C144-E018-03EN

M2488 CARTRIDGE TAPE DRIVE

USER'S GUIDE

FUJITSU

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AGENCY STATEMENTS

FCC

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

> Important: Changes or modifications to this product not authorized by Fujitsu Computer Products of America, Inc. could void the FCC Certification and negate your authority to operate the product.
>
> This product was tested for FCC Compliance under conditions that included the use of shielded cables and connectors between system components. It is important that you use shielded cables and connectors to reduce the possibility of causing interference to radios, television sets and other electronic devices.

CSA

This digital apparatus does not exceed the class A limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de classe A prescrites dans le reglement sur le brouillage radioelectrique edicte par le Ministere des Communications du Canada.

PREFACE

The M2488 User's Guide provides the information necessary for the user to operate the M2488 Cartridge Tape Drive.

Chapter 1 Introduction

This chapter provides an overview of the M2488 Cartridge Tape Drive and its optional equipment.

Chapter 2 Installation Instructions

This chapter provides procedures for the preparation and assembly of the M2488 Cartridge Tape Drive.

Chapter 3 Controls and Indicators

This chapter describes the controls, indicators and connectors for the M2488 Cartridge Tape Drive and its optional equipment.

Chapter 4 Configuration

This chapter describes the configuration menus of the M2488 Cartridge Tape Drive.

Chapter 5 Operating Instructions

This chapter provides procedures for operating the M2488 Cartridge Tape Drive and its optional equipment.

Chapter 6 Maintenance and Servicing

This chapter describes the user maintenance and servicing of the M2488 Cartridge Tape Drive.

Chapter 7 Parts List

This chapter describes the M2488 models and optional equipment available.

The ANSI X3.131-199x SCSI specification may be purchased from:

American National Standard Institute, Inc.
1430 Broadway, New York, N.Y. 10018
Tel. (212) 642-4900

SCSI-2 unreleased documentation X3B5/87-099 may be obtained from:

Global Engineering Documents
2805 McGaw
Irvine, CA 92714

CONVENTION

Hexadecimal numbers are denoted by an "h" following the number (e.g. 23h) or 0xNN.
Binary numbers are denoted by a "b" following the number (e.g. 001b).

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CHAPTER 1

INTRODUCTION

1-1 CHAPTER INTRODUCTION

Chapter 1 provides information on the M2488 Cartridge Tape Drive and its optional equipment as described in the following paragraphs:

1-2 GENERAL DESCRIPTION

The M2488 cartridge tape drive provides enhanced capability in a single compact drive. The drive utilizes an Interface Personality Module (IPM) which is a modulized host interface circuit card that allows easy modification for various host interfaces. A Medium Changer may be added to the drive for multiple tape cartridge loading and unloading; i.e., Automatic Cartridge Loader (ACL) or Flush-mounted Automatic Cartridge Loader (FACL).

1-3 PRODUCT FEATURES

1-3.1 Design Goals

The reason for developing the M2488 was to provide a high quality, compact magnetic tape unit for mid/small-range system users. Fujitsu designed the M2488 not only to be compact and for lower price but also for excellent reliability and serviceability. To satisfy these requirements, Fujitsu utilized its long experience in proven technologies gained through years of development of magnetic tape products. The M2488 is the world's smallest-size high-performance magnetic tape subsystem compatible with the IBM 3490E.

This subsystem features Fast & Wide SCSI, fast access, high reliability with lower price, flexible installation, and optional automatic cartridge loaders.

1-3.2 Firmware Download

New code versions are downloaded into flash memory from the Host SCSI interface or from tape. Refer to "LOADING NEW FIRMWARE" in section 4-3. Note that a base level of code is kept in ROM within the control unit to allow recovery from an unlikely failure during the download procedure.

1-3.3 EDRC Compression

EDRC compression allows more data to be stored per data cartridge. Fujitsu EDRC compression is compatible with the binary arithmetic coding algorithm, ANSI X3.225-1992, and allows interchange of tapes with other manufacturers' tapes that comply with this standard.

EDRC compression is comprised of two parts:

1) reblocking, which is grouping of host blocks into a single superblock and

2) compaction, which is the reduction of data stored by binary arithmetic coding.

Reblocking is always active during write operations. Compaction is selectable via the MODE SELECT command. In this mode, host data is formed into packets consisting of a header, data, and trailer. Packets are combined into superblocks. Normally a superblock is closed after the last packet that causes the superblock to exceed 128 KB in length. The maximum superblock size is 451 KB in the M2488.

Compaction reblocking (EDRC compression) is the default mode of operation for the M2488.

Reblocking is performed in the buffer (SDDP) LSI. Compaction is performed by the EDRC chip set prior to the data buffer. Placement of compaction before the buffer effectively extends buffer capacity by a factor equal to the average compaction rate. Compaction before the buffer also allows more efficient write operation by preventing some start and stop operations resulting in fewer repositions and better throughput.

36-track operation requires that data is always written with reblocking on. No clear data mode exists for writing. The M2488 may read clear 18-track data however.

1-3.4 Savable Parameters

The M2488 allows changeable options, mode select page parameters, and INQUIRY vital product data to be saved to non-volatile RAM (NVRAM) within the control unit. Refer to "SETTING MENU" in section 4-2 for changing settable options. The MODE SELECT and CHANGE DEFINITION command descriptions in the M2488 PRODUCT GUIDE contain the procedure for saving MODE SELECT parameters and vital product data respectively.

1-3.5 Data Transfer Retry

In the event of record expansion or other compression problems, the M2488 has the ability to retry write data transfer operations for data blocks up to 64k bytes without requesting retransmission of the data from the initiator. This operation is automatic and is transparent to the host except for a possible small reduction in throughput.

1-3.6 Maintenance Interface

A 9-pin (DB-9) maintenance interface (DTE device) is provided on the rear panel of the tape drive which is used for maintenance and diagnostic operation. Nearly all maintenance and all diagnostic capabilities are accessible through this interface.

1-3.7 Data Transfer Modes

The M2488 supports the following data transfer modes;

1) 36-Track (3490E): M2488 supports full IBM 3490E Compatible Tape operation. EDRC Compacted mode is supported for read and write operations of tape. EDRC Non-compacted mode is supported for read and write operations of tape.

2) 18-Track (3480): M2488 supports read compatibility with the IBM 3480 format. It is not possible to write 3480 format tapes using the M2488 product.

EDRC Compacted mode, EDRC Non-compacted mode, and Clear mode is supported only for 18-track read operations from tape.

3) SCSI Unique Transfers: Read and Write Buffer SCSI operations are supported by the M2488.

1-3.8 Seismic Data Function Feature Option

The Seismic Data Function (SDF) feature is a standard M2488 with modifications to provide access to digital data from the read channel after the 9:8 decode and the error correction is performed. The digital "Seismic Data" is provided for what is usually termed RAW, Read-After-Write verification during the actual write transfer to tape. In addition, the same Seismic Data Function is provided during a read playback of the recorded tape. For more information, see the M2488 Cartridge Tape Drive Supplemental Manual, SDF Feature For Seismic Data Gathering Applications (CG00000-0128xx).

1-4 DATA INTEGRITY

The M2488 has been designed to detect data errors when they occur so that data integrity can be maintained. Data integrity through the M2488 data path is ensured by extensive use of CRC (Cyclic Redundancy Check) and ECC (Error Correction Code) circuitry. CRC detection was chosen for superior detection capability over parity schemes. Parity detection exists only on the SCSI interface. The remainder of the M2488 data path uses at least one level of CRC to ensure data integrity.

The M2488 data path integrity can best be described by listing the elements of the data path and then describing error detection schemes present. The elements of the data path are listed below;

SCSI Interface - Data protected by parity as defined by ANSI SCSI-2 specification.

Host Interface Data Path - Multiple CRCs are used to protect the data as it is reformatted to 3490 tape standards (EDRC Compacted, EDRC Non-compacted). The CRC used depends on the data transfer type selected. If the operation is Write EDRC Compacted, the EDRC circuitry also performs a Decompaction Readback check on the Compacted data.

Data Buffer - Data in the 2MB buffer is protected by CRC.

Formatter Data Path - CRC is used to protect the data while it is still in "parallel" format. Once the data is broken in tracks for movement to tape, "media CRC" and ECC information is added. The ECC is a Reed-Solomon algorithm as defined by the 3490 Media Interchange Specification. The Formatter logic also performs a Readback check of the data written to the tape media. The read heads are used to pick up the just written data, and this read data is verified for integrity by using the Read ECC and CRC check circuitry.

On read operations the Read ECC circuitry is used to correct for media induced errors on up to four tracks at once. The Read "media CRC" ensures that any corrections performed by the ECC circuitry are valid, since the media CRC was generated when the data was written.

1-5 DATA COMPATIBILITY

The M2488 Cartridge Tape Drive records data in a format that is compatible with the binary arithmetic coding algorithm, ANSI X3.225-1992, and allows interchange of tapes with other manufacturers' tapes that comply with this standard. The M2488 reads 18-track and 36-track format tapes and writes in 36-track tape format.

1-6 RECORDING CAPABILITIES

The M2488 tape drive uses the DD-NRZI 36 Track (36-Track Serpentine) method of recording. It records 18 tracks in the forward direction (wrap 1) and 18 tracks in the reverse direction (wrap 2). Table 1-1 presents the performance capabilities of the drive.

Table 1-1. Capabilities

SPECIFICATION	CAPABILITY
Tape Speed	2 m/s
Search Speed	4 m/s
SCSI Transfer Rate	20 MB/second (FAST and WIDE Synchronous)
Data Buffer	2 MB
Retry Data Buffer	64 KB
Bit Density	75,742 bpi (37,871 cpi; 49,378 ftpi)
Recording Capacity	2.4 GB (2xL Tape, 3:1 compression)

1-7 PERFORMANCE CHARACTERISTICS

Table 1-2 describes the characteristics and the performance expectations of the M2488 Cartridge Tape Drive and of optional equipment that may be used with the M2488. A description of each characteristic follows the table.

Table 1-2. Performance Characteristics

CHARACTERISTIC *	PERFORMANCE
M2488:	
Access Time	65 ms
Positioning Time	280 ms
Load Time	13 seconds - CST cartridge 17 seconds - ECCST cartridge
Rewind Time	3 seconds from EOT to BOT
EOT Rewind Time (Typical)	55 seconds - CST cartridge 100 seconds - ECCST cartridge
Power-on Time (nominal)	40 seconds
Optional Equipment:	
Automatic Cartridge Loader	
Initial Loading Time	50 seconds for 10-cartridge magazine; 42 seconds for 5-cartridge magazine
Cartridge Exchange Time	46 seconds
Loading Time	31 seconds
Unloading Time	20 seconds
Ejecting Time	40 seconds for 10-cartridge magazine; 33 seconds for 5-cartridge magazine

Table 1-2. Performance Characteristics (Continued)

CHARACTERISTIC *	PERFORMANCE
Flush-mount Automatic Cartridge Loader	
Initial Loading Time	30 seconds
Cartridge Exchange Time	40 seconds
Loading Time	20 seconds
Unloading Time	20 seconds
Ejecting Time	25 seconds
NOTE: All times listed are maximum values, actual times may be less.	

* CHARACTERISTIC	DESCRIPTION
Access Time	The time required to accelerate tape from a stopped condition until it is at speed and positioned near the beginning of the next block.
Positioning Time	The time to stop tape, reverse direction and position before the next block to be read or written, stop, and accelerate to speed and position near the beginning of the next block.
Rewind Time	Period of time to rewind from the physical end of tape for wrap2 (PEOT), to the beginning of tape for wrap 1 (BOT). The EOT rewind time is the period of time to rewind from the physical end of wrap 1, end of tape (EOT), to BOT. Time may vary with M2488 and cartridges used.
Power-on Time	Period of time to complete initial power-on sequences and self test diagnostics until the unit becomes ready. The nominal time is measured without tape in the drive and no ACL or FACL attached. These conditions will increase the time required for power-on.
Initial Loading Time	Period of time after START is pressed until the magazine is loaded.
Cartridge Exchange Time	Period of time from tape loaded at BOT until the next tape cartridge is loaded and the tape drive is ready.
Loading Time	Period of time from when a tape cartridge is retrieved from the magazine, until the tape is loaded and the tape drive is ready.
Unloading Time	Period of time from ready status at BOT until a tape cartridge is ejected and loaded into the magazine.
Ejecting Time	Period of time from ready status at BOT until the magazine is ready to remove.

1-7.1 Data Transfer Rates

The data transfer rate is determined by the rate negotiated in synchronous data transfer mode. The minimum transfer period supported is 100 ns. The transfer rate in asynchronous data transfer mode is determined by cable length and hardware constraints.

1-8 RELIABILITY

The reliability specifications of the M2488 tape drive and its optional equipment are described in Table 1-3.

Table 1-3. Reliability

SPECIFICATION	PERFORMANCE
MTBF	50,000 hours, duty 20%
MTTR	30 minutes or less
Device Life	6 years
Mechanical Life loader/threader ACL FACL	 200,000 times 100,000 times 200,000 times
Error Rate read write	 one error block in 10^{12} bytes one error block in 10^{10} bytes

1-9 DESCRIPTION

The M2488 tape drive and its optional equipment are described in Table 1-4. The description includes dimensions and weight.

Table 1-4. Equipment Description

CHARACTERISTIC	DESCRIPTION		
Dimensions:	M2488C	M2488CA *	M2488CF
Height mm (inches)	127 (5)	127 (5)	254 (10)
Width mm (inches)	217 (8.5)	217 (8.5)	217 (8.5)
Depth mm (inches)	400 (15.8)	626 (24.6)	705 (27.8)
Weight kg (lbs.)	12 (26.5)	17.1 (37.6)	23 (50.6)
Optional Equipment:			
Automatic Cartridge Loader (ACL)			
Dimensions:			
Height	127mm, 5 inches		
Width	217 mm, 8.5 inches		
Depth	226 mm, 8.9 inches		
Weight	5.1 kg, 11.2 lbs.		
ACL 10-cartridge Magazine			
Dimensions:			
Height	388 mm, 15.3 inches		
Width	128 mm, 5 inches		
Depth	139 mm, 5.5 inches		
Weight	1.5 kg, 3.3 lbs without cartridges; 4 kg, 8.8 lbs with cartridges		

Table 1-4. Equipment Description (Continued)

CHARACTERISTIC	DESCRIPTION
ACL 5-cartridge Magazine	
Dimensions:	
Height	231 mm, 9.1 inches
Width	128 mm, 5 inches
Depth	139 mm, 5.5 inches
Weight	1 kg, 2.2 lbs without cartridges; 2.3 kg, 5.1 lbs with cartridges
Flush-mount Automatic Cartridge Loader (FACL)	
Dimensions:	
Height	254 mm, 10 inches
Width	217 mm, 8.5 inches
Depth	305 mm, 12 inches
Weight	11 kg, 24.3 lbs
FACL 7-cartridge Magazine	
Dimensions:	
Height	218 mm, 8.6 inches
Width	125 mm, 4.9 inches
Depth	126 mm, 5 inches
Weight	0.7 kg, 1.5 lbs without cartridges; 2.4 kg, 5.3 lbs with cartridges

* The 10-cartridge Support Base, M2488A41, adds 165 mm (6.5 inches) to the height and 5 kg (11 lbs.).

1-10 POWER AND UTILITY INFORMATION

Table 1-5 describes the power and utility requirements for the M2488.

Table 1-5. Power Requirements

SPECIFICATION	REQUIREMENT
Input Voltage	100 to 120 VAC, single phase 200 to 240 VAC, single phase
Input Frequency	50 to 60 Hz
Input Current 100 to 125 VAC 200 to 240 VAC	 2.6 A RMS 1.3 A RMS
Input Power	150 Watts maximum
Heat Dissipation	512 BTU/hour

1-11 ENVIRONMENTAL INFORMATION

Table 1-6 describes the operational environment for the M2488 tape drive.

Table 1-6. Environmental Specifications

SPECIFICATION	REQUIREMENT
Operating:	
Tape Drive	
Temperatures	10 ° to 40 ° C, 50° to 104 ° F 29 ° C maximum wet bulb temperature; 15° C/hour maximum rate-of-change
Humidity	20 to 80%
Altitude	0 to 3050 m, 0 to 10,000 feet
Vibration*	5 -10 Hz: 0.13 mm; 10 - 200 Hz: 0.25 G
Shock**	4 G, 10 ms maximum.
* Cycle: 10mm/cycle log sweep, 3 axes ** Half sine pulse (+/-), 3 axes	
Tape Cartridges	
Temperatures	0 ° to 50 °C, 32 ° to 122 ° F
Humidity	8 to 95%
NOTE: Acclimate the tape cartridge to the machine room environment for 24 hours prior to use. Remove cartridge from drive if temperature exceeds 32° C for more than 12 hours. The applicable proposed ANSI specification for half-inch tape cartridge requires operation in the range of 16°C to 32°C, 20% relative humidity and maximum wet bulb temperature of 25.6°C. Operation of this device beyond these limits may result in a degradation of media reliability.	
Magazine	
Temperatures	0 ° to 50 ° C, 32 ° to 122 ° F
Humidity	8 to 95%
Non-Operating	
Tape Drive	
Temperatures	0 ° to 50 ° C, 32 ° to 122 ° F
Humidity	8 to 95%
Altitude	not specified
Vibration*	5 - 8 Hz: 3.8 mm; 8 - 32 Hz: 0.5 G 32 - 55 Hz: 0.25 mm; 55 - 200 Hz: 1.5 G
Shock**	20 G, 10 ms maximum.
* Cycle: 10mm/cycle log sweep, 3 axes ** Half sine pulse (+/-), 3 axes **Note 1:** Drive operation, under cartridge environment which exceeds the ANSI standard, may cause degradation of media reliability. Do not operate in the environment for many hours. ANSI standard operation: Temperature 16 ° C to 32 ° C; Humidity 20 to 80%; Maximum Wet Bulb 25.6 ° C **Note 2:** Acclimate the tape cartridge to the machine room environment for 24 hours prior to use.	

Table 1-6. Environmental Specifications (Continued)

SPECIFICATION	REQUIREMENT
Tape Cartridges	
Temperatures	5 ° to 32 ° C, 41 ° to 90 ° F 27° C maximum wet bulb temperature
Humidity	5 to 80%
Magazine	
Temperatures	0 ° to 55 ° C, 32 ° to 131 ° F
Humidity	8 to 95%

1-12 ACOUSTIC NOISE

The acoustic noise level specifications are described in Table 1-7.

