

**STORAGE MODULE DISK
INTERCONNECT (SMDI) SUBSYSTEM**

USER'S MANUAL



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WARNING

This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the technical manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of Federal Communications Commission (FCC) Rules, which are designed to provide reasonable protection against such interference when operating 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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STATEMENT OF WARRANTY

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.

In all cases where equipment is to be returned to Emulex, a "Return Authorization" must be issued by the "Repair Center," (714) 662-5600.

CONTROLLERS - PERIPHERALS - 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 all Disk and Tape Controllers, Magnetic Disk and Tape Drives, and Optical Disk Drives.

During this period, if the customer experiences difficulties with an Emulex product, and is unable to resolve the problem via the phone with Emulex Technical Support, a Return Authorization will be issued. Following receipt of a Return Authorization, the customer is responsible for returning the product to Emulex, freight prepaid. Emulex, upon verification of warranty will, at its option, repair or replace the product in question, and return to the customer, freight prepaid.

CABLE WARRANTY (Return to Factory) - All Emulex provided cables are warranted for ninety (90) days from the time of shipment. Questionable cables should be returned to Emulex, freight prepaid, where they will be repaired or replaced by Emulex at its option and returned to the customer freight prepaid.

RETURN TO FACTORY - All of the warranties referenced above provide for corrective action on products returned to the Emulex factory accompanied by a "Return Authorization."

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. Emulex shall have no obligation to make repairs or to cause replacement required through normal wear and tear or necessitated in whole or in part by catastrophe, fault or negligence of the user, improper or unauthorized use of the Product, or use of the Product in such 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.

Emulex's sole obligation hereunder shall be to repair or replace items covered in the above warranties, unless covered by an Emulex On-Site Warranty Contract. 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.

RETURNED MATERIAL - Warranty claims must be received by Emulex within the applicable warranty period. A replaced product, or part thereof, shall become the property of Emulex and shall be returned to Emulex at Purchaser's expense. All returned material must be accompanied by a Return Authorization Number assigned by 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 to 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.

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 PRODUCTS.

1.1 Overview

This manual describes the operation of the various Emulex Storage Module Disk Interconnect (SMDI) subsystems. SMDI is a family of high-capacity disk subsystems compatible with Standard Disk Interconnect (SDI) disk controllers manufactured by Digital Equipment Corporation (DEC).

This manual consists of the following sections:

- **Section 1 (Introduction)** describes the SMDI subsystems in general terms. It lists the drives that are available with the subsystems, and it gives general, electrical, and environmental specifications.
- **Section 2 (Installation)** details the required preparations for the site of the respective SMDI subsystem configurations, and it provides the information necessary to power the subsystem up, and run diagnostics.
- **Section 3 (Operation)** describes the following:
 1. The operation of the subsystem
 2. The function of the LEDs on the SMDI and SM600 chassis front panels
 3. The care and handling of Portable Drive Modules (PDMs)
- **Section 4 (Troubleshooting)** describes the following:
 1. Checking the disk drive switches and jumpers
 2. Checking the adapters
 3. Error codes
 4. Service
- **Appendix A (Adapter Switch Settings)** provides the required adapter switch settings and configuration PROM revision levels for the various disk drives.
- **Appendix B (Disk Drive Parameters and Specifications)** provides the required parameters for, and specifications of, the various disk drives.

1.2 General Description

SMDI is a complete disk subsystem for use with SDI disk controllers. It can be used with a DEC KDA50, KDB50, or UDA50 disk controller or an HSC50 or HSC70 cluster controller. SMDI offers higher performance than similar DEC subsystems because it contains industry-standard Storage Module Drives (SMD) that offer higher capacity, faster transfer rates, and better reliability than the equivalent DEC drives.

SMDI can be configured with a maximum configuration of 12 S821 SMD disk drives in a cabinet, providing 10.48 gigabytes of storage. Several configurations of disk drive and cabinet are available for your SMDI subsystem (see Table 2-1).

In addition to 8-inch or 14-inch SMD drives, you can select 5.25-inch Enhanced Small Disk Interface (ESDI) disk drives in PDMs. These PDMs can be moved between subsystems, allowing for data interchange and data security between centralized computer centers and remote, independent sites.

The following drives are currently available:

- S660 (598 MB formatted, 5.25-inch ESDI)
- S680 (288 MB formatted, 5.25-inch ESDI)
- S820 (663 MB formatted, 8-inch SMD)
- S821 (873 MB formatted, 8-inch SMD)
- S851 (365 MB formatted, 14-inch SMD)
- S883 (1055 MB formatted, 14-inch SMD)

Adapters for each logical disk drive provide compatibility with SDI-compatible controllers. An SM80 adapter for each SMD drive and an SM60 adapter for each ESDI drive allow for transparent conversion of SDI to SMD and SDI to ESDI data and control signals. An SM70 adapter allows the doubling up of two physical drives so that the controller sees them as one logical drive.

SMDI subsystems come completely assembled, with disk drives pre-formatted at the factory. Figure 1-1 is a schematic drawing of logical configurations of the SMDI subsystem.

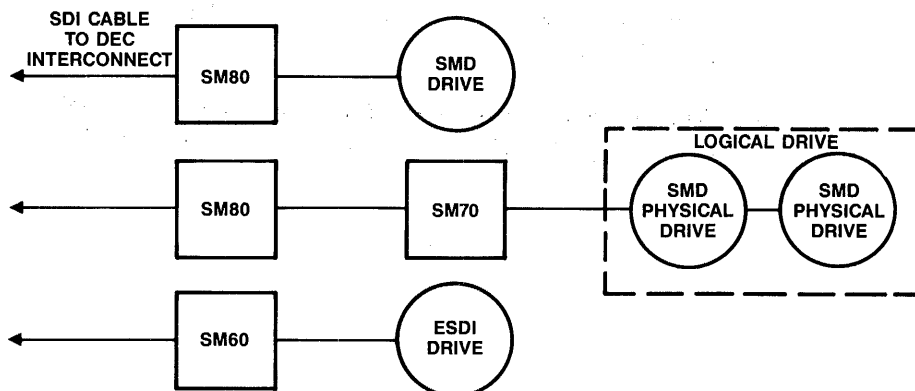


Figure 1-1. Logical Configurations of the SMDI Subsystem

SM8001-2031

Figure 1-2 is a photograph of an SMDI subsystem in a high-boy cabinet with eight 8-inch disk drives and four 5.25-inch disk drives. Figure 1-3 shows an SMDI subsystem with four 14-inch disk drives. Figure 1-4 shows the SM600 configuration with the PDM extended.

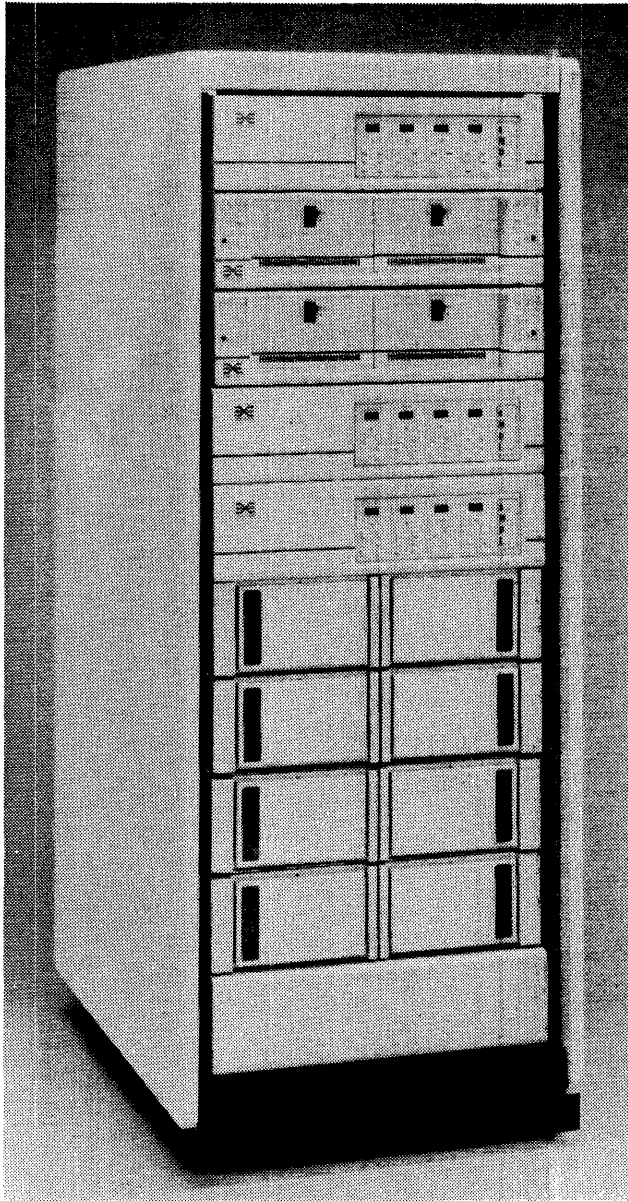


Figure 1-2. Emulex SMDI Subsystem
(High-Boy Cabinet, 5.25-inch and 8-inch Drives)

SM8001-1768

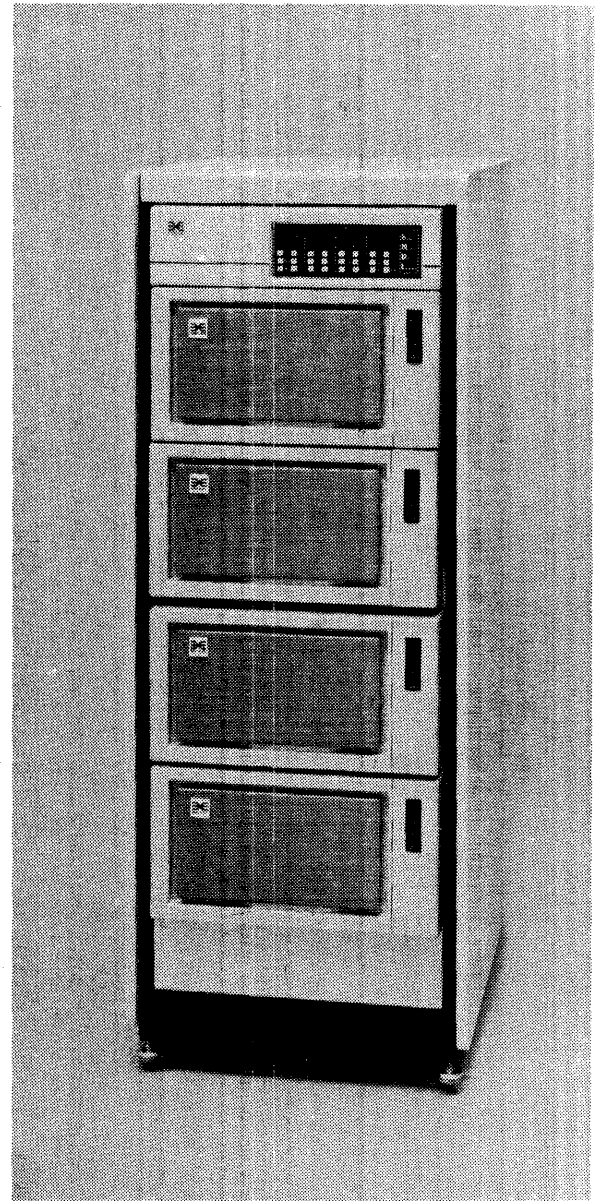


Figure 1-3. Emulex SMDI Subsystem
(High-Boy Cabinet, 14-inch Drives)

SM8001-1382

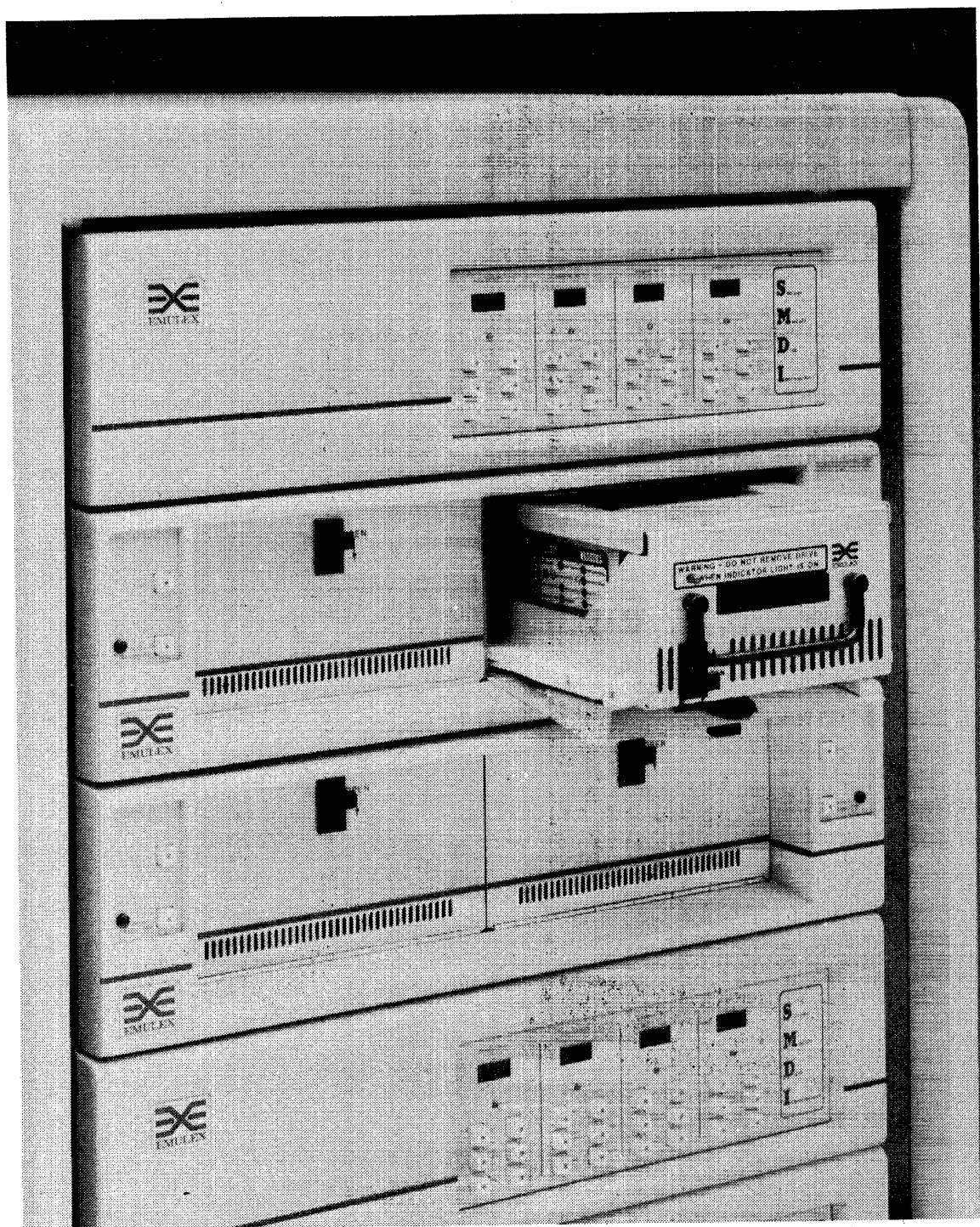


Figure 1-4. The SM600 Configuration (with the PDM Extended)

SM8001-1769

1.3 General and Electrical Specifications

Table 1-1 contains general and electrical specifications for the SMDI subsystem.

