

**EMULEX MICRO SYSTEMS
(DM01/DM02)
INSTRUCTION SHEET**



3545 Harbor Boulevard
Costa Mesa, California 92626
(714) 662-5600 TWX 910-595-2521

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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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1.1 General Description

This instruction sheet describes how to install the DM01- and DM02-based Emulex Micro Packaged Subsystem Kits. The EMS kits, designed for the DEC MicroVAX II World Box (BA123 enclosure), support one or two hard disk drives and one or two floppy disk drives.

There are eight versions of this kit. Each version includes the following components:

- Emulex DM01 or DM02 disk controller
- Disk drive(s)
- Mounting hardware for drives
- Cables
- Activity panel
- Diagnostics
- This instruction sheet

The differences between the eight versions lie in the model of disk controller and disk drive included in each. The DM01 disk controller is included in kits that use ST506-type hard drives; the DM02 disk controller is included in kits that use ESDI-type hard drives. The following types of hard drives are available:

- Maxtor Xt-1140 (ST506, 110 megabytes)
- Micropolis 1355 (ESDI, 170 megabytes)
- CDC Wren III (ESDI, 180 megabytes)
- Maxtor EXT-4380 (ESDI, 380 megabytes)
- Micropolis 1558 (ESDI, 380 megabytes)
- Maxtor XT-4380E (ESDI, 380 megabytes)

Table 1 shows the model numbers and descriptions of each kit described by this instruction sheet.

Table 1. EMS Model Numbers

Model Number	Description
EMS/110-D	DM01 controller, one 110 MB drive
EMS/110-110-D	DM01 controller, two 110 MB drives
EMS/170-D	DM02 controller, one 170 MB drive
EMS/170-170-D	DM02 controller, two 170 MB drives
EMS/180-D	DM02 controller, one 180 MB drive
EMS/180-180-D	DM02 controller, two 180 MB drives
EMS/380-D	DM02 controller, one 380 MB drive
EMS/380-380-D	DM02 controller, two 380 MB drives

1.2 Configuring the Subsystem

Before you begin installing the EMS kit, you must check the disk drives, the disk controller, and the activity panel to make sure they are configured properly. The following three subsections explain how to do this.

1.2.1 Configuring the Disk Drives

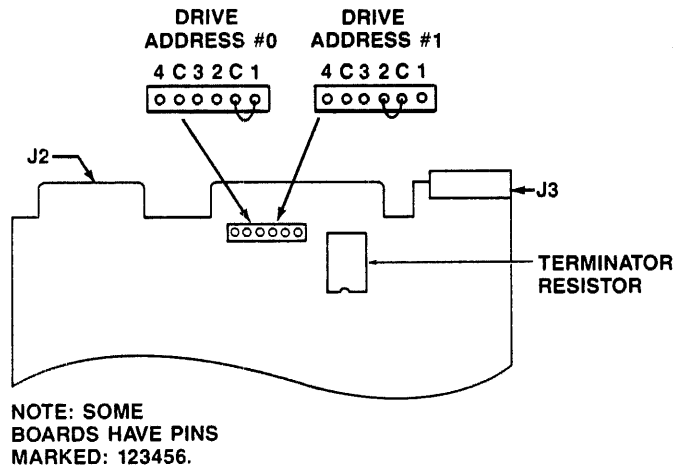
There are two considerations when you are configuring the disk drives:

1. **Drive address** - The first ESDI or floppy drive must be configured for address #1. If your kit includes two drives, the second drive must be configured for address #2. Note that ST506 drive addresses are numbered #0 and #1.

Because hard and floppy drives use separate interfaces, floppy drive addresses are 0 and 1 even if you also have hard drives.

2. **Termination resistor** - A termination resistor must be installed on the last drive only. If you have one drive, install the termination resistor on this drive. If you have two hard or two floppy drives, leave the resistor socket empty on the first drive and install the termination resistor on the second drive.

The following figures show the required configuration for the drives available for the EMS kit. Use only the figure that applies to your drive and skip the others. If you are using your own drive, consult its installation manual for configuration details.



DM0101-1036

Figure 1. Configuring the 110 MB Drive (Maxtor Xt-1140)

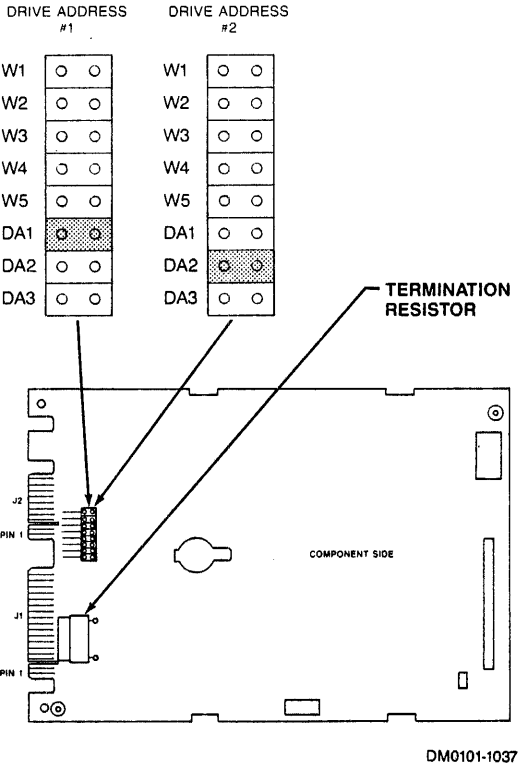


Figure 2. Configuring the 170 MB Drive (Micropolis 1355)

