

***TMC-850M***  
***User's Guide***

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**8-Bit High Performance  
SCSI Host Adapters**



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## **Federal Communications Commission Radio Frequency Interference Statement (USA Only)**

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This equipment generates and uses radio frequency energy and may, if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, cause interference to radio and television reception.

It has been type-tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference in a residential installation. Shielded data cables were used during the type test; therefore, properly shielded and terminated data cables should be used to reduce potential interference. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio and television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna
- Relocate the computer with respect to the receiver
- Move the computer away from the receiver
- Plug the computer into a different outlet so that computer and receiver are on different branch circuits

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions.



## **PREFACE**

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This manual provides step by step instructions for installing your TMC-850M host adapter. The TMC-850M has been designed to provide easy PLUG & PLAY<sup>®</sup> installation.

Please take a few moments to familiarize yourself with the contents of this manual. Follow the installation instructions as they apply to your particular installation. Then familiarize yourself with the software utilities to be used.

Requirements before using Future Domain's Small Computer Systems Interface (SCSI) TMC-850M host adapter, are as follows:

IBM PC XT/AT or compatible computer

SCSI device(s) such as hard disk, WORM optical disk, CD-ROM player, tape drive or other SCSI peripherals.

PC-DOS or MS DOS version 3.X or greater.

The following operating systems are also supported for the TMC-850M.

INTERACTIVE UNIX 386/ix V1.0.6 and V2.X  
SCO XENIX operating system V2.2 and V2.3  
Novell Version 2.1X  
Novell Version 3.1X  
IBM/Microsoft OS/2

Drivers for these operating systems may be purchased from Future Domain. Support for other versions of operating systems on the TMC-850M are available from other vendors.



The description in this manual refers to using the DOS operating system. If another operating system is used, certain changes may apply. For questions that are specific to an operating system, please refer to that particular operating system's documentation.

## Using This Manual

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Chapter 1, **INTRODUCTION**, contains a brief overview and list of features of the TMC-850M.

Chapter 2, **CONFIGURATION**, discusses factory settings and has a "Quick Reference Guide."

Chapter 3, **INSTALLATION**, contains instructions on how to install the TMC-850M in your computer.

Chapter 4, **TECHNICAL REFERENCE**, includes sections on SCSI BIOS, jumper settings, connector pinouts and termination.

Chapter 5, **TROUBLESHOOTING**, includes information about Diagnostic and Error Messages and Problem Determination Procedures.

Chapter 6, **NOTES**, is provided for manual revisions, technical tips and/or updates provided by Future Domain.



## **Additional Documentation**

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The following information may be used as a supplement to this manual.

Future Domain's OEM Developer's Toolkit Manual (model number FDC-OEM) contains additional information specific to Section 4.1.4, **Special Sector Size Handling**. Future Domain's TMC-950 Technical Reference Manual (model number FDC-950T). Future Domain documentation may be purchased by contacting your nearest authorized dealer or distributor.

**"Electromagnetics,"** John D. Kraus, Keith R. Carver, McGraw Hill, 1973, Chapter 13 may be used as a reference to Section 4.6, **Termination**.



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## 1.0 INTRODUCTION

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The TMC-850M supports SCSI devices such as CD-ROMs, WORM optical disks, hard drives, tape drives and other SCSI devices that conform to SCSI-1 (ANSI X3.131-1986) or the 8-bit wide SCSI-2 specifications.

The TMC-850M is an advanced design that requires no user configuration in most installations. It is a true PLUG & PLAY<sup>®</sup> host adapter for PC XT/AT and 386 computer systems. The BIOS automatically adjusts for use in the system. The SCSI host adapter uses no DMA channels, no I/O ports, and no interrupts under PC/MS-DOS. All operations are memory mapped.

The standard configuration uses 8K of memory space at address CA000 in the system (the area reserved for ROM BIOS).