Table 1-1. SMDI General and Electrical Specifications

Parameter	Description
Drives Supported	S660 (Maxtor XT-8760E) S680 (Maxtor XT-4380E) S820 (CDC 9720-850) S821 (CDC 9720-1120) S851 (Fujitsu 2351) S883 (CDC 9783)
Controllers Supported	DEC KDA50 DEC KDB50 DEC UDA50 DEC HSC50 cluster controller DEC HSC70 cluster controller
Electrical Power Requirements	
Domestic (30 A service line required)	9602 cabinet (high-boy): 208 VAC, 3-phase, 30 A max. 9642 cabinet (low-boy): 110 VAC, 30 A max.
European (service line as per local requirements)	9602 cabinet: 240 VAC, single-phase, 24 A 9642 cabinet: 240 VAC, single-phase, 12 A
Power Receptacle Requirements	
Domestic	9602 cabinet: Hubbell 2810, 208 VAC, 3-phase, 30 A; NEMA L21-30R, 208 VAC 3-phase, 30 A 9642 cabinet: Hubbell 2610, 120 V, 30 A; NEMA L5-30R, 120 V, 30 A
European	As per local requirements

1.4 Environmental Specifications

Table 1-2 provides environmental specifications for the SMDI subsystem.

Table 1-2. SMDI Environmental Specifications

Parameter	Description
Operating Temperature	50°F (10°C) to 89°F (32°C) Maximum temperature is reduced 1°F per 1000 feet (1.8°C per 1000 meters) altitude
Relative Humidity	20% to 80% with a maximum wet bulb of 82°F (28°C) and a minimum dewpoint of 36°F (2°C)

1.5 External SDI Cables

Three external SDI cables are available for the subsystem. Table 1-3 lists them, with their Emulex part numbers.

Table 1-3. External SDI Cables

Part Number	Description
SM8011204-01	External SDI Cable - 12 foot
SM8011204-02	External SDI Cable - 25 foot
SM8011204-03	External SDI Cable - 50 foot

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

Emulex Corporation
3545 Harbor Blvd.
Costa Mesa, CA 92626

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

2.1 Overview

This section provides details about site requirements and procedures for installing your SMDI. It gives specifications, to assist you in preparing your site, and it discusses assigning unit numbers to drives, cabling, installation with the various controllers, powering-up the SMDI, and running internal diagnostics.

2.2 Configurations and Site Requirements for SMDI Subsystems

Table 2-1 provides a list of the various SMDI configurations, along with their associated site requirements in the following areas: maximum AC power, air conditioning, and weight information for floor strength and installation equipment.

The power requirements of the SMDI subsystem depend on the type of power distribution unit mounted in the SMDI cabinet. The unit in the 9642 cabinet (low-boy) requires 110 VAC for domestic, or 240 VAC for European, installation. The unit in the 9602 cabinet (high-boy) requires 208 VAC, three-phase, for domestic, or 240 VAC for European, installation.

The SMDI subsystem must be installed in a room with adequate air conditioning. Table 2-1 lists the load that each SMDI subsystem configuration places on an air conditioning system in watts. To convert from watts to BTU/hour, multiply the watts by 3.4192.

The weight of your subsystem must not exceed the strength of the flooring where it will be installed, and it will determine the type of equipment required for installation.

CAUTION

SMDI subsystems are extremely heavy. Trying to move an SMDI cabinet into position without the proper equipment can injure you and damage the equipment.

Table 2-1. Configurations and Site Requirements for SMDI Subsystems

Subsystem Configuration*	Weight (Pounds)	Heat Output (Watts)	Max. Continuous AC Ratings (Domestic)	Max. Continuous AC Ratings (European)
SM202-1	262	420	110 VAC	240 VAC
-2	301	565	Single Phase	Single Phase
-3	367	710	12.5 A	8 A
-4	406	855	NEMA L5-30R	
SM204-1	341	420	208 VAC	240 VAC
-2	380	565	Three Phase	Single Phase
-3	446	710	8 A	8 A
-4	485	855	NEMA L21-30R	
SM208-5	581	1275	208 VAC	240 VAC
-6	620	1420	Three Phase	Single Phase
-7	686	1565	15 A	15 A
-8	725	1710	NEMA L21-30R	
SM206 -9	821	2130	208 VAC	240 VAC
-10	860	2275	Three-phase	Single Phase
-11	926	2420	22 A	22 A
-12	965	2565	NEMA L21-30R	
SM212-1	262	420	110 VAC	240 VAC
-2	301	565	Single Phase	Single Phase
-3	367	710	12.5 A	8 A
-4	406	855	NEMA L5-30R	
SM214-1	341	420	208 VAC	240 VAC
-2	380	565	Three Phase	Single Phase
-3	446	710	8 A	8 A
-4	485	855	NEMA L21-30R	
SM218-1	371	420	208 VAC	240 VAC
-2	410	565	Three Phase	Single Phase
-3	476	710	15 A	15 A
-4	515	855	NEMA L21-30R	
-5	581	1275		
-6	620	1420		
-7	686	1565		
-8	725	1710		
SM216-1	401	420	208 VAC	240 VAC
-2	440	565	Three Phase	Single Phase
-3	506	710	22 A	22 A
-4	545	855	NEMA L21-30R	
-5	611	1275		
-6	650	1420		
-7	716	1565		
-8	755	1710		
-9	821	2130		
-10	860	2275		
-11	926	2420		
-12	965	2565		

(Continued on next page)

Table 2-1. Configurations and Site Requirements for SMDI Subsystems (Continued)

Subsystem Configuration	Weight (Pounds)	Heat Output (Watts)	Max. Continuous AC Ratings (Domestic)	Max. Continuous AC Ratings (European)
SM802-1	214	362	110 VAC	240 VAC
-2	225	397	Single Phase	Single Phase
-3	258	484	7A	3.5 A
-4	269	519	NEMA L5-30R	
SM832-1	357	790	110 VAC	240 VAC
-2	533	1305	Single Phase	Single Phase
			15 A	9 A
			NEMA L5-30R	
SM834-1	436	790	208 VAC	240 VAC
-2	612	1305	Three-phase	Single Phase
-3	788	1820	18 A	18 A
-4	964	2335	NEMA L21-30R	
SM602-1	214	362	110 VAC	240 VAC
-2	225	397	Single Phase	Single Phase
-3	258	484	7 A	3.5 A
-4	269	519	NEMA L5-30R	
SM702-1	322	620	110 VAC	240 VAC
-2	427	910	Single Phase	Single Phase
-3	532	1200	22 A	14 A
-4	637	1490	NEMA L5-30R	
SM712-1	322	620	110 VAC	240 VAC
-2	427	910	Single Phase	Single Phase
-3	532	1200	22 A	14 A
-4	637	1490	NEMA L5-30R	
SM708-1	431	620	208 VAC	240 VAC
-2	536	910	Three-phase	Single Phase
-3	641	1200	22 A	22 A
-4	746	1490	NEMA L21-30R	
-5	851	2055		
-6	956	2345		
SM718-1	431	620	208 VAC	240 VAC
-2	536	910	Three-phase	Single Phase
-3	641	1200	22 A	22 A
-4	746	1490	NEMA L21-30R	
-5	851	2055		
-6	956	2345		

* In the model number, the number after the dash indicates the number of logical drives. The SM7XX series of subsystems has two physical drives for each logical drive.

2.3 Maintaining FCC Class A Compliance

The SMDI subsystem is a completely enclosed subsystem that complies with FCC Class A limits for radiated and conducted interference (RFI). As such, no special steps need be taken to ensure compliance with FCC requirements.

To block radiated interference, the SMDI subsystem is completely enclosed in the cabinet. Furthermore, a filter blocks conducted interference in the power distribution panel in the cabinet. You must ensure that nothing is done to reduce the effectiveness of either the SMDI cabinet shielding or the power filter.

2.4 Inspecting the Subsystem

2.4.1 Inspecting the Shipping Crate

Emulex products are shipped in special crates 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.

2.4.2 Visually Inspecting the Subsystem

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 subsystem for such items as bent or broken connector pins, damaged components, or any other visual evidence of physical damage. Make sure that all socketed components are properly seated. Confirm that there are no cracks or dents in the cabinet, and no damaged components.

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

2.5 SMDI Front Panel

The front panel of the SMDI chassis contains four Unit Number switches and four user panels (one for each drive). The Unit Number switches are on the left side of the chassis, behind the front faceplate. The faceplate is held on by pressure snaps, and can be pulled off easily. Each of the four user panels includes a 2-digit display as well as LEDs and switches. Figure 2-1 gives an overview of the front panel of the SMDI.

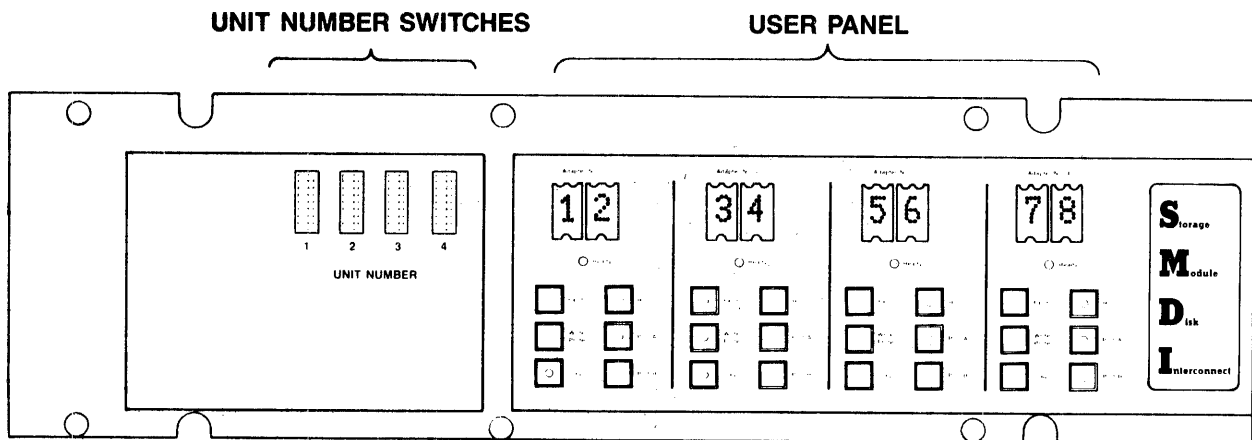


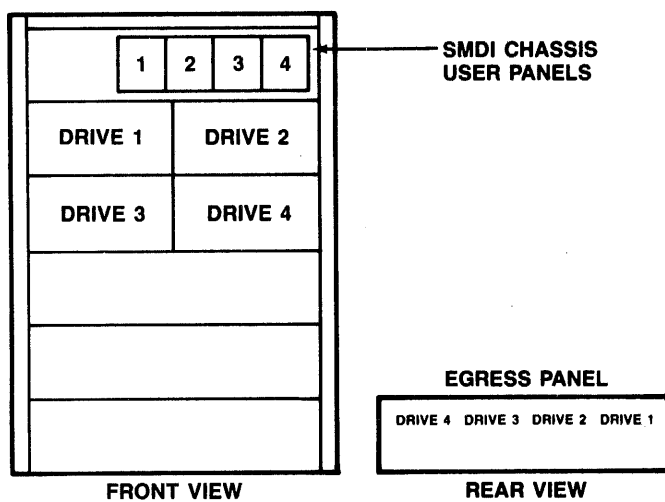
Figure 2-1. SMDI Displays, LEDs, and Switches

SM8001-1665A

2.5.1 User Panel Arrangement

There are two families of models: SM2XX-X and SM7XX-X. The first X represents the model of the drive; the second represents the height of the cabinet; and the third, the number of drives.