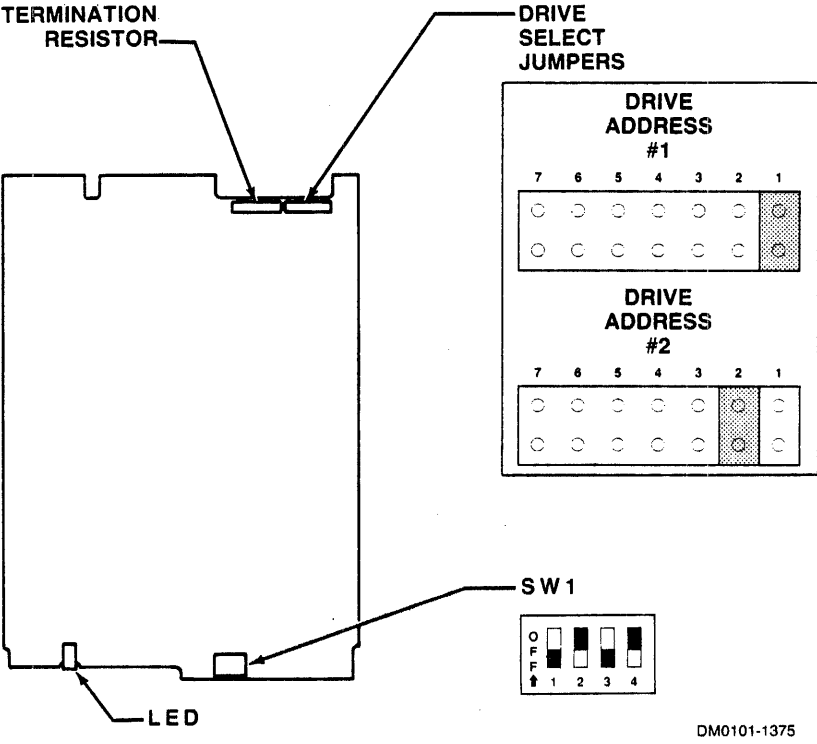


Figure 3. Configuring the 180 MB Drive (CDC Wren III)

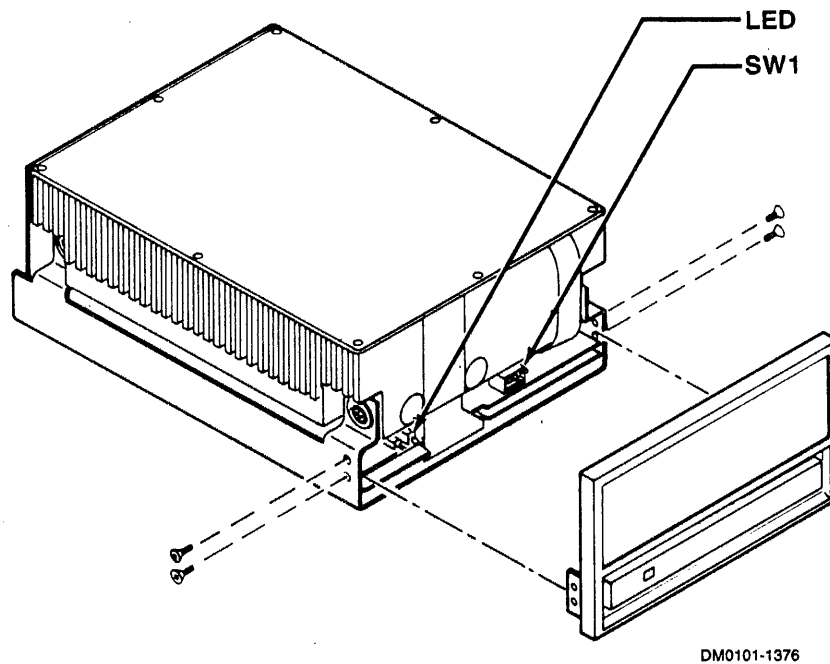


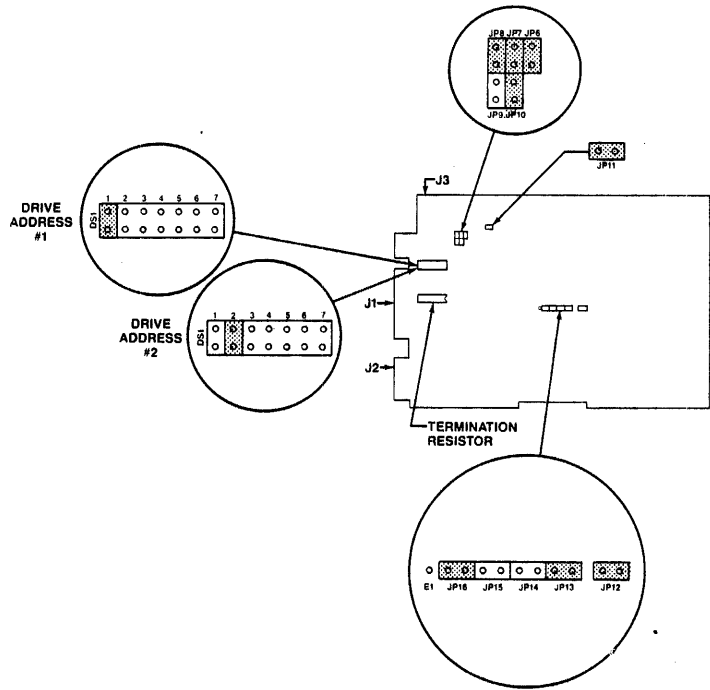
Figure 4. Setting the Switches on the WREN III

The Wren III is shipped from Emulex with the switches set for 36 sectors per track (SW1-2, -3, -4) and the DM02 controlling drive spin-up (SW1-1), as shown. If your Wren III was not purchased from Emulex, you may need to change the switch settings.

To change the switch settings on the Wren III, the front cover plate must first be removed. Use a TORX (six-splined) TX-10 screwdriver (or a small, flat-bladed one) to remove the two screws from each side of the drive. Remove the cover plate and set the switches (see Figure 4).