### 1.1 TMC-850M Features

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- Future Domain SCSI BIOS supports a maximum of two SCSI disk drives. Additional devices require a separate driver.
- For PC XT/AT bus systems.
- High performance.
- 50-pin internal SCSI and 25-pin external SCSI Apple signal connectors.
- Jumpers: Six alternate addresses (four jumpers) and two interrupts (3 and 5).

**NOTES**

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## 2.0 CONFIGURATION

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### 2.1 Factory Configuration

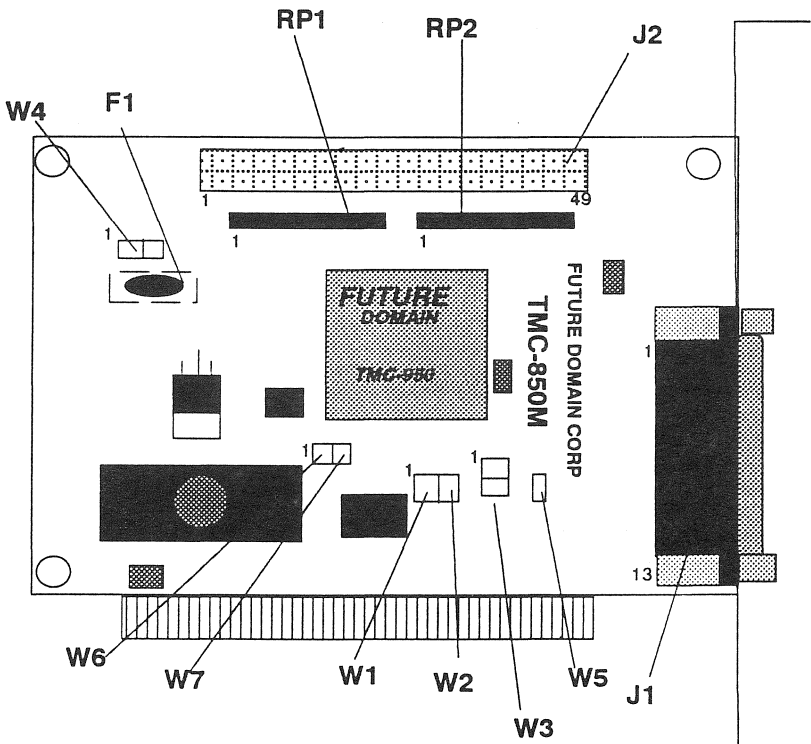
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The TMC-850M SCSI host adapter and ROM BIOS are factory configured as follows:

- BIOS/Host Adapter Address: CA000 (W1, W2 OPEN)  
(W3: 1-3, 2-4, OPEN)
- Interrupts used: None under DOS, jumper set for interrupt 5 (W7)
- I/O Ports used: None
- The SCSI BIOS supports up to two hard disk drives. Other devices require a separate driver.
- If the factory configuration meets your requirements, proceed to Chapter 3, **INSTALLATION**. If you need to modify the configuration of the TMC-850M, read Chapter 4, **TECHNICAL REFERENCE**.

## 2.2 Quick Reference Guide

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## TMC-850M Jumper Settings

TMC-850M SPECIFIC JUMPER SETTINGS		
JUMPER	SETTING	FUNCTION
<b>W4</b>	1	TERMINATION POWER ENABLED
	0	TERMINATION POWER DISABLED
<b>W5</b>	1	ZERO WAIT STATE ENABLED
	0	ZERO WAIT STATE DISABLED
<b>W6</b> PIN 1-2	1	IRQ 3
<b>W7</b> PINS 2-3	1	IRQ 5

NOTE:    1 = SHORTED  
          0 = OPEN

TMC-850M ADDRESS JUMPER SETTINGS				
JUMPER SETTINGS			MEMORY RANGE	FUNCTIONS
W1	W2	W3		
0	0	1-2, 3-4	CA00h	PRIMARY ADDRESS RANGES
0	1	1-2, 3-4	C800h	
1	0	1-2, 3-4	CE00h	
1	1	1-2, 3-4	DE00h	
0	0	1-3, 2-4	E800h	EXTENDED RANGE
1	0	1-3, 2-4	EC00h	EXTENDED RANGE

NOTE:    1 = SHORTED  
          0 = OPEN



UNIX, XENIX and Novell operating system drivers utilize hardware interrupts. When interrupts are used under these operating systems, be sure the device driver specifies the same interrupt line jumpered on the board.