Table 1-7. Acoustic Noise Level Specifications

SPECIFICATION	MODE	REQUIREMENT
Sound Pressure Level	Stand-by	<45dB (A)
	Operating	<50dB (A)
Sound Power	Stand-by	<6.0 B (A)
	Operating	<6.5 B (A)

Maschinenlärminformationsverordnung 3. GSGV, 18.01.1991:

Der arbeitsplatzbezogens Schalldruckpegel beträgt 70 dB (A) oder weinger gemä ß ISO 7779

1-13 STORAGE PROCEDURES

Store all items in their original containers to provide protection from dust and damage. The storage environment is described in Table 1-8.

Table 1-8. Storage Environment

ITEM	TEMPERATURE	HUMIDITY
Tape Cartridge	5 ° to 32 ° C, 41 ° to 90 ° F 27° C maximum wet bulb temperature	5 to 80%
Tape Drive	0 ° to 50 ° C, 32 ° to 122 ° F	8 to 95%
ACL	0 ° to 50 ° C, 32 ° to 122 ° F	8 to 95%
FACL	0 ° to 50 ° C, 32 ° to 122 ° F	8 to 95%
Magazine	0 ° to 55 ° C, 32 ° to 131 ° F *	8 to 95%

* Magazines should not be stored at the maximum temperature or humidity for more than several months. Do not leave the magazine in direct sunlight or near a very hot heat source, the magazine may deform.

1-14 WARRANTY INFORMATION

See the warranty information enclosed with the equipment or contact your distributor.

1-15 SHIPPING AND HANDLING PROCEDURES

Pack the equipment in the original shipping container. The shipping environment is the same as the storage environment described in Table 1-8.

1-16 SAFETY AND EMI COMPLIANCE

The M2488 meets the following safety and EMI levels of compliance:

1-16.1 Safety

NRTL/C (CSA950/UL1950)

TUV (EN60 950)

CE Mark (EMI: EN 55022 class A; Immunity: EN 50082-1)

1-16.2 EMI

FCC class A

CSA class A

VCCI class 1

1-17 RELATED PUBLICATIONS

Table 1-9 lists other publications which may assist you in the operation and maintenance of the M2488 tape drive.

Table 1-9. Related Publications

TITLE	DESCRIPTION	DOCUMENT NUMBER
M2488 Product Guide	M2488 Reference Information	CG00000-0115xx
M2488 Cartridge Tape Drive Supplemental Manual	SDF Feature For Seismic Data Gathering Applications	CG00000-0128xx
Small Computer System Interface (SCSI) -2	American National Standard for SCSI-2	ANSI X3.131-1994
Extended Magnetic Tape Format for Information Interchange 36-Track, Parallel Serpentine	American National Standard for 36-Track Recording	ANSI X3B5/94-043
Information Technology - Data Compression for Information Interchange - Binary Arithmetic Coding Algorithm	International Standard for EDRC compression	X3B5/92-187 ISO/IEC DIS 12042
Compaction Algorithm - Binary Arithmetic Coding	American National Standard for EDRC compression	ANSI X3.225-1992

CHAPTER 2

INSTALLATION INSTRUCTIONS

2-1 INTRODUCTION

This chapter contains information on installing the M2488 tape drive and optional equipment. This chapter is divided into the following major paragraphs:

2-2 PREPARING THE M2488 AND ITS OPTIONAL EQUIPMENT
2-3 CONFIGURATIONS
2-4 UNPACKING INSTRUCTIONS
2-5 EQUIPMENT INSPECTION
2-6 ASSEMBLY INSTRUCTIONS
2-7 PREPARATION FOR USE

2-2 PREPARING THE M2488 AND ITS OPTIONAL EQUIPMENT

Upon receipt of your equipment, follow the procedures in the order listed below:

STEP	PROCEDURE	WHERE?
1	Unpack the M2488 and attached medium changer (if applicable).	User's Guide, Chapter 2, paragraph 2-4
2	Inspect the M2488 and medium changer (if applicable).	User's Guide, Chapter 2, paragraph 2-5
3	Assemble the M2488.	User's Guide, Chapter 2, paragraph 2-6
4	Configure the M2488.	User's Guide, Chapter 4
5	Operating the M2488.	User's Guide, Chapter 5

2-3 CONFIGURATIONS

The M2488 tape drive may have a medium changer and be rack-mounted or placed on a desktop. The desktop configurations are described in the following paragraphs.

There are three desktop configurations for the M2488 drive. Refer to Table 2-1 for a description of the available configurations.

Table 2-1. Desktop Configurations

CONFIGURATION	EQUIPMENT REQUIRED
M2488	M2488 IPM Terminator (may be required) AC Power Cable (110 or 220 VAC)
M2488 with ACL	M2488 IPM Terminator (may be required) ACL AC Power Cable (110 or 220 VAC) Optional Support base for M2488 with ACL (5 or 10-cartridge size) 5 or 10-Cartridge Magazine
M2488 with FACL	M2488 IPM Terminator (may be required) FACL AC Power Cable (110 or 220 VAC) 7-Cartridge Magazine Optional Support base for M2488 with FACL

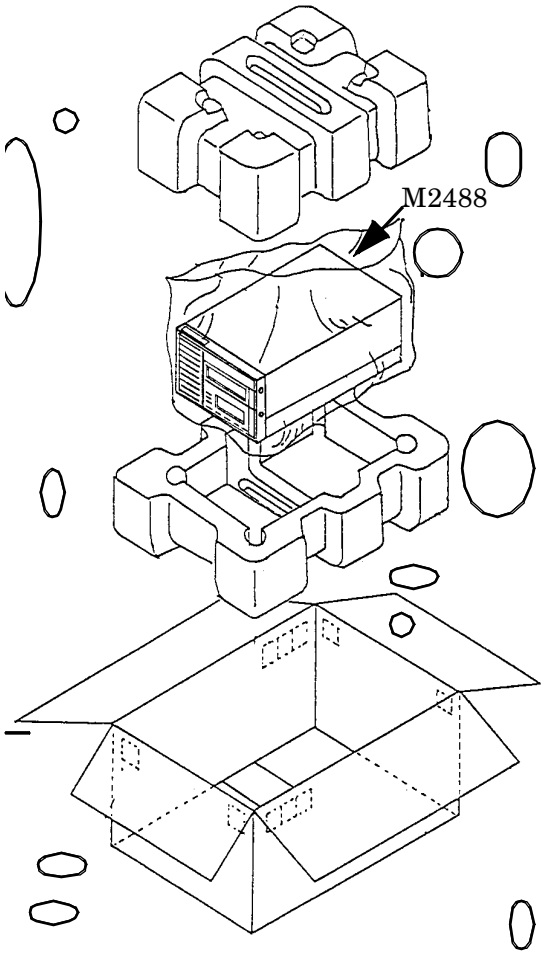
Continue with unpacking the equipment.

2-4 UNPACKING INSTRUCTIONS

Use the following procedures to unpack the M2488 tape drive and its optional equipment. When the equipment is unpacked, proceed to the inspection procedures in paragraph 2-5.

2-4.1 Unpack the M2488 Tape Drive

Unpack the M2488 tape drive as described below.



**** NOTE ****

The model shown is a M2488 without an ACL or FACL attached.

1. Carefully remove the M2488 from the packing material as shown in the figure above.
2. Place the tape drive on a flat work surface.
3. Verify contents of package to the packing list.
4. Retain packing material for future use.
5. Continue with inspection of the equipment.

2-5 EQUIPMENT INSPECTION

After unpacking, inspect the equipment. If any damage is found, note the type of damage and location. Also note any damage to the packing container. Contact your distributor for further instructions for handling the damaged equipment.

2-5.1 Inspect the M2488 Tape Drive

Inspect the tape drive for the following items. Upon completion, inspect the medium changer, if attached, or continue with the assembly instructions.

- Visually examine the chassis for dents and cracks.

2-5.2 Inspect the ACL

Inspect the ACL for the following items. Upon completion, continue with the assembly instructions.

- Visually examine the chassis for dents and cracks.

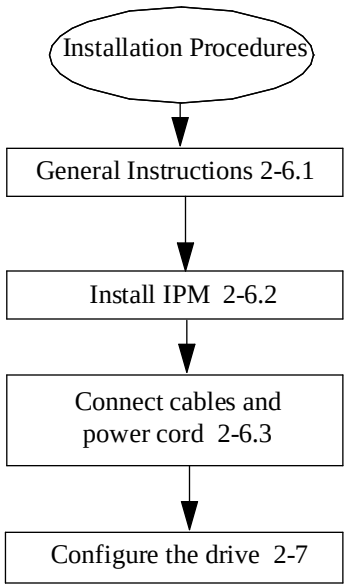
2-5.3 Inspect the FACL

Inspect the FACL for the following items. Upon completion, continue with the assembly instructions.

- Visually examine the chassis for dents and cracks.
- Check the door lock by pressing on the lock lever and opening the door.
- Check the carrier movement by rotating the carrier knob. Refer to the Controls and Indicators in Chapter 3 of the User's Guide for the location of the knob.

2-6 ASSEMBLY INSTRUCTIONS

These paragraphs describe the assembly and installation of the M2488 tape drive and of the optional equipment. Use the following flowchart, in the order presented, as a guide to installing the M2488. Each flowchart block indicates the procedure to be performed and the paragraph in this manual where the procedure is located.



2-6.1 General Installation and Assembly Instructions

Prior to assembly, ensure all SCSI cables and power cords have been disconnected. The M2488 should be placed as near as possible to the power source.

2-6.1.1 Air Flow and Service Clearances

Allow a gap of 50 mm at the rear of the drive for heat dissipation.

Allow a 620 mm servicing area to the rear, with drive extended, for rack-mounted drives.

2-6.2 IPM Installation

Installation of the IPM is described below.

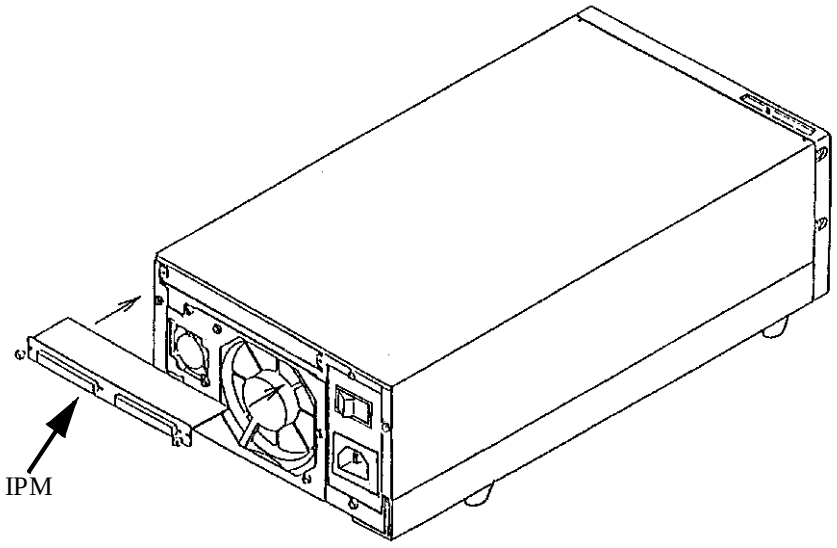


Figure 2-1. IPM Installation

STEP	ACTION
1	Insert the IPM, component side down, into the circuit board at the rear of the M2488. See Figure 2-1.
2	Insert and tighten two screws on the IPM.

2-6.3 Cable and Power Connections

Installation of the SCSI cables and power cord are described in the following paragraphs. A description of the SCSI connectors follows the installation procedure.

**** NOTE ****

1. Cable and power connections should only be made upon completion of the M2488 hardware setup to include attachment of optional equipment. Use the appropriate assembly procedures for the desired option.

2. Both SCSI connectors on the IPM must be connected. The connection may be either two SCSI cables or one SCSI cable and one Terminator.

See Figure 2-2.

STEP	ACTION
1	Attach SCSI cable to one of the SCSI connectors on the IPM (either connector will work).
2	Attach the Terminator or second SCSI cable to the other SCSI connector on the IPM.
3	Connect power cord.

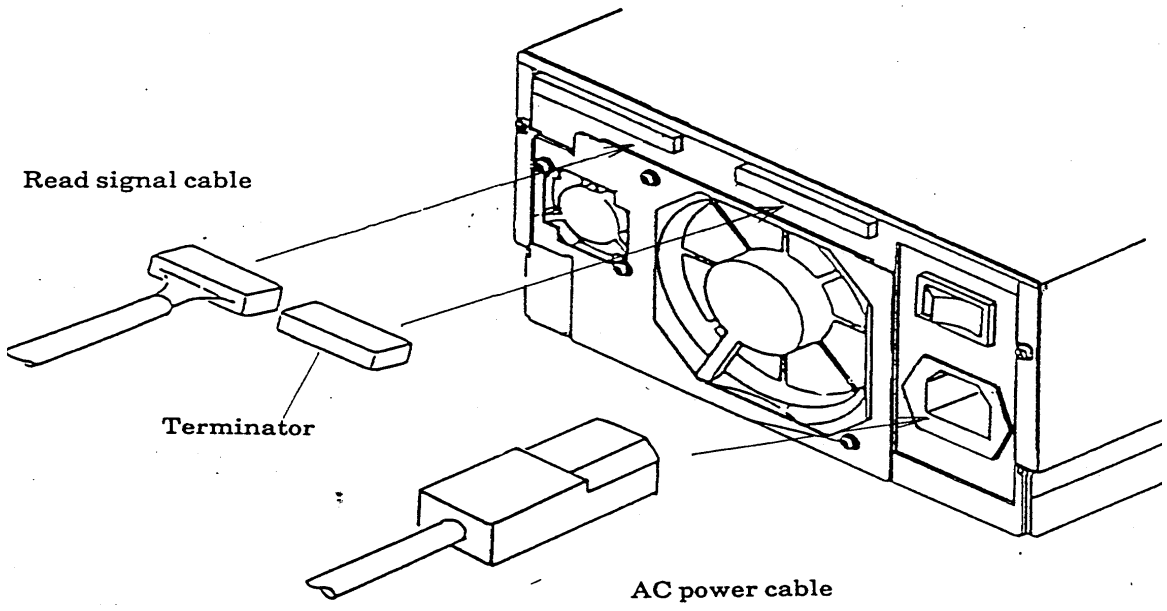


Figure 2-2. Cable and Power Connections

2-6.4 Description of SCSI Connectors

Different IPM cards are available to provide for different types of SCSI connectors to be used with the M2488 Cartridge Tape Drive. Table 2-2 shows the various types of connectors available along with references to diagrams and tables for those specific connectors. Refer to the ANSI SCSI-2 Specification for a description of signals and their function.

Table 2-2. SCSI Connectors

TYPE OF CONNECTOR	IPM SCSI CONNECTOR FIGURE	SCSI CABLE CONNECTOR FIGURE	CONTACT ASSIGNMENT TABLE
Single Ended, 50 pin	Figure 2-3	Figure 2-4	Table 2-3
Differential, 50 pin	Figure 2-3	Figure 2-4	Table 2-4
Single Ended, 68 pin	Figure 2-5	Figure 2-6	Table 2-5
Differential, 68 pin	Figure 2-5	Figure 2-6	Table 2-6

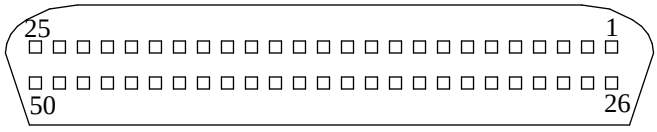


Figure 2-3. 50 Pin IPM SCSI Connector

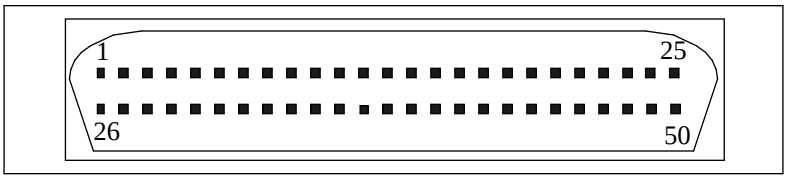


Figure 2-4. 50 Pin SCSI Cable Connector

Table 2-3. Single Ended, 50 pin Contact Assignments

SIGNAL NAME	CONNECTOR CONTACT NUMBER	CABLE CONDUCTOR NUMBER	CABLE CONDUCTOR NUMBER	CONNECTOR CONTACT NUMBER	SIGNAL NAME
ground	1	1	2	26	-DB(0)
ground	2	3	4	27	-DB(1)
ground	3	5	6	28	-DB(2)
ground	4	7	8	29	-DB(3)
ground	5	9	10	30	-DB(4)
ground	6	11	12	31	-DB(5)
ground	7	13	14	32	-DB(6)
ground	8	15	16	33	-DB(7)
ground	9	17	18	34	-DB(P)
ground	10	19	20	35	ground
ground	11	21	22	36	ground
reserved	12	23	24	37	reserved
open	13	25	26	38	TERMPWR
reserved	14	27	28	39	reserved
ground	15	29	30	40	ground
ground	16	31	32	41	-ATN
ground	17	33	34	42	ground
ground	18	35	36	43	-BSY
ground	19	37	38	44	-ACK
ground	20	39	40	45	-RST
ground	21	41	42	46	-MSG
ground	22	43	44	47	-SEL
ground	23	45	46	48	-C/D
ground	24	47	48	49	-REQ
ground	25	49	50	50	-I/O

Table 2-4. Differential, 50 pin Contact Assignments

SIGNAL NAME	CONNECTOR CONTACT NUMBER	CABLE CONDUCTOR NUMBER	CABLE CONDUCTOR NUMBER	CONNECTOR CONTACT NUMBER	SIGNAL NAME
ground	1	1	2	26	ground
+DB(0)	2	3	4	27	-DB(0)
+DB(1)	3	5	6	28	-DB(1)
+DB(2)	4	7	8	29	-DB(2)
+DB(3)	5	9	10	30	-DB(3)
+DB(4)	6	11	12	31	-DB(4)
+DB(5)	7	13	14	32	-DB(5)
+DB(6)	8	15	16	33	-DB(6)
+DB(7)	9	17	18	34	-DB(7)
+DB(P)	10	19	20	35	-DB(P)
DIFFSENS	11	21	22	36	ground
reserved	12	23	24	37	reserved
TERMPWR	13	25	26	38	TERMPWR
reserved	14	27	28	39	reserved
+ATN	15	29	30	40	-ATN
ground	16	31	32	41	ground
+BSY	17	33	34	42	-BSY
+ACK	18	35	36	43	-ACK
+RST	19	37	38	44	-RST
+MSG	20	39	40	45	-MSG
+SEL	21	41	42	46	-SEL
+C/D	22	43	44	47	-C/D
+REQ	23	45	46	48	-REQ
+I/O	24	47	48	49	-I/O
ground	25	49	50	50	ground