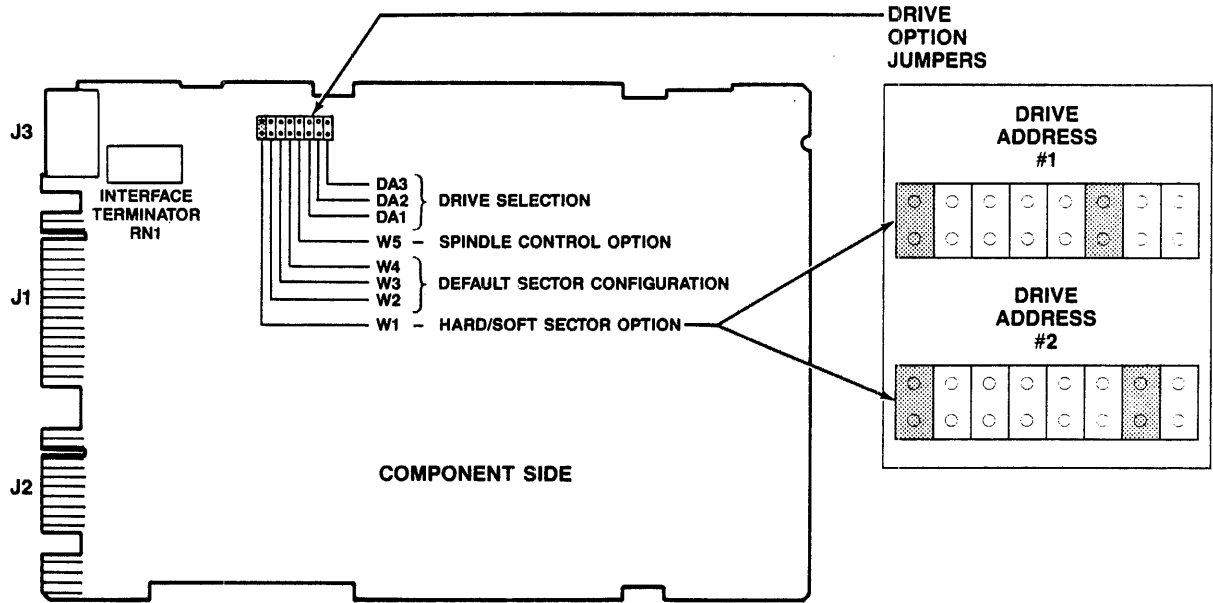
In some versions of this drive, the LED is attached to the front cover and there is a separate inner plate. Remove both plates after loosening the screws.

After setting the switches, replace the plate(s) and the screws. If your version has the LED on the cover plate, take care that the LED wires are properly aligned with the two top openings.



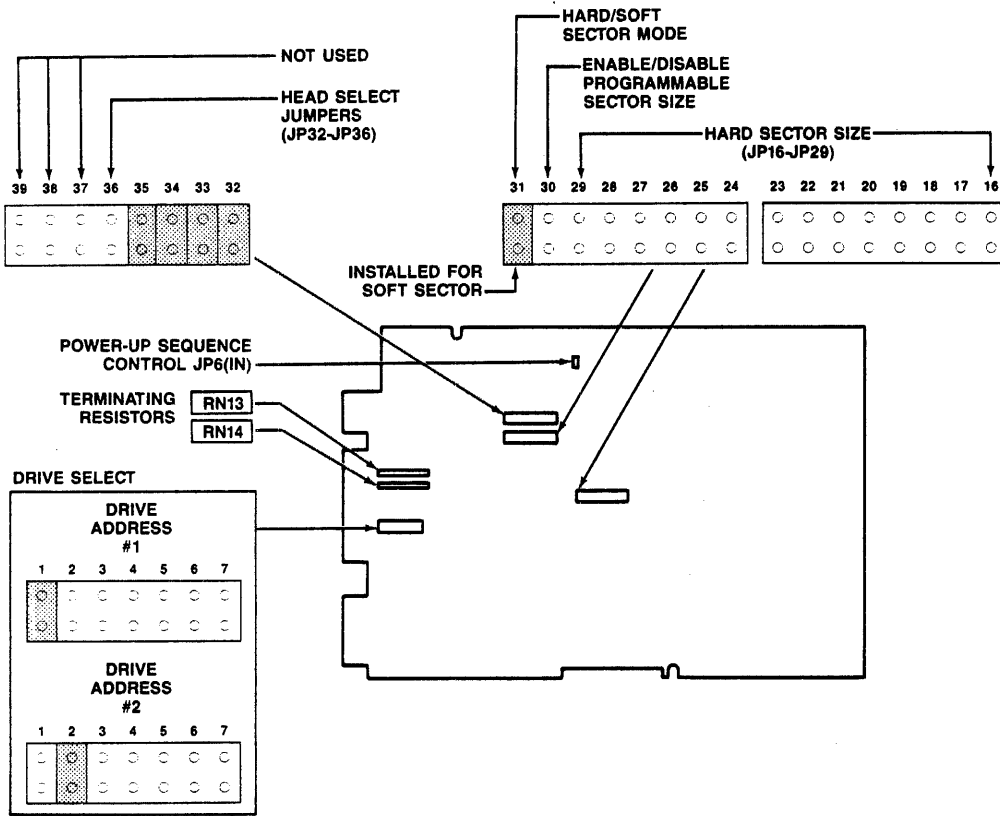
DM0101-1038

Figure 5. Configuring the 380 MB Drive (Maxtor EXT-4380)



DM0101-1450

Figure 6. Configuring the 380 MB Drive (Micropolis 1558)



DM0101-1502

Figure 7. Configuring the 380 MB Drive (Maxtor XT-4380E)

1.2.2 Configuring the Disk Controller

The disk controller must be properly configured for such things as bus address, number of drives, and other options. Tables 2 and 3 show the configuration of the DM01 switches and jumpers as set by the factory; Tables 4 and 5 do the same for the DM02. If you require more detailed information about configuring the controller, refer to either the *DM01 Technical Manual* (part number DM0151001-00) or the *DM02 Technical Manual* (part number DM0251001-00), available from Emulex.

Table 2. DM01 Switch Definitions and Factory Settings

Switch	OFF(0)	ON(1)	Fact	Function
SW1-1	Run	Reset/Halt	OFF(0)	Run vs. Reset/Halt
SW1-2	-	-	OFF(0)	MSCP Device Number (LSB)
SW1-3	-	-	OFF(0)	MSCP Device Number
SW1-4	-	-	OFF(0)	MSCP Device Number (MSB)
SW2-1	Disable	Enable	OFF(0)	Loop on Self-Test Error
SW2-2	Disable	Enable	OFF(0)	Automatic Bootstrap
SW2-3	-	-	OFF(0)	LSI-11 Bus Address
SW2-4	-	-	OFF(0)	LSI-11 Bus Address
SW2-5	-	-	OFF(0)	LSI-11 Bus Address
SW2-6	18-bit	22-bit	OFF(0)	Twenty-Two-Bit Addressing
SW2-7	4 usec	8 usec	OFF(0)	DMA Burst Delay
SW2-8	Enable	Disable	OFF(0)	Adaptive DMA Mode
ON(1) = Closed OFF(0) = Open Fact = Factory Setting				