Model SM2X2-X, a low-boy cabinet, holds only one SMDI chassis. The top left drive corresponds to the user panel for adapter number 1; the top right corresponds to adapter number 2; the bottom left, to number 3; and the bottom right, to number 4. Figure 2-2 correlates user panels, disk drives, and SDI cable egress panel connectors. The user panels and drives are in the front of the cabinet; the egress panel is in the rear.



SM8001-1910

Figure 2-2. Correlation of User Panels, Disk Drives, and SDI Cable Egress Panel in Model SM202-X

Model SM206-X, a high-boy cabinet, may contain up to three SMDI chassis. From the front, drive 1 is in the lower right-hand corner of the cabinet. It is controlled from user panel 1. The drives are then sequentially numbered from right to left, and from bottom to top. The user panels, on the other hand, are numbered sequentially from *left to right*, and from bottom to top (see Figure 2-3).

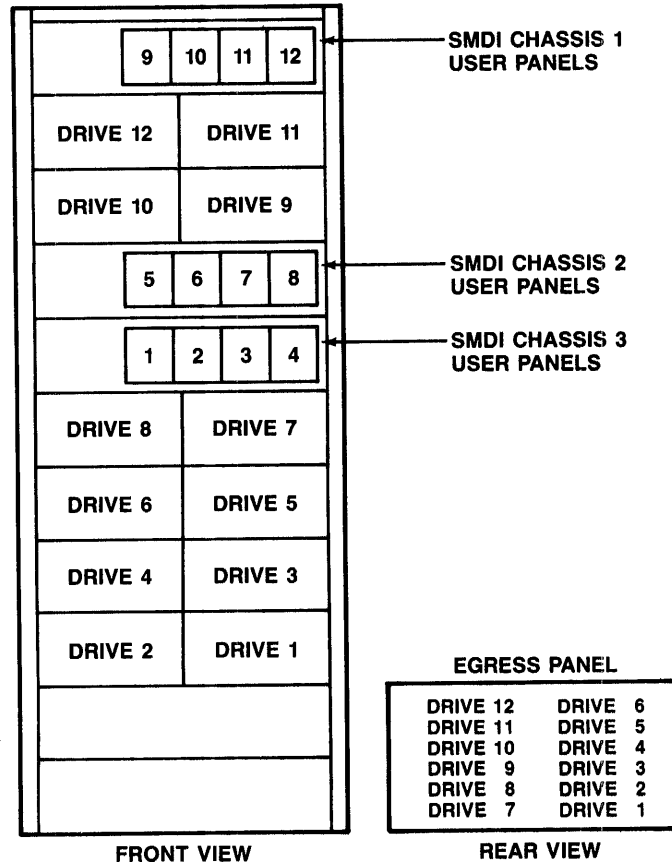
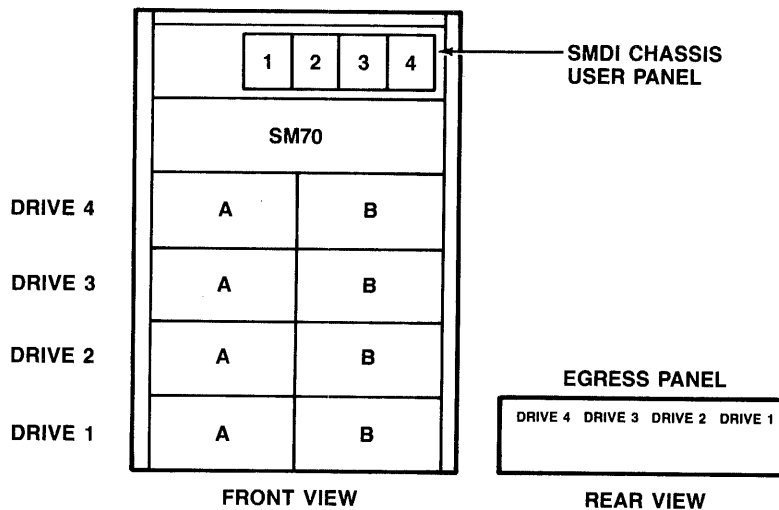


Figure 2-3. Correlation of User Panels, Disk Drives, and Egress Panel Drive Identification in Model SM206-X

SM8001-1912

Model SM7X2-X, a low-boy cabinet, contains one SMDI chassis, up to four logical drives (up to eight physical drives), and an Emulex SM70 adapter for each subsystem. The first X in the model number represents the drive type, either 850 MB or 1120 MB, and the second X represents the number of logical drives. Figure 2-4 correlates logical drives (from 1 through 4), the two physical drives (A and B) that make up a logical drive, SMDI user panel, and SDI cable egress panel connectors.



SM8001-1911

Figure 2-4. Correlation of User Panels, Disk Drives, and Egress Panel Drive Identification in Model SM7X2-X

Model SM7X8-X, a high-boy cabinet, may contain up to two SMDI chassis. Figure 2-5 correlates logical drives (from 1 through 6), the two physical drives (A and B) that make up a logical drive, SMDI user panels, and SDI cable egress panel connectors.

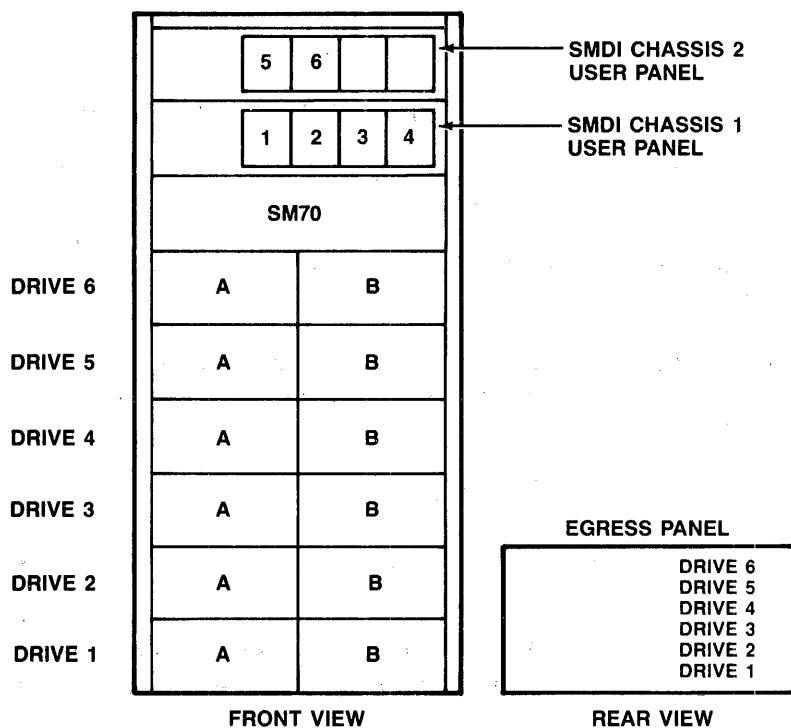


Figure 2-5. Correlation of User Panels, Disk Drives, and Egress Panel Drive Identification in Model SM7X8-X

SM8001-1909

2.5.2 Unit Number Switches

Before you can power-up the SMDI subsystem, you must assign an SDI unit number to each drive in the subsystem. Do this by setting the Unit Number switches, which are located on the left side of the SMDI chassis, behind the front faceplate.

VMS and various disk utilities refer to SDI drives with a decimal unit number. If possible select a number less than 99. If you cannot, Emulex provides the ability to specify hexadecimal numbers to accommodate display of numbers larger than 99. Switch SW1-3 on each adapter determines whether the display of the unit number, which appears below the corresponding adapter number on the SMDI user panel, should be interpreted as two decimal digits or two hexadecimal digits.

In the default setting (SW1-3 set to ON), the display should be interpreted as two decimal digits, with a range in unit numbers from 0-99, decimal. If SW1-3 is changed to OFF, the display should be interpreted as two hexadecimal digits, with a range 0-FB hex (0-251 in decimal values).

NOTE

Before removing any adapter, turn off the power for its slot. Adapter power ON/OFF switches are located on the back of the adapter chassis. Like the adapters themselves, the switch with the highest number is at the top. If the fan assembly is on the back of the cabinet, loosen its two thumbscrews, and swing it out, in order to gain access to the switches.

Remove the faceplate and user panel by turning their six thumbscrews, and pulling them directly forward. Use a small tool, such as a screwdriver, to change the switch setting.

Figure 2-6 shows the following:

- The rear of the SMDI chassis, showing the adapter power ON/OFF switches
- The front of the SMDI chassis, with the faceplate, user panel, and adapter, along with the corresponding adapter number
- Thumbscrews for removal of the faceplate and user panel
- Switch SW1 and configuration PROM(s) on the adapter (Appendix A defines the settings of SW1, and gives the minimum configuration PROM revision levels.)
- Settings of SW1-3 for either decimal or hexadecimal display of the adapter number

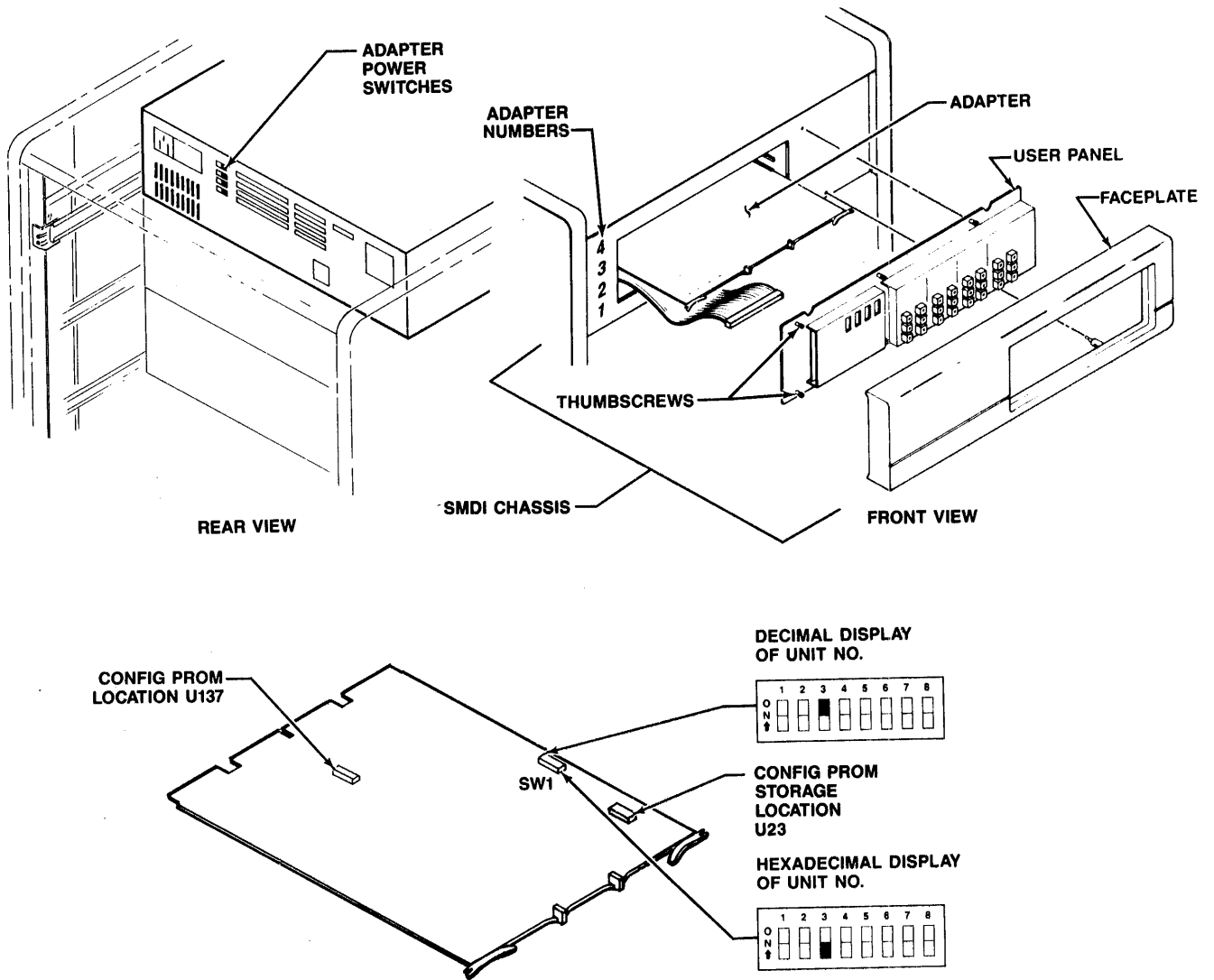


Figure 2-6. Accessing the Adapter and Setting Switch SW1-3

SM8001-2032

Each drive corresponds to a switchpack containing eight switches, which represent binary numbers as follows: switch 1 is bit 0, switch 2 is bit 1, and so forth. OFF represents 0, and ON represents 1. Thus all switches OFF = 00 hex, and all switches ON = FF hex. Table 2-2 gives the full set of possible values in both decimal (Dec) and hexadecimal (Hex).