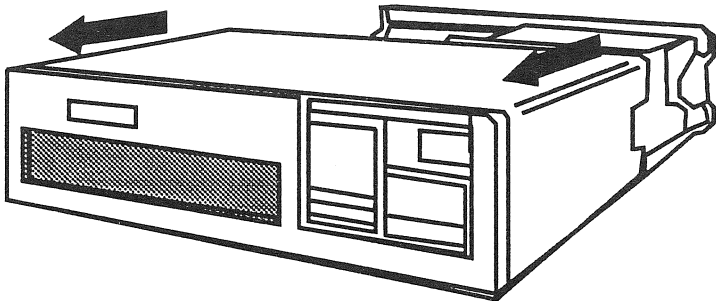
## 3.0 INSTALLATION

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### 3.1 Pre-Installation Instructions

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- Step 1. The tools required to install the TMC-850M and most hard disks or tape drives are:
- Screwdriver or 3/16" nutdriver
  - Installation instructions for the particular disk or tape drive
- Step 2. Place the system unit switch to the **OFF** position.
- Step 3. Turn **OFF** all external equipment.
- Step 4. Remove the system unit cover by following the instructions provided with the system. For IBM PC/AT systems, use the screwdriver to remove the screws at the rear of the system cabinet and slide the unit cover forward and off. See diagram below.



- Step 5. Locate an unused 8- or 16-bit expansion slot in the system unit. Using the screwdriver or 3/16" nutdriver, remove the screw holding the system expansion slot cover in place by turning it counterclockwise.

### 3.2 Internal Installation

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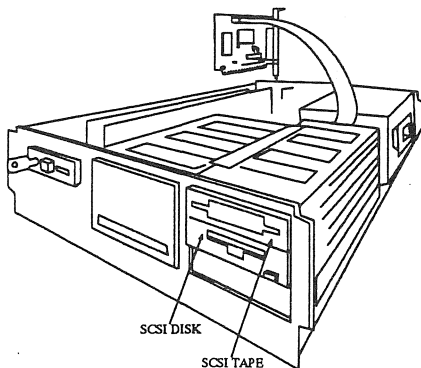
The following steps are for installing SCSI peripherals inside a system cabinet. Proceed to Section 3.3, **External Installation**, if using an external cabinet.

- Step 1. Locate the 50-pin SCSI ribbon cable and install one end on the 50-pin SCSI header **J2** on the TMC-850M. The red or blue stripe on the cable should be aligned with the side of the header labeled **1**. See the figure below:



**50-Pin Header(J2)**

- Step 2. Align the TMC-850M board with an 8- or 16-bit expansion slot and firmly plug it in. Reinstall the screw to secure the TMC-850M in the expansion slot.
- Step 3. Pictured below is a typical installation with a hard disk drive and a half-high tape drive in a PC/AT.



- Step 4. Up to six SCSI hard disk drives may be supported by the TMC-850M. The SCSI ID of a hard disk may be set at ID 0 to 5, with 0 as the ID of the first drive (each drive must be set to a different ID). The TMC-850M does not require any SCSI ID jumper settings because the on-board ROM BIOS contains a feature that automatically reads the setting on the installed drives. Refer to your hard disk installation manual for setting SCSI IDs. Only the devices at the ends of the SCSI cables are terminated. See Section 4.6, **Termination**, for more information.
- Step 5. When installing a tape or CD-ROM drive, assign it to a unique SCSI address which does not conflict with any of the disk drive addresses assigned in step 3. SCSI address 6 may not be assigned to the tape as this address is reserved for the host adapter. See your tape drive installation manual for details on setting the SCSI address.



