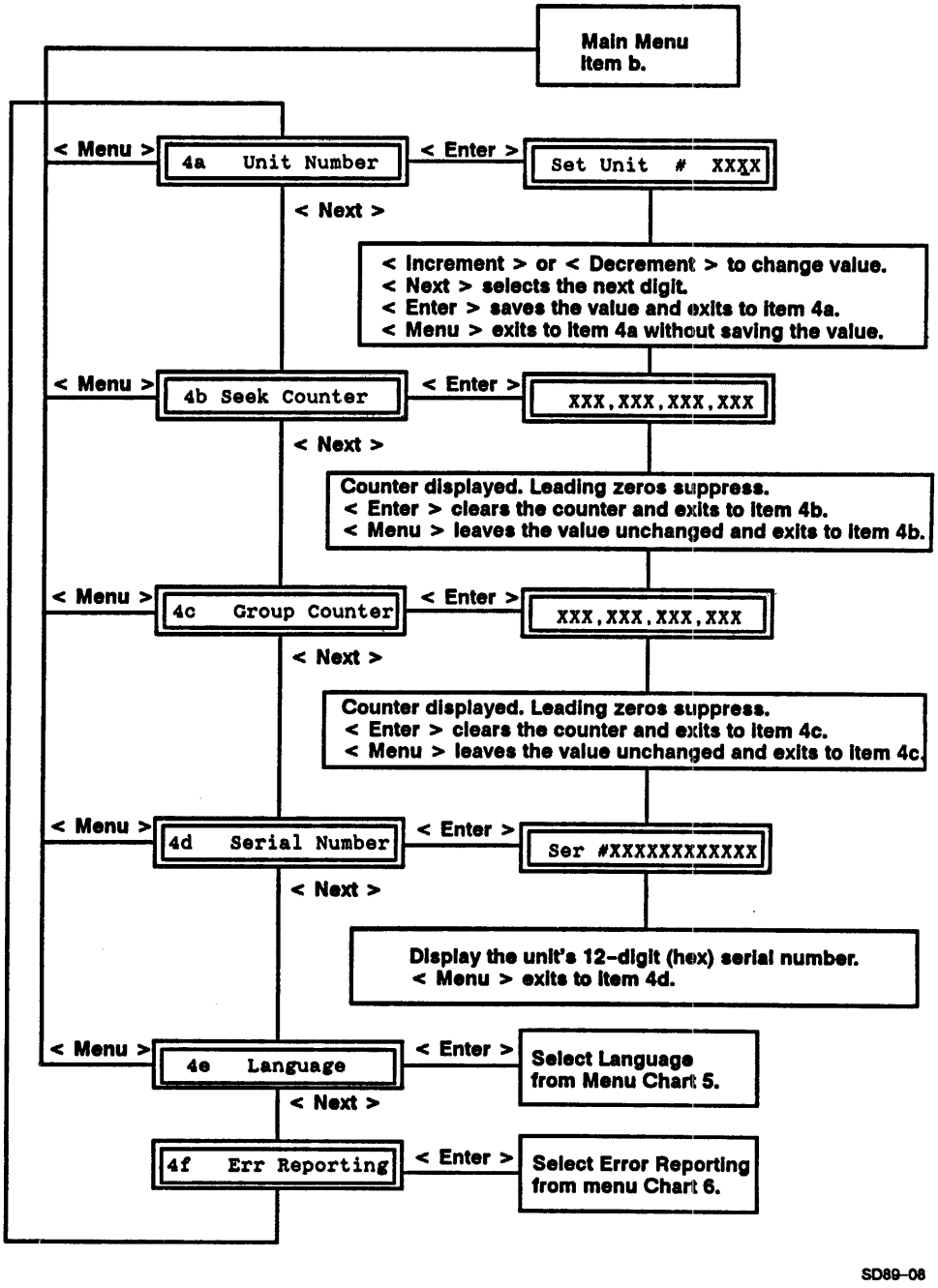


Figure C–4. Menu Chart 4: Set/Show Selection

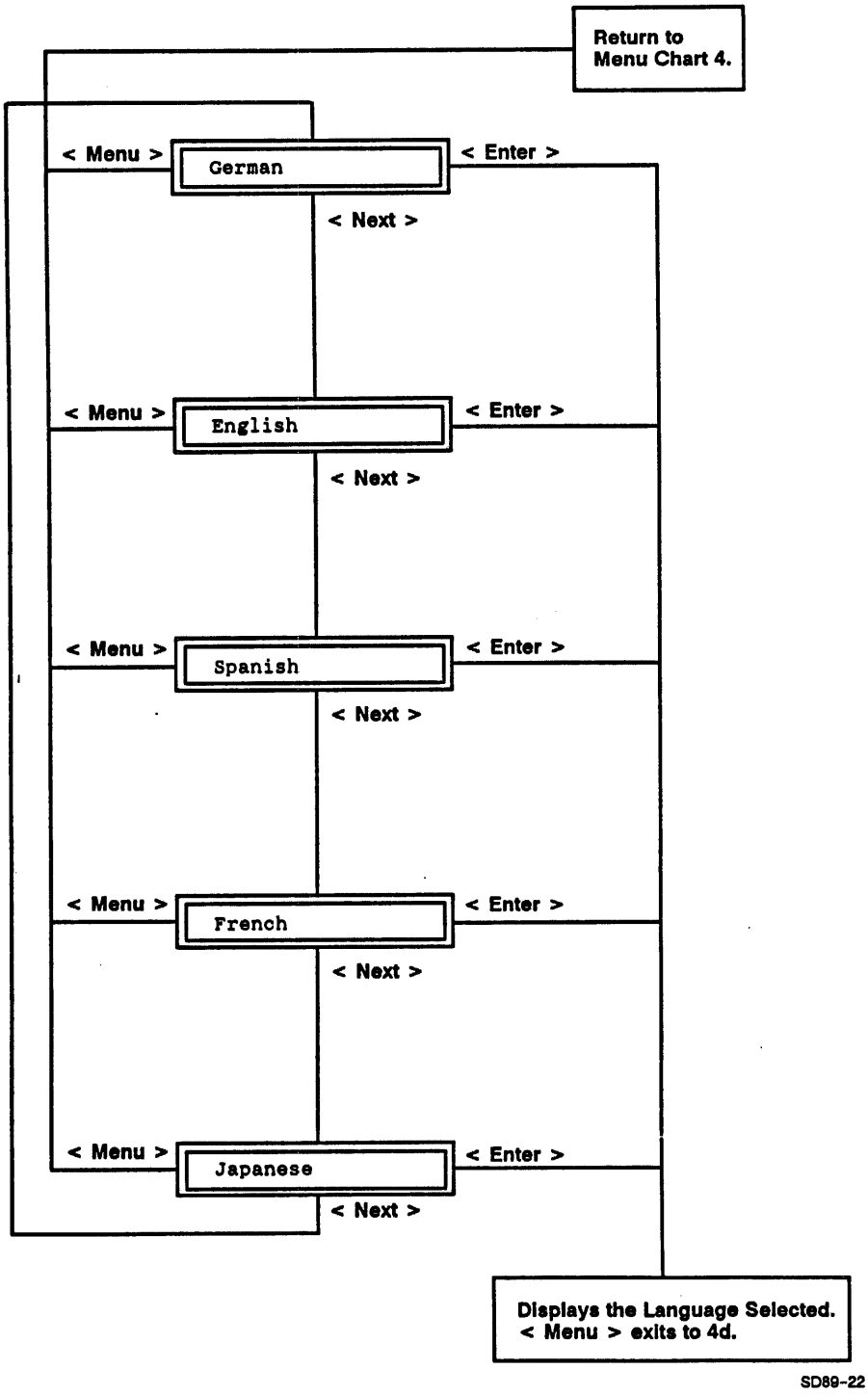


Figure C–5. Menu Chart 5: Language Selection

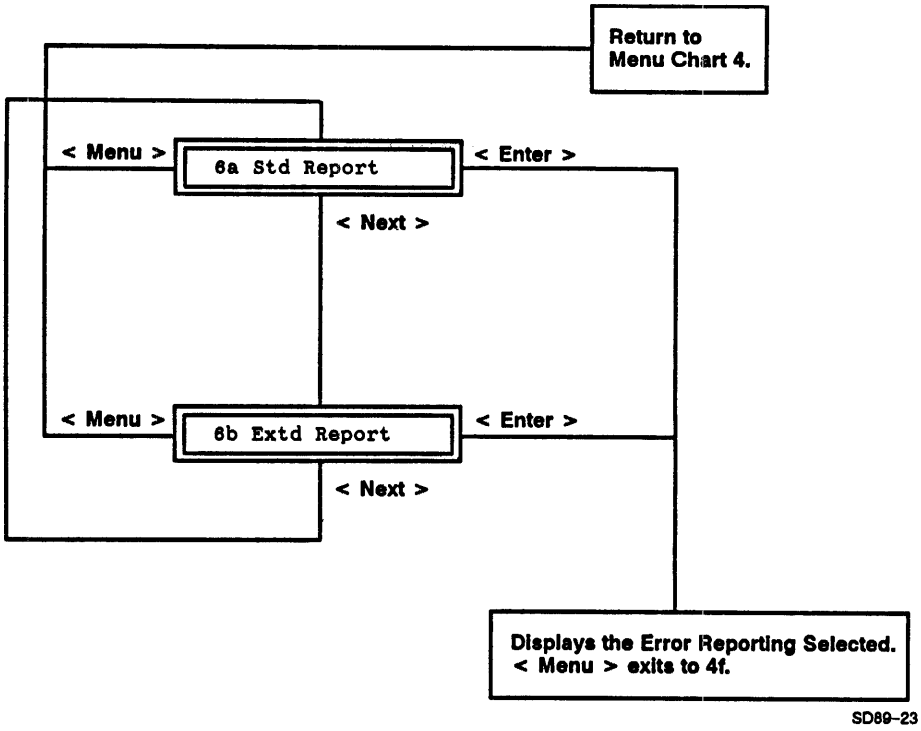


Figure C–6. Menu Chart 6: Error Reporting Selection

Appendix D
ERROR CODE LIST

D.1 Overview

When the drive detects a fault, it lights the Fault LED, and shows the error code on the LCD display. Subsection 3.3 discusses diagnostics and subsection 3.9 gives troubleshooting instructions. Table D–1, below, details some of the possible error codes, including