Table 2-2. Unit Number Switch Settings

Dec	Hex	Unit No. Switch 87654321	Dec	Hex	Unit No. Switch 87654321	Dec	Hex	Unit No. Switch 87654321
0	0	00000000	42	2A	00101010	84	54	01010100
1	1	00000001	43	2B	00101011	85	55	01010101
2	2	00000010	44	2C	00101100	86	56	01010110
3	3	00000011	45	2D	00101101	87	57	01010111
4	4	00000100	46	2E	00101110	88	58	01011000
5	5	00000101	47	2F	00101111	89	59	01011001
6	6	00000110	48	30	00110000	90	5A	01011010
7	7	00000111	49	31	00110001	91	5B	01011011
8	8	00001000	50	32	00110010	92	5C	01011100
9	9	00001001	51	33	00110011	93	5D	01011101
10	A	00001010	52	34	00110100	94	5E	01011110
11	B	00001011	53	35	00110101	95	5F	01011111
12	C	00001100	54	36	00110110	96	60	01100000
13	D	00001101	55	37	00110111	97	61	01100001
14	E	00001110	56	38	00111000	98	62	01100010
15	F	00001111	57	39	00111001	99	63	01100011
16	10	00010000	58	3A	00111010	100	64	01100100
17	11	00010001	59	3B	00111011	101	65	01100101
18	12	00010010	60	3C	00111100	102	66	01100110
19	13	00010011	61	3D	00111101	103	67	01100111
20	14	00010100	62	3E	00111110	104	68	01101000
21	15	00010101	63	3F	00111111	105	69	01101001
22	16	00010110	64	40	01000000	106	6A	01101010
23	17	00010111	65	41	01000001	107	6B	01101011
24	18	00011000	66	42	01000010	108	6C	01101100
25	19	00011001	67	43	01000011	109	6D	01101101
26	1A	00011010	68	44	01000100	110	6E	01101110
27	1B	00011011	69	45	01000101	111	6F	01101111
28	1C	00011100	70	46	01000110	112	70	01110000
29	1D	00011101	71	47	01000111	113	71	01110001
30	1E	00011110	72	48	01001000	114	72	01110010
31	1F	00011111	73	49	01001001	115	73	01110011
32	20	00100000	74	4A	01001010	116	74	01110100
33	21	00100001	75	4B	01001011	117	75	01110101
34	22	00100010	76	4C	01001100	118	76	01110110
35	23	00100011	77	4D	01001101	119	77	01110111
36	24	00100100	78	4E	01001110	120	78	01111000
37	25	00100101	79	4F	01001111	121	79	01111001
38	26	00100110	80	50	01010000	122	7A	01111010
39	27	00100111	81	51	01010001	123	7B	01111011
40	28	00101000	82	52	01010010	124	7C	01111100
41	29	00101001	83	53	01010011	125	7D	01111101

(Continued on next page)

Table 2-2. Unit Number Switch Settings (Continued)

Dec	Hex	Unit No. Switch 87654321	Dec	Hex	Unit No. Switch 87654321	Dec	Hex	Unit No. Switch 87654321
126	7E	01111110	170	AA	10101010	214	D6	11010110
127	7F	01111111	171	AB	10101011	215	D7	11010111
128	80	10000000	172	AC	10101100	216	D8	11011000
129	81	10000001	173	AD	10101101	217	D9	11011001
130	82	10000010	174	AE	10101110	218	DA	11011010
131	83	10000011	175	AF	10101111	219	DB	11011011
132	84	10000100	176	B0	10110000	220	DC	11011100
133	85	10000101	177	B1	10110001	221	DD	11011101
134	86	10000110	178	B2	10110010	222	DE	11011110
135	87	10000111	179	B3	10110011	223	DF	11011111
136	88	10001000	180	B4	10110100	224	E0	11100000
137	89	10001001	181	B5	10110101	225	E1	11100001
138	8A	10001010	182	B6	10110110	226	E2	11100010
139	8B	10001011	183	B7	10110111	227	E3	11100011
140	8C	10001100	184	B8	10111000	228	E4	11100100
141	8D	10001101	185	B9	10111001	229	E5	11100101
142	8E	10001110	186	BA	10111010	230	E6	11100110
143	8F	10001111	187	BB	10111011	231	E7	11100111
144	90	10010000	188	BC	10111100	232	E8	11101000
145	91	10010001	189	BD	10111101	233	E9	11101001
146	92	10010010	190	BE	10111110	234	EA	11101010
147	93	10010011	191	BF	10111111	235	EB	11101011
148	94	10010100	192	C0	11000000	236	EC	11101100
149	95	10010101	193	C1	11000001	237	ED	11101101
150	96	10010110	194	C2	11000010	238	EE	11101110
151	97	10010111	195	C3	11000011	239	EF	11101111
152	98	10011000	196	C4	11000100	240	F0	11110000
153	99	10011001	197	C5	11000101	241	F1	11110001
154	9A	10011010	198	C6	11000110	242	F2	11110010
155	9B	10011011	199	C7	11000111	243	F3	11110011
156	9C	10011100	200	C8	11001000	244	F4	11110100
157	9D	10011101	201	C9	11001001	245	F5	11110101
158	9E	10011110	202	CA	11001010	246	F6	11110110
159	9F	10011111	203	CB	11001011	247	F7	11110111
160	A0	10100000	204	CC	11001100	248	F8	11111000
161	A1	10100001	205	CD	11001101	249	F9	11111001
162	A2	10100010	206	CE	11001110	250	FA	11111010
163	A3	10100011	207	CF	11001111	251	FB	11111011
164	A4	10100100	208	D0	11010000	252	FC	Not Allowed.
165	A5	10100101	209	D1	11010001	253	FD	Not Allowed.
166	A6	10100110	210	D2	11010010	254	FE	Not Allowed.
167	A7	10100111	211	D3	11010011	255	FF	Not Allowed.
168	A8	10101000	212	D4	11010100			
169	A9	10101001	213	D5	11010101			

Each unit in the SMDI cabinet must have its own unit number, i.e., unique switch setting. If decimal display mode is selected on the disk drive adapter (SW1-3 set to ON, the default setting), the unit numbers must be in the range 0-99 decimal (00-63 hex). If you need more than 99 (decimal) unit numbers, set SW1-3 OFF, and use hexadecimal numbering. If an invalid unit number is selected (more than 99 in decimal mode or more than FB in hexadecimal mode), the unit number display flashes "FF" until a valid setting is placed in the unit number switches.

NOTE

The unit-identification plug or switch located on each SMD drive must be set to 0 (zero) for either a single-drive unit or for drive A of a dual-drive (adapter SM70) unit. It must be set to 8 (eight) for drive B of a dual-drive unit. The unit-identification plug or switch located on each ESDI drive must be set to 1 (one).

2.6 Powering-up the SMDI

Power-up the SMDI subsystem as follows:

1. Turn on the main AC breaker on each disk drive. This breaker is normally on the rear of the drive. If this step is not performed first, an error occurs on power-up.
2. Plug the subsystem AC power cord into the available AC socket. The 9642 cabinet (low-boy) requires 110 VAC; the 9602 cabinet (high-boy) requires 208 VAC three-phase. Turn ON the main breaker on the power distribution unit located at the rear of the SMDI subsystem.
3. SMDI performs its power-up self-test. The displays on the front user panels should flash for a few seconds and then go off. If any of the display LEDs or digits remain lighted, the self-test has failed.
4. For drives with manual controls, press the Start switch on the front panel of the drive. The drives should not spin up. If any drive does, the Local/Remote switch is in the Local position. See the appropriate appendix to this manual, and set the switch to the Remote position.
5. Run the SMDI internal diagnostics (see the next subsection).
6. For each drive in the subsystem, press (1) the Run switch and (2) the Port A/B switches on the front user panel and wait for the drives to spin up. When the Ready LED lights, the subsystem is ready for operation.

2.7 SMDI Internal Diagnostics

The SMDI internal diagnostics should be run on each drive before the SMDI subsystem is brought online. Running the diagnostics is a simple process, as follows:

1. Turn OFF all the switches on the user panel.
2. One of the diagnostic tests requires that loopback plugs be placed on the transition panel or at the controller end of the SDI cable. Unplug each SDI cable from the transition panel or from the controller, and install a loopback plug on the transition panel or on the controller end of the SDI cable. This requires a double male adapter. Install plugs on both port A and port B.
3. Power-up the SMDI (see Subsection 2.6).
4. Make sure no errors are posted on the Unit Number display. If any errors are pending, or if you are not sure what the display means, press the Fault switch to clear the error condition.
5. Press the Diagnostic switch. The Diagnostic LED should go on. To include the optional user panel test in the diagnostic sequence, press the Write Protect switch. The Write Protect LED should go on.
6. Press the Run switch. SMDI begins running a series of diagnostic tests. The number of the test currently running is displayed in the Unit Number display and should change frequently.
7. If the Write Protect LED is on, after a few seconds the Ready LED lights to signal the start of the user panel test. Press each switch on the user panel on, then off, to make sure the corresponding LED turns on and off in concert with the switch. *Press the Diagnostic and Run switches on before continuing testing.*

Set each Unit Number switch on in turn, and make sure that the hexadecimal number displayed in the 2-digit display matches the Unit Number switch setting. When the unit number equals FF (all unit number switches on), the test is finished and SMDI goes through the rest of its diagnostic sequence.

8. Be sure to reset the Unit Number switches after the diagnostics are finished and before turning off the Diagnostic switch. Leave the Run switch on so that the drive does not spin down. Put the Write Protect switch in the appropriate position.

If a test fails, the Fault LED lights up, and the Unit Number display shows an error code. 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) EMULEX-3 outside California or (714) 662-5600 inside California, for instructions.

Some of the error codes indicate easily corrected problems (e.g., bad cables, drives not connected, loopback connector not installed). Table 4-1 also lists these error codes and suggested remedies.

If the diagnostics complete successfully, the Unit Number display reads AA hex (see Figure 2-7). Press the Diagnostic switch to end the diagnostics. When diagnostics are completed successfully on all drives, the subsystem is ready to be brought online.

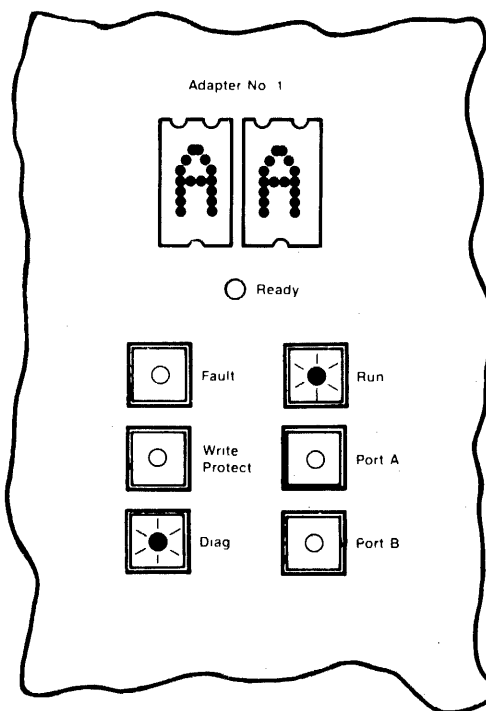


Figure 2-7. Successful Diagnostic Display Status on a User Panel

SM8001-1666

If you plan to use the drive right away, leave the Run switch on, reattach the SDI cabling, and select a port. Be sure to remove the SDI loopback connectors before attempting to enable the port switches. If port A or B is enabled and the SDI loopback connectors are left in place, the adapter will hang, with either a blank display or a flashing FF hexadecimal. A power-up reset will clear this.

2.8 External SDI Cable

The SMDI subsystem requires external SDI cables from the transition panel at the back of the SMDI cabinet to the transition panel on your SDI controller. The SMDI transition panel contains two ports for each drive (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.

If both the A and B ports are used, they must be attached to similar but separate controllers (for example two HSC50/70 controllers) on a cluster or system that supports automatic failover. If this is done, both ports should be enabled by pressing the Port A switch and the Port B switch. SMDI supports static dual porting only, not dynamic dual access. Only one port can be active at a time, so only one port LED will light at a time.

External cables between the SMDI and the controller are not standard equipment with the subsystem. However, they may be ordered as options from Emulex, in various lengths to suit your needs.

2.9 Installation with the HSC 50/70

Before installing the SMDI with the HSC 50/70, please note the following points. First, do not attempt to format the drives; they come formatted from the factory. Second, HSC software must be version 370 or above. 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 SMDI with the HSC 50/70, perform the following steps:

1. Ascertain 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 (Subsection 2.7.2).
2. Ascertain requestor (K.SDI) `<SETSHO> SHO REQ`. Verify REV 34 or higher, and locate the corresponding male connectors for the external SDI cable (see the section on "General Information" in the HSC 50/70 Service Manual or, if there is one, a chart on the back of the HSC unit).
3. Run the external SDI cable from the SMDI chassis Port A for each drive to the selected connector on the HSC, which you ascertained from the HSC manual. Now run Port B if dual porting.
4. On the SMDI, depress the Port Select Switch(es): A or B or both.

5. On the HSC, run SHO DISKS again, as you did in step 1. New disk units should be shown in the list.
6. Run the VERIFY utility on each disk in order to confirm that the disk drive has been properly formatted, and is ready for use. The VERIFY utility will print out the contents of the FCT and RCT tables, and will then scan the disk. If it finds a block that has a problem with ECC or transient errors, it will print out the LBN; these blocks can then be revectorred with the DKUTIL utility. It finishes by printing the statistics for the run, and confirming that the drive is OK.