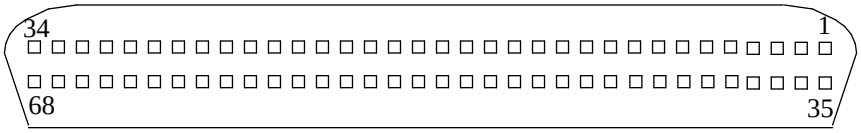


Figure 2-5. 68 Pin IPM SCSI Connector

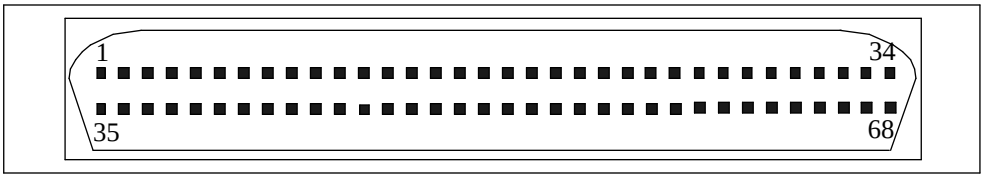


Figure 2-6. 68 Pin SCSI Cable Connector

Table 2-5. Single Ended, 68 pin Contact Assignments

SIGNAL NAME	CONNECTOR CONTACT NUMBER	CABLE CONDUCTOR NUMBER	CABLE CONDUCTOR NUMBER	CONNECTOR CONTACT NUMBER	SIGNAL NAME
ground	1	1	2	35	-DB(12)
ground	2	3	4	36	-DB(13)
ground	3	5	6	37	-DB(14)
ground	4	7	8	38	-DB(15)
ground	5	9	10	39	-DB(P1)
ground	6	11	12	40	-DB(0)
ground	7	13	14	41	-DB(1)
ground	8	15	16	42	-DB(2)
ground	9	17	18	43	-DB(3)
ground	10	19	20	44	-DB(4)
ground	11	21	22	45	-DB(5)
ground	12	23	24	46	-DB(6)
ground	13	25	26	47	-DB(7)
ground	14	27	28	48	-DB(P)
ground	15	29	30	49	ground
ground	16	31	32	50	ground
TERMPWR	17	33	34	51	TERMPWR

Table 2-5. Single Ended, 68 pin Contact Assignments (Continued)

SIGNAL NAME	CONNECTOR CONTACT NUMBER	CABLE CONDUCTOR NUMBER	CABLE CONDUCTOR NUMBER	CONNECTOR CONTACT NUMBER	SIGNAL NAME
TERMPWR	18	35	36	52	TERMPWR
reserved	19	37	38	53	reserved
ground	20	39	40	54	ground
ground	21	41	42	55	-ATN
ground	22	43	44	56	ground
ground	23	45	46	57	-BSY
ground	24	47	48	58	-ACK
ground	25	49	50	59	-RST
ground	26	51	52	60	-MSG
ground	27	53	54	61	-SEL
ground	28	55	56	62	-C/D
ground	29	57	58	63	-REQ
ground	30	59	60	64	-I/O
ground	31	61	62	65	-DB(8)
ground	32	63	64	66	-DB(9)
ground	33	65	66	67	-DB(10)
ground	34	67	68	68	-DB(11)

Table 2-6. Differential, 68 pin Contact Assignments

SIGNAL NAME	CONNECTOR CONTACT NUMBER	CABLE CONDUCTOR NUMBER	CABLE CONDUCTOR NUMBER	CONNECTOR CONTACT NUMBER	SIGNAL NAME
+DB(12)	1	1	2	35	-DB(12)
+DB(13)	2	3	4	36	-DB(13)
+DB(14)	3	5	6	37	-DB(14)
+DB(15)	4	7	8	38	-DB(15)
+DB(P1)	5	9	10	39	-DB(P1)
ground	6	11	12	40	ground
+DB(0)	7	13	14	41	-DB(0)
+DB(1)	8	15	16	42	-DB(1)

Table 2-6. Differential, 68 pin Contact Assignments (Continued)

SIGNAL NAME	CONNECTOR CONTACT NUMBER	CABLE CONDUCTOR NUMBER	CABLE CONDUCTOR NUMBER	CONNECTOR CONTACT NUMBER	SIGNAL NAME
+DB(2)	9	17	18	43	-DB(2)
+DB(3)	10	19	20	44	-DB(3)
+DB(4)	11	21	22	45	-DB(4)
+DB(5)	12	23	24	46	-DB(5)
+DB(6)	13	25	26	47	-DB(6)
+DB(7)	14	27	28	48	-DB(7)
+DB(P)	15	29	30	49	-DB(P)
DIFFSENS	16	31	32	50	ground
TERMPWR	17	33	34	51	TERMPWR
TERMPWR	18	35	36	52	TERMPWR
reserved	19	37	38	53	reserved
+ATN	20	39	40	54	-ATN
ground	21	41	42	55	ground
+BSY	22	43	44	56	-BSY
+ACK	23	45	46	57	-ACK
+RST	24	47	48	58	-RST
+MSG	25	49	50	59	-MSG
+SEL	26	51	52	60	-SEL
+C/D	27	53	54	61	-C/D
+REQ	28	55	56	62	-REQ
+I/O	29	57	58	63	-I/O
ground	30	59	60	64	ground
+DB(8)	31	61	62	65	-DB(8)
+DB(9)	32	63	64	66	-DB(9)
+DB(10)	33	65	66	67	-DB(10)
+DB(11)	34	67	68	68	-DB(11)

2-6.5 Desktop Installation

If foot rails were removed, reattach and place drive in prepared location.

2-7 PREPARATION FOR USE

Refer to the Configuration information in the User's Guide, Chapter 4.

CHAPTER 3

CONTROLS AND INDICATORS

3-1 INTRODUCTION

The following paragraphs illustrate and describe all controls, connectors, and indicators on the M2488 tape drive and on the medium changers. Use the index numbers from the figures to locate the information in the tables.

3-2 M2488 CONTROLS AND INDICATORS

3-3 AUTOMATIC CARTRIDGE LOADER CONTROLS AND INDICATORS (OPTIONAL EQUIPMENT)

3-4 FLUSH-MOUNTED AUTOMATIC CARTRIDGE LOADER CONTROLS AND INDICATORS (OPTIONAL EQUIPMENT)

3-2 M2488 CONTROLS AND INDICATORS

The following paragraphs illustrate and describe front, rear and bottom of the M2488 tape drive.

3-2.1 M2488 Front Panel Controls and Indicators

The M2488 front panel is illustrated in Figure 3-1 and described in Table 3-1.

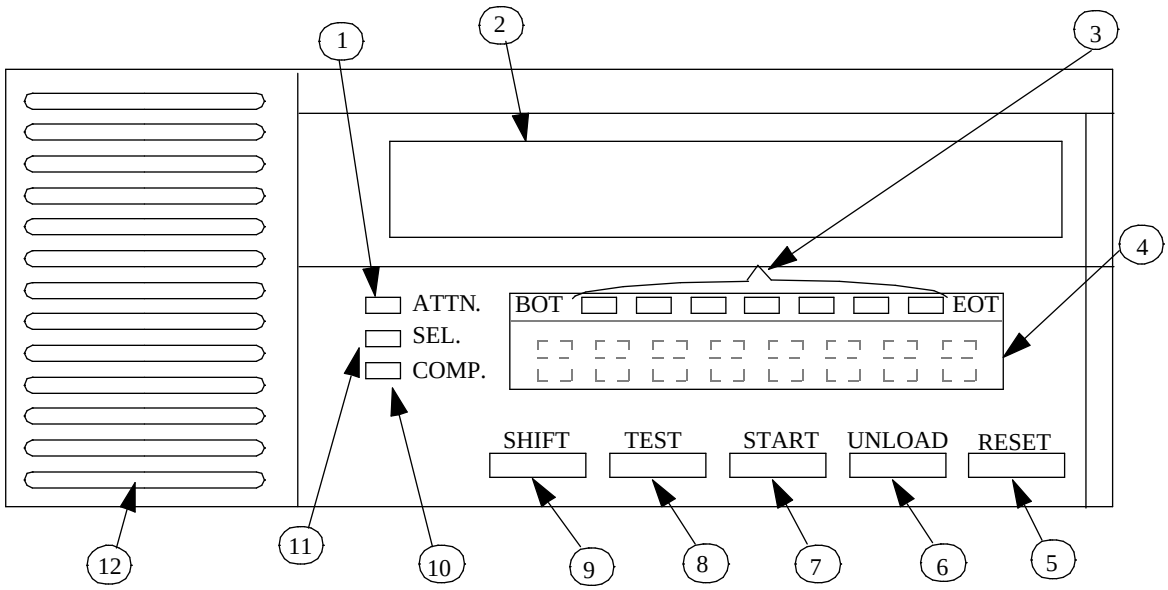


Figure 3-1. M2488 Front Panel Controls and Indicators

Table 3-1. M2488 Front Panel Controls and Indicators

FIGURE AND INDEX NO.	CONTROLS AND INDICATORS	DESCRIPTION
3-1		
1	ATTN LED	When a mount/demount message is received from the host system, the ATTN LED blinks to prompt the operator to mount the cartridge.
2	Cartridge Slot	Cartridge opening.
3	Tape Position LEDs	Indicates tape position between BOT and EOT. Lights illuminate sequentially in the forward direction (wrap 1) and turn off sequentially in the reverse direction (wrap 2).
4	Message Display	Displays the background, host, fixed, not-ready, check or configuration messages with eight alphanumeric characters, including symbols.
5	*RESET* push-button	Press to select the not-ready state, or reset check conditions.
6	*UNLOAD* push-button	Press to unload tape cartridge when in the not ready state.
7	*START* push-button	Press to make drive ready when in the not ready state.
8	*TEST* push-button	Pressed with the *UNLOAD* push-button to enter the offline (menu) mode. Press to display additional messages.
9	*SHIFT* push-button	Press with the *START* push-button in test mode.
10	COMP LED	Illuminates during all write operations. Illuminates during all 36-track reads and during 18-track reads if the compression bit is set in the block ID for the data read. The compression LED will be off if the last 18-track block read is not compressed data.
11	SEL LED	Illuminates when the tape drive is selected on the SCSI bus.
12	Air filter	Replaceable air filter.

3-2.2 M2488 Rear Panel Controls

The rear panel is illustrated in Figure 3-2 and described in Table 3-2.

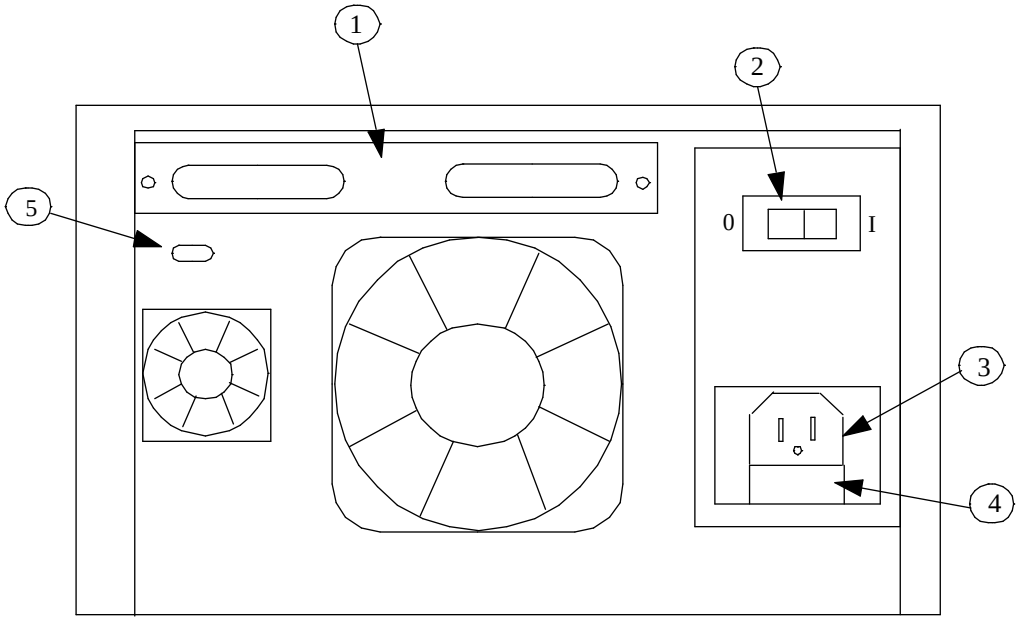


Figure 3-2. M2488 Rear Panel Controls

Table 3-2. M2488 Rear Panel Controls

FIGURE AND INDEX NO.	CONTROLS AND INDICATORS	DESCRIPTION
3-2		
1	IPM	Interface Personality Module for SCSI connections. Four types of modules are available.
2	Power Switch	Push switch to I for on or 0 for off.
3	AC Input	Power cord connection.
4	Fuse Holder	A 250VF 5AH fuse is located inside the fuse holder.
5	9-pin D Connector	Maintenance port.

3-2.3 M2488 Bottom Panel Controls

The bottom panel is illustrated in Figure 3-3 and described in Table 3-3.

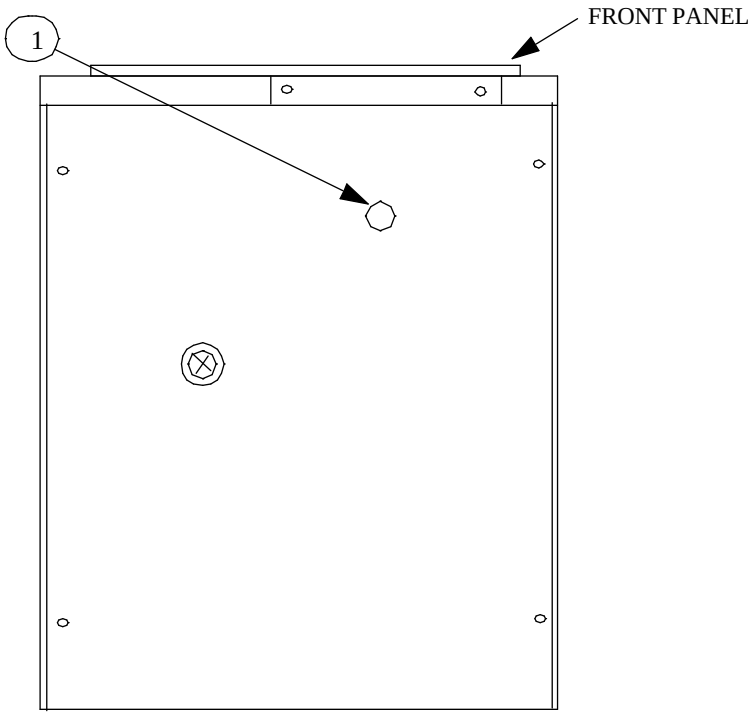


Figure 3-3. M2488 Bottom Panel Controls

Table 3-3. M2488 Bottom Panel Controls

FIGURE AND INDEX NO.	CONTROLS AND INDICATORS	DESCRIPTION
3-3		
1	Cartridge Manual Eject Turning Screw	Turn to eject cartridge.

3-3 AUTOMATIC CARTRIDGE LOADER CONTROLS AND INDICATORS (OPTIONAL EQUIPMENT)

Figure 3-4 through Figure 3-6 and Table 3-4 through Table 3-6 illustrate and describe the controls and indicators on the Automatic Cartridge Loader (ACL).

3-3.1 ACL Front Panel Controls and Indicators

Figure 3-4 and Table 3-4 illustrate and describe the front panel of the ACL.

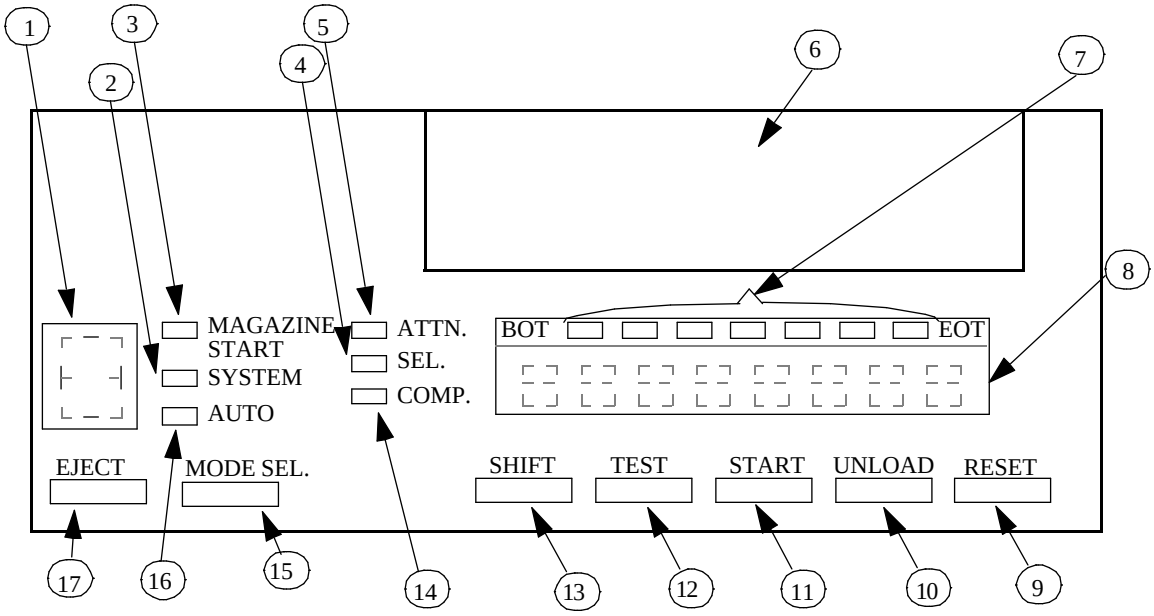


Figure 3-4. ACL Front Panel Controls and Indicators

Table 3-4. ACL Front Panel Controls and Indicators

FIGURE AND INDEX NO.	CONTROLS AND INDICATORS	DESCRIPTION
3-4		
1	Magazine Position Indicator	Displays numbers and letters to indicate magazine positions or state of the ACL.
2	SYSTEM LED	Illuminates to indicate the ACL is in the SYSTEM mode.
3	MAGAZINE START LED	Illuminates when a magazine is installed in the ACL and the *START* pushbutton has been pressed.
4	SEL LED	Illuminates when the tape drive is selected on the SCSI bus.
5	ATTN LED	When a mount/demount message is received from the host system, the ATTN LED blinks to prompt the operator to mount the cartridge/magazine.
6	Cartridge slot/magazine slot	Holds a 5 or 10-cartridge magazine or provides an opening to manually insert a cartridge.
7	Tape Position LEDs	Indicates tape position between BOT and EOT. Lights illuminate sequentially in the forward direction (wrap 1) and turn off sequentially in the reverse direction (wrap 2).