Table 3. DM01 Jumper Definitions and Factory Configuration

Jumper	Out	In	Factory Setting
A-B-C	Not Used	Not Used	OUT
D-E-F	Not Used	Not Used	OUT
G	Not Used	Not Used	OUT
H-J	Disable Clock	Enable Clock	IN
K	Normal Operation	Ground (Test)	OUT
L-M	16K PROM Select	32K PROM Select	IN
N-P	Normal Operation	Factory Test	OUT

Table 4. DM02 Switch Definitions and Factory Settings

Switch	OFF(0)	ON(1)	Fact	Function
SW1-1	Run	Reset/Halt	OFF(0)	Run vs. Reset/Halt
SW1-2	-	-	OFF(0)	MSCP Device Number (LSB)
SW1-3	-	-	OFF(0)	MSCP Device Number
SW1-4	-	-	OFF(0)	MSCP Device Number (MSB)
SW2-1	Disable	Enable	OFF(0)	Loop on Self-Test Error
SW2-2	Disable	Enable	OFF(0)	Automatic Bootstrap
SW2-3	-	-	OFF(0)	LSI-11 Bus Address
SW2-4	-	-	OFF(0)	LSI-11 Bus Address
SW2-5	-	-	OFF(0)	LSI-11 Bus Address
SW2-6	18-bit	22-bit	OFF(0)	Twenty-Two-Bit Addressing
SW2-7	4 usec	8 usec	OFF(0)	DMA Burst Delay
SW2-8	Enable	Disable	OFF(0)	Adaptive DMA Mode
ON(1) = Closed OFF(0) = Open Fact = Factory Setting				

Table 5. DM02 Jumper Definitions and Factory Configuration

Jumper	Out	In	Factory Setting
A-B-C-D	Not Used	Not Used	OUT
E-F-G	Not Used	Not Used	OUT
H-J-K	Not Used	Not Used	OUT
L-M-N	Not Used	Not Used	OUT
P-Q	Disable Clock	Enable Clock	IN
R	Normal Operation	Ground (Test)	OUT
U-V	Normal Operation	Factory Test	OUT

1.2.3 Configuring the Activity Panel

One activity panel for each hard drive is included with the EMS kit. Each activity panel has a single DIP switch that must be configured differently depending on which drive it is connected to. Table 6 shows the proper configuration of the activity panel for connection to either drive #1 or drive #2 (drive #0 or #1 for DM01-based kits).

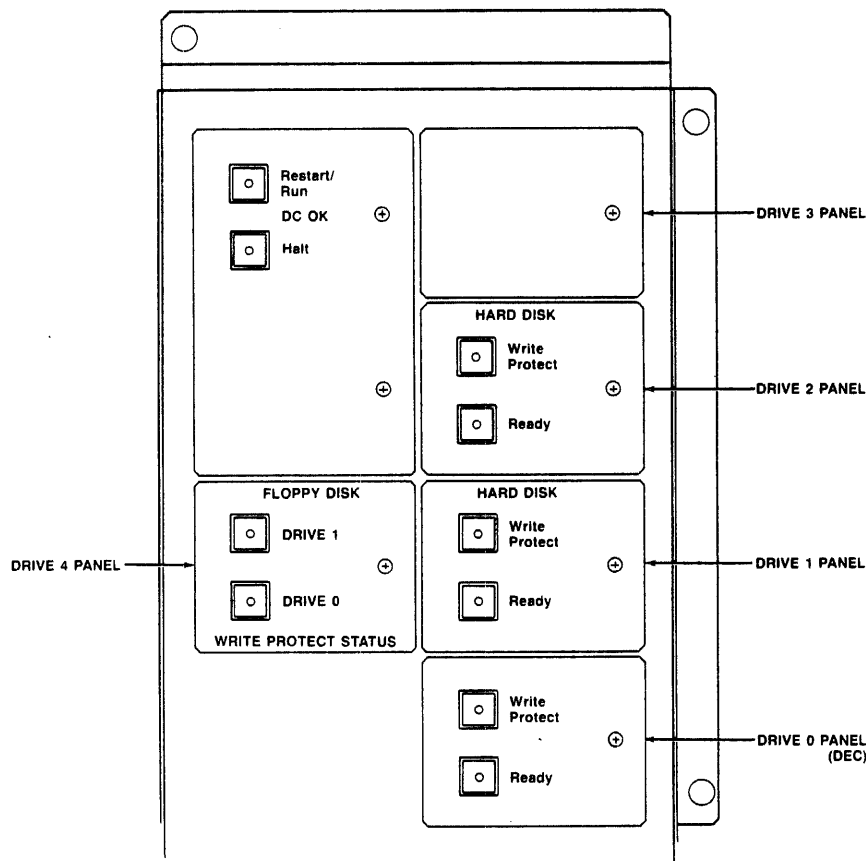
Table 6. Activity Panel Switch Settings

Switch	Hard Drive 1	Hard Drive 2
SW1-1	ON(1)	OFF(0)
SW1-2	OFF(0)	ON(1)
SW1-3	OFF(0)	ON(1)
SW1-4	ON(1)	OFF(0)
SW1-5	OFF(0)	OFF(0)
SW1-6	OFF(0)	OFF(0)
SW1-7	OFF(0)	OFF(0)
SW1-8	ON(1)	ON(1)
ON(1) = Open OFF(0) = Closed		