Run the VERIFY utility as follows:

```
HSC> RUN DD1:VERIFY
```

```
VERIFY-Q Enter the unit number to verify (U) [D0]? D0
VERIFY-Q Was this unit just FORMAtted (Y/N) [Y]? Y
VERIFY-Q Print informational (non-warning) messages (Y/N) [N]? Y
VERIFY-Q Report transient errors by block (Y/N) [N]? Y
```

7. Run the ILEXER drive-reliability diagnostic, which can test 12 disks simultaneously for the specified number of minutes, on all drives in the SMDI chassis. To run ILEXER, do the following:

```
HSC50> RUN DD1:ILEXER
```

```
ILEXER>D>17:35 Execution Starting
```

```
ILEXER>D>Tape Interface Not Available
```

```
Drive Unit Number (U) []? D8
Access User Data Area (Y/N) [N]? Y
Are You Sure (Y/N) [N]? Y
Start Block Number (D) [0]? 0 (To ensure that testing spans both physical
drives, use 800000 for S70X units, and 1200000 for S71X units.)
End Block Number (D) [0=MAX]? 0
Initial Write Test Area (Y/N) [N]? Y
Terminate Test on Drive Following Initial Write (Y/N) [N]? N
Data Pattern (0-15) (D) [15]? 15
Sequential Access (Y/N) [N]? N
Read Only (Y/N) [N]? N
Write Only (Y/N) [N]? N
Data Compare (Y/N) [N]? Y
Data Compare Always (Y/N) [N]? N
Another Drive (Y/N) []? N (Or Y if testing more than one at a time)
Average Disk Transfer Size in Sectors (1 to 400) [10]? 10i - ALWAYS "10"
Run Time in Minutes (1 to 37767) [10]? 30
Hard Error Limit (DN) [20]? 20
Narrow Error Report (Y/N) [N]? N
Enable Soft Error Reports (Y/N) [N]? Y
```


ILEXER will begin execution, printing a progress report every 30 seconds. This time period can be changed by typing `ctl-G`, and answering 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; all other drives will continue the test. To prevent data compare errors, always select that the data option pattern be written on the disk.

8. After running ILEXER successfully, log into VMS and perform INITIALIZE, MOUNT, and BACKUP/VERIFY on each drive. You may abbreviate these commands as INIT, MOU, and BAC/VER, respectively. From the VMS system, drives attached to the SM60 adapter are referred to as units "DJ...", and those attached to the SM80 adapter are referred to as units "DU...."

S7XX units of the SMDI (those with the doubled-up CDC drives and the SM70 adapter) require special parameters with the VMS INIT command. This is both to accommodate the large capacity and to optimize use of the separate head positions in the two drives of each unit. S71X units (those with the CDC9720-1120 drive) require the parameter `/CLUSTER SIZE=4` to override the default (`/CLUSTER SIZE=3`). This is optional for S70X units (those with the CDC 9720-850 drive).

The default parameter `/INDEX=MIDDLE` is not recommended for S7XX units because it actually places the index file at the end of drive A and the beginning of drive B. Therefore, use the following parameters to place the index file in the middle of the second drive:

S70X units: `/INDEX=1944810`
S71X units: `/INDEX=2560950`

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

2.10 Installation with the KDA50, KDB50, or UDA50

To install the SMDI with the KDA50, KDB50, or UDA50, perform the following steps.

NOTE

Do not attempt to format the drives; they come formatted from the factory.

1. If necessary ascertain the controller mnemonic with the VMS utility MCR SYSGEN SHO/CON.
2. Ascertain the drive unit numbers for the SDI disks by logging into VMS and performing `SHO DEV DU <CR>`. Then set the switches on the SMDI user panel (see Subsection 2.7.2).

3. Run the external SDI cable from the SMDI chassis Port A to the cable panel for the appropriate controller on the back of the system.
4. On the SMDI, depress the Port Select Switch, either A or B.
5. With VMS, perform SHO DEV DU. New disk units should be shown in List.
6. With VMS, perform INITIALIZE, MOUNT, and BACKUP/VERIFY on all disks in SMDI (you may abbreviate these commands as INIT, MOU, and BAC/VER, respectively). Diagnostics are not necessary.

S7XX units of the SMDI (those with the doubled-up CDC drives and the SM70 adapter) require special parameters with the VMS INIT command. This is both to accommodate the large capacity and to optimize use of the separate head positions in the two drives of each unit. S71X units (those with the CDC9720-1120 drive) require the parameter "/CLUSTER SIZE=4" to override the default ("/CLUSTER SIZE=3"). This is optional for S70X units (those with the CDC 9720-850 drive).

The default parameter "/INDEX=MIDDLE" is not recommended for S7XX units because it actually places the index file at the end of drive A and the beginning of drive B. Therefore, use the following parameters to place the index file in the middle of the second drive:

S70X models: /INDEX=1944810
S71X models: /INDEX=2560950

3.1 Overview

This section discusses the User Panel LEDs and switches, and the PDMs, their LEDs, moving them between systems, and some cautions on their care and handling.

3.2 SMDI User Panel

The SMDI chassis contains one user panel for each drive. The user panel allows you to control and monitor the drive and to run diagnostics. Figure 3-1 presents a detailed view of a user panel.

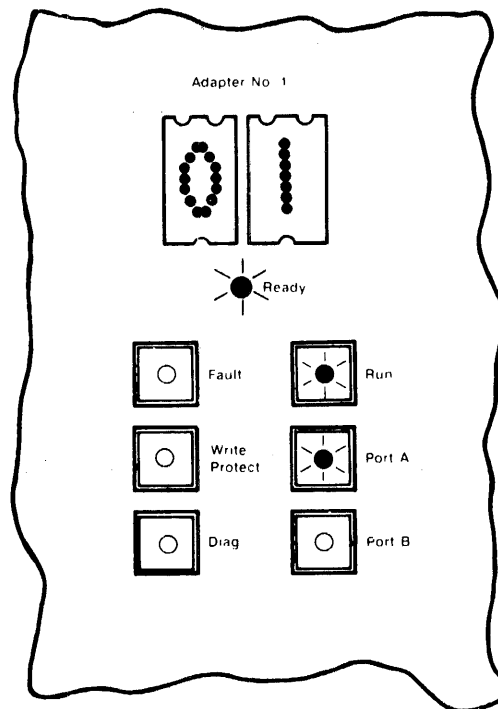


Figure 3-1. User Panel (Detail)

SM8001-1913

Unit Number Display

LEDs located below the labels "Adapter No. 1" through "Adapter No. 4" give the respective unit numbers, either in decimal (default, adapter switch SW1-3 set to OFF) or hexadecimal (SW1-3 set to ON). These LEDs have a different meaning when the internal SMDI diagnostics are running. Then they indicate either a diagnostic test number (if the diagnostic is in progress) or an error code (if the Fault LED is lit).

Ready LED

The green Ready LED indicates that the corresponding drive is spun up and ready.

Fault LED

The Fault LED indicates that an error has been detected, either during normal operation or by the internal diagnostics. The Unit Number display indicates the nature of the error (see Table 4-1). Pressing the Fault switch clears the fault.

Write-Protect Switch and LED

Pressing the Write-Protect switch prevents any write to the drive and lights the Write-Protect LED. Pressing the switch again unprotects the drive. The drive can also be write protected via software.

NOTE

The Write-Protect switch located on the drive **must not** be used to write protect the drive. If the drive's write protect switch is used, an SMDI error (3D) may result.

Diagnostic Switch and LED

Pressing the Diagnostic switch places SMDI in diagnostic mode; it may be pressed only if no errors are posted and all other user panel switches are OFF. If this is the case, pressing the Diagnostic switch lights the Diagnostic LED. The diagnostics begin running when the Run switch is pressed.

Run Switch and LED

If the drive is offline, pressing the Run switch spins the drive up. The Run LED lights if no error prevents the drive from spinning up. Pressing the switch again spins the the drive down. If the drive is online, the switch works the same way, except that some interaction with the host must occur after you press the switch: the host must also issue a spin up command. The drive can also be spun down by the host.

The drives in the SMDI cabinet always spin up in sequence, even if you press all four Run switches at the same time. The Run LED is not lit until the previous drive in the sequence has spun up, either completely or to the point that it is no longer drawing extra current. For some drives, the Run LED is repeatedly flashed on and off to indicate that the drive is spinning down. Until the drive has spun down completely, no other operation is possible, including starting a spin-up cycle or completing the SMDI power-up sequence.

NOTE

If the Run/Start switch is located on the drive, it must be ON, or an SMDI error may result (be sure to use the SMDI Run switch to spin the drive up or down).

Port A/B Switches and LEDs

The Port A and Port B switches choose which port controls the drive. The A and B ports may be cabled to separate controllers, thus providing a convenient method of switching controllers in case of a system crash. If both the A and B ports are used, they must be attached to similar but separate controllers (for example two HSC50/70 controllers) on a cluster or system that supports automatic failover. If this is done, both ports should be enabled by pressing the Port A switch and the Port B switch. SMDI supports static dual porting only, however, not dynamic dual access. Only one port can be active at a time, so only one port LED will light at one time.

3.3 SM600 PDM LEDs

The SM600 chassis has a Power LED and a Secure/Sequencing LED on it for each Portable Drive Module (PDM). In addition, a warning LED is located on each PDM, inside the enclosure door. Figure 3-2 shows the location of these three LEDs, with the enclosure to Drive 0 closed, and the enclosure door to Drive 1 open.

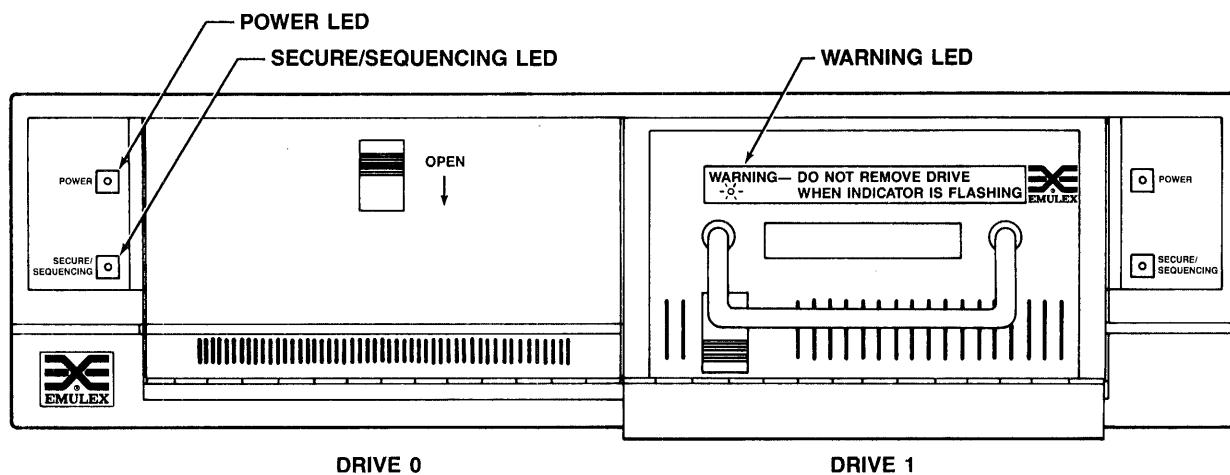


Figure 3-2. PDM LEDs

SM8001-1561

Power Indicator LED

The Power Indicator LED lights whenever the RUN switch for this drive on the SMDI chassis is on (pressed in) and a drive is installed. When the RUN switch is off, this LED is off.

Secure/Sequencing LED

The Secure/Sequencing LED indicates whether the drive is in the process of cycling up or down, is fully powered on or powered off. When the drive is in the process of cycling up or cycling down, the secure/sequencing LED is flashing. When the drive is fully cycled up, the LED is on. When the drive is completely cycled down, the LED is off.

Warning LED

The Warning LED on each PDM inside the enclosure door indicates whether the drive is fully powered down so that it can be moved from the subsystem for storage or for moving between systems. The Warning LED is always flashing unless the RUN switch on the SMDI front panel is off (not pressed in) and the drive is fully powered down.

Overtemperature Indicators

If the internal temperature reaches 122°F (50°C), the two front panel LEDs for each PDM on the SM600 chassis start flashing, and the PDMs are spun down. The PDMs are automatically spun back up when the temperature drops below 122°F.

3.4 Moving PDMs between Systems

To move the PDMs between systems, you must first logically dismount the PDM from the host system (refer to your operating system documentation for instructions on using the DISMOUNT command). Then power down the PDM from the SMDI chassis (set the Run switch to the Out position).

After you have dismounted the drive, it will still be powered on. The SM600 chassis power LED for that drive will be on, and the warning light on the PDM will continue to flash. To power down the drive, press the Run switch for the PDM on the SMDI chassis. The drive will be powered down, and the Run LED, the SM600 chassis LEDs, and the Warning light will all turn off within 10 seconds.

NOTE

The SM600 automatically identifies the type of drive that is installed, and it reports the drive's characteristics to the system.

3.5 Accidental Spin Down

In the event of PDM spin down while the drive is logically mounted to the system, the SMDI subsystem immediately disables read/write operations. In the case of multiple sector transfers, correctly restarting the operation where it left off is the responsibility of the operating system software. Most DEC operating systems using MSCP devices have extensive recovery mechanisms to handle this situation. Consult your operating system software manuals for details about Power Fail recovery capabilities.

3.6 Accidental Drive Removal

The SMDI provides the following combination of mechanical barriers and warning indicators to make accidental drive removal very unlikely:

1. You must manually unlatch and open a door in order to gain access to the PDM.
2. Once you open the door, a flashing LED and warning label are clearly visible on the exposed PDM. The warning label reads as follows:

WARNING. DO NOT REMOVE DRIVE WHEN INDICATOR IS FLASHING.