If no disk drives are being used, and the TMC-850M is only being used to control tape, CD-ROM or optical drives, you may remove the BIOS ROM chip to speed up booting.

- Step 6. Install the SCSI disk and/or tape drive according to the manufacturer instructions. The hard disk and/or tape drive must have embedded SCSI control and be supported by the TMC-850M. Plug the 50-pin cable into the 50-pin connector on the back of the drive. Observe pin 1 on both the drive connector and cable.

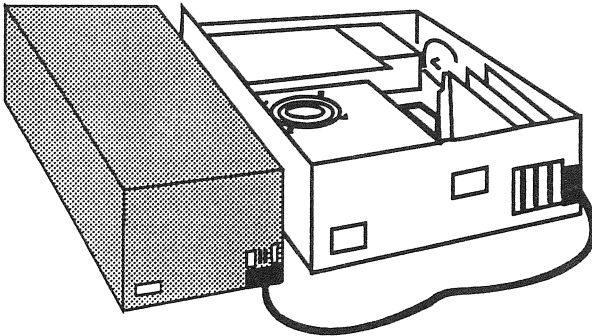
Due to the limited space in many PCs, it may be easier to plug in the SCSI cable before permanently mounting the device into place.

### 3.3 External Installation

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The following steps are for installing SCSI peripherals in an external cabinet.

- Step 1. Align the TMC-850M board with the expansion slot and firmly plug in. Reinstall the screw to secure the TMC-850M in the expansion slot.
- Step 2. Plug the 25-pin connector of the shielded cable (Future Domain model HCA-120 or equivalent) into the 25-pin connector at the rear of the TMC-850M board. Secure the cable to the TMC-850M using the thumbscrews on the cable.
- Step 3. Connect the other end of the cable to the connector of the external SCSI device, as shown below.



Host Adapter  
Connector Cable



Only the last device in the external box should be terminated. Refer to Section 4.6, **Termination** and to your drive manufacturer's instructions for details on termination. If internal and external devices are installed, remove resistor packs RP1 and RP2 from the TMC-850M.

### 3.4 Post-Installation Instructions

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Step 1. Reassemble the system unit using the reverse procedure from that used during disassembly.

Step 2. After the system has been reassembled, turn the power ON. After a short time, the cursor should be displayed on the monitor and the Future Domain banner will be displayed.

As each drive is identified on the display, the following message will appear on the screen:

```
SCSI N LUN n xxxx          www
yyy Bytes per Sector
```

**Where:**

**N** = The SCSI address of the drive (0-5).

**n** = The SCSI LUN address of the device.

**xxxx** = Disk Drive Type and Version Number. This is a copy of the ASCII character string that is returned by the drive in response to a SCSI Inquiry Command.

**www**=Firmware revision of the device reported in the SCSI Inquiry Command

**yyyy** = Number of bytes per physical sector reported by the drive.

This prompt identifies the type of hard disk drive attached and indicates that the preliminary self test has passed. If you are installing only a tape drive, this message will not appear on the screen, and your computer should bootup in the normal manner.

After the screen has been displayed, your SCSI device(s) is now ready for use by the operating system.

If the Future Domain banner does not appear or your computer failed to boot properly, see Chapter 5, **TROUBLESHOOTING**.

### **3.5 Optical Drives**

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If you are installing a SCSI optical drive, it may be configured at any of the SCSI IDs 0-5.

To boot the system from the hard disk, configure the hard disk at a lower ID than the SCSI optical drive. For example, configure the hard disk at SCSI ID 0 and the optical drive at one of the higher SCSI IDs (1, 2, 3, 4, 5).

Please refer to the optical drive's installation manual for more information.

### **3.6 Tape or CD-ROM Drives**

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When installing a tape or CD-ROM drive, assign it to a unique SCSI address which does not conflict with any of the disk drive addresses assigned in step 3. SCSI address 6 may not be assigned to the tape or CD-ROM, as this address is reserved for the host adapter. See your tape or CD-ROM drive installation manual for details on setting the SCSI address.