Table 3-4. ACL Front Panel Controls and Indicators (Continued)

FIGURE AND INDEX NO.	CONTROLS AND INDICATORS	DESCRIPTION
8	Message Display	Displays the background, host, fixed, not-ready, check or configuration messages with eight alphanumeric characters, including symbols.
9	*RESET* push-button	Press to select the tape drive not-ready state and the ACL stop state. Press to reset an error display.
10	*UNLOAD* push-button	Press to manually unload and eject cartridge into magazine. Only operates when the tape drive is not ready.
11	*START* push-button	Press to move the magazine to the selected position and load the tape cartridge.The tape cartridge is set at BOT and the drive enters the ready state.
12	*TEST* push-button	Pressed with the *UNLOAD* push-button to enter the offline (menu) mode. Press to display additional messages.
13	*SHIFT* push-button	Press with the *START* push-button in the test mode.
14	COMP LED	Illuminates when data compression is selected.
15	*MODE SEL.* push-button	Press to change the ACL mode to system or auto.
16	AUTO LED	Illuminates to indicate the ACL is in the AUTO mode.
17	*EJECT* push-button	Press to eject the cartridge into the magazine and eject the magazine.
15/10	*MODE SEL* plus *UNLOAD* push-buttons	Moves the magazine up.
17/10	*EJECT* plus *UNLOAD* push-buttons	Moves the magazine down.

3-3.2 ACL Rear Panel Cables

Figure 3-5 and Table 3-5 illustrate and describe the rear panel of the ACL.

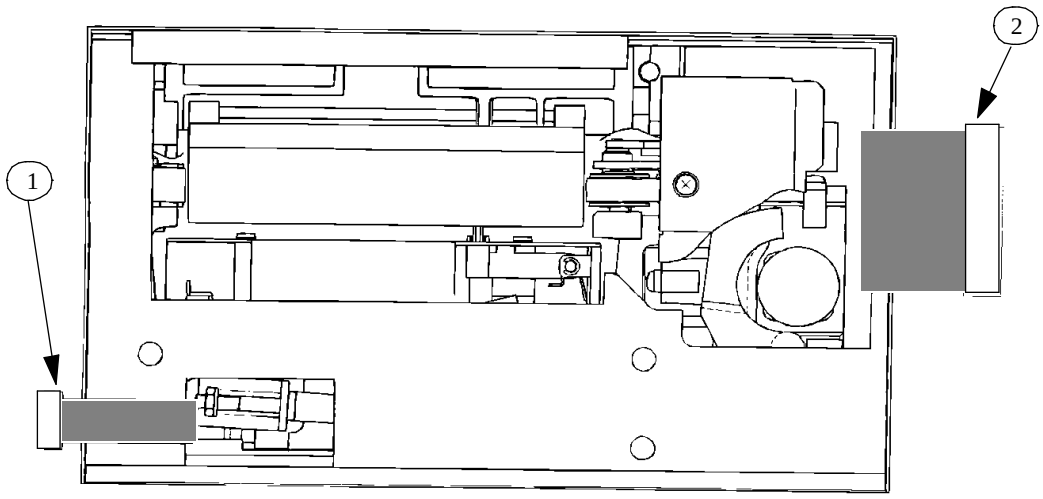


Figure 3-5. ACL Rear Panel Cables

Table 3-5. ACL Rear Panel Cables

FIGURE AND INDEX NO.	CONTROLS AND INDICATORS	DESCRIPTION
3-5		
1	Display Cable	CNJ41
2	Control Cable	CNJ28

3-3.3 ACL Top Panel Controls

Figure 3-6 and Table 3-6 illustrate and describe the top panel of the ACL.

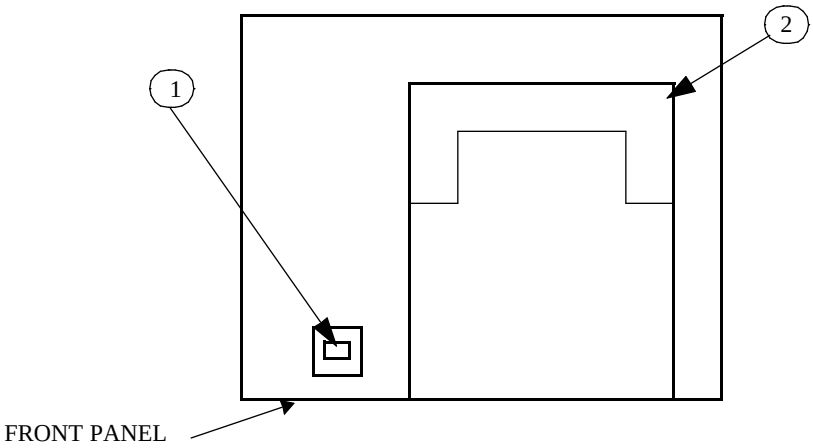


Figure 3-6. ACL Top Panel Controls

Table 3-6. ACL Top Panel Controls

FIGURE AND INDEX NO.	CONTROLS AND INDICATORS	DESCRIPTION
3-6		
1	Thumbwheel	Turn to manually raise the magazine. Lift door to access thumb-wheel.
2	Cartridge Interlock	Senses correct orientation of the tape cartridge.

3-4 FLUSH-MOUNTED AUTOMATIC CARTRIDGE LOADER CONTROLS AND INDICATORS (OPTIONAL EQUIPMENT)

The Flush-mounted Automatic Cartridge Loader (FACL) is illustrated and described in the following paragraphs.

3-4.1 FACL Front Panel Controls and Indicators

Figure 3-7 and Table 3-7 illustrate and describe the FACL front panel.

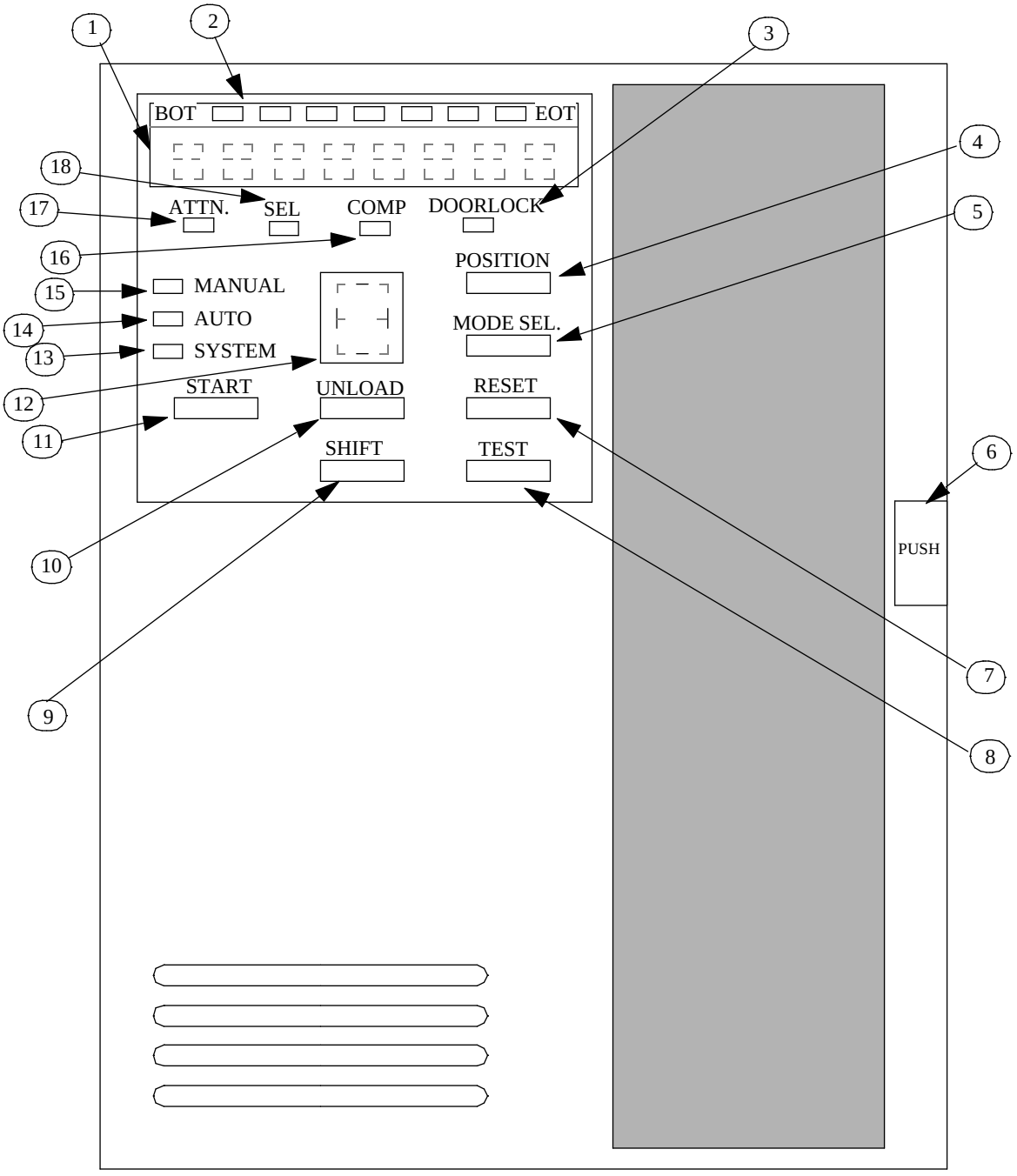


Figure 3-7. FACL Front Panel Controls and Indicators

Table 3-7. FACL Front Panel Controls and Indicators

FIGURE AND INDEX NO.	CONTROLS AND INDICATORS	DESCRIPTION
3-7		
1	Message Display	Displays the background, host, fixed, not-ready, check or configuration messages with eight alphanumeric characters, including symbols.
2	Tape Position LEDs	Indicates tape position between BOT and EOT. Lights illuminate sequentially in the forward direction (wrap 1) and turn off sequentially in the reverse direction (wrap 2).
3	DOORLOCK LED	Illuminates to indicate the front panel door is locked.
4	*POSITION* pushbutton	This pushbutton operates only in manual mode. Press to do one of the following: 1. select a start point in the magazine. 2. select the cleaning cartridge.
5	*MODE SEL.* pushbutton	Press to change the FACL mode to system, auto or manual.
6	*PUSH* switch	Push to open and push to close door.
7	*RESET* pushbutton	Press to select the tape drive not-ready state and the FACL stop state. Press to reset an error display.
8	*TEST* pushbutton	Pressed with the *UNLOAD* pushbutton to enter or exit the offline (menu) mode. Press to display additional messages.
9	*SHIFT* pushbutton	Press with the *START* pushbutton in the test mode.
10	*UNLOAD* pushbutton	Press to manually unload and eject cartridge into magazine. Press only during a not-ready or error state.
11	*START* pushbutton	Press to do one of the following: 1. mount the magazine, if inserted. 2. cause the autoloader to go from a stop status to a start status (DOORLOCK LED illuminates). 3. load the tape cartridge from the current position.
12	Magazine Position indictor	Displays numbers or letters to indicate magazine position or state of the FACL.
13	SYSTEM LED	Illuminates to indicate the FACL is in the SYSTEM mode.
14	AUTO LED	Illuminates to indicate the FACL is in the AUTO mode.
15	MANUAL LED	Illuminates to indicate the FACL is in the MANUAL mode.
16	COMP LED	Illuminates when data compression is selected.
17	ATTN. LED	When a mount/demount message is received from the host system, the ATTN LED blinks to prompt the operator to mount the cartridge/magazine.
18	SEL LED	Illuminates when the tape drive is selected on the SCSI bus.

3-4.2 FACL Rear Panel Controls and Cables

Figure 3-8 and Table 3-8 illustrate and describe the FACL rear panel.

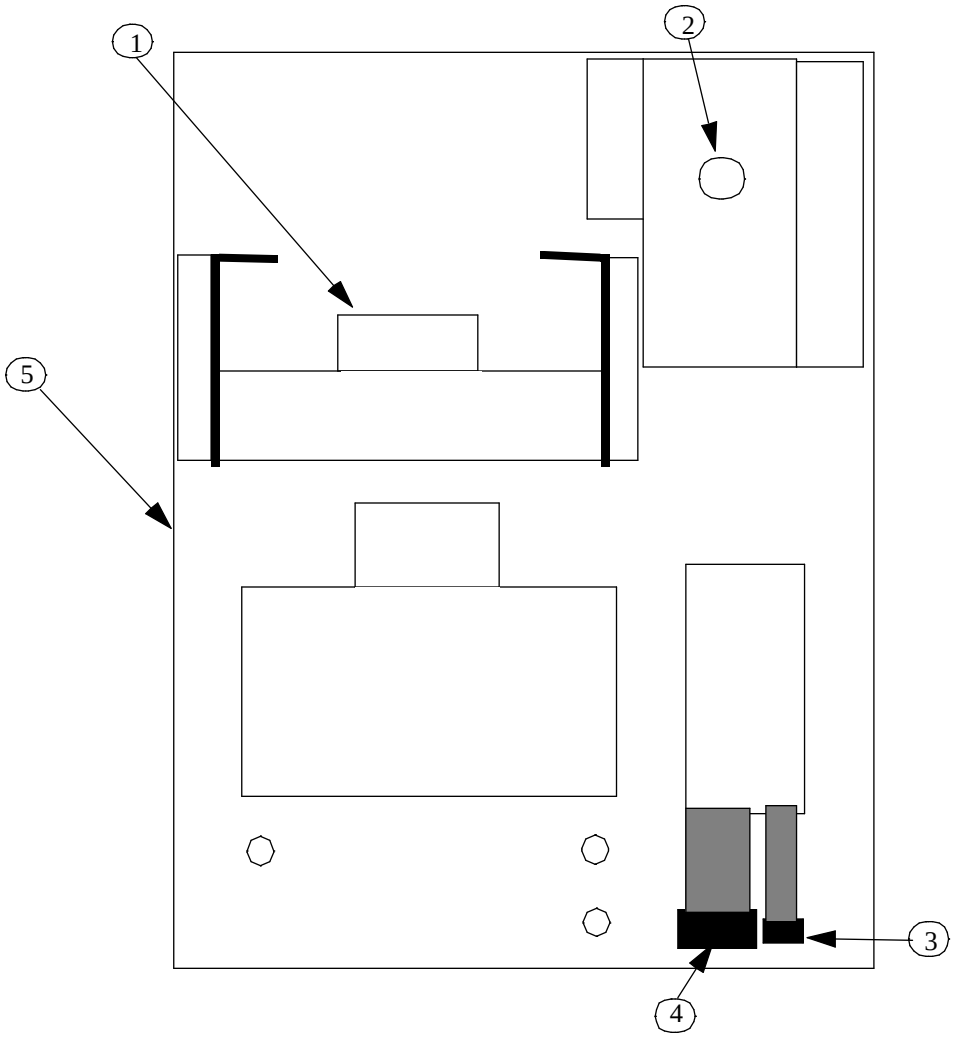


Figure 3-8. FACL Rear Panel Controls and Cables

Table 3-8. FACL Rear Panel Controls and Cables

FIGURE AND INDEX NO.	CONTROLS AND INDICATORS	DESCRIPTION
3-8		
1	Cleaning Cell	Cleaning cartridge holder for the automatic tape drive cleaning system.
2	Carrier knob	Rotate to manually move the carrier.
3	Display cable	Cable CNJ24.
4	Control cable	Cable CNJ28.
5	Door Lock Lever	(Located on side panel near front panel.) Press down to open door when PUSH switch on the front of the door is inoperative.

CHAPTER 4

CONFIGURATION

4-1 CHAPTER INTRODUCTION

This chapter provides information on the following subject areas:

4-2 SETTING MENU

4-3 LOADING NEW FIRMWARE

4-4 DRIVE INFORMATION

4-5 MODE PAGE SETTINGS

4-2 SETTING MENU

This procedure describes the steps required to access and configure the user settable options. All displays refer to the Operator Panel display on the M2488 tape drive or the medium changer. The menu structure is shown below with the SETTING menu shaded:

Table 4-1. Operator Panel Top Level Menus - Settings

TEST and *UNLOAD* pressed — *TEST* and *UNLOAD* released

* → **OFFLINE** → **DIAGMODE**

DIAGMODE		Selection and execution of off-line diagnostics	Product Guide Section 8-4
↓ *START*			
SETTING	*TEST* →	Access and configure user settable options	User's Guide Section 4-2
LOADCODE		Copy new firmware from a code image tape cartridge into non-volatile memory of M2488.	User's Guide Section 4-3
INQUIRY		View M2488 Information	User's Guide Section 4-4
MODE PGS		Display or change selected Tape Unit or Medium-Changer Mode Pages	User's Guide Section 4-5
FACTORY		Change factory mode settings, enable factory mode, or enable factory diagnostics.	Product Guide Section 8-5

Navigation keys:
To navigate through the options, settings, and to make changes from the Operator Panel:
Press *START* to move forward through the options or settings. It will also increment the settings numbers.
Press *SHIFT* and *START* to move backward through the options or settings. It will also decrement the settings numbers.
Press *RESET* to move from settings to option or to leave setting mode.
Press *TEST* to move from the option to settings.
Press *UNLOAD* to select a number field for multiple digit numbers.
Setting Procedure:
Remove all cartridges and magazine prior to performing this procedure.

Step 1. Press and hold both the *TEST* and *UNLOAD* keys, wait for **OFFLINE** to be displayed then release both keys.[a] Once the keys are released then the first item, **DIAGMODE**, in the main Off-line menu will be displayed. (Keys must be held for approximately 2 seconds before Off-line mode is entered.)

Step 2. Press the *START* pushbutton until **SETTING** is displayed. The settable options are described in Table 4-2.

Step 3. Press the *TEST* pushbutton.

Step 4. The first option, **70: S.TAR**, is displayed. Press *TEST* to view the setting or *START* to view next option.

Step 5. The settings may be saved at option **89: WTROM.**

Step 6. When options are set and saved, press *RESET* twice to return to ✳ or ✳**N.**

a. If there is an outstanding SCSI command or if there is a tape loaded in the tape drive then Off-line mode cannot be entered.