3. In order to remove the PDM, you must use a mechanical latch and handle on the front of the PDM.

4. In the event that you bypass all the mechanical and indicator protection devices, an electronic interlock senses PDM motion. After aborting any read or write operation in progress, the interlock spins the drive down, and removes DC power to the drives. In the case where a read or write operation is in progress, the operating system error recovery process described above (Accidental Drive Spin Down) restarts the operation if you immediately re-install and power-up the drive.

3.7 Some Cautions on the Care and Handling of PDMs

PDMs slide into and out of the SM600 chassis easily, and they generally require little special care. However, you should observe the following cautions.

PDMs are sensitive to sudden changes in temperature. If you move a PDM from one temperature to another (for example, by moving it from the trunk of a car to an air conditioned computer room), allow it time to cool off (or warm up if necessary). Since the platters in the disk drive expand or contract with temperature changes, allow about 30 minutes per 10°F (5.5°C) change. Data written to the drive before the temperature has stabilized may be unreadable.

Regardless of temperature changes, the temperature of an operating SMDI subsystem should be between 50°F and 95°F (10°C to 35°C). Storage temperature for PDMs should be between -40°F and 140°F (-40°C to 60°C).

When the RUN switch for the PDM is pressed on the SMDI chassis, the red warning LED on the front of the PDM inside the PDM enclosure lights. When it is pressed again, the drive spins down, and the red LED light turns off after about 10 seconds. **Do not remove the PDM while the red warning LED is lit.**

Store PDMs in their carrying cases (included with the PDMs). PDMs in their carrying cases may be stacked three high.

A device that measures shock is attached to the left side of each PDM, toward the rear. It should initially be white. If the PDM is subjected to a shock of more than 23 G, the shock device turns red. The PDM warranty is voided if the shock device is red or has been removed. **The PDM should not be operated if the shock device turns red. Data written to the drive is unreliable and may be unreadable.**

3.8 Drive Formatting

SMDI disk drives come preformatted from the factory. Reformatting an SMDI disk drive requires special equipment and must be done by Emulex Field Service. Call Emulex for further details.

4.1 Overview

This section discusses checking the disk drive switches and jumpers and checking the adapters. In addition it provides a table of error codes, and it discusses service.

4.2 Checking the Disk Drive Switches and Jumpers

SMDI disk drives are preformatted, integrated, and tested at the factory with your SMDI subsystem. If the system does not run, check the disk drive switches and jumpers to confirm that they are set correctly. Refer to Appendix B for the correct parameters for that drive when it is used with SMDI. The drive manufacturer's manual, included with the SMDI subsystem, describes where the switches and jumpers are located, and how to set them.

4.3 Checking the Adapters

The SMDI chassis comes installed in the equipment cabinet. The chassis contains one adapter, either an SM80 or an SM60, for each disk unit in the subsystem. Each adapter contains a switchpack (SW1), a configuration PROM at location U137, and a spare configuration PROM at storage location U23 for providing drive-configuration information.

The switches are set at the factory to correspond to the required drive. There are no recommended options to be obtained by resetting the switches, unless you need to change the factory setting of decimal display of unit numbers to hexadecimal (see Subsection 2.5.2). If you must check the switch settings, see Appendix A.

4.4 Error Codes

Table 4-1 lists some of the possible error codes (they are always shown in hexadecimal). When a fault is detected, the red Fault LED lights up, and the appropriate error code is displayed. Codes not listed in the table indicate a hardware error code that is not user serviceable; call Emulex Technical Support for instructions.

NOTE

If you encounter errors while initializing under VMS, see Subsection 2.9, para. 8.

Table 4-1. SMDI Error Codes

Error Code (Hex)	Probable Problem Area
00	No Error. Diagnostics incomplete because Run switch is not on during test 11.
30-3B	Drive* Error. Unexpected drive condition reported. Usually occurs during a data transfer.
3C	Drive Busy. Probably a drive error. Check the drive switches and jumpers for correct configuration (see Appendix B).
3D	Drive Write Protected. Disable the Write Protect switch on the drive front panel.
3E	Drive Unit Select Error. Be sure that all SMD drives are configured as unit 0, and all ESDI drives are configured as unit 1. This may also indicate that an SMD cable is not correctly installed. When the cause of this error is cleared, SMDI goes through a power-up sequence.
3F	Drive Error. Unexpected drive condition reported. Usually occurs during a data transfer.
40-41	SMDI Power/Cable Interlock Failure.
42	Drive Disabled. Drive hardware error detected by host.
43	SM600 Chassis Non-functional. An SMD or power cable to the SM600 chassis is not installed correctly.
44	SMDI Hardware Failure.
45	SM600 Chassis Over-Temperature Detection. May indicate that a PDM in an SM600 chassis is overheating. Probably a drive hardware problem.
46	Drive Already Spun Up. Either a user or the host software tried to spin up the drive when it was already spun up. Drive may be in local mode instead of remote mode.
47	Drive Timed Out. Usually a drive microprocessor failure.
49	Drive Error.
4D	Drive Spin-Up Failed. Drive hardware error. An SMD or power cable may not be correctly installed, or a drive hardware error may exist.
4E	Drive Spin-Down Failed. Drive hardware error. Local/remote switch is in remote setting and drive has no remote mode.

* For SM70 configurations "drive" refers to drive A; drive B errors are explicitly listed as such.

(Continued on next page)

Table 4-1. SMDI Error Codes (Continued)

Error Code (Hex)	Probable Problem Area
4F	Drive Seek Error. Drive hardware error.
50-5C	SDI Transmission or Protocol Error. Hardware failure or bad SDI cable.
5D	No Drive Installed. Turn off Run switch and install drive in SM600 chassis.
5E	Configuration Mismatch. The drive in the PDM is not configured for SMDI.
5F	SDI Transmission Error.
60	Write Protect Error. A write operation was attempted with a drive that is write-protected on the SMDI user panel.
61	Illegal Drive Status.
62-63	Illegal SDI OP Code Parameter Detected.
64	Drive Disabled. Drive hardware error detected by host.
65	Run Switch Off. The Run switch on the SMDI user panel is off. Press it on.
66	Illegal SDI OP Code Parameter Detected.
67	Illegal Drive Status. Jumper-selected options on the drive may be set incorrectly.
68-6F	Illegal SDI OP Code Parameter Detected.
70-72	SMDI Hardware Failure.
73-74	Drive or Cable Error. This error code (and all listed through 9F) indicate either a drive hardware error, a bad drive cable, or a bad SDI cable. If a cable is suspect, exchange it and see if that solves the problem. If it does not, check the drive switches and jumpers for correct configuration.
75-76	SMDI Hardware Failure.
77-78	Drive Cable Error.
79-8B	SDI Port or Cable Error.
8C-8F	SMDI Hardware Failure.
90-95	SDI Port or Cable Error.

(Continued on next page)

Table 4-1. SMDI Error Codes (Continued)

Error Code (Hex)	Probable Problem Area
96-9F	SMDI or Drive Hardware Failure.
A0-A6	SMDI Hardware Failure.
AA	No Error. Self-Test Successful.
B0-B5	SMDI Hardware Failure.
C0-C1	Firmware PROM Verification Failure.
C2	SDI Port or Cable Error.
C3	SMDI Hardware Failure.
C4	Configuration PROM Verification Failure.
C5-CE	Drive or Cable Error.
DB	Drive B Write Protected. (See Error 3D.)
DD	SMDI State Error. May require Cycling Run switch.
E0	Write Protect Error, Drive B.
E1	Illegal Drive B Status. (See Error 67.)
E5-EE	Drive B or Cable Error.
EF	Drive B Seek Error. Drive B hardware error.
F0-FD	Drive B Error. (See the corresponding Drive A Errors 30-3D.)
FE	Drive B Unit Select Error. As for Error 3E, but on Drive B of an SM70 configuration. When the cause of this error is cleared, SMDI goes through a power-up sequence.
FF	Invalid Unit Number. (Slow flash, Fault LED not on). Set valid number in Unit Number switches. Unit number can range from 0-99 (decimal) if switch SW1-3 is ON, or from 0-FB (hexadecimal) if SW1-3 is OFF.

4.5 Service

If you have a problem with your SMDI subsystem, 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)
TWX 910-595-2521

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

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

Appendix A

Configuration PROMs and Switch Settings on the Adapter

A.1 Overview

The adapter contains an eight-position switch (SW1) and a configuration PROM (See Figure 2-4), which are set at the factory for proper subsystem operation. Subsection A.2 defines the various switch settings. Subsection A.3 indicates the following:

- The adapter required by each drive
- The minimum revision level required for configuration PROMs
- The required settings of SW1-6 through SW1-8 for the various drives.

You should not have to handle the PROM or switch, except to set SW1-3 for decimal or hexadecimal display of the unit number.

A.2 Definition of SW1

Table A-1 defines the function and factory (default) setting of each of the eight switches on switchpack SW1, and it references the corresponding subsections in this manual.

Table A-1. Adapter Switch (SW1) Definitions/Factory Configuration

Switch	OFF (0)	ON (1)	Factory	Function	Subsection
SW1-1	-	-	OFF (0)	Factory Setting	A.2
SW1-2	-	-	OFF (0)	Factory Setting	A.2
SW1-3	Hexadecimal	Decimal	ON (1)	Unit Number Display Radix	2.5.2
SW1-4	-	-	OFF (0)	Factory Setting	A.2
SW1-5	-	-	OFF (0)	Factory Setting	A.2
SW1-6	-	-	NS	Drive Selection	A.3
SW1-7	-	-	NS	Drive Selection	A.3
SW1-8	-	-	NS	Drive Selection	A.3
ON(1) = Closed OFF(0) = Open			Factory = Factory switch setting NS = No standard		

A.3 Settings for Particular Drives

Location U137 on the adapter holds the active configuration PROM (see Figure 2-4). Location U23 is a storage socket for holding the alternate configuration PROM on the SM80 adapter. When PROM G140 is installed at location U137, PROM G39 is stored at location U23.

If you have any problem, make sure that the configuration PROM and switch settings conform with the requirements given in Table A-2.

Table A-2. Configuration PROMs and Switch Settings for Particular Drives

Drive	Configuration PROM Minimum Revision Level	----- SW1 -----		
		6	7	8
S820 (CDC 9720-850)	G39B	0	1	1
S821 (CDC 9720-1120)	G39C	0	0	1
S883 (CDC 9783)	G39A	1	1	0
S851 (Fujitsu 2351)	G39A	0	0	0
SM600 Chassis and Maxtor PDMs (XT4380E or XT8760E)	G99B	0	0	0
SM70X (2 CDC 9720-850s)	G140A	1	0	0
SM71X (2 CDC 9720-1120s)	G140A	0	1	0

B.1 Overview

This section provides information on the parameters and specifications of the various drives that may be used with the SMDI.

B.2 S820 (CDC 9720-850)

B.2.1 S820 Disk Drive Parameters

Use the following values to select switch settings for the S820 drive. Note that one style of controller board has three six-position switch blocks; it is labeled 54412506. The other has two 10-position switch blocks; it is labeled 54412509. Values that differ for the two disk drives are followed by the controller board label number in parentheses. The CDC manual, which is included with the disk drive, gives the actual switch settings for these values.

Power Supply

- Main circuit breaker = ON

Control Board Switches

- Write Protect switch = Normal
- Sector Select switches = 641 bytes per sector (54412509) or 64 sectors per track (54412506)
- Logical Address Switches = Logical Address 0 (Logical Address 8 for Drive B of SM70X configuration)
- Sector Clock Switch = B (54412509) or .8 (54412506)
- Sweep Cycle Function = Disabled (54412509 only)

I/O Board Switches

- Index/Sector switch (Channel 1) = Index/Sector on "B" Cable
- Index/Sector switch (Channel 2) = Don't Care
- Channel 1 switch = Enabled
- Channel 2 switch = Don't Care
- SMD Mode = SMD-E
- Cylinder Address Mode = Extended Cylinder Address
- Reserve Mode = Don't Care
- Local/Remote switch = Remote
- Device ID jumpers = Don't Care
- Ready/Power OK = Ready

B.2.2 S820 Disk Drive Specifications

Table B-1 gives S820 disk drive specifications (the figures are approximations; they may vary with your subsystem configuration).

Table B-1. S820 Disk Drive Specifications

Parameter	Description
Formatted Capacity	663 MB
Transfer Rate	19.72 MHz (2.465 MB/s)
Average Latency	8.33 milliseconds (disk rotates at 3600 rpm)
Seek Time	
Full	35 milliseconds maximum
Average	16 milliseconds
Single Track	5 milliseconds maximum

B.3 S821 (CDC 9720-1120)

B.3.1 S821 Disk Drive Parameters

Use the following values to select switch settings for the S821 drive.

Power Supply

- Main circuit breaker = ON

Control Board Switches

- Write Protect switch = Normal
- Sector Select switches = 644 bytes per sector
- Logical Address Switches = Logical Address 0 (Logical Address 8 for Drive B of SM70X configuration)
- Sector Clock Switch = B
- Sweep Cycle Function = Disabled

I/O Board Switches

- Index/Sector switch (Channel 1) = Index/Sector on "B" Cable
- Index/Sector switch (Channel 2) = Don't Care
- Channel 1 switch = Enabled
- Channel 2 switch = Don't Care
- SMD Mode = SMD-E
- Cylinder Address Mode = Extended Cylinder Address
- Reserve Mode = Don't Care
- Local/Remote switch = Remote
- Device ID jumpers = Don't Care
- Ready/Power OK = Ready

B.3.2 S821 Disk Drive Specifications

Table B-2 gives S821 disk drive specifications (the figures are approximations; they may vary with your subsystem configuration).