### **3.7 Configuring for IBM AT or Compatibles**

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The following steps cover the disk system setup for disk type configuration (for PC/AT computers). Use your manufacturer's setup program or built-in BIOS setup for these steps. See your manufacturer's manual for details in switch settings or specific operation of the setup program.



## Under DOS

If using a ST-506 or ESDI disk, one of these must be the boot device. Setup the ST-506 or ESDI disk drive types as non-SCSI drives. SCSI drive type reporting is handled automatically by the Future Domain ROM BIOS extension on your host adapter.

If using only SCSI disks, setup your system to show zero hard disks installed. The SCSI disk type reporting is handled automatically by the Future Domain ROM BIOS extension on your host adapter.



Once the disk drives are connected and the names of each drives is displayed during bootup, it is now time to partition and format the SCSI disk. To do this, you can use either Future Domain's The Disk Maestro™ software or the standard DOS FDISK and FORMAT if only a single drive is being used.

## Under Novell

Refer to the DOS section.

## SCSI Bootable

Set the number of hard disks in your system to zero. The SCSI disk type reporting for SCSI disks is handled automatically by the Future Domain ROM BIOS extension on your host adapter. Any ST-506/ESDI disk must be installed only after the SCSI boot disk installation is completed. When any ST-506/ESDI disks are installed, they will be configured and reported via kernel drivers and system software. **DO NOT** use your setup program to report the ST-506/ESDI drives—leave your CMOS setup as zero drives shown.



If ST-506/ESDI drives are in the system, the SCSI drive is not bootable.

**ST-506/ESDI Bootable**

Setup your system to show the ST-506 and ESDI drives as detailed in your manufacturer's instructions. **DO NOT** report any SCSI disks in your setup. Disk type reporting for SCSI disks is handled automatically by Future Domain's ROM BIOS extensions on your host adapter.

## 4.0 TECHNICAL REFERENCE

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This chapter contains technical information about the TMC-850M. Included in this chapter are sections on Boot Sequence, Special Sector Size Handling, Address Jumpers and Interrupts. Also included in this chapter are sections outlining External SCSI Connectors, Internal SCSI Connector, and Termination.

### 4.1 SCSI BIOS

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#### 4.1.1 General Description

---

The Future Domain ROM BIOS is compatible with the IBM PC AT adapter ROM BIOS interface specifications and utilizes the standard Interrupt 13 mass storage vector. It contains the capability to allow booting from devices that can be made IBM media compatible.

In addition to the basic set of commands, extensions are available to provide direct control of SCSI devices for the purposes of control, identification, formatting, extended addressing, etc.

The ROM BIOS also maintains information in a private RAM table that may be useful to the writer of device drivers of utilities.



Only one Future Domain ROM BIOS is supported per installation.

## 4.1.2 Addressing Conventions

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The ROM BIOS has conventions concerning the use of SCSI addresses and LUN assignments. The BIOS performs its scan for drives at SCSI addresses in the following order:

SCSI ID 0 LUN 0
SCSI ID 1 LUN 0
SCSI ID 2 LUN 0
SCSI ID 3 LUN 0
SCSI ID 4 LUN 0
SCSI ID 4 LUN 1
SCSI ID 4 LUN 2
SCSI ID 4 LUN 3
SCSI ID 5 LUN 0
SCSI ID 5 LUN 1
SCSI ID 5 LUN 2
SCSI ID 5 LUN 3

A SCSI device that allows addressing of LUNs other than 0 must be setup at SCSI ID 4 or 5.

If a device does not properly return an error code when the incorrect LUN is addressed, it cannot be set at SCSI ID 4 or 5. The symptom of this error is that the same drive name will appear multiple times on the screen during bootup.

When installing a tape or CD-ROM drive, assign it to a unique SCSI address which does not conflict with any of the disk drive addresses assigned in step 3. SCSI address 6 may not be assigned to the tape as this address is reserved for the host adapter. See your tape drive installation manual for details on setting the SCSI address.