Table 4-2. Settable Options Description

OPTION	SETTINGS	DESCRIPTION	DEFAULT SETTINGS
70: S.TAR	TARGID: 0	The SCSI target ID assigned to the M2488 system.	0
71: S.LUN	LUN: 0	The logical unit number assigned to the tape drive.	0
72: S.LNG	ENGLISH FRENCH GERMAN SPANISH ITALIAN	Select the language of the fixed display messages.	ENGLISH
73: S.RDY	BOTRDY:N Y	If N, the BOT RDY message is not displayed on the operator panel when the cartridge is loaded and positioned at the physical load point. If Y, the BOT RDY message is displayed on the operator panel when the cartridge is loaded and positioned at the physical load point.	N

Table 4-2. Settable Options Description (Continued)

OPTION	SETTINGS	DESCRIPTION	DEFAULT SETTINGS
74: S. ✻N	✻N: NO YES	If NO, the drive's Target ID is not displayed when no cartridge is loaded. If YES, the drive's Target ID is displayed when no cartridge is displayed.	NO
75: S.ITS	INTEN: 0	Adjusts intensity of the Operator Panel display. 0 is brightest, 3 is darkest.	0
76: S.ACL	ACL:AUTO SYS	Select the automatic or system mode for the medium changer at power up. If a medium changer is not installed, this setting has no effect on unit operation.	AUTO
77: S.FT1	S.FT1: 00	Sets an additional function. The bits are described in Table 4-3.	00
78: S.FT2	S.FT2: 00	Sets an additional function. The bits are described in Table 4-4.	00
79: S.FT3	S.FT3: 00	Sets an additional function. The bits are described in Table 4-5.	00
80: S.FT4	S.FT4: 00	Sets additional functions. The bits are described in Table 4-6.	00
81: FSGRP	NONE FSGRP S FSGRP T FSGRP U FSGRP V FSGRP W FSGRP X FSGRP Y FSGRP Z	Selects a feature setting group. Each group enables a subset of the features controlled by the FT1 through FT5 settings. A feature can be enabled either by a feature group or by setting the appropriate values in the FT1 through FT5 settings. A feature is disabled only if both the feature group and the FT1 through FT5 settings are not enabled. The actual features for each group are not specified in this manual.	NONE
82: S.SDT	SDTR: N Y	If N, the target will not initiate a Synchronous Data Transfer Request If Y, the target will initiate a Synchronous Data Transfer Request if the initiator does not.	N
83: S.WDT	WDTR: N Y	If N, the target will not initiate a Wide Data Transfer Request If Y, the target will initiate a Wide Data Transfer Request if the initiator does not.	N
84: S.FT5	S.FT5: 00	Sets additional functions. The bits are described in Table 4-7.	00
85: LIBRY	NONE KOALA ATL	Selects a Library Interface setting. This option is used by Manufacturing to configure and enable a Library RS-232 Interface port on the tape drive for attachment to a particular tape Library.	NONE
86: S.MCL	MCL: 4	Medium changer logical address.	4
89: WTROM	WTROM: Y N	If Y, the setting data is written to the nonvolatile memory. If N, the setting data is not written to the nonvolatile memory.	Y

Table 4-3. S.FT1 Bit Description

BIT	VALUE	DESCRIPTION
0	1	Disable internal Retry Buffer retries.
	0	Enable internal Retry Buffer retries.
1	1	Disable all host data phase retry. (Disallows DISCONNECT or RESTORE POINTERS during data phase.)
	0	Enable all host data phase retry.
2	1	Buffer Flush mode. When operator panel *RESET* is pressed, **PEN NRDY** is displayed. Flush all write data to tape before allowing the MTU to go NOT READY.
	0	Go NOT READY immediately when *RESET* is pressed.
3	1	When the ACL is in System Mode, load the first available cartridge when the magazine is loaded.
	0	Do not load first cartridge.
4	1	Disable Save Data Pointer message. NOTE: During fixed block data transfers, the Save Data Pointer message is not sent to the initiator in between each record transferred. NOTE: Performing fixed block data transfers in this mode automatically disables the use of the Restore Pointers message during data transfer retries since Restore Pointers requires the Save Data Pointer message to be supported.
	0	Enable Save Data Pointer message.
5	1	Synchronize write data to tape on each write operation when positioned between Logical End of Tape (LEOT) and Physical End of Tape (PEOT).
	0	Synchronize write data to tape when LEOT is encountered, then buffer subsequent write operations while positioned between LEOT and PEOT.
6-7		Reserved

Table 4-4. S.FT2 Bit Description

BIT	VALUE	DESCRIPTION	
0-3		Reserved	
4-7		Sets cleaning cartridge counter (FACL only).	
		0xh 500 times (default)	1xh 100 times
		2xh 200 times	3xh 300 times
		4xh 400 times	5xh 600 times
		6xh 700 times	7xh 800 times
		8xh 900 times	9xh 1000 times
		Axh 1100 times	Bxh 1200 times
		Cxh 1300 times	Dxh 1400 times
		Exh 1500 times	Fxh 1600 times

Table 4-5. S.FT3 Bit Description

BIT	VALUE	DESCRIPTION
0-7	1	Reserved

Table 4-6. S.FT4 Bit Description

BIT	VALUE	DESCRIPTION
0-2		Reserved
3	1	Support ANSI SCSI-3 Write Buffer modes 6 and 7. Reference the Write Buffer command description in the M2488 for a description of Write Buffer modes 6 and 7.
	0	Write Buffer modes 6 and 7 are reserved (per ANSI SCSI-2).
4	1	For SCSI commands which require access to tape or the data buffer, Busy status is not generated when the command is received for an ITL nexus which is currently processing previously issued immediate SCSI command. The new SCSI command is held (following a disconnect, if allowed) , then processed after the current immediate operation under way has completed. **NOTES:** 1) This feature is similar to FT4, bit 5 defined below, except for sense key 2 (Not Ready) with ASC/ASCQ 0401 (LUN is in process of becoming ready) not being generated. 2) If FT4, bit 4 and FT4, bit 5 are both set, then the FT4, bit 4 feature takes precedence.
	0	Busy status is generated when a SCSI command, which requires access to tape or data buffer, is received for an ITL nexus currently processing a previously issued immediate SCSI command.

Table 4-6. S.FT4 Bit Description (Continued)

BIT	VALUE	DESCRIPTION
5	1	For SCSI commands which require access to tape or the data buffer, Busy status is not generated when the command is received for an ITL nexus which is currently processing a previously issued immediate SCSI command. If the active immediate operation is a Rewind or Load/Unload, then the new SCSI command is rejected with Check Condition status. The SCSI sense data generated is sense key 2 (Not Ready) and the ASC/ASCQ is 0401 (LUN is in process of becoming ready). If the active immediate operation is not a Rewind or Load/Unload, then the new SCSI command is held (following a disconnect, if allowed) and then processed after the current immediate operation under way has completed. **NOTES:** 1) The TUR (Test Unit Ready) command is a special case in that Check Condition for not ready, in process of becoming ready is generated if there is any active immediate operation. 2) Inquiry and Request Sense SCSI commands are processed per ANSI SCSI-2, i.e. the Check Condition mentioned above is not generated and the data is sent to the initiator. 3) This feature is similar to FT4, bit 4 defined above, except for sense key 2 (Not Ready) with ASC/ASCQ 0401 (LUN is in process of becoming ready) being generated. 4) If FT4, bit 4 and FT4, bit 5 are both set, then the FT4, bit 4 feature takes precedence.
	0	Busy status is generated when a SCSI command, which requires access to tape or data buffer, is received for an ITL nexus currently processing a previously issued immediate SCSI command.
6	1	a) ANSI SCSI-3 Density Code 28h (36-track) is supported in the Mode Sense/Select Block Descriptor. For more information, refer to the Density Code 28h information and the Mode Sense/Mode Select commands in the M2488 Product Guide. b) ANSI SCSI-3 REPORT DENSITY SUPPORT command is supported.
	0	a) Density Code 28h is reserved (per ANSI SCSI-2). For more information, refer to the Density Code 28h information and the Mode Sense/Mode Select commands in the M2488 Product Guide. b) ANSI SCSI-3 REPORT DENSITY SUPPORT command is not supported.
7	1	Support 16 (10h) byte SCSI Display command data length and format.
	0	Support 17 (11h) byte SCSI Display command data length and format.

Table 4-7. S.FT5 Bit Description

BIT	VALUE	DESCRIPTION
0-1	1	Reserved
2	1	The EOM bit is treated in non-ANSI compliant mode. EOM is on in unsolicited REQUEST SENSE data when the MTU is at PBOT or LBOT as well as for the conditions described for a value of 0.
	0	The EOM bit is treated in ANSI compliant mode. EOM indicates that the MTU is at or past the early warning if the direction was forward, or that the command could not be completed because beginning of partition was encountered if the direction was reverse. Both conditions generate an unit check.
3	1	Maximum SCSI bus reselection timeout is 8ms.
	0	Maximum SCSI bus reselection timeout is 419ms.
4	1	Support ASC/ASCQ 3A00 (Medium Not Present) on unload via Load/Unload SCSI command. If an unload request is received via the Load/Unload SCSI command when the MTU is not ready, then Check Condition status is generated. The SCSI sense data generated contains sense key 2 (Not Ready) and ASC/ASCQ 3A00 (Medium Not Present).
	0	Do not Support ASC/ASCQ 3A00 (Medium Not Present) on unload via Load/Unload SCSI command. If an unload request is received via the Load/Unload SCSI command when the MTU is not ready, then Check Condition status is generated. The SCSI sense data generated contains sense key 2 (Not Ready) and ASC/ASCQ 0400 (LUN Not Ready, Cause Not Reportable)
5	1	Support ANSI SCSI-3 ASC/ASCQ 0017 (Clean Requested). Check Condition status is generated for "Clean Requested" under the conditions listed below. The SCSI sense data generated contains sense key 1 (Recovered Error) and ASC/ASCQ 0017. 1) Tape sectors processed since last cleaning has gone over the cleaning required threshold, and 2) The MTU ready status has changed (e.g. from not-ready to ready or from ready to not-ready), and 3) The next SCSI command (after the MTU status change) for which status is being generated has completed without error, and 4) The SCSI command is not TUR, Inquiry, or Request Sense.
	0	Do not support ANSI SCSI-3 ASC/ASCQ 0017 (Clean Requested).
6	1	Support ANSI SCSI-3 Log Sense page 0Ch.
	0	Do not support ANSI SCSI-3 Log Sense page 0Ch.
7	1	Do not clear Log Sense counters when they are read via the Log Sense command.
	0	Clear Log Sense counters when they are read via the Log Sense command. Only the counters for the log page(s) read are cleared.

4-2.1 Setting Target ID

**** NOTE ****

Remove medium changer magazine (if mounted) prior to performing this procedure.

The following procedure describes the steps required to set the Target ID.

Step 1. Press and hold both the *TEST* and *UNLOAD* keys, wait for **OFFLINE** to be displayed then release both keys.[a] Once the keys are released then the first item, **DIAGMODE**, in the main Off-line menu will be displayed. (Keys must be held for approximately 2 seconds before Off-line mode is entered.)

Step 2. Press the *START* pushbutton until **SETTING** is displayed.

Step 3. Press the *TEST* pushbutton.

Step 4. The first option, **70: S.TAR**, is displayed. Press *TEST* to view the setting. The setting may be incremented by pressing *START* or decremented by pressing *SHIFT* and *START*.

Step 5. Press *TEST* to return to **70: S.TAR**

Step 6. Press *SHIFT* and *START* until **89: WTROM** is displayed.

Step 7. Press *TEST* to view settings at option **89: WTROM**.

Step 8. Press *START* until **y** is displayed.

Step 9. Press the *TEST* pushbutton to write the setting to ROM.

Step 10. Press *TEST* to return to **89: WTROM**.

Step 11. Press *RESET* twice to return to ✳.

a. If there is an outstanding SCSI command or if there is a tape loaded in the tape drive then Off-line mode cannot be entered.

4-2.2 Emergency ROM Load

Step 1. From a powered-off state, turn power to on while pressing *SHIFT* + *RESET*. Release *SHIFT* + *RESET* when **SELFTEST** is displayed.

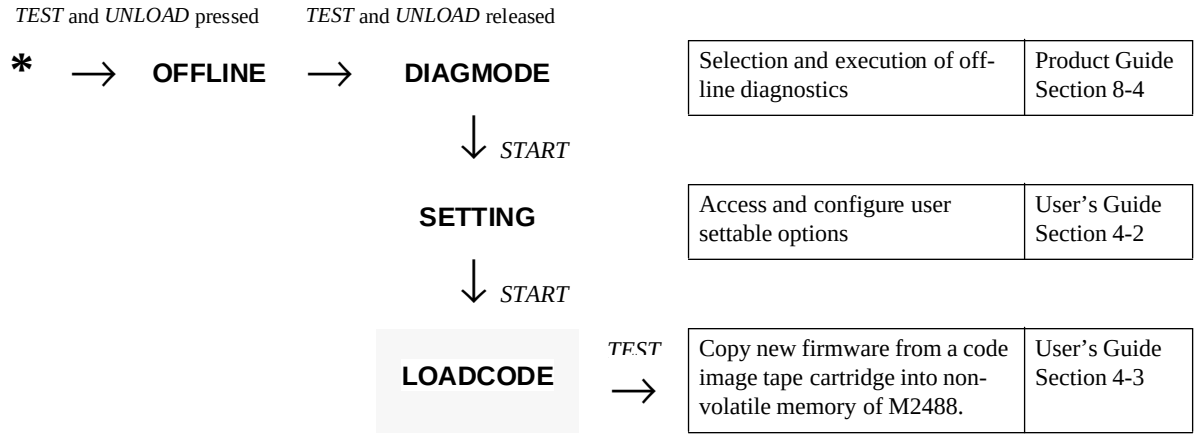
4-3 LOADING NEW FIRMWARE

The M2488 tape drive contains a substantial amount of firmware (software) used to control the tape drive hardware. The firmware is stored in non-volatile memory within the tape drive. From time to time new firmware will become available for the M2488 tape drive. This new firmware will be provided either on a code image tape cartridge or as a binary code image file. This section of the guide describes the procedures for copying the firmware into the tape drive's non-volatile memory.

4-3.1 Copying from a Code Image Tape Cartridge

Use the following procedure to copy new firmware contained in a code image tape cartridge into the non-volatile memory of the tape drive. This procedure does not require the operation of the SCSI interface. Once the new firmware has been copied, the new firmware will be used by the tape drive every time the unit is powered on.

Table 4-8. Operator Panel Top Level Menus - Microcode Load



Code Load Procedure Using Code Image Tape Cartridge

STEP	ACTION
1	Power-up tape drive, wait for initialization to complete.
2	Press and hold both the *TEST* and *UNLOAD* keys, wait for **OFFLINE** to be displayed then release both keys.[a] Once the keys are released then the first item, **DIAGMODE**, in the main Off-line menu will be displayed. (Keys must be held for approximately 2 seconds before Off-line mode is entered.)
3	Press the *START* key several times until **LOADCODE** is displayed.
4	Press *TEST* key once to select Load Code operation; **PLEASE INSERT CODE IMAGE TAPE** will be displayed.
5	Insert the firmware tape cartridge into the tape drive (If FACL is attached then you will need to also close the door and press the START key). The cartridge will automatically be loaded, read and unloaded. After the cartridge is unloaded **COPYING IMAGE** will be displayed for approximately a minute. After the copy step completes then **CODE UPLOAD COMPLETE, SWITCH POWER OFF** will be displayed.[b]
6	After the operation has completed, press the *RESET* key once to return to the main Off-line menu.
7	The new firmware will not be used until the tape drive power is switched off and then on.

a. If there is an outstanding SCSI command or if there is a tape loaded in the tape drive then Off-line mode cannot be entered.
b. If the tape cartridge cannot be read or contains incorrect data then "CODE IMAGE TAPE ERROR" will be displayed. If a problem occurs with the non-volatile memory then "FLASH MEMORY ERROR" will be displayed.

4-3.2 Copying from a Binary Code Image File

This section describes the procedure to copy new firmware contained in a binary code image file into the nonvolatile memory of the tape drive. This procedure requires the use of the SCSI interface. Data is transferred into the Read/Write Data Buffer using WRITE BUFFER commands. This data is then transferred from the Read/Write Data Buffer into the nonvolatile memory area. Once the new firmware has been transferred into the nonvolatile memory area, the new firmware will be used by the tape drive every time the unit is powered on.

The binary code image file is a 1 Megabyte binary data file. The data in this file is transferred to the tape drive over the SCSI interface using one or more WRITE BUFFER commands. The data is transferred into the Read/Write Data Buffer, buffer ID 0, starting at buffer offset 0. All WRITE BUFFER commands except the final WRITE BUFFER command use the Write Data mode (Mode 2); the final WRITE BUFFER command uses the Download Microcode and Save mode (Mode 5). Mode 5 indicates to transfer the data in the Read/Write Data Buffer into the non-volatile memory area. Note that the tape drive does not require any particular block size to be used when transferring data using the WRITE BUFFER command for the download of code; transfers could be 64 16K blocks or one 1 Megabyte block if desired. Note that if multiple blocks are transferred then the user is responsible for adjusting the buffer offset for each block so that the blocks are properly concatenated in the Read/Write Data Buffer. Please see the Product Guide description of the WRITE BUFFER command for further details.

4-4 DRIVE INFORMATION

Use the Inquiry menu to display or modify selected information about the M2488 configuration. An explanation of this menu is given in Table 4-9.

Table 4-9. Operator Panel Top Level Menus - Information (Inquiry)

TEST and *UNLOAD* pressed *TEST* and *UNLOAD* released

* → **OFFLINE** → **DIAGMODE**

DIAGMODE	Selection and execution of off-line diagnostics	Product Guide Section 8-4
↓ *START*		
SETTING	Access and configure user settable options	User's Guide Section 4-2
↓ *START*		
LOADCODE	Copy new firmware from a code image tape cartridge into non-volatile memory of M2488.	User's Guide Section 4-3
↓ *START*		
INQUIRY *TEST* →	View M2488 Information	User's Guide Section 4-4
MODE PGS	Display or change selected Tape Unit or Medium-Changer Mode Pages	User's Guide Section 4-5
FACTORY	Change factory mode settings, enable factory mode, or enable factory diagnostics.	Product Guide Section 8-5

Navigation keys:
To navigate through the options, settings, and to make changes from the Operator Panel:
Press *START* to move forward through the options or settings. It will also increment the settings numbers.
Press *SHIFT* and *START* to move backward through the options or settings. It will also decrement the settings numbers.
Press *RESET* to move from settings to option or to leave setting mode.
Press *TEST* to move from the option to settings.
Press *UNLOAD* to select a number field for multiple digit numbers.

Setting Procedure:

Step 1. Press and hold both the *TEST* and *UNLOAD* keys, wait for **OFFLINE** to be displayed then release both keys.[a] Once the keys are released then the first item, **DIAGMODE**, in the main Off-line menu will be displayed. (Keys must be held for approximately 2 seconds before Off-line mode is entered.)