Table B-2. S821 Disk Drive Specifications

Parameter	Description
Formatted Capacity	873 MB
Transfer Rate	22 MHz (2.75 MB/s)
Average Latency	8.33 milliseconds (disk rotates at 3600 rpm)
Seek Time	
Full	35 milliseconds maximum
Average	16 milliseconds
Single Track	5 milliseconds maximum

B.4 S883 (CDC 9783)

B.4.1 S883 Disk Drive Parameters

Use the following values for selecting switch settings for the S883 drive. The CDC manual, which is included with the disk drive, gives the actual switch settings for these values.

Back Panel (Power Supply) Switches

- Main circuit breaker = ON

Front Panel Switches

- Logic Plug = 0
- START switch = ON
- FAULT indicator = OFF (press switch to clear fault)
- Write Protect switch = OFF

Status/Fault Display Switches (behind front panel)

- Diagnostic Mode switch = OFF
- Diagnostic Execute switch = OFF
- Diagnostic Step switch = OFF

Control Board Switches

- Write Protect jumper = Normal
- Sector Select switches = 78 sectors per track

I/O Board Switches

- Index/Sector jumpers (Channel 1) = Index/Sector on "B" Cable
- Index/Sector jumpers (Channel 2) = Don't Care
- Channel 1 jumper = Enabled
- Channel 2 jumper = Don't Care
- SMD Mode = SMD-E
- Cylinder Address Mode = Extended Cylinder Address
- Reserve Mode = Don't Care
- Local/Remote Switch = Remote
- Device ID jumpers = Don't Care

B.4.2 S883 Disk Drive Specifications

Table B-3 gives S883 disk drive specifications (the figures are approximations; they may vary with your subsystem configuration).

Table B-3. S883 Disk Drive Specifications

Parameter	Description
Formatted Capacity	1055 MB
Transfer Rate	22 MHz (2.75 MB/s)
Average Latency	9.16 milliseconds (disk rotates at 3274 rpm)
Seek Time	
Full	30 milliseconds maximum
Average	16 milliseconds
Single Track	5 milliseconds maximum

B.5 S851 (Fujitsu 2351)

B.5.1 S851 Disk Drive Parameters

Use the following values in selecting switch settings for the S851 drive. The Fujitsu manual, which is included with the disk drive, gives the actual switch settings for these values.

Back Panel (Power Supply) Switches:

- Main Line switch = ON
- Local/Remote switch = Remote
- AC Current = 120 VAC (domestic) or 220 VAC (European)
- Grounding = user's choice

Front Panel Switches

- Start switch = ON
- Write Protect switch = OFF
- Fault LED = OFF
- Start/Ready/Power on LEDs = ON

Indicator Unit Switches (located at rear of drive)

- State switch = State 0
- MRTZ switch = OFF

Interface PCB Switches

- Drive Address switches = 0

Logic PCB Switches

- Tag 4,5 Capability jumper = Disable
- Seek End Status jumper = Seek End issued after Offset Command is reset
- Unit Ready jumper = Unit Ready issued even if drive in fault condition
- Sector Count = 44 sectors per track

B.5.2 S851 Disk Drive Specifications

Table B-4 gives S851 disk drive specifications (the figures are approximations; they may vary with your subsystem configuration).

Table B-4. S851 Disk Drive Specifications

Parameter	Description
Formatted Capacity	365 MB
Transfer Rate	1.859 MB/s
Average Latency	7.5 milliseconds
Seek Time	
Full	35 milliseconds maximum
Average	18 milliseconds
Single Track	5.5 milliseconds maximum

B.6 S680 (Maxtor XT-4380E)

B.6.1 S680 Disk Drive Parameters

Confirm that the jumpers on the S680 (Maxtor XT-4380E) drive are set for the following configuration:

- Drive Number = Number 1
- Mode = Hard Sector Mode
- Sector Size = 654 bytes per sector (with 32 sectors) or 634 bytes per sector (with 33 sectors)
- Local/Remote Spin up and down = Remote

In addition, confirm that the drive termination resistor packs on the drives have been removed, because they will interfere with the drive termination provided on the SM600 chassis.

B.6.2 S680 Disk Drive Specifications

Table B-5 gives specifications for the S680 (Maxtor XT-4380E) disk drive. The figures are approximations; they may vary with subsystem configurations.

Table B-5. S680 (Maxtor XT-4380E) Disk Drive Specifications

Parameter	Description
Formatted Capacity	288 MB (32 sectors) or 298 MB (33 sectors)
Transfer Rate	10 MHz (1.25 MB/s)
Average Latency	8.33 milliseconds
Access Time	
Maximum	35 milliseconds
Average	18 milliseconds
Track-to-Track	3 milliseconds maximum

B.7 S660 (Maxtor XT-8760E)

B.7.1 S660 Disk Drive Parameters

Confirm that the jumpers on the S660 (Maxtor XT-8760E) drive are set for the following configuration:

- Drive Number = Number 1
- Mode = Hard Sector Mode
- Sector Size = 641 bytes per sector
- Local/Remote Spin up and down = Remote

In addition, confirm that the drive termination resistor packs on the drives have been removed, because they will interfere with the drive termination provided on the SM600 chassis.

B.7.2 S660 Disk Drive Specifications

Table B-6 gives specifications for the S660 disk drive. The figures are approximations; they may vary with subsystem configurations.

Table B-6. S660 Disk Drive Specifications

Parameter	Description
Formatted Capacity	597 MB
Transfer Rate	15 MHz (1.87 MB/s)
Average Latency	8.33 milliseconds
Access Time	
Maximum	35 milliseconds maximum
Average	18 milliseconds
Track-to-Track	3 milliseconds maximum


```

;*****
;*****
;
;           SMDI CODES
;
;*****

```

```

;
;           DIAGNOSTIC TESTS
;-----
;
; TEST #           FUNCTION
;-----

```

TEST #	FUNCTION
1	PROM VERIFICATION
2	FRONT PANEL LED DISPLAY
3	SECTOR COUNTER PORT
4	READ/WRITE CONTROLS
5	CLOCK CONTROLS
6	MAX SECTOR # OUTPUT PORT
7	SMD/ESDI CABLE PORTS
8	OPERATOR PANEL CONTROLS
9	TIMER 5.5
A	TIMER 6.5
B	INTERRUPT 7.5 STATUS A & B
C	SDI OUTPUT PORT - LOOPBACK PLUG CABLE NOT INSTALLED
D	SDI COMMAND/RESPONSE - DATA I/O
E	SDI CABLE LOOP BACK - BOTH PORTS
F	DIAGNOSTIC DATA I/O PORTS
10	DISK DATA READ/WRITE VERIFICATION
11	SEEK ERROR/FAULT ERROR RECOVERY
12	INTERLOCK STATUS
13	CONTROL PORT #9
14	INCREMENT/DECREMENT SEEK TEST
15	ALTERNATE SEEK TEST
16	RANDOM SEEK TEST
17	RECALIBRATE TEST

GROUP ERROR CODES

CODE #	MEANING
20	-5 VDC POWER/PANEL INTERLOCK STATUS BAD
21	DRIVE NOT READY OR NOT SELECTED
22	DRIVE OFFLINE OR DISABLED
23	ROTATIONAL POSITION OR SECTOR COUNTER ERROR
24	SMD/ESDI ERROR (TIMEOUT, FAULT, SEEK-ERROR)
25	READ/WRITE ERROR
26	READ/WRITE COMMAND OVERRUN
27	UNRECOGNIZED ERROR CODE
28	FATAL ERROR
29	UNEXPECTED INTERRUPT OR RESET
2A	SDI TRANSMISSION ERROR
2B	INVALID SDI COMMAND RECEIVED
2C	SDI COMMAND PARAMETER OR PROTOCOL ERROR
2D	DRIVE STATE ERROR
2E	CONFIGURATION ERROR
2F	HARDWARE FAILURE DETECTED

SPECIFIC ERROR CODES

CODE #	MEANING
30	LOSS OF SERVO CLOCK
31	LOSS OF READ CLOCK
32	R/G OR W/G .AND. DRIVE NOT READY
33	R/G OR W/G .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	R/G OR W/G .AND. FAULT
3A	LATE WRITE GATE
3B	UNEXPECTED RESET
3C	DRIVE BUSY INPUT TRUE
3D	DRIVE WRITE PROTECT INPUT TRUE
3E	DRIVE UNIT SELECT INPUT FALSE
3F	7.5 INTERRUPT WITH NO ERROR STATUS PRESENT
40	-5 VDC STATUS BAD
41	OPERATOR PANEL INTERLOCK STATUS BAD
42	DRIVE DISABLED
43	SM600 CHASSIS NONFUNCTIONAL
44	FATAL ERROR TRAP
45	SM600 OVER-TEMPERATURE DETECTION
46	DRIVE ALREADY SPUN UP
47	SMD/ESDI COMMAND TIMEOUT OCCURRED
48	SM600 POWER-FAIL DETECTION
49	READ/WRITE COMMAND OVERRUN
4A	'DRIVE CLEAR' DID NOT CLEAR ATTENTION
4B	'DRIVE CLEAR' DID NOT CLEAR ALL ERROR BITS
4C	'DRIVE CLEAR' DID NOT CLEAR DRIVE ERRORS
4D	DRIVE SPIN-UP FAILED
4E	DRIVE SPIN-DOWN FAILED
4F	DRIVE SEEK/RECAL ERROR
50	SDI COMMAND ALREADY IN PROGRESS
51	SDI FRAMING PROTOCOL ERROR
52	SDI CHECKSUM ERROR
53	SDI PARITY ERROR
54	INVALID REAL-TIME COMMAND
55	INVALID MICROPROCESSOR COMMAND
56	COMMAND INPUT BUFFER OVERRUN/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
5D	NO DRIVE INSTALLED
5E	CONFIGURATION MISMATCH
5F	COMMAND/WRITE DATA PULSE ERROR

*B CABLE ON SM600 OUT OR CENTER
CABLE ON SM70*

SPECIFIC ERROR CODES (CONT.)

CODE #	MEANING
60	WRITE PROTECTED DRIVE
61	UNEXPECTED SPIN-DOWN
62	ILLEGAL DIAGNOSTIC NUMBER
63	TIMEOUT LENGTH = 0
64	RUN SWITCH ON .AND. DRIVE DISABLED
65	RUN SWITCH OFF
66	MEMORY REGION NOT FOUND
67	DRIVE UNEXPECTEDLY NOT ON CYLINDER
68	ATTEMPTED TO WRITE PAST MEMORY REGION
69	SDI TRANSMISSION TIMEOUT
6A	DRIVE NOT ON-LINE
6B	READ/WRITE READY STATUS NOT SET
6C	TOPOLOGY MODE MISMATCH
6D	AVAILABLE STATUS NOT SET
6E	INVALID ERROR RECOVERY LEVEL (>0)
6F	INVALID SUB-UNIT FLAG/NO SUB-UNIT #0 FLAG
70	5.5 TIMER ERROR
71	6.5 TIMER ERROR
72	SDI OUT/ECHO ERROR
73	NUMBER OF BAD TRACKS = 1 TO 3
74	NUMBER OF BAD TRACKS > 3
75	SECTOR COUNT NOT FOUND
76	DIAGNOSTIC READ ERROR LATCH FAILURE
77	DRIVE NOT SPUN UP
78	DRIVE NOT SPUN DOWN
79	DRIVE ERROR STATUS SET
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
85	unused
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 - BANK # 0
8D	RAM ERROR - BANK # 1
8E	RAM ERROR - BANK # 2
8F	RAM ERROR - BANK # 3

*BIT - No LOOPBACK
PUG INSTALLED*

SPECIFIC ERROR CODES (CONT.)

CODE #	MEANING
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	CONTROL PORT #9 ERROR
99	DRIVE STATUS PORTS A OR B ERROR
9A	SMD/ESDI 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
A6-A9	unused
AA	NO ERROR (TEST PASSED)
AB-AF	unused
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
B4	INTERRUPT 7.5 STATUS 'B' BIT 4 ERROR
B5	INTERRUPT 7.5 STATUS 'B' BIT 5 ERROR
B6-BF	unused
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
C7	unused
C8	SEEK ERROR ON OTHER DRIVE (DRIVE 8)
C9	DRIVE FAULT ON OTHER DRIVE (DRIVE 8)
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
CF-DA	unused

SPECIFIC ERROR CODES (CONT.)