1.3 Installing the EMS Kit

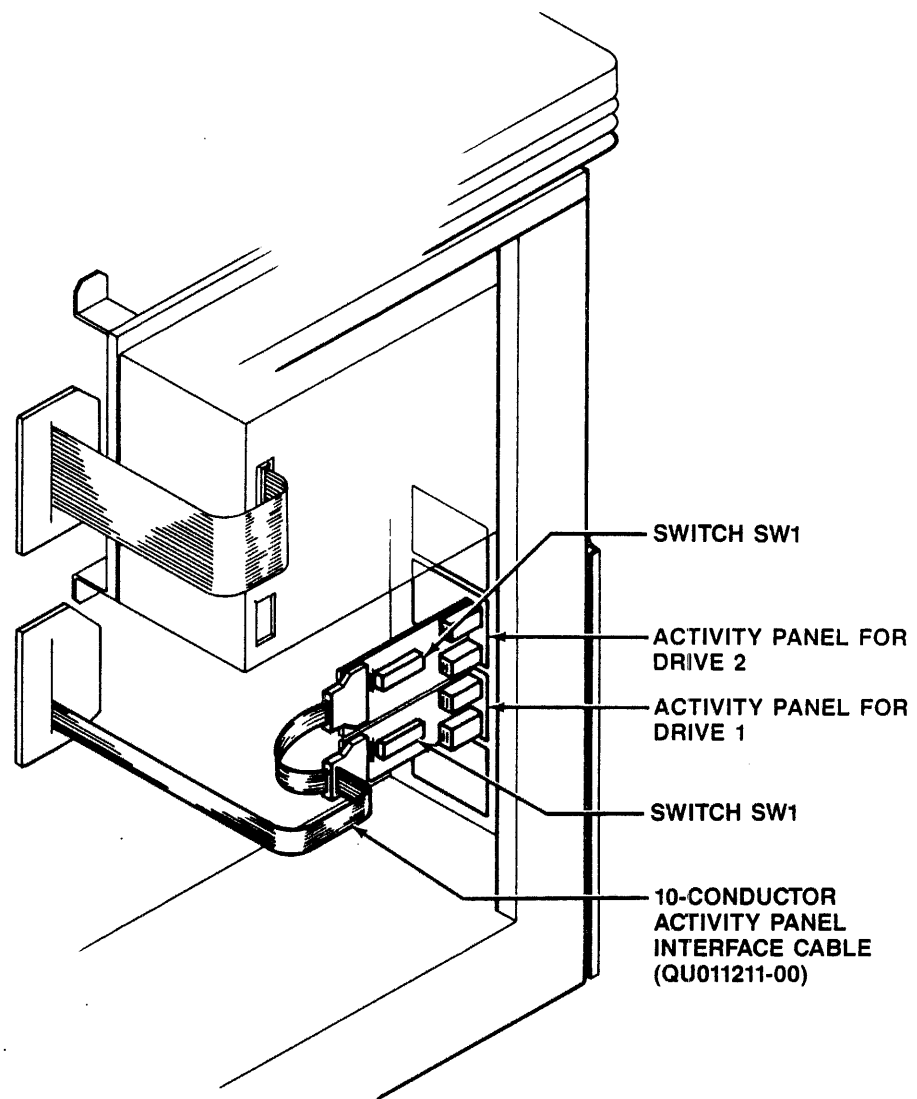
The following procedure explains how to install the EMS kit in the chassis of a MicroVAX II World Box. Configure the controller, the drive(s), and the activity panel(s) before beginning this procedure (see section 1.2).

1. Turn the system power OFF and remove the front and side panels of the World Box enclosure. Remove the card cage door to expose the backplane.
2. Install the Emulex activity panel(s) in the unused slots on the front of the enclosure. Be sure the panel position corresponds with the appropriate drive, as shown in Figure 8.



DM0101-0831

Figure 8. Installing the Activity Panels



DM0101-0832

Figure 9. Cabling the Activity Panels

4. Cable the activity panel(s). Attach the 10-conductor flat-ribbon cable to connector J1. Use the cable lockdowns on the connector to secure the cable. If you have two activity panels, daisy chain the cable from the first panel to the second, as shown in Figure 9. Once the cable is attached, feed it into and pull it out through the disk drive area of the CPU cabinet.

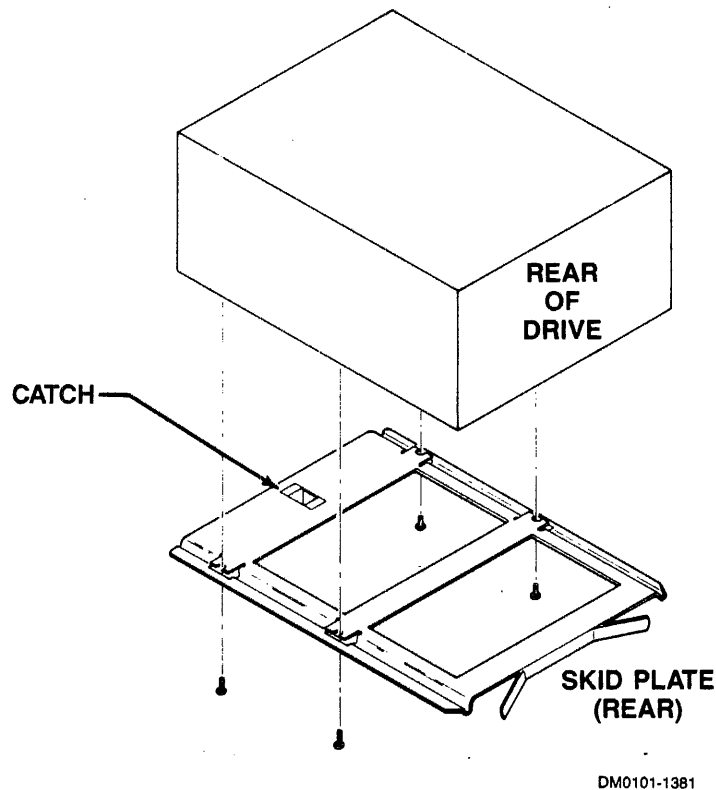
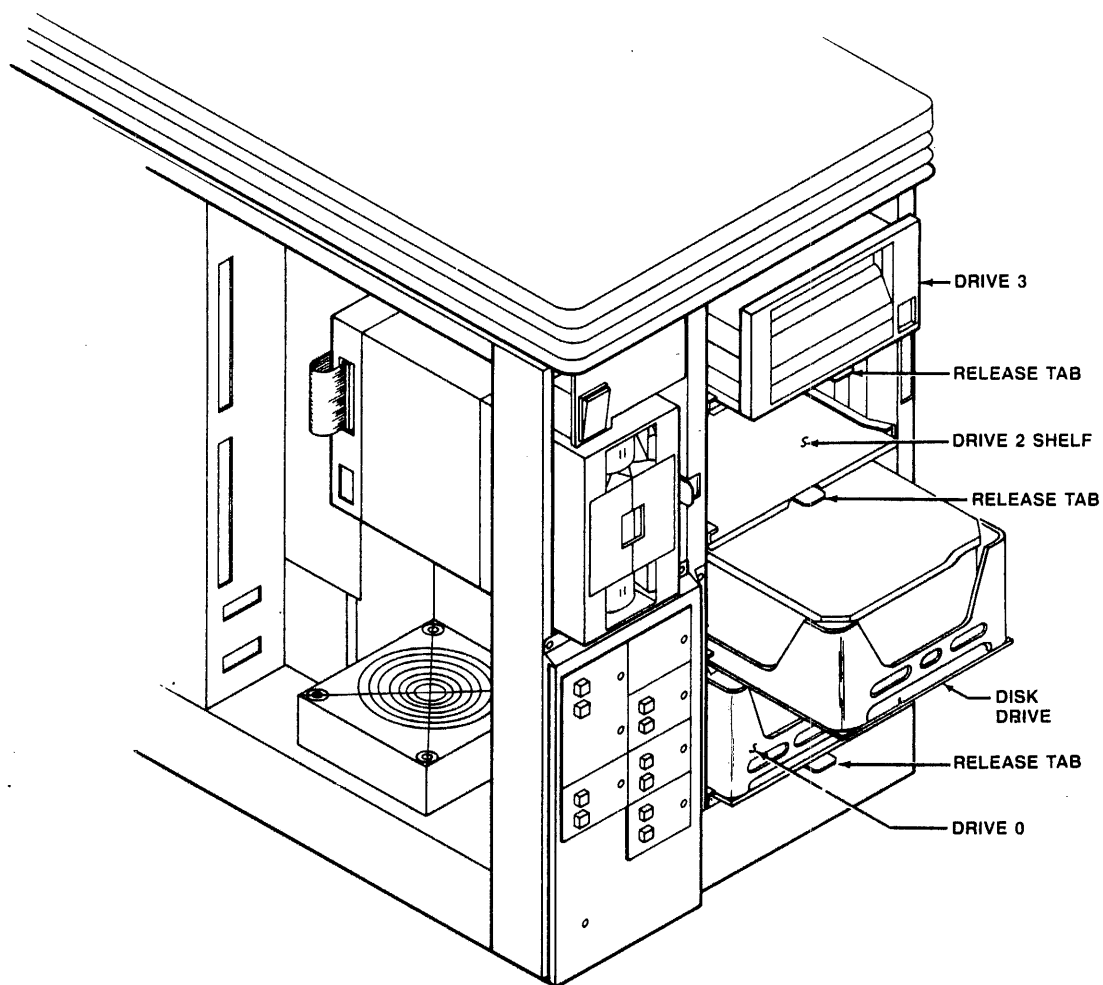