both the Standard and the Extended codes (see subsection 1.1). Errors not listed in the table are hardware errors that are not user serviceable. If necessary, call Emulex Technical Support for instructions.

Table D–1. Error Codes

Error Code (Hex)	Probable Problem Area
30	Loss of Servo Clock.
31	Loss of Read Clock.
32	Read Gate or Write Gate .and. Drive Not Ready.
33	Read Gate or Write Gate .and. Drive Not On-Cylinder.
34	Multiple Write Gate Transitions.
35	Write Gate .and. Write Protected.
36	Sector Counter Error.
37	Read Gate .and. Write Gate.
38	Drive Fault.
39	Read Gate or Write Gate .and. Fault.
3A	Late Write Gate.
3D	Drive Write Protect Input True.
3E	Drive Unit Select Input False. *Check spin-up delay switches.*
3F	7.5 Interrupt with No Error Status Present.
40	-5 VDC Status Bad.
41	Operator Panel Interlock Status Bad.
42	Drive Disabled. *The host has detected a hardware error.*
44	Fatal Error Trap.
46	Drive Already Spun Up. *Either a user or the host software tried to spin up the drive when it was already spun up.*
47	Drive Command Timeout Occurred. *Usually a drive microprocessor failure.*
49	Read/Write Command Overrun.