CODE #	MEANING
DB	OTHER DRIVE WRITE-PROTECTED (DRIVE 8)
DC	unused
DD	INCONSISTENT FLAGS AND CONTROLS
DE-DF	unused
E0	WRITE PROTECTED DRIVE (DRIVE 8)
E1	DRIVE 8 UNEXPECTEDLY NOT ON CYLINDER
E2-E4	unused
E5	SEEK ERROR NOT DETECTED ON DRIVE 8
E6	DRIVE FAULT NOT DETECTED ON DRIVE 8
E7	SMD COMMAND TIMEOUT OCCURRED FOR DRIVE 8
E8	SEEK ERROR ON OTHER DRIVE (DRIVE 0)
E9	DRIVE FAULT ON OTHER DRIVE (DRIVE 0)
EA	NUMBER OF BAD TRACKS = 1 TO 3 (DRIVE 8)
EB	NUMBER OF BAD TRACKS > 3 (DRIVE 8)
EC	DRIVE 8 NOT SPUN UP
ED	SYNC DETECT FAILURE ON DRIVE 8
EE	INCORRECT NUMBER OF SECTORS ON DRIVE 8
EF	DRIVE 8 SEEK/RECAL ERROR
F0	LOSS OF SERVO CLOCK FROM DRIVE 8
F1	LOSS OF READ CLOCK FROM DRIVE 8
F2	R/G OR W/G .AND. DRIVE 8 NOT READY
F3	R/G OR W/G .AND. DRIVE 8 NOT ON-CYLINDER
F4	MULTIPLE WRITE GATE TRANSITIONS USING DRIVE 8
F5	WRITE GATE .AND. WRITE PROTECTED USING DRIVE 8
F6	SECTOR COUNTER ERROR ON DRIVE 8
F7	READ GATE .AND. WRITE GATE USING DRIVE 8
F8	DRIVE FAULT ON DRIVE 8
F9	R/G OR W/G .AND. FAULT USING DRIVE 8
FA	LATE WRITE GATE USING DRIVE 8
FB	OTHER DRIVE WRITE-PROTECTED (DRIVE 0)
FC	DRIVE 8 BUSY INPUT TRUE
FD	DRIVE 8 WRITE PROTECT INPUT TRUE
FE	DRIVE 8 UNIT SELECT INPUT FALSE
FF	INVALID UNIT NUMBER

CABLE ON SM70 -4T L02 RT CABL

HSC Console error printout

ERROR-E Drive Detected Error at 7-Aug-1987 15:21:46.62

Command Ref #	00000000	!
RA82 Unit #	7.	!
Err Seq #	277.	!
Format Type	03	! MSCP Error Format
Error Flags	40	! MSCP Error Flags
Event	00EB	! MSCP Event code
Request	1B	! Request Byte
Mode	06	! Mode Byte
Error	80	! Error Byte
Controller	00	! Controller Byte
Retry/Fail	00	! Retry Count (Always 0)
Extended Status	0A	! Previous Command Code
	20	! Interface Error Status
	89	! Low Cylinder Address
	05	! High Cylinder Address
	0D	! Current Group/track
	5C	! SMDI Error/LED Code
	2A	! SMDI Group Code
Requestor #	3.	! HSC requestor number
Drive port #	3.	! HSC port number

ERROR-I End of error.

COMMAND REFERENCE NUMBER

The number of the command that caused the error. The error log message may be received before or shortly after the end message of the command that caused the error. The reference number will be zero if the error does not correspond to a specific outstanding command.

UNIT NUMBER

The number of the unit to which the error relates, or 4095 if the error does not relate to a specific unit. This field may contain the unit number of any unit of the drive or formatter if the error relates to an entire multi-unit drive or formatter.

ERROR FORMAT

The value in this field will define the format of the error log message.

- 0 Controller errors
- 1 Host memory access errors with Bus Address
- 2 Disk Transfer Errors
- 3 SDI Errors

ERROR FLAGS

- 01 Sequence number reset

Set when the error log sequence number has been reset by the MSCP server since the last error log message sent to the receiving class driver. Cleared when the sequence number has not been reset, implying that the 'Sequence Number' field may be used to detect missing error log messages. Always set if the MSCP server does not implement error log sequence numbers.

- 80 Operation continuing

Set while the retry sequence for an operation is continuing, and while the error log message is reporting unprocessed completions retries. Cleared when the retry sequence is completed. If the successful flag is also cleared, an unrecoverable error will be reported. If the successful flag is set, this flag is undefined.

- 40 Operation successful

Set when the operation that caused an error log message has been successfully completed. The error log message summarizes the retry sequence that was necessary to successfully complete the operation. Cleared when the operation has not yet been successfully completed.

EVENT CODE

Identifies the specific error or event being reported by this error log message. The meaning of this code is displayed on the first line of this error printout.

REQUEST BYTE

Bit 0	RU bit	A logical 1 in this bit position indicates that the RUN/STOP Switch is pushed in (RUN). A logical 0 indicates the switch is out (STOP).
Bit 1	PS bit	A logical 1 in this bit position indicates that the port select switch for this controller is pushed in (selected). A logical 0 indicates that the switch is out.
Bit 2		Not used
Bit 3	EL bit	A logical 1 in this position indicates that there is loggable information in the extended status area. A logical 0 indicates that no information is available in the extended status area.
bit 4	SR bit	1 = Drive up to speed 0 = Drive not up to speed
bit 5	DR bit	A logical 1 indicates that there is a request for a diagnostic to be loaded. A logical 0 indicates that no diagnostic is being requested.
bit 6	RR bit	Indicates that the drive needs an internal adjustment. This bit is not used by the SMDI subsystem.
bit 7	OA bit	A 1 in this bit position indicates that the drive is unavailable to the controller. A 0 in this position indicates that the drive is available to the controller.

MODE BYTE

- bit 0 S7 bit A logical 1 in this bit position indicates that the 576 byte sector format is selected. A logical 0 indicates that the 512 byte sector format is selected. All SMDI drives will use the 512 format.
- bit 1 DB bit A logical 1 in this bit position indicates that the diagnostic cylinders on the drive can be accessed.
- bit 2 FO bit A logical 1 in this bit position indicates that the drive can be formatted.
- bit 3 DD bit A logical 1 in this bit position indicates that the drive has been disabled by a controller error routine or diagnostic.
- bit 4-7 These bits indicate the write-protect status of the sub-unit represented. (e.g, 0001 indicates that subunit 0 of the selected drive is write-protected.)

ERROR BYTE

bit 0,1,2	Not used
Bit 3 WE bit	A logical 1 in this position indicates that a write lock error has occurred.
Bit 4 DF bit	A logical 1 in this position indicates a failure in the initialization routine of the drive.
Bit 5 PE bit	A logical 1 in this position indicates that improper command codes or parameters were issued to the drive.
Bit 6 RE bit	A logical 1 in this position indicates that an error occurred in the transmission of a command between the drive and the controller. The error could be a checksum error or an incorrectly formatted command string.
Bit 7 DE Bit	A logical 1 in this position indicates that a drive error has occurred and that the drive FAULT led may be on. If this bit is set then byte 6 of the extended status will contain the SMDI error code.

CONTROLLER BYTE

bits 0-3

This is a four bit drive status code indicating various states of drive operation. At the present time, only three codes are valid.

0000 = drive normal operation
1000 drive is off-line due to diagnostics.
1001 = drive is off-line due to another drive having the same unit identifier.

bits 4-7

This is a four-bit representation of the sub-units that have their attention-available messages suppressed in the controller. The right most position represents subunit 0. the left most position represents subunit 3.

RETRY/FAIL

This byte on the SMDI is always 0 and has no meaning. The following information is only valid on a DEC RA type drive.

This byte contains one of two types of information depending upon the status of the DF bit of the ERROR byte. The DF bit monitors the drive initialization process. The DF bit remains a 0 if initialization is successful. In this case, the RETRY/FAIL byte contains the retry count from the previous operation. i.e., a seek operation required 14 retries to be successful. If a get status command is initiated, this byte contains the number 14.

The DF bit being set indicates that the drive initialization failed; therefore, byte 8 now contains a specific drive error code. This error code can be looked up in the appropriate drive service manual.

EXTENDED STATUS BYTES

The following paragraphs describe the contents of the extended status bytes for a EMULEX SMDI disk drive.

Byte 0

This byte contains the controller command function code last executed by the drive. The codes are listed as follows, with and without parity.

NO	PARITY	PARITY	
01		81	Change Mode
02		82	Change Cont Flags
03		83	Diagnose
04		84	Disconnect
05		85	Drive Clear
06		86	Error Recovery
07		87	Get Common Charater
08		88	Get Subunit Charater
09		89	Get Status
0A		8A	Initiate Seek
0B		8B	Online
0C		8C	Run
0D		8D	Read Memory
0E		8E	Recalibrate
0F		8F	Write Memory
10		90	Topology

Byte 1

This byte contains the SDI error status bits 3,4,5, and 7. All other bits are unused.

Bit 3 Overrun error

This bit sets when either a read or a write command extends past the sector or index pulse that the operation started from.

Bit 4 Parity error found

This bit sets when a parity error is discovered during the transmission of a real-time command on the real-time controller state line.

Bit 5 Control pulse error

This bit sets during the transmission of a real-time command if two or more pulses of the same polarity are detected on the real-time controller state line.

Bit 7 Data pulse error

This bit sets during the transmission of a real-time command if two or more pulses of the same polarity are detected on the write command data line.

Byte 2

This byte contains the low order bits of the cylinder address of the last seek operation.

Byte 3

This byte contains the high order bits of the cylinder address of the last seek operation.

Byte 4

This byte contains the present RA81 group address. An RA81 "group" is equivalent to a track in SMDI terminology.

Byte 5

This byte contains the hexadecimal error codes that are displayed by the SMDI LED's. Refer to the SMDI manual for the definition of these codes.

Byte 6

SMDI Group code errors.

20	-5 VDC or panel interlock bad
21	Drive not ready or not selected
22	Drive offline or disabled
23	RPS or sector counter error
24	Timeout, fault or seek error
25	Read/Write error
26	Read/Write command overrun
27	Unrecognized error code
28	Fatal error trap
29	Unexpected interrupt or reset
2A	SDI transmission error
2B	Invalid SDI command received
2C	SDI command error
2D	Unused
2E	Drive state error
2F	Hardware failure detected

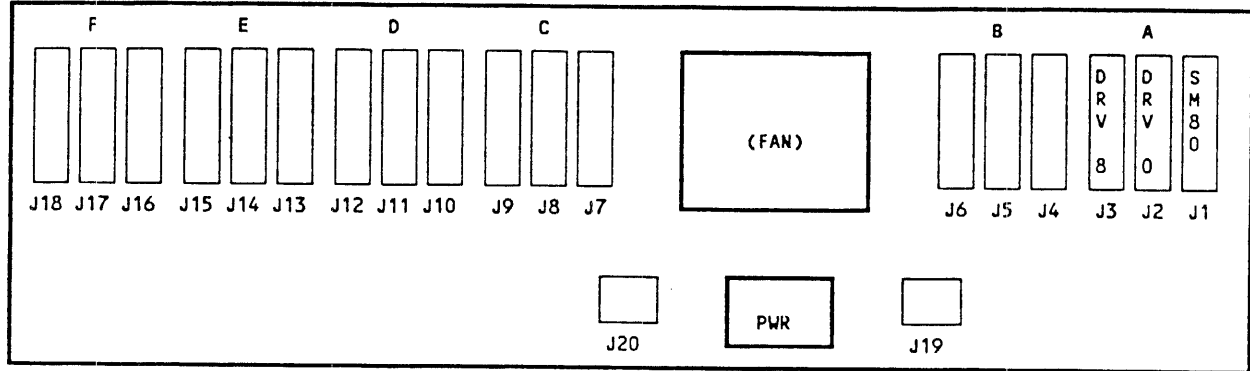
REQUESTOR BYTE

The number of the requestor that the drive is connected to.

DRIVE PORT BYTE

The port number of the requestor that the drive is connected to.

SM70 Chassis Back View



Connector Descriptions:

J1, J4, J7, J10, J13, J16:

Connect to SM80 adaptor board "B" cable connector on appropriate SMDI chassis. In the 12-pack (6 logical drives), the drive pair connecting to channel A will connect to adaptor 1 on the bottom SMDI (bottom drive pair connects to bottom board).

J2, J5, J8, J11, J14, J17:

Connect to drive with ID = 0 (usually the drive to your right as you face the back of the cabinet, which would be the last drive in the A-cable daisy-chain).

J3, J6, J9, J12, J15, J18:

Connect to drive with ID = 8 (usually the drive to your left as you face the back of the cabinet, which would be the first drive in the A-cable daisy-chain).

J19: Connect through the RJ-type cable connector to the SMDI chassis with four SM80 adaptor boards. This connector handles drive selection for channels A, B, C, and D.

J20: Connect through another RJ-type cable (same type as above) to the SMDI chassis with the remaining two adaptor boards. This connector carries the selection signals for channels E and F.

Notes:

The physical layout, cabling, and drive arrangement could change at any time, either due to a change in manufacturing procedure or due to "customer preference" (on-site modification).

The SM80 boards that select drives via J20 must be installed in the slots for adaptors 1 and 2 in the bottom of the SMDI chassis.

VMS Considerations

INITializing the disk pair:

CLUSTERSIZE:

Use this formula (from help on INIT command)

$$\frac{\text{Number of blocks in user area}}{\text{-----}} \\ 255 * 4096$$

INDEXF file placement:

Normal default would split between both drives

Center INDEXF on second drive for best results

INIT/INDEX=BLOCK:nnnnnn

Consult manual page 2-19, end of sect. 2.9.

BACKUP clustersize considerations:

BACKUP uses a default clustersize of 3

Use INIT/CLUSTERSIZE to init disk...

... then use BACKUP/NOINIT to restore.

Miscellaneous

Revisions:

SM80 board artwork must be revision C minimum

SM80 firmware prom G40D

SM80 as SM700 uses config prom G140A

- otherwise uses standard G39 config prom**
- both proms on board, one in "carrier"**
- see manual appendix A, page 2**

Different backplane assy. - SM7010402-00

HSC50/70 In-Line Diagnostics:

Use large enough parameters to test BOTH drives

Caution:

Line voltage is passed through board to pwr supp.

AC fan taps line voltage via spade lugs on top

Terminal strip in front is also "hot"



Reader's Comments

Your comments and suggestions will help us in our continuous effort to improve the quality and usefulness of our publication.

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