Step 2. Press the *START* push-button until **INQUIRY** is displayed. The information available is described in Table 4-10.

Step 3. Press the *TEST* pushbutton.

Step 4. The first item, **REV LEVL**, is displayed. Press *TEST* to view the vendor information or *START* to view next option.

a. If there is an outstanding SCSI command or if there is a tape loaded in the tape drive then Off-line mode cannot be entered.

Table 4-10. Information Description

OPTION	DESCRIPTION
REV LEVL	Microcode revision level: example **REV=" 1. A.13"**
IPM TYPE	Type of Interface Personality Module installed. Example: **IPM="SINGLE-ENDED, 50 PIN"**
TAPEUNIT	Select sub-menu to modify Tape unit Vital Product Data pages (sub-menu described in Table 4-11)
MED-CHGR	Select sub-menu to modify Medium-Changer Vital Product Data pages (sub-menu described in Table 4-12)

Table 4-11. Tape Unit VPD Pages Menu

OPTION	DESCRIPTION
PAGE C2	Modify Tape-Unit Vital Product Data page C2 (sub-menu described in Table 4-13)

Table 4-12. Medium-Changer VPD Pages Menu

OPTION	DESCRIPTION
PAGE C2	Modify Medium-Changer Vital Product Data page C2 (sub-menu described in Table 4-13)

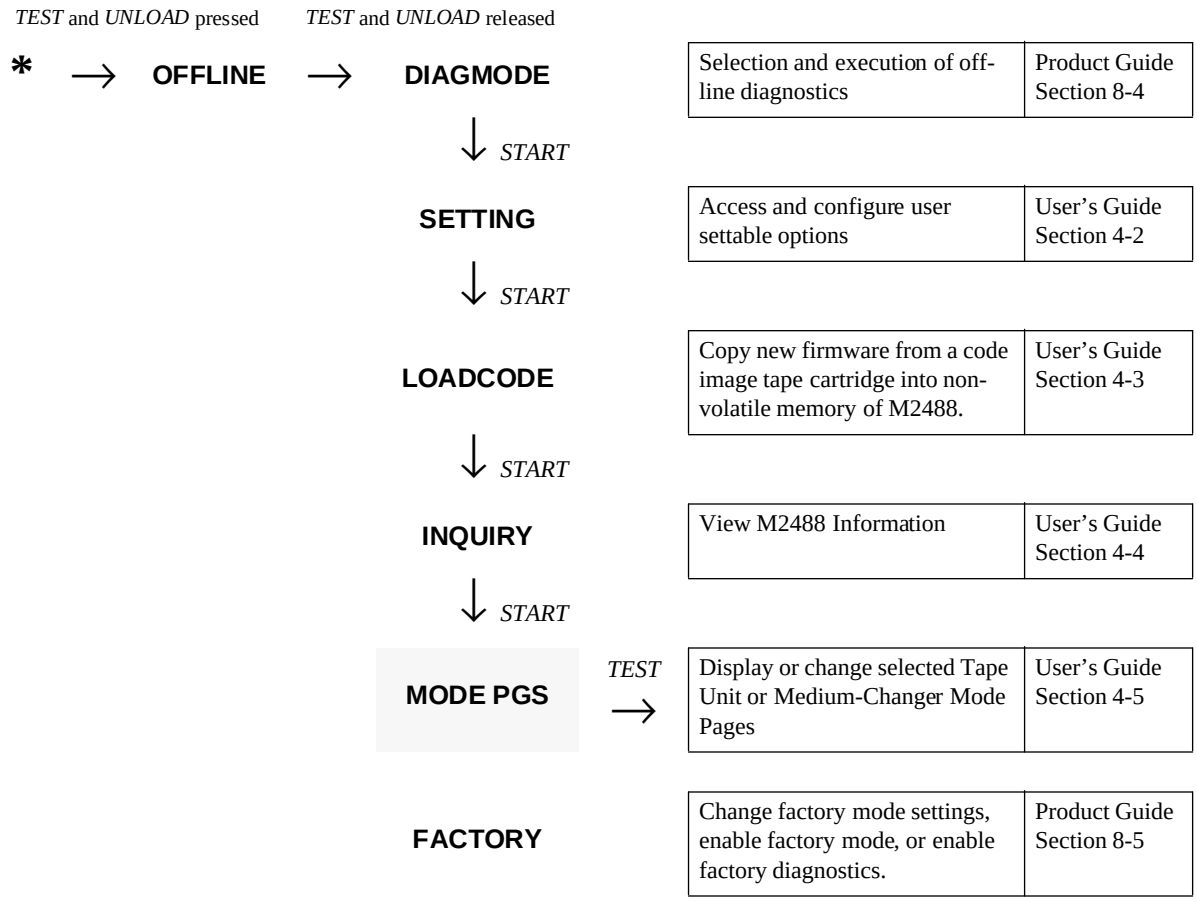
Table 4-13. Settable VPD Page C2 Menu

OPTION	SETTINGS	DESCRIPTION	DEFAULT SETTINGS
VENDOR	V=""	Vendor ID, 8 ASCII characters	
CTLR PID	CPID=""	Controller Product ID, 8 ASCII characters	
LUN PID	LPID=""	Log Unit Product ID, 8 ASCII characters	
PGC2:WTR	WTROM: Y N	If Y, the setting data is written to nonvolatile memory. If N, the setting data is not written to nonvolatile memory.	Y

4-5 MODE PAGE SETTINGS

Use the Mode Page menu to display or change selected Mode Pages of the Tape Unit or Medium-Changer An explanation of this menu is given in Table 4-14.

Table 4-14. Operator Panel Top Level Menus - Mode Pages



Navigation keys:

To navigate through the options, settings, and to make changes from the Operator Panel:
Press *START* to move forward through the options or settings. It will also increment the settings numbers.
Press *SHIFT* and *START* to move backward through the options or settings. It will also decrement the settings numbers.
Press *RESET* to move from settings to option or to leave setting mode.
Press *TEST* to move from the option to settings.
Press *UNLOAD* to select a number field for multiple digit numbers.

Setting Procedure:

Step 1. Press and hold both the *TEST* and *UNLOAD* keys, wait for **OFFLINE** to be displayed then release both keys.[a] Once the keys are released then the first item, **DIAGMODE**, in the main Off-line menu will be displayed. (Keys must be held for approximately 2 seconds before Off-line mode is entered.)

Step 2. Press the *START* push-button until **MODE PGS** is displayed. The information available is described in Table 4-15.

Step 3. Press the *TEST* pushbutton.

Step 4. The first item, **TAPEUNIT**, is displayed. Press *TEST* to view the selected mode pages for the Tape Unit or *START* to view next option.

a. If there is an outstanding SCSI command or if there is a tape loaded in the tape drive then Off-line mode cannot be entered.

Table 4-15. Information Description

OPTION	DESCRIPTION
TAPEUNIT	Select sub-menu to modify Tape unit Mode pages (sub-menu described in Table 4-16)
MED-CHGR	Select sub-menu to modify Medium-Changer Mode pages (sub-menu described in Table 4-17)

Table 4-16. Tape Unit Mode Pages Menu

OPTION	DESCRIPTION
PAGE 00	Display and/or Modify Tape-Unit Mode page 00 (sub-menu described in Table 4-18)
PAGE 01	Display and/or Modify Tape-Unit Mode page 01
PAGE 10	Display and/or Modify Tape-Unit Mode page 10

Table 4-17. Medium-Changer Mode Pages Menu

OPTION	DESCRIPTION
PAGE 00	Modify Medium-Changer Mode page 00 (sub-menu described in Table 4-18)

Table 4-18. Settable Mode Page 00 Menu *

OPTION	SETTINGS	DESCRIPTION	DEFAULT SETTINGS
PG00/B02	BYT02:00	Mode Page 00, Byte 2	00
PG00/B03	BYT03:00	Mode Page 00, Byte 3	00
PG00/B04	BYT04:00	Mode Page 00, Byte 4	FE
:	:	:	:
PG00/Bnn	BYTnn:00	Mode Page 00, Byte nn	00
PG00:WTR	WTROM: Y N	If Y, the setting data is written to nonvolatile memory. If N, the setting data is not written to nonvolatile memory.	Y

***** Refer to the M2488 Product Guide, CG00000-0115xx, Chapter 5 for Mode Page 00 information.

CHAPTER 5

OPERATING PROCEDURES

5-1 INTRODUCTION

This chapter provides information on the following subject areas:

5-2 TAPE CARTRIDGE FUNCTIONS

Tape cartridges may be loaded manually, or automatically using an ACL or a FACL. Use the procedures which apply to your equipment. The cleaning cartridge has an identification notch.

Cartridges are capable of 15,000 mount operations, but periodic replacement is recommended.

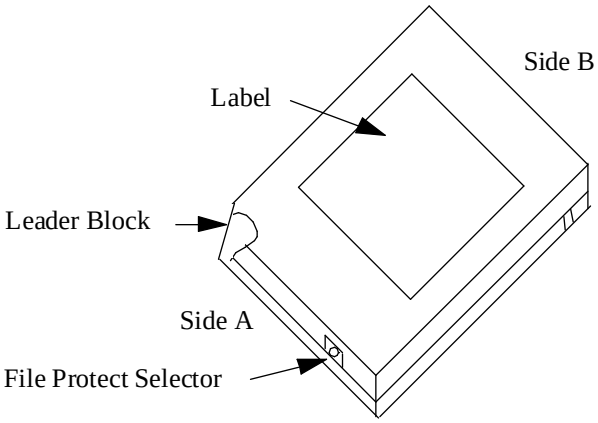


Figure 5-1. Tape Cartridge

5-2.1 Tape Cartridge File Protection

See Figure 5-1 for location of the File Protect Selector.

1. To protect files and inhibit a data write, turn the File Protect Selector until the white circle is visible and centered.
2. To enable a data write, turn the File Protect Selector to a position where the white circle is no longer visible.

5-2.2 Tape Cartridge Labeling

See Figure 5-1 for location of the label.

5-2.3 Tape Cartridge Handling Instructions

1. Allow the cartridge to acclimate to the computer room for 24 hours prior to use.
2. Protect from dust, high temperatures, shock and vibration.
3. Do not stack more than seven cartridges high.
4. Do not remove the leader block, pull out the tape, or press the reel lock. These actions may damage the tape.
5. Do not expose to magnetic fields of 100 oersteds or greater.
6. Store cartridges reel side up. If possible, use storage shelves instead of stacking cartridges.
7. Do not burn tapes for disposal.
8. Remove the cartridge from the drive when temperatures exceed 32° C for more than 12 hours. This will prevent adhesion problems between the tape and head.

5-3 POWER ON SEQUENCE

This procedure provides instructions for power-on of the M2488 tape drive with or without an attached medium changer.

STEP	ACTION
1	On the rear panel, turn the power switch to the on (I) position.
2	Wait for the tape controller and connected drives to complete the power on diagnostic procedures. **SELFTEST** is displayed on the operator panel display.
3	Verify the system messages indicate that the subsystem is online. ✻ is displayed.

5-4 M2488 TAPE DRIVE OPERATION

5-4.1 Load a Tape Cartridge into the M2488 Tape Drive

STEP	ACTION
1	Insert a tape cartridge, side A first (leader block on right, label up) as shown in Figure 5-1, into the tape cartridge slot.
2	After approximately one second, the tape loading starts.
3	After approximately 13 seconds, the tape loading is complete and a message is displayed. The **F** indicates that the cartridge is file protected. The optional mode is displayed after a rewind or by pressing *RESET* and *START*. * Standard mode: **READY U** or **READY F** Optional Mode: **BOT RDYU** or **BOT RDYF**
4	When the tape starts running, the seven LEDs on the operator panel indicate the tape position.

*If the display indicates the wrong file protect position, unload the cartridge and change the File Protect Selector. Reload the cartridge.
Selection of standard or optional mode are set at installation via the settings menu.

****
*** CAUTION ***
****

Tape Cartridges should not be left in the M2488 without usage for more than 24 hours.

5-4.2 Tape Rewind

To rewind the tape to BOT, press *RESET*, then press *START*. **REWINDNG** is displayed.

5-4.3 Unload a Tape Cartridge from the M2488 Tape Drive

Unloading may be done by either of these methods.

1. The host system sends an UNLOAD command to the drive. Remove the ejected cartridge.
2. To manually unload the tape cartridge, press *RESET*. **NT RDYU** is displayed. Then press *UNLOAD* to unload the cartridge. Remove the ejected cartridge.

During unloading **UNLOADNG** is displayed. After the tape cartridge is unloaded, ✳**N** or ✳ is displayed.

5-5 MEDIUM CHANGER MAGAZINE PROCEDURES

The magazine provides automatic loading of tape cartridges in the AUTO or SYSTEM modes of the medium changer. The following procedures describe the loading and unloading of tape cartridges in the ACL and FACL magazines.

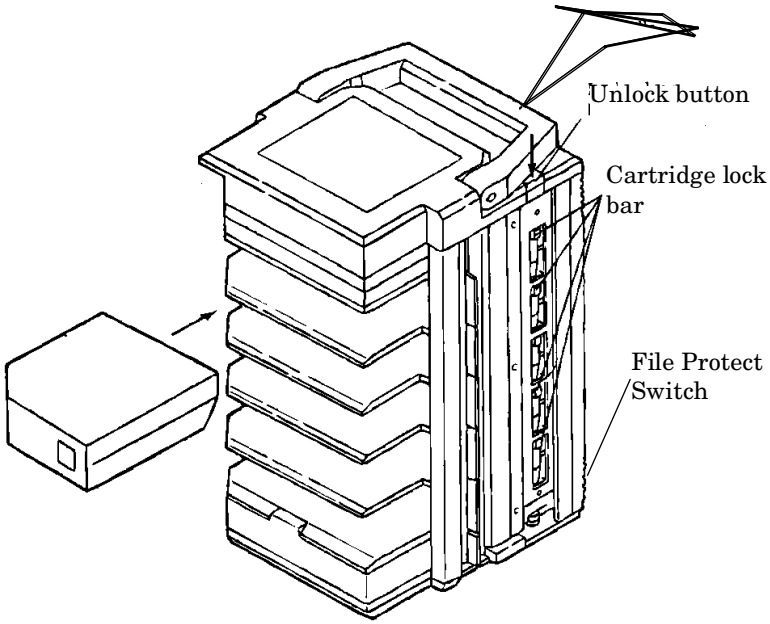


Figure 5-2. ACL Magazine

5-5.1 Load Tape Cartridges into an ACL Magazine

The procedure is the same for both the 5 and 10-cartridge magazine. The magazine should be removed from the ACL for this procedure.

STEP	ACTION
1	Insert tape cartridges, as shown in Figure 5-2, into the tape cartridge slots.
2	Press on the cartridge to ensure the magazine lock has engaged.
3	If file protect for all cartridges within the magazine is desired, slide the File Protect Switch to the file protect position. This protects all cartridges without regard to individual cartridge file protect settings.

5-5.2 Unload Tape Cartridges from an ACL Magazine

The procedure is the same for both the 5 and 10-cartridge magazine.

STEP	ACTION
1	Remove magazine from the ACL.
2	Release cartridge lock. If only one cartridge is to be unloaded, press the cartridge lock bar. If several cartridges are to be unloaded, press the unlock button.
3	Remove the cartridge from the magazine.

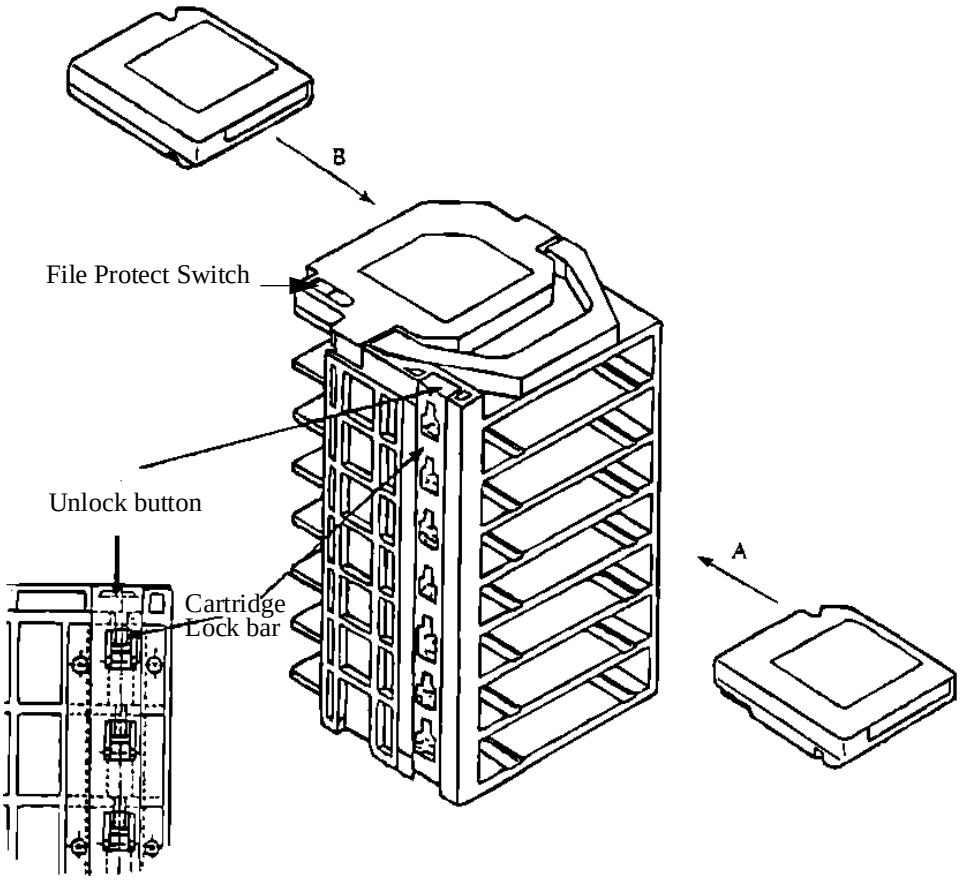


Figure 5-3. FACL Magazine

5-5.3 Load Tape Cartridges into a FACL Magazine

STEP	ACTION
1	Insert tape cartridges, from either side A or B as shown in Figure 5-3, into the tape cartridge slot. *
2	Press on the cartridge to ensure the magazine lock has engaged.
3	If file protect for all cartridges within the magazine is desired, slide the file protect switch to the file protect position. This protects all cartridges without regard to individual cartridge file protect settings.

* Cartridges may be loaded into the magazine while mounted in the FACL, except for the bottom slot.