(Continued on next page)

Table D–1. Error Codes (Continued)

Error Code (Hex)	Probable Problem Area
4D	Drive Spin-Up Failed. *Drive hardware error. Check cabling.*
4E	Drive Spin-Down Failed. *Drive hardware error.*
4F	Drive Seek or Recalibrate Error. *Drive hardware error.*
50	SDI Command Already in Progress.
51	SDI Framing Protocol Error. *Hardware failure or bad SDI cable.*
52	SDI Checksum Error.
53	SDI Parity Error.
54	Invalid Real-time Command.
55	Invalid Microprocessor Command.
56	Command Input Buffer Overrun or Underrun.
57	Drive Error Set .and. 'No Error Allowed' Flag Set.
58	Invalid Head Address.
59	Invalid Cylinder Address.
5A	Changing from 512 to 576 Byte Mode.
5B	Control-in Parity Error.
5C	Control-in Pulse Error.
5F	Command/Write Data Pulse Error.
60	Write Protected Drive. *A write operation was attempted with a drive that is write-protected on the SD89X user panel.*
61	Unexpected Spin-down.
62	Illegal Diagnostic Number.
64	Run Switch On .and. Drive Disabled.
65	Run Switch Off. *The Run switch on the SD89X user panel is off. Press it on.*
66	Memory Region Not Found.
67	Drive Unexpectedly Not on Cylinder. *Jumper-selected options on the drive might be set incorrectly.*
68	Attempted to Write Past Memory Region.
69	SDI Transmission Timeout.
6A	Drive Not Online.
6B	Read/Write Ready Status Not Set.
6C	Topology Mode Mismatch.
6D	Available Status Not Set.
6E	Invalid Error Recovery Level (>0).
6F	Invalid Subunit Flag or No Subunit #0 Flag.
70	5.5 Timer Error.

(Continued on next page)

Table D–1. Error Codes (Continued)

Error Code (Hex)	Probable Problem Area
71	6.5 Timer Error.
72	SDI Out/Echo Error.
75	Sector Count Not Found.
76	Diagnostic Read Error Latch Failure.
77	Drive Not Spun Up.
7A	Command Available Time Out.
7B	Drive Init. Found.
7C	Unexpected SDI Status 'B' Error Found.
7D	Unused.
7E	Invalid Command Not Detected.
7F	Loss of Control Clock Not Detected.
80	Loss of Command/Write Clock Not Detected.
81	Expected SDI Status 'B' Port A Error Not Found.
82	Cannot Clear Loss of Command/Write Clock Status Bit.
83	Cannot Clear Loss of Control Clock Status Bit.
84	Expected SDI Status 'B' Port B Error Not Found.
86	Invalid Response Frame.
87	Invalid SDI Data Received.
88	Response Not Detected.
89	Cannot Clear Command Available Status Bit.
8A	Invalid Command Improperly Detected.
8B	Drive Init Not Detected or Not Cleared.
8C	RAM Error.
8E	Mode Switch Error.
8F	Panel Switch Register Error.
90	Loss of Command/Write Clock Improperly Detected.
91	Loss of Control Clock Improperly Detected.
92	Command Available Not Detected.
93	Wrong Command Code Detected.
94	Wrong SDI Data Detected.
95	Sync Detect Failure.
96	Incorrect Number of Sectors.
97	Sector Counter Port Error.
98	Interrupt Control Port Error.