Figure 10. Attaching the Drive's Skid Plate

5. Next, install the drive(s). To begin, turn the drive upside down. Place the skid plate on the drive with the skid plate's catch side up at the front of the drive. Attach the skid plate to the drive with the four screws, then turn the assembly right side up. (See Figure 10.)
6. Connect the drive interface cables. If you are installing a DM01 with a hard drive, see the special instructions below. Otherwise, attach the 34-conductor "A" cable and (for a hard drive only) one 20-conductor "B" cable to the drive's connectors. If you have two drives, attach the 34-conductor Daisy chain cable and the second "B" cable to the second hard drive.

The DM01 is connected to a hard drive by a 50-conductor cable. This cable is split on the drive end into three segments (a 34-conductor segment for control and two 8-conductor segments for data). Attach the 34-conductor segment to the corresponding connector on the drive. Attach the inside 8-conductor segment to drive 0.

If you are installing a second hard drive with your DM01, attach the 34-conductor Daisy chain cable to the drive (#1). Then plug the other end of the Daisy chain into the connector on the 34-conductor segment of the 50-conductor cable. Attach the outside 8-conductor segment to the drive's connector.



DM0101-1088

Figure 11. Installing the Disk Drives

7. Slide each disk drive and its attached skid plate onto a drive shelf, then pull the cables through the CPU area. (See Figure 11.)
8. Secure each drive by sliding it to the end of the shelf and pushing up on the release tab (located below the drive shelf).

9. Cable the controller. While holding the controller, connect the 10-conductor activity panel Daisy chain cable from connector J1 on each activity panel to the activity panel connector on the disk controller (J4 for the DM01 or J5 for the DM02).

Next, attach the drive interface cables to the controller. For the DM01, connect either the 50-conductor cable to J1 (hard drives only; see Figure 12) or the 34-conductor cable to J3 (floppy drives only; see Figure 13).

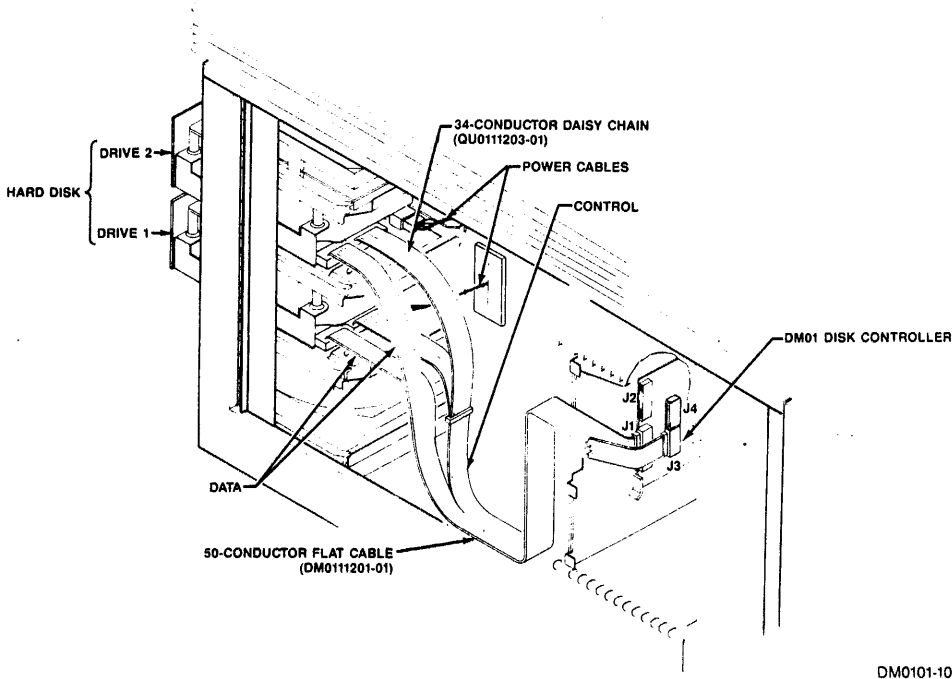
If you have a second drive, connect the 34-conductor Daisy chain cable to the 34-conductor "A" cable or cable segment.