5-5.4 Unload Tape Cartridges from a FACL Magazine

STEP	ACTION
1	Remove magazine from the FACL. *
2	Release cartridge lock. If only one cartridge is to be unloaded, press the cartridge lock bar. If several cartridges are to be unloaded, press the unlock button.
3	Remove the cartridge from the magazine.

* Cartridges may be unloaded from the magazine while mounted in the FACL, except for the bottom slot.

5-5.5 FACL Cleaning Cartridge Replacement Procedure

The cleaning cartridge has an identification notch.

STEP	ACTION
1	Insert cleaning cartridge, side B first as shown in Figure 5-3, into the first tape cartridge slot. Leave the second slot empty.
2	Mount the magazine into the FACL.
3	Press *SHIFT* and *UNLOAD* together to start the cleaning cartridge replacement mode.
4	Select the replacement menu, CHG CTG, then press *TEST*. The carrier moves up while checking cartridges in the magazine.
5	The old cleaning cartridge is ejected from the cleaning cell and moved to the second slot of the magazine.
6	The new cleaning cartridge is loaded into the drive to identify the type of cartridge, then ejected. If the cartridge is a cleaning type, it is inserted into the cleaning cell.
7	The cleaning cartridge use count is cleared upon replacement.
8	Remove the old cleaning cartridge from the second slot of the magazine and dispose of it.

5-6 MEDIUM CHANGER OPERATING MODES

The FACL has three operating modes: System mode, Auto mode and Manual mode. The mode is selected using the MODE SEL. pushbutton.

The ACL has two operating modes: System mode and Auto mode. The mode is selected using the MODE SEL. pushbutton. Regardless of the selected mode, a hand operation method is also allowed.

5-6.1 FACL Manual Mode

The POSITION pushbutton selects which cartridge is to be loaded. The START pushbutton causes the selected cartridge to be loaded.

5-6.2 System Mode

SCSI medium-changer commands (e.g. MOVE MEDIUM and EXCHANGE MEDIUM commands) are used to move cartridges between the tape drive and magazine.

5-6.3 Auto Mode

Cartridges are selected from the magazine in order. The first cartridge is loaded when the magazine is loaded. When the cartridge in the tape drive is unloaded from the tape drive, the cartridge is returned to its original position in the magazine and then the next cartridge in the magazine is automatically loaded.

5-6.4 Hand Operation Method

This refers to using the medium-changer without a magazine. A cartridge is placed into the tape drive and the cartridge is then automatically loaded. (The medium-changer mode seen at the SCSI interface, System or Auto, is not changed when the hand operation method is used.)

5-7 OPERATOR PANEL MESSAGES

Messages displayed on the operator panel are described in the following paragraphs. The types of messages are listed in the order of their priority from lowest to highest.

5-7.1 Background Messages

This type of message indicates the current drive status. These messages have the lowest priority.

DISPLAY	DESCRIPTION
✳ (or ✳*n*)	No cartridge is loaded.
✳ **CLEAN**	No cartridge is loaded and cleaning is required.
READY U or **BOT RDYU**	The tape is loaded and write is enabled.
READY F or **BOT RDYF**	The tape is loaded with write inhibited.

5-7.2 Host Messages

This 8 or 16 character message is sent from the host system by a DISPLAY command. It is displayed in the mode specified by the control byte.

5-7.3 Fixed Messages

This type of message indicates the state of the drive.

DISPLAY	DESCRIPTION
UNLOADNG	The tape is unloading.
REWINDNG	The tape is rewinding.
LOCATING	Searching for data.
ERASING	Erasing data.
E.O.T.	The tape is at EOT.
CLEANING	Drive cleaning is in progress.

5-7.4 Not-ready Messages

This type of message is displayed when a cartridge is loaded, but the drive is in the offline state.

DISPLAY	DESCRIPTION
NT RDYU	The drive is not ready with write enabled.
NT RDYF	The drive is not ready with write inhibited.

5-7.5 Check Messages

This type of message is displayed when a drive error is detected and requires operator intervention. The messages either contain **CHK** with a hexadecimal error code or indicates that the operator has made an error. Refer to Section 6-4 ERROR RECOVERY.

5-7.6 Ozone Messages

This type of message is displayed where a drive error is detected. The scrolling message contains **OZONE NNNNNNN** and text describing the error. Refer to Section 6-4 ERROR RECOVERY.

5-8 MEDIUM CHANGER MESSAGES

5-8.1 Position Indicator

The following messages are displayed on the Position Indicator of the Medium Changer operator panel.

INDICATION	DESCRIPTION
(unlit)	Magazine is not mounted.
number	Value indicates the magazine position.
-	Magazine is mounted, START has not been pressed.
A	Autoloader is operating: 1. power turned on with a magazine mounted. 2. magazine stopped for loading or ejecting.
C	Cleaning tape is running.
E	Indicates autoloader is in error status. This may indicate the magazine position in case of a feed or return error.
F	Magazine has been ejected and is ready to replace.
H	Cartridge was inserted manually without using a magazine.

5-9 ACL OPERATING INSTRUCTIONS

The ACL and the ACL with magazine are shown in Figure 5-4 and Figure 5-5 respectively.

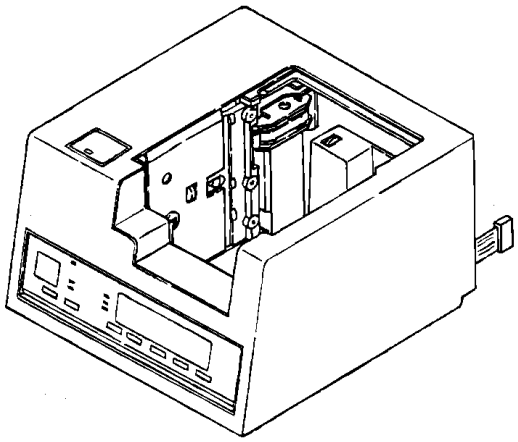


Figure 5-4. ACL

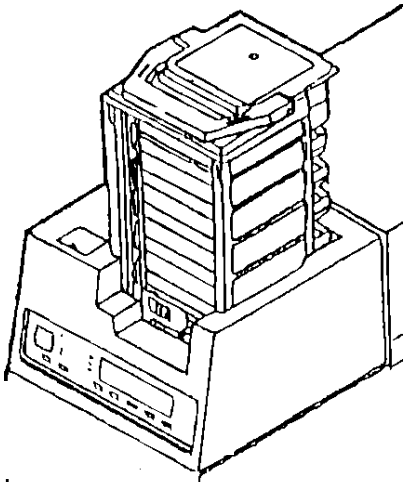


Figure 5-5. ACL with Magazine

5-9.1 Select the ACL Mode

After selecting the mode with this procedure, only use the procedures for that mode.

STEP	ACTION
1	Press *MODE SEL.* until the AUTO LED illuminates for the auto mode or the SYSTEM LED illuminates for the system mode.

5-9.2 Load the ACL with the Magazine

STEP	ACTION
1	Hold the magazine handle and set it in the ACL opening.
2	When the magazine is in position, **-** is indicated on the position indicator.
3	Press *START*. The magazine moves down. The position indicator changes as the magazine moves. (i.e. for 10-cartridge magazine the indicator counts down from 10, shown as a '0', down to 1.)

5-9.3 Eject the ACL Magazine

STEP	ACTION
1	Press *RESET*. The MAGAZINE START LED turns off and **NT RDYU** OR **NT RDYF** is displayed.
2	If a cartridge is loaded, press *UNLOAD*. The cartridge is returned to the magazine.
3	Press *EJECT*. **EJECTING** is displayed while the magazine moves up.
4	When the position indicator changes to **F**, remove the magazine by the handle.

5-9.4 ACL Auto Mode Operation

STEP	ACTION
1	The first cartridge is loaded and the tape is positioned at BOT. The drive enters the ready state.
2	When the LOAD UNLOAD command is issued [a], the tape cartridge is ejected and stored in the magazine. The next cartridge is automatically loaded.

a. The tape cartridge may be unloaded manually by pressing *RESET*, then *UNLOAD*.

5-9.5 ACL System Mode Operation

STEP	ACTION
1	✳**N** is displayed.
2	ACL operation is controlled by the SCSI medium changer commands.
3	When the next LOAD UNLOAD command is issued, the tape cartridge is ejected and stored in the magazine.
4	When MOVE MEDIUM command is issued, the desired cartridge is loaded.

5-9.6 ACL Hand Mode Operation

STEP	ACTION
1	Insert the cartridge directly into the cartridge entry slot on the tape drive.
2	When the cartridge is inserted, the position indicator displays an **H**.
3	Push in the cartridge until it stops.
4	Continue with the Step 2 of the procedure for loading a tape cartridge without the ACL in paragraph 5-4.1.
5	The tape cartridge is unloaded using one of the methods described in paragraph 5-4.3.

5-10 FACL OPERATING INSTRUCTIONS

The FACL is shown in Figure 5-6. Its operation is presented in the following paragraphs.

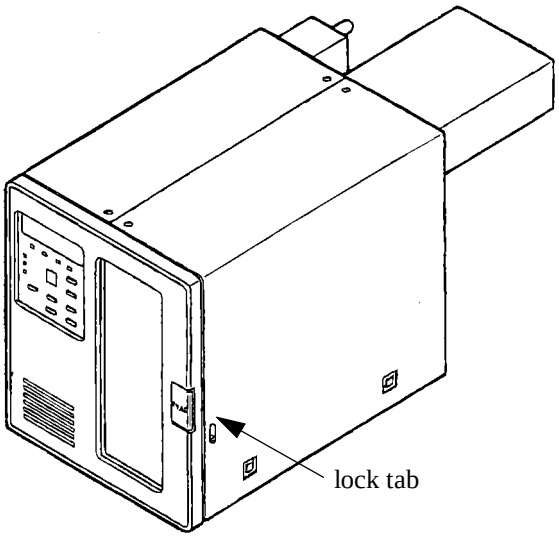


Figure 5-6. FACL

5-10.1 Open and Close FACL Door

To open the spring-loaded door, press PUSH. If the door does not open, press down on the lock tab (side panel) and open the door.

To close the door, press PUSH.

5-10.2 Select the FACL Mode

After selecting the mode with this procedure, only use the procedures for that mode.

STEP	ACTION
1	Press *MODE SEL.* until the AUTO LED illuminates for the auto mode, the SYSTEM LED illuminates for the system mode or the MANUAL LED illuminates for the manual mode.

5-10.3 Mount the FACL Magazine

Refer to Figure 5-7.

STEP	ACTION
1	Open the door (see paragraph 5-10.1) and press PUSH on the magazine loading section. The mounting tray moves forward.
2	Hold the magazine handle and insert the magazine into the mounting tray.
3	Press PUSH on the mounting tray until the device locks into the FACL.
4	Close the door (see paragraph 5-10.1).

5-10.4 Eject the FACL Magazine

Refer to Figure 5-7.

STEP	ACTION
1	Press *RESET*, **AUTOLOAD OPERATION INTERRUPTED** is displayed.
2	Press *RESET*.
3	Open the door (see paragraph 5-10.1) and press PUSH on the magazine mounting tray. The mounting tray moves forward.
4	Hold the magazine handle and remove the magazine from the mounting tray.
5	Press PUSH on the mounting tray until the device locks into the FACL.
6	Close the door (see paragraph 5-10.1).

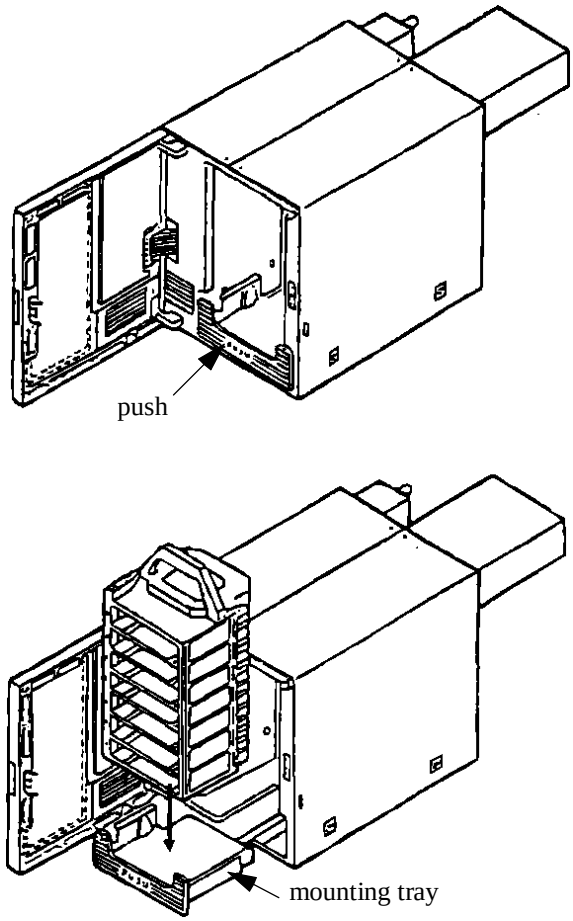


Figure 5-7. FACL Magazine Mount

5-10.5 FACL Auto Mode Operation

STEP	ACTION
1	Press *START* to load the magazine. The first cartridge is loaded and the tape is positioned at BOT. The drive enters the ready state.
2	When the LOAD UNLOAD command is issued [a], the tape cartridge is ejected and stored in the magazine. The next cartridge is automatically loaded.

a. The tape cartridge may be unloaded manually by pressing *RESET*, then *UNLOAD*.

5-10.6 FACL System Mode Operation

STEP	ACTION
1	**✻N** is displayed.
2	FACL operation is controlled by the SCSI medium changer commands.

5-10.7 FACL Manual Mode Operation

STEP	ACTION
1	Select the manual mode (see paragraph 5-10.2). MANUAL LED illuminates.
2	Mount the FACL magazine and close the FACL door (if magazine is not loaded). See paragraph 5-10.3.
3	Select the tape cartridge to be loaded by pressing *POSITION* until the position indicator displays the selected position. **MOVE MAG** is displayed during positioning.
4	Press *START*. **LOADING** is displayed. When loading is complete, **READY U** or **READY F** is displayed.
5	The tape cartridge is unloaded using one of the methods described in paragraph 5-4.3. Open the FACL door for tape cartridge removal.

5-10.8 FACL Cleaning Operation

The cleaning cartridge is retrieved from the cleaning cell, inserted into the drive, then ejected and returned to the cleaning cell upon completion. The cleaning operation can be done by one of two methods.

1. Automatic cleaning mode. In this mode, cleaning is controlled by the device itself.
2. Manual cleaning mode. In this mode, the drive is instructed to start the cleaning procedure from the operator panel.

STEP	ACTION
1	Select the manual mode (see paragraph 5-10.2). MANUAL LED illuminates.
2	Select the cleaning cartridge by pressing *POSITION* until the position indicator displays **C**. **MOVE MAG** is displayed during positioning.
3	Press *START*.
4	Cleaning cartridge loads, cleans the drive, then ejects automatically.

CHAPTER 6

MAINTENANCE AND SERVICING

6-1 INTRODUCTION

This chapter provides the maintenance and servicing instructions required to maintain the M2488 Tape Drive. This chapter is divided into the following subject areas:

6-2 PREVENTIVE MAINTENANCE
6-3 PERFORMANCE VERIFICATION
6-4 ERROR RECOVERY
6-5 CARTRIDGE RECOVERY WITH AN ACL

6-2 PREVENTIVE MAINTENANCE

Table 6-1 describes the preventive maintenance procedures performed on the M2488 tape drive.

Table 6-1. Preventive Maintenance Requirements

PROCEDURE	INTERVAL	PROCEDURE PARAGRAPH
Equipment Cleaning	As needed	6-2.1 on page 6-1
Head Cleaning	After a display of ✳ **CLEAN.** Cleaning is performed automatically with the FACL (see Chapter5).	6-2.2 on page 6-1
Air Filter	As needed	6-2.3 on page 6-2

6-2.1 Equipment Cleaning Procedure

This procedure is used to perform the equipment cleaning on the M2488.

STEP	ACTION
1	Turn power switch to off.
2	Using a soft cloth or vacuum cleaner, remove dust from the equipment exterior.
3	If the exterior is dirty, a soft damp cloth with mild detergent may be used for cleaning.

6-2.2 Head Cleaning Procedure

This procedure is used to perform normal head cleaning on the M2488 with a cleaning cartridge.

STEP	ACTION
1	With power applied, insert the cleaning cartridge into the tape drive.
2	Cleaning time is approximately 60 seconds.
3	When cleaning is finished, cartridge rewinds and ejects automatically.
4	Remove cleaning cartridge and mark cartridge label block.

6-2.3 Air Filter Procedure

Inspect the air filter. If dirty, use the remove and replace instructions which follow.

6-2.3.1 Air Filter Removal

See Figure 6-1.

STEP	ACTION
1	Insert a screwdriver into the bottom left of the front panel under the air filter.
2	Push up with screwdriver, then remove air filter from top of front panel.

6-2.3.2 Air Filter Replacement

STEP	ACTION
1	Insert clean air filter though the top left of the front panel.

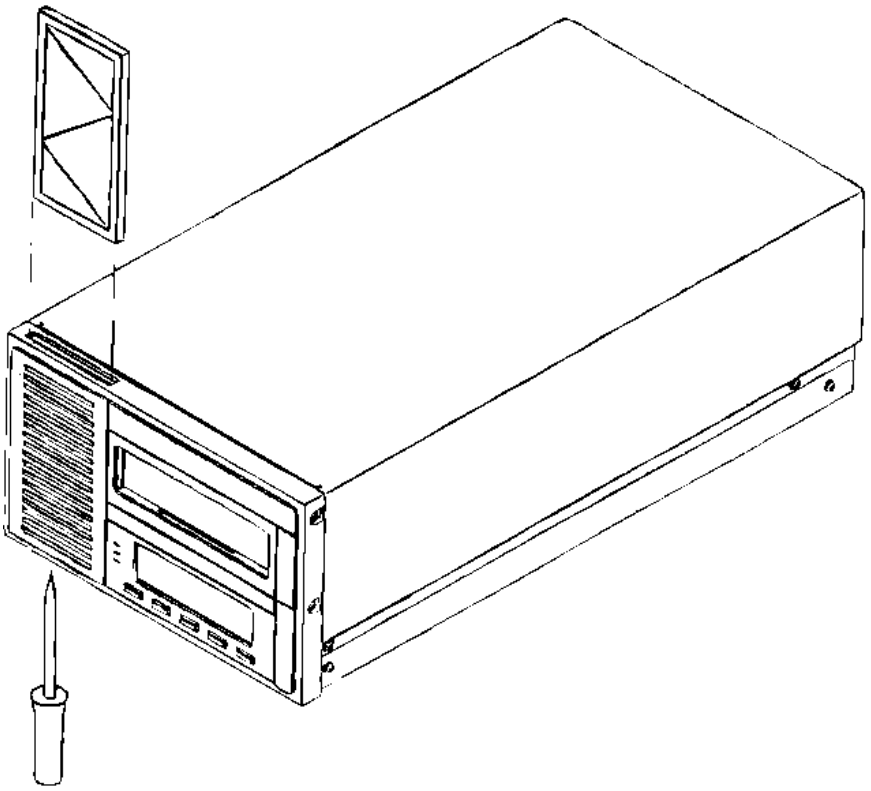


Figure 6-1. Air Filter Removal

6-3 PERFORMANCE VERIFICATION

The M2488 performs a selftest upon power on. During the selftest, **SELFTEST** will be displayed. Upon successful completion of the selftest, the tape drive will return to normal operation with an ✳. If a malfunction occurs, an error code is displayed. Refer to the error code description.