(Continued on next page)

Table D–1. Error Codes (Continued)

Error Code (Hex)	Probable Problem Area
99	Drive Status Ports A or B Error.
9A	Drive Output/Input Ports Error.
9B	Max Sector # Output Port Error.
9C	Interlock Status Port Error.
9D	Read/Write Control Port Error.
9E	Clock Control Port Error.
9F	Disk Data Read/Compare Ports Error.
A0	Interrupt 7.5 Status 'A' Bit 0 Error.
A1	Interrupt 7.5 Status 'A' Bit 1 Error.
A2	Interrupt 7.5 Status 'A' Bit 2 Error.
A3	Interrupt 7.5 Status 'A' Bit 3 Error.
A4	Interrupt 7.5 Status 'A' Bit 4 Error.
A5	Interrupt 7.5 Status 'A' Bit 5 Error.
B0	Interrupt 7.5 Status 'B' Bit 0 Error.
B1	Interrupt 7.5 Status 'B' Bit 1 Error.
B2	Interrupt 7.5 Status 'B' Bit 2 Error.
B3	Interrupt 7.5 Status 'B' Bit 3 Error.
B5	Interrupt 7.5 Status 'B' Bit 5 Error.
C0	Program PROM Checksum Error.
C1	Program PROM Verification Flag Error.
C2	Unexpected SDI Status 'A' Error Found.
C3	Cannot Clear Interrupt Status A or B Error Bit.
C4	Configuration PROM Checksum Error.
C5	Seek Error Not Detected.
C6	Drive Fault Not Detected.
CA	Number of Bad Tracks = 1 to 3.
CB	Number of Bad Tracks > 3.
CC	Drive Not Spun Up.
CD	Sync Detect Failure.
CE	Incorrect Number of Sectors.
DD	Inconsistent Drive Clock Controls.

Appendix E
LANGUAGE DISPLAYS

E.1 Overview

Subsection 3.5.1 tells how to select the language of your choice. Table E-1, below, lists the displayed messages in their respective languages and in the approximate order that they appear on the display. The 16-character display must abbreviate the messages but this table spells them out more fully. In addition, Appendix C explains each message in the context of the full menu charts.

Since Table E-1 includes messages for both Normal Mode (NM) and Diagnostic Mode (DM), it lists more than one message with the same menu-level code, such as ***1a** Show/Set* and ***1a** Run Tests*.

Table E-1. Messages in The Respective Languages

ENGLISH	FRANCAIS	DEUTSCH	ESPAÑOL	JAPANESE (KATAKANA)
Enter Diag. Mode	Entrer Mode Diag	Diag Mod aufrufn	Entre Modo Diag.	タイワモードカイシ
Select Menu Item	Sél. Rubri. Menu	Menüpkt.auswähln	Escoja del Menú	メニューコウモクノセンタク
Clear Error #	Effac. Erreur#	FehlernrLösch.	Borre Error #	バンゴウノクリア
Leave Diag. Mode	Quit Mode Diag.	Diag Mod verlass	Deje Modo Diag.	タイワモードシュウリヨウ
Remove Loopbacks	Enlever Bouclage	Prúfschleif Entf	Remueva Loopback	ループバツクノジヨキヨ
1a Run Tests 1a Show/Set	1a Tester 1a Indiq./Sélec.	1a Tests durchlf 1a anzeig/festlg	1a Corra Pruebas 1a Vea/Ajuste	1a テストジツコウ 1a ヒヨウジノセツテイ
1b Show/Set 1b Restart Micro	1b Indiq./Sélec. 1b Rall Micropro	1b anzeig/festlg 1b Mikro Neustrt	1b Vea/Ajuste 1b Reinic. Micro	1b ヒヨウジノセツテイ 1b マイコンノサイキドウ
1c Test Controls	1c Commande Test	1c Testbefehle	1c Pruebe Contrl	1c テストセイキヨ
1d Restart Micro	1d Rall Micropro	1d Mikro Neustrt	1d Reinic. Micro	1d マイコンノサイキドウ
2a Default Seq.	2a Séq. Implic.	2a Standardfolge	2a Secuenc. Inic	2a ヒヨウジユンジユンジヨ
2b Panel Test	2b Test Panneau	2b Paneltest	2b Prueba Panel	2b パネルテスト
2c Drive Tests	2c Tests Unité	2c Laufwerktests	2c Prueb´s Unid.	2c ドライブテスト
2d Single Test	2d Test Unique	2d Einzeltest	2d Prueba Indiv.	2d シングルテスト
3a Start Test(s)	3a Demarrer Test	3a Test(s) Start	3a Empiez Pruebs	3a スタートテスト
3b Single Pass	3b Pass. Unique	3b Einzldrchlauf	3b Paso Indiv.	3b シングルパス