For the DM02, connect the 34-conductor "A" cable to either J3 (hard drives only; see Figure 14) or J4 (floppy drives only; see Figure 15). For a hard drive, connect the data (20-conductor "B") cable to J1, as shown in Figure 14.

If you have a second drive, connect the 34-conductor Daisy chain cable to the 34-conductor "A" cable. For a second hard drive, connect the second data cable to J2.

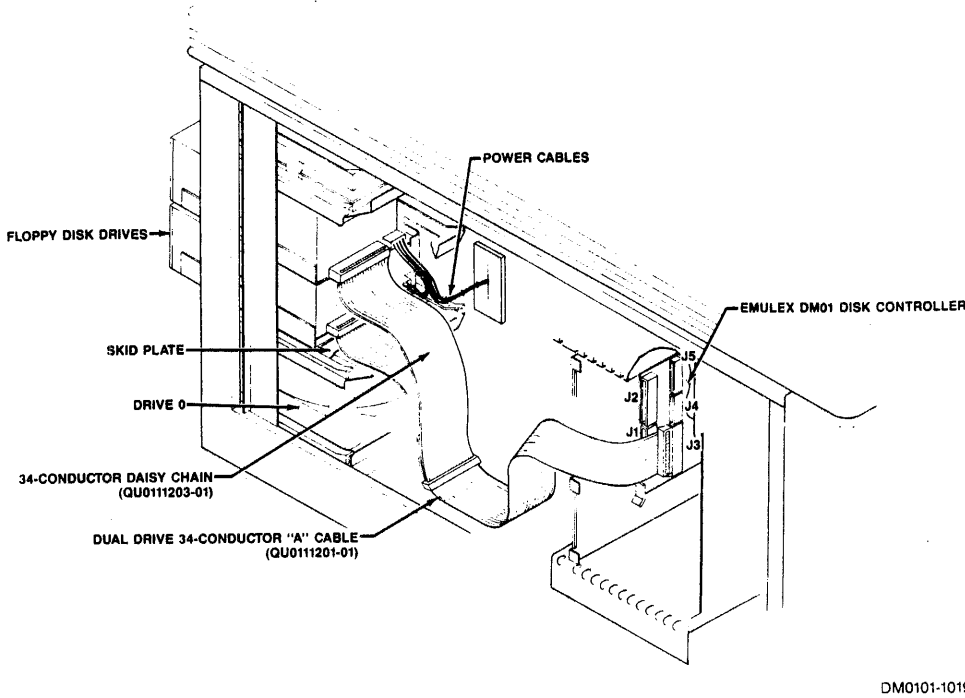
Refer to the appropriate controller technical manual if you require further details.

10. Install the DM01 or DM02 disk controller in the back-plane, using the first available slot. A lower slot is preferred; if an upper slot is used, be sure that the board is fully seated and squared to the upper card cage surface to avoid interface when the card cage door is closed.
11. Attach the drive power cables and replace the World Box card cage door and the front and side panels.



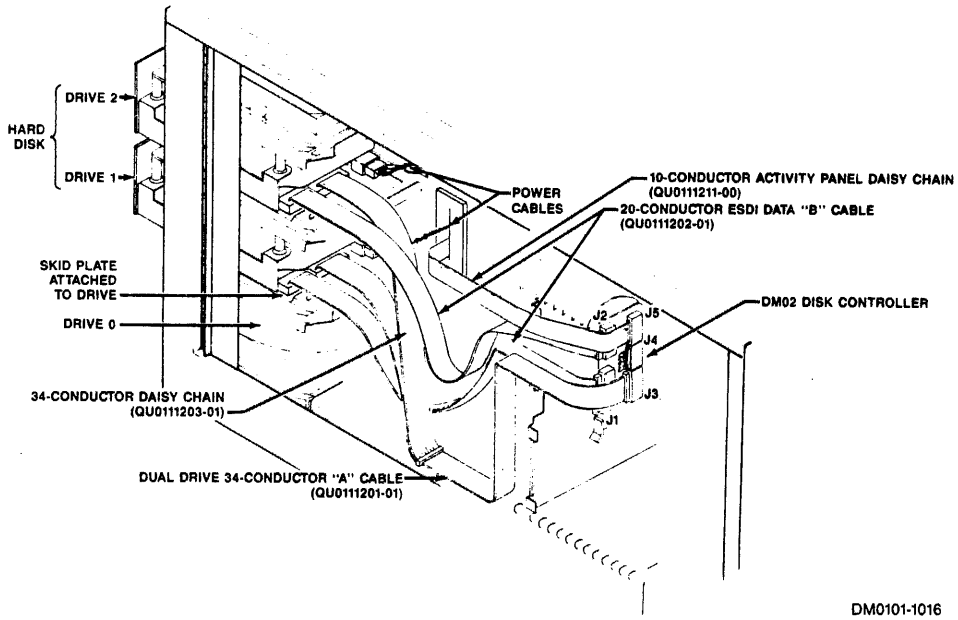
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Figure 12. DM01 Hard Disk Drive Cabling