6-4 ERROR RECOVERY

When specific error types are detected by the tape subsystem, messages are displayed on the operator panel display. This section describes the various error types that may be displayed and the appropriate operator and system action required when the error is displayed. Detailed information describing the error codes may be found in the M2488 PRODUCT GUIDE, Appendix F.

6-4.1 OZONE:xxxxyyyy <text>

Ozone messages signal the operator that a microcode self-destruct has just occurred. The microcode controlling the tape unit operation has detected a condition that should "never" occur or a condition that may compromise data integrity. The tape unit has performed an internal reset and returns to a known state. All buffered data is discarded and tape motion is halted. Power On and Not Ready to Ready Unit Attention check conditions are returned to the SCSI host.

Ozone messages may be caused by the following:

- Incorrect and complicated SCSI operation/sequences by
  1) Host adaptor under abnormal conditions
  2) incorrect conditions of SCSI termination or cables.
- Abnormal system configuration such as a duplicated SCSI ID Setting, etc.
- During an error recovery operation for excessively damaged tape media.
- Broken hardware.

xxxxyyyy specify a unique error condition that the microcode has detected. <text> gives a short description of the condition that caused the Ozone. These error codes and text descriptions hold little information for anyone except the firmware developers.

When an Ozone message is displayed, the current job at the host computer should be aborted as data integrity is compromised. Data being written to tape is no longer valid. Read data on tape is not affected on the media.

When an Ozone message is observed, the check code and text message should be recorded as well as the current operating conditions and all data forwarded to your maintenance provider for problem resolution. If possible a Read Buffer CDB specifying the entire 2MB data buffer as a data length and a buffer start address of zero should be issued from the host computer. This data should be made available to the maintenance provider.

A table of ozone codes is not provided in this document as they are of little use to the user of the product and are generated for the use of firmware developers only.

6-4.2 NVRAM Initialization Required

This message is displayed after power on if the non-volatile RAM that contains configuration and setting information is not initialized, i.e.; CRC error when reading the configuration file. It is possible that the NVRAM was previously initialized but has since failed. When this message is displayed the tape unit will not respond to SCSI selection until the configuration is performed via the operator panel. See the User's Guide, 4-2 SETTING MENU.

6-4.3 CHK XX

CHK xx errors signal drive or ACL/FACL errors when displayed on the operator panel. xx may be any hexadecimal value from 00 to FF. When **CHK XX** is displayed, pressing the *TEST* key will cause

the operator panel to scroll a short descriptive text message describing the cause of the error. Pressing the *RESET* key when a **CHK XX** message is displayed erases the message and unloads the tape cartridge and, when an autoloader is installed, ejects the magazine. A description of each check code is contained in the M2488 PRODUCT GUIDE, Appendix E.

The operator should press the *RESET* key to eject the cartridge and magazine after recording the check code and associated text. This information should be provided to the maintenance provider. Host jobs in progress that are using the tape unit should be aborted. Write data should be considered not valid. Read data on the media is not effected.

6-5 CARTRIDGE RECOVERY WITH AN ACL

A CHK C8, CHK C9, CHK D8, or a CHK DA error may occur when using the ACL. These errors may occur due to one of the following:

- The cartridge was not fully inserted into the drive.
- The cartridge was partially ejected into or out of the magazine.
- The mount arm did not return to home position, possibly due to the magazine obstructing the return path.

Press *RESET* to eject the cartridge. If this does not work, continue with the Test Mode procedure to recover the cartridge.

6-5.1 Test Mode Procedure

This procedure is used to recover a cartridge that has not loaded or ejected properly. This procedure will only function if the tape system's power supply, logic and electromechanical processes are intact.

****
****

Confine hands to the Operator Panel to prevent injuries from moving parts.

The Test Mode, unlike the normal operating mode, keeps driving the motor selected by the operator while the pushbutton is depressed. If the electromechanical assembly binds, immediately release the pushbutton.

Complete the steps of the procedure in the order presented. While in the Test Mode, the *START* and *UNLOAD* pushbuttons enable the various electromechanical assemblies to move vertically or horizontally.

STEP	ACTION
1	Power off the tape drive.
2	Look through the back of the magazine to determine the position of the tape cartridge, the magazine, and the mount arm are in relationship to each other. A light source may be needed to complete this task.
3	Apply power to the tape drive, then immediately press and hold the *EJECT + MODE SEL + TEST* pushbuttons. Release the pushbuttons when the display indicates **ACL TEST**. The drive is now in Test Mode.
4	Press *TEST* until **PWM=35%** is displayed.
5	Change the PWM value to 50% by pressing *START* or *UNLOAD*.
6	Look through the back of the magazine to determine the position of the mount arm. If the mount arm is obstructed, go to paragraph 6-5.2 on page 6-5. Otherwise go to paragraph 6-5.3 on page 6-5.

6-5.2 Cartridge Recovery With Mount Arm Obstruction

After completing the Test Mode procedure, continue with this procedure only if directed to do so when the mount arm **is** obstructed.

STEP	ACTION
7	Press *TEST* until **MGMTR DV** is displayed.
8	Using *UNLOAD* or *START*, move the magazine up or down to position the mount arm in the magazine opening.
9	Continue with the procedure in paragraph 6-5.3 on page 6-5.

6-5.3 Cartridge Recovery With No Mount Arm Obstruction

Continue with this procedure when directed to do so from one of the previous procedures.

STEP	ACTION
10	Press *TEST* until **PUMTR DV** is displayed.
11	Press *UNLOAD* to insert the cartridge fully into the loader.
12	Press *START* to return the mount arm to the home position.
13	Press *TEST* until **MGMTR DV** is displayed.
14	Press and hold *UNLOAD* to raise the magazine.
15	Release *UNLOAD* when the magazine is disengaged, then remove the magazine.
16	Press *RESET* to reinitialize the tape drive.
17	After the tape cartridge is ejected, remove it manually.

CHAPTER 7

PARTS LIST

7-1 INTRODUCTION

Chapter 7 provides parts information on the M2488 Cartridge Tape Drive and optional equipment as described in the following paragraphs:

7-2 M2488 MODELS AND OPTIONS

7-2 M2488 MODELS AND OPTIONS

Table 7-1 describes the M2488 Cartridge Tape Drive models available. The Description column describes all equipment that is included in that model/part number. Table 7-2 describes the optional equipment available for use with the M2488 Cartridge Tape Drive.

Table 7-1. M2488 Models

MODEL	PART NUMBER	DESCRIPTION **
M2488C Cartridge Tape Drive	CA01311-B002	Desktop drive Requires one of options M2488A31 through A34, see Table 7-2.
M2488CA Cartridge Tape Drive	CA01311-B020	Desktop drive ACL Requires one of options M2488A31 through A34, see Table 7-2.
M2488CF Cartridge Tape Drive	CA01311-B030	Desktop drive FACL Requires one of options M2488A31 through A34, see Table 7-2.
** All models are FJ Standard color. Any of the IPMs listed in Table 7-2 may be used with the models listed in this table.		

Table 7-2. Optional Equipment

MODEL	PART NUMBER	DESCRIPTION
M2488A31 IPM 1Kit	CA01311-K031	IPM - Fast/Wide Single-ended Terminator
M2488A32 IPM 2 Kit	CA01311-K032	IPM - Fast/Wide Differential Terminator
M2488A33 IPM 3Kit	CA01311-K033	IPM - Narrow Single-ended Terminator
M2488A34 IPM 4Kit	CA01311-K034	IPM - Narrow Differential Terminator
M2488A41 Support Base	CA01311-K041	ACL Standard Option for 10 CTG Magazine (Models M2488CA1 through CA4)

Table 7-2. Optional Equipment (Continued)

MODEL	PART NUMBER	DESCRIPTION
M2481A11 ACL	B03B-5400-H011A	Automatic Cartridge Loader
Cartridge Magazine 5	B03B-5400-H205A B03B-5400-H305A	ACL 5-cartridge Magazine ACL 5-cartridge Magazine (black)
Cartridge Magazine 10	B03B-5400-H210A B03B-5400-H310A	ACL 10-cartridge Magazine ACL 10-cartridge Magazine (black)
M2483A12 FACL	CA01032-B001	Flush-mount Automatic Cartridge Loader
Cartridge Magazine 7	CA01951-0241	FACL 7-cartridge Magazine
M2483A21 Rack Mounting	B03B-5530-H021A	M2488, with or without ACL, rack-mount tray
M2483A22 Front Panel	B03B-5530-H022A	Front Fitting Panel for tray with 1 drive in right side
M2483A23 Front Panel	B03B-5530-H023A	Front Fitting Panel for tray with 2 drives
M2483A24 Front Panel	B03B-5530-H024A	Front Fitting Panel for tray with 1 drive with ACL in right side
M2483A25 Front Panel	B03B-5530-H025A	Front Fitting Panel for tray with 2 drives with ACLs
M2483A26 Front Panel *	B03B-5530-H026A	Front Fitting Panel for tray with 2 drives with 1 ACL in left side
M2483A27 Front Panel *	B03B-5530-H027A	Front Fitting Panel for tray with 1 drive in left side
M2483A28 Front Panel *	B03B-5530-H028A	Front Fitting Panel for tray with 1 drive with ACL in left side
M2483A29 Front Panel *	B03B-5530-H029A	Front Fitting Panel for tray with 2 drives with 1 ACL in right side
M2488A51 Conversion Kit	CA01311-K051	Cabinet parts for desktop ACL upgrade
M2488A61 Conversion Kit	CA01311-K061	Cabinet parts for desktop FACL upgrade
M2488A62	CA01311-K062	Spare bezel kit
M2488A81	CA01311-K081	M2488 with FACL rack-mount kit
M2488A8x (x= 2-9)		Faceplate for M2488A81
M2488A91	CG01000-0104xx	Kit, Seismic, Diana
	CG00000-0114XX	M2488 User's Guide
	CG00000-0115XX	M2488 Product Guide

* Not available in the U. S. A.

APPENDIX G

GLOSSARY

This glossary defines all acronyms associated with the M2488 tape drive.

ACRONYM	DEFINITION
A	
A RMS	Amperes Root-Mean-Square
AC	Alternating Current
ACK	Acknowledge
ACL	Automatic Cartridge Loader
AEN	Asynchronous Event Notification
AENC	Asynchronous Event Notification Capability
ANSI	American National Standard Institute
ASC	Additional Sense Code
ASCII	American Standard Characters for Information Interchange
ASCQ	Additional Sense Code Qualifier
ATN	Attention
ATTN	Attention
AUTO	Automatic
AVC	Automatic Velocity Control
B	
B	Byte
b	Byte or binary
BIS	Block Identifiers Supported
BOP	Beginning of Partition
BOT	Beginning of Tape
BPU	Block Position Unknown
BSY	Busy
BT	Block Address Type
BTU	British Thermal Unit

ACRONYM	DEFINITION
C	
CAF	Change Active Format
CAP	Change Active Partition
CDB	Command Descriptor Block
CE	Compression Engine
CHK	Check
CMD	command
CmdQ	Command Queuing
COMP	Compress
CNJ	Connector Jack
CNP	Connector Plug
CP	Change Partition or Control Processor
CRC	Cyclic Redundancy Check
CRRZ	Read Data ECC Summary Register (2/7)
CRS	Read Data ECC Summary Register (1/7)
CST	Cartridge System Tape (165m long)
CTG	cartridge
CTLR	controller
CTS	Clear to Send
D	
DB	data bus
dB	decibel
DBD	Disable Block Descriptor
DBR	Data Buffer Recovery
DCD	Data Carrier Detect
DCR	Disable Correction
DDR	Dynamic Device Reconfiguration
DE	Decompression Engine
Dev	Device

ACRONYM	DEFINITION
DevOfL	Device Offline
DID	Density ID
DMA	Direct Memory Access
DQUE	Disable Queuing
DRAM	Dynamic Random Access Memory
DRV ERR	Drive Error
DS	Disable Save
DSR	Data Set Ready
DTC	Drive Tape Controller
DTDC	Data Transfer Disconnect Control
DTE	Disable Transfer on Error
DTR	Data Terminal Ready
DU	Disable Update
DVL	Drive Logic (Printed Circuit Board)

E

EAENP	Error Asynchronous Event Notification Permission
EC	Engineering Control
ECC	Error Correction Code
ECCST	Enhanced Capacity Cartridge System Tape (332m long)
ECMA	
EDRC	Enhanced Data Recording Capability
EECA	Enabled Extended Contingent Alliance
EEG	Enable EOD generation
EER	Enable Early Recovery
EMI	Electro-magnetic Interference
EOD	End-of-Data
EOM	End-of-Medium
EOP	End-of-Partition
EOT	End-of-Tape

ACRONYM	DEFINITION
ERPA	Error Recovery Procedure Action
ETC	Enable Threshold Comparison
ETPA	Error Track Pointers Group A
ETPB	Error Track Pointers Group B
EVPD	Enable Vital Product Data

F

FACL	Flush-mounted Automatic Cartridge Loader
FDXC	Formatter Data Transfer Control
FDXS	Formatter Data Transfer Status
FIFO	First In, First Out
FJ	Fujitsu Japan
FMT	Formatter Function
FMT_RD	Formatter Read Control Registers
FRU	Field Replaceable Unit
FSC	Fault Symptom Code

G

GB	gigabyte
GND	Ground

H

h	hexadecimal
HltLd	Halt Load
Hz	Hertz

I

I/F	interface
I/O	input/output
IBG	Internal Block Gap
IC	integrated circuit
ID	Identification

ACRONYM	DEFINITION
ILI	Incorrect Length Indicator
Immed	Immediate
ImpExp	Import/Export
INTEN	Interrupt Enable
IPM	Interface Personality Module
IRCM	Interrupt Request Controller mask
ISO	International Standards Organization

K

KB	kilobyte
kg	kilogram

L

lbs.	pounds
LED	Light Emitting Diode
LEOT	Logical End-of-Tape
LIFO	Last In, First Out
LP	Load Point
LSB	Least Significant Bit
LSI	Large Scale Integration
LU	Logical Unit
LUN	Logical Unit Number
LUNTAR	Logical Unit Number Target
LVL	level
LWR	Loop Write to Read

M

m	meter
m/s	meters per second
MB	megabytes

ACRONYM	DEFINITION
MB/s	megabytes per second
MC	medium changer
MCL	Medium Changer Logical address
MHz	megahertz
mm	millimeter
ms	milliseconds
MSB	Most Significant Byte
Msg	Message
MTBF	Mean-Time-Between-Failures
MTC	Magnetic Tape Controller
MTTR	Mean-Time-To-Repair
MTU	Magnetic Tape Unit

N

ns	nanoseconds
NVRAM	Nonvolatile Random Access Memory

O

Op Code	Operation Code
OP	Operator Panel
OS	Operating System

P

PC	Page Control
PCA	Printed Circuit Assembly
PCBA	Printed Circuit Board Assembly
PCC	Processor Companion Chip
PCR	Parameter Code Reset
PEOT	Physical-End-Of-Tape
PER	Post Error Recovery
PF	Page Format

ACRONYM	DEFINITION
PID	Product ID
PS	Parameters Savable
PSU	Power Supply Unit

R

RAM	Random Access Memory
RBE	Read Block Error register
RBID	Read Block ID
RBO	Recover Buffer Order
Rd	read
RDC	Read Circuit Control Register
RDE	Read data Error Register
RDL	Read Logic (Printed Circuit Board)
RDY	Ready
RelAdr	Relative Addressing
REQ	Request
Reten	Retension
REW	Report Early Warning / Rewind
RI	Ring Indicator
RLEC	Report Log Exception Condition
RMB	Removable Medium Bit
ROM	Read Only Memory
RSVP	Read Signal Verification Processor
RTS	Request to Send
RX	Receive Data

S

SavImp	Save Implemented
SCSI	Small Computer System Interface
SDDP	Super Duper Data Path
SDTR	Synchronous Data Transfer Request

ACRONYM	DEFINITION
SEL	Select
SEW	Synchronize at Early Warning
SFTRE	Soft Reset
SG	Scatter/Gather logic
SIC	SCSI Interface Controller
SILI	Suppress Incorrect Length Indication
SKSV	Sense Key Specific Valid
SNDA	
SOCF	Stop On consecutive Filemarks
SP	Save Pages
SPC	SCSI Protocol Controller
SValid	Source Valid
SVL	Servo Logic (Printed Circuit Board)
Sync	Synchronous

T

TB	Transfer Block
TLN	Test List Number
TLUN	Target Logical Unit Number
TM	Tape Mark
TMC	Threshold Met Criteria
TMT	Tape Motion Time
TrmIOP	Terminate I/O Process
TSD	Target Save Disable
TX	Transmit Data

U

UAAENP	
UnitOfL	Unit Offline

ACRONYM	DEFINITION
V	
VAC	Volts AC
VFC	Variable Frequency Oscillator Control register
VPD	Vital Product Data
W	
WBus	wide bus
WCT	Write Circuit Control register
WDTR	Wide Data Transfer Request
WEL	Write Error Length register
WES	Write Error Summary register
WP	Write Protected
Wr	Write
WRE	Write Residual Byte
WTL	Write Logic
WTROM	Write to Read Only Memory
X	
XCL	cartridge loader x= A (automatic) or FA (flush-mounted automatic)
XFR	transfer

APPENDIX I

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COMMENT FORM

We would appreciate your comments and suggestions regarding this manual.

Manual Code	C144-E018-03EN
Manual Name	M2488 CARTRIDGE TAPE DRIVE USER'S GUIDE

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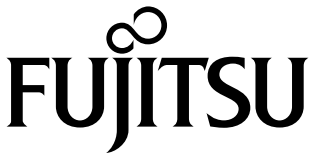
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