(Continued on next page)

Table E–1. Messages in The Respective Languages (Continued)

ENGLISH	FRANCAIS	DEUTSCH	ESPAÑOL	JAPANESE (KATAKANA)
3c Continuous	3c Continu	3c Kontinuierlch	3c Continuo	3c ケイゾク
3d Set # Passes	3d Déterm # Pass	3d Fest # Drchlf	3d Establ# Pasos	3d パ ススウ ノセツテイ
4a Unit Number	4a Numéro Unité	4a Gerätenummer	4a Número Unidad	4a ユニツトバンゴウ
4b Seek Counter	4b Comptr Cherch	4b Posit. Zähler	4b Contdr Seek	4b カウンタノケンサク
4c Group Counter	4c Compteur Grpe	4c Gruppenzähler	4c Contdr Grupo	4c グループ カウンタ
4d Serial Number	4d No. de Série	4d Seriennummer	4d Núm de Serie	4d シリアル バンゴウ
4e Language 4e Error Stack	4e Langue 4e Pile Erreurs	4e Sprache 4e Fehler-Stack	4e Idioma 4e Pila Errores	4e ゲンゴセンタク 4e エラー スタツク
4f Drive Status 4f Err Reporting	4f Statut Unité 4f Rapp. Erreurs	4f Laufwerkstats 4f Fehlerbericht	4f Estado Unidad 4f Reporte Err´s	4f ドライブノジヨウタイ 4f エラー ホウコク
4g Show/Set Mem	4g Ind/Sél. Mém.	4g spchr anz/fest	4g Ver/Ajus Mem	4g メモリノヒ ヨウジ/セツテイ
4h Show/Set Port	4h Ind/Sél. Pte	4h Port anz/fest	4h Ver/Aj Puerto	4h ポートヒ ヨウジ/セツテイ
4i Show Menu	4i Indiq Menu	4i Menü anzeig	4i Ver Menú	4i メニユーノヒ ヨウジ
5a Deutsch 5a Error Mode	5a Deutsch 5a Mode Erreur	5a Deutsch 5a Fehlermodus	5a Deutsch 5a Modo de Error	5a Deutsch 5a エラー モード
5b English 5b Default Tests	5b English 5b Tests Implic.	5b English 5b StandardTests	5b English 5b Pruebas Inic.	5b English 5b ヒ ヨウジユ ンテスト
5c Español	5c Español	5c Español	5c Español	5c Español

(Continued on next page)

Table E–1. Messages in The Respective Languages (Continued)

ENGLISH	FRANCAIS	DEUTSCH	ESPAÑOL	JAPANESE (KATAKANA)
5d Francais	5d Francais	5d Francais	5d Francais	5d Francais
5e カタカナ	5e カタカナ	5e カタカナ	5e カタカナ	5e カタカナ
6a Std Report	6a Rapp. Stand.	6a Stand Bericht	6a Reporte Norml	6a ヒヨウジュンホウコク
6b Extd Report	6b Rapp. Étendu	6b Erweit. Ber.	6b Reporte Exten	6b カクチヨウホウコク
Enter Test: #	Entre Test: #	Test eing:Nr	Entre Prueba #	テストニュウリヨク：#
Passes(1-255)	Passg (1-255)	Drchlf (1-255)	Pases (1-255)	パス(1-255)
Error(s) in Test	Erreur(s)	Fehler	Err(es) en Preub	エラーハツセイ
Test #	Test #	Test #	Prueb #	テスト #
Err #	Err #	Fehler #	# Err	エラー #
Errors	Erreur	Fehler	Errores	エラー
NOVRAM	NOVRAM	NOVRAM	NOVRAM	NOVRAM
Set NM	Sel NM	anz NM	Ajust NM	セツテイ NM
Set DM	Sel DM	anz DM	Ajust DM	セツテイ DM
Set Unit # 0	Sél Unité# 0	Gerätenr Fest. 0	Ajust Unid # 0	ユニツトセツテイ 0
Invalid Unit No.	Nº Unité Invalid	Ungült Gerätenr	# Unid Inválido	ユニツトバンゴウフセイ
Counter Cleared!	Compteur á Zéro!	Zähler gelöscht!	Contadr Borrado	カウンタガクリアサレマシタ.
Ser#	Sér#	S/N#	#Ser	シリア #