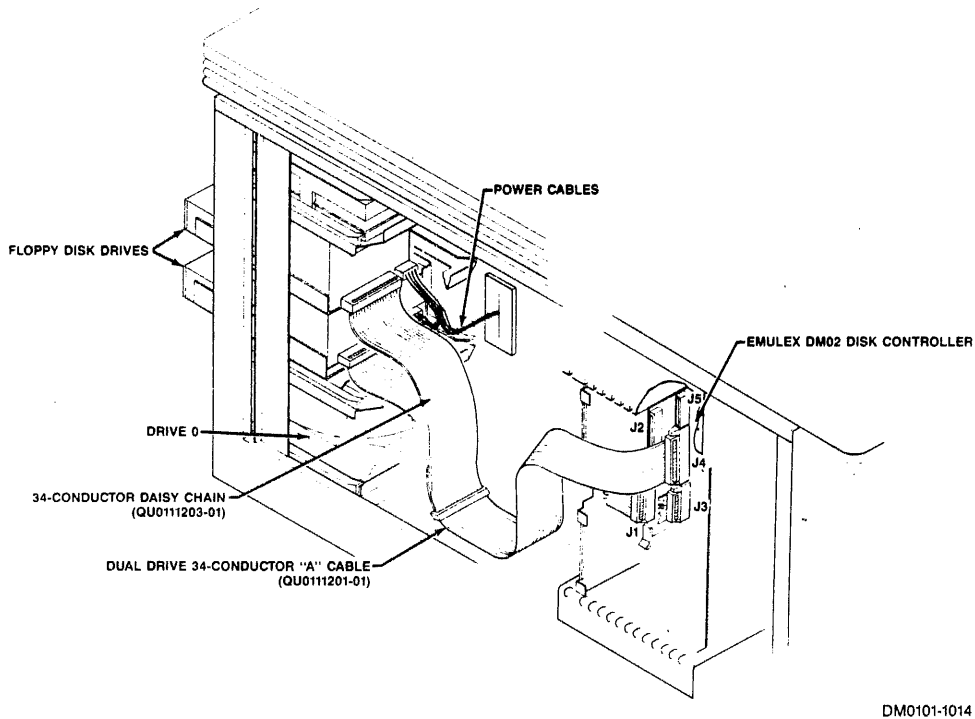
DM0101-1019

Figure 13. DM01 Floppy Disk Drive Cabling



DM0101-1016

Figure 14. DM02 Hard Disk Drive Cabling



DM0101-1014

Figure 15. DM02 Floppy Disk Drive Cabling

1.4 Diagnostics

The EMS kit comes with a diagnostic package (part number VX9951804-xx or PX9951802-xx) that includes an MSCP disk formatter, FVD32M (for VAX-based systems) or QXMX8C (for PDP-based systems). This formatter includes a utility that loads the Nonvolatile RAM (NOVRAM) on the disk controller. The NOVRAM is used to permanently store drive parameters and must be loaded with the correct values for the drive you are using.

Tables 7, 8, and 9 show the standard NOVRAM values for each of the three drives available for the kit. Instructions for running the NOVRAM utility are included in the diagnostic instruction manual. If you require further details on the NOVRAM parameters, refer to the *FVD32M User's Guide* (part number VX9950918-00) or the *QXMX8C User's Guide* (part number PX9950912-00).

NOTE

If your system runs on RSX11M, the NOVRAM must be configured to reflect the actual number of drives attached to the DM01 controller. If the NOVRAM identifies two drives when only one is installed (or seen by the controller), the operating system will hang in the secondary boot, waiting indefinitely for the non-existent drive to spin up.

Table 7. 110 MB Drive NOVRAM Parameters

Input	Description
1	Number of Drives
1	Drive Type Code
15	Heads
918	Physical Cylinders
4	Spare Cylinders
17	Physical Sectors per Track
1	Spare Sectors per Track
0	Split Code
0	Removable Media Flag
918	Reduced Write Current Cylinder
918	Write Precompensation Cylinder
1	Step Pulse Code
0	Spiral Offset

Table 8. 170 MB Drive NOVRA M Parameters
(Hard-sectored format only)

Input	Description
1	Number of Drives
8	Heads
1024	Physical Cylinders
2	Spare Cylinders
35	Physical Sectors per Track
1	Spare Sectors per Track
0	Split Code
0	Removable Media Flag
14	Configuration Bits
2316	Gap 0 Parameter
2827	Gap 1 Parameter
521	Gap 2 Parameter
1	Spiral Offset

Table 9. 180 MB Drive NOVRA M Parameters
(Hard-sectored format only)

Input	Description
1	Number of Drives
9	Heads
969	Physical Cylinders
2	Spare Cylinders
36	Physical Sectors per Track
1	Spare Sectors per Track
0	Split Code
0	Removable Media Flag
6	Configuration Bits
2316	Gap 0 Parameter
2827	Gap 1 Parameter
521	Gap 2 Parameter
0	Spiral Offset

Table 10. 380 MB Drive NOVRAM Parameters

Input	Description
1	Number of Drives
15	Heads
1224	Physical Cylinders
2	Spare Cylinders
34	Physical Sectors per Track
1	Spare Sectors per Track
0	Split Code
0	Removable Media Flag
13	Configuration Bits
3086	Gap 0 Parameter
6682	Gap 1 Parameter
3095	Gap 2 Parameter
1	Spiral Offset



PUBLICATION CHANGE NOTICE

NO. 1297	DATE 03 NOV 87
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SYSTEM AFFECTED

DM01/DM02 DISK CONTROLLERS

PUBLICATION NUMBER	PUBLICATION TITLE	REV		EFFECTIVE DATE
		FRM	TO	
DM0152401-00	Emulex Micro Systems (DM01/DM02)	C	D	03 NOV 87
	Instruction Sheet			

DISPOSITION			
TYPE	ACTION	TYPE	ACTION
IN STOCK	Use Rev D	DISTRIBUTED, HOUSE	Use Rev D
ON ORDER	Use Rev D	DISTRIBUTED, FIELD	Use Rev D

REASON:

To document Maxtor XT-4380E 380 MB drive support.

INSTRUCTIONS:

Print and distribute.

NO	ORIGINATOR L.L. Karanja	ENGINEERING SERVICES	ENGINEERING <i>[Signature]</i>	MANUFACTURING <i>[Signature]</i>
	QUALITY CONTROL <i>[Signature]</i>	FIELD SERVICE	PUBLICATIONS <i>[Signature]</i>	MARKETING



PUBLICATION CHANGE NOTICE

NO. 1279

DATE 15 SEP 87

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SYSTEM AFFECTED

DM01/DM02 DISK CONTROLLER

PUBLICATION NUMBER	PUBLICATION TITLE	REV		EFFECTIVE DATE
		FRM	TO	
DM0152401-00	EMS Kit DM01/DM02 Instruction Sheet	B	C	15 SEP 87

DISPOSITION			
TYPE	ACTION	TYPE	ACTION
IN STOCK	Use Rev C	DISTRIBUTED, HOUSE	Use Rev C
ON ORDER	Use Rev C	DISTRIBUTED, FIELD	Use Rev C

REASON:

To incorporate CDC Wren III (180 MB) and Micropolis 1558 (380 MB) drives.

INSTRUCTIONS:

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