(Continued on next page)

Table E–1. Messages in The Respective Languages (Continued)

ENGLISH	FRANCAIS	DEUTSCH	ESPAÑOL	JAPANESE (KATAKANA)
Stack+0 Err #	Pile+0 Err #	Stack+0 Fehl #	Pila+0 Err #	スタツク +0 エラー #
Stack Cleared!	Pile á Zéro!	Stack gelöscht!	Pila Borrada!	スタツクガクリアサレマシタ
Drive Status	Statut Unité	Laufwerkstatus	Estado de Unid	ドライブノジヨウタイ
Status Unavail.!	Stat. non Dispo!	Status n verfugb	Estad Indisponbl	ステータスミテイ
New Status	Nouveau Statut	Neuer Status	Estado Nuevo	シンキジヨウタイ
Set Address	Sélect Adres	Adress fest.	Ajust Direcc	アドレスノセツテイ
Addr 0000: 00 00	Adr 0000: 00 00	Adrs 0000: 00 00	Dir. 0000: 00 00	アドレス 0000: 00 00
Data at 0000: 00	Donnée 0000: 00	Daten b 0000: 00	Data en 0000: 00	データ 0000: 00
Set Port: 00	Sél Pte: 00	Port festl: 00	Ajust Prto: 00	ポートセツテイ:00
Port 00 Data: 00	Port 00 Donné:00	Port 00 Daten:00	Prto 00 Data: 00	ポート 00 データ:00
Mode:	Mode:	Modus:	Modo:	モード:
Stop	Stop	Stop	Pare	テイシ
Loop Error	Err Boucl	Schlffhlr	Loop Error	ループエラー
Loop Test	Test Boucl	Schlftest	Loop Prueba	ループテスト
Ignore	Ignorer	Ignorieren	Ignore	ムシシマシタ
Continue	Continuer	Weiter	Continúe	ケイゾク
Test :	Test :	Test :	Prueba :	テスト:

(Continued on next page)

Table E–1. Messages in The Respective Languages (Continued)

ENGLISH	FRANCAIS	DEUTSCH	ESPAÑOL	JAPANESE (KATAKANA)
Run	Marcher	Starten	Corra	ｼﾞｯｺｳ
Skip	Omettre	Überspr	Omita	ｼｮｳﾘｬｸ
Add Test:	Ajout Test:	Weit. Test	Añada Prueba	ﾃｽﾄﾉﾂｲｶ：
A	A	A	A	A
B	B	B	B	B
P	P	P	P	P
READY	PRÊT	BEREIT	LISTO	ﾚﾃﾞｨ
SPIN UP	DÉMARRA	ANFAHREN	ARRANCANDO	ｽﾋﾟﾝ UP
SPIN DN	RALENTI	BREMSEN	DETENIENDO	ｽﾋﾟﾝ DN
STOPPED	ARRÊTE	HALT	PARADO	ﾃｲｼ
DISABLE	DEBRANC	INAKTIV	DESHABL	ﾌﾉｳ
Err #	Err #	Fehl #	# Err	ｴﾗｰ #
OVERTEMP ERROR	SURCHAUFFE	ÜBERTEMP	SOBRECALENTADO	ｲｼﾞｮｳｵﾝﾄﾞ
Tests Passed	Tests Reussi	Tests Beendet	Pasó Pruebas	ﾃｽﾄｶﾝﾘｮｳ

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