### 4.1.3 Boot Sequence

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The ROM BIOS follows the rules for a mapped BIOS in the system and is executed at boot time by the system BIOS. The SCSI drives are scanned in the address order described in Section 4.1.2, **Addressing Conventions**, and are located as follows:

- Step 1. An initial search of the addresses is performed using the Test Unit Ready command looking for a drive that responds. This search allows for drives coming up to speed in slightly different orders.
- Step 2. The next sequence of searching for drives restarts at the first drive. Each address is checked using the SCSI Test Unit Ready command. If there is a time-out during the selection phase (500 ms), the address is skipped and the next address is interrogated.
- Step 3. If a drive responds to the Test Unit Ready command, whether it is ready or not, the drive is sent an Inquiry command to read out the drive description. This is displayed on the screen along with the drive's SCSI address and LUN number.
- Step 4. The SCSI bus was checked for a parity error during the issuing of the Test Unit Ready command. If the adapter detected a parity error, further checking for parity on the SCSI bus is disabled. A message is output indicating that SCSI bus parity is not being checked.
- Step 5. The SCSI Read Capacity command is issued to determine the size of the drive. This number is used to make up drive parameters to report to ROM BIOS users.
- Step 6. The sector size of the device is displayed. Normally this value is either 256 or 512. Other values may occur for such things as optical drives which have a non-standard sector size and are supported by a separate loadable driver.

Step 7. The search for drives continues until either the last address is reached, or the maximum of 6 drives is located.

#### 4.1.4 Special Sector Size Handling

---

Two different sector sizes are supported. They are 256 and 512 bytes per sector. All drives with 256 byte sectors appear, to the user of the ROM BIOS, to have 512 bytes.

Drives for sector sizes other than 256 or 512 that have been reported are part of the drive addressing scheme, but all read, write, and verify commands are completed with an error code.

Magnetic media to be run by the system should be assigned to the lower SCSI addresses, while optical media should be assigned to an upper SCSI address, i.e. SCSI address 5. This allows booting from the magnetic media, whereas a device with a non-standard sector size will not be allowed to boot. Future Domain's OEM Toolkit Developer's Manual contains additional detailed information. See, **Additional Documentation**, located in the **PREFACE**.

## 4.2 Address Jumpers

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The TMC-850M ROM is mapped into memory space in the PC XT/AT/386. The default address is CA00:0000. This address will work for a large majority of applications. If another device is mapped into this space, there are five other addresses the adapter will map into. The address area mapping is controlled by the jumpers W1, W2 and W3.

The **AS-SHIPPED** condition of the TMC-850M is to have jumpers in the position as illustrated below.

TMC-850M SPECIFIC JUMPER SETTINGS		
JUMPER	SETTING	FUNCTION
W4	1	TERMINATION POWER ENABLED
	0	TERMINATION POWER DISABLED
W5	1	ZERO WAIT STATE ENABLED
	0	ZERO WAIT STATE DISABLED
W6 PIN 1-2	1	IRQ 3
W7 PINS 2-3	1	IRQ 5

NOTE: 1 = SHORTED  
0 = OPEN

To change the TMC-850M's board address, use the jumpers to set the address to one of the three other possible adapter addresses shown below.

TMC-850M ADDRESS JUMPER SETTINGS				
JUMPER SETTINGS			MEMORY RANGE	FUNCTIONS
W1	W2	W3		
0	0	1-2, 3-4	CA00h	PRIMARY ADDRESS RANGES
0	1	1-2, 3-4	C800h	
1	0	1-2, 3-4	CE00h	
1	1	1-2, 3-4	DE00h	
0	0	1-3, 2-4	E800h	EXTENDED RANGE
1	0	1-3, 2-4	EC00h	EXTENDED RANGE

NOTE: 1 = SHORTED  
0 = OPEN

For easy future reference, write down the Alternate Address you selected for the TMC-850M on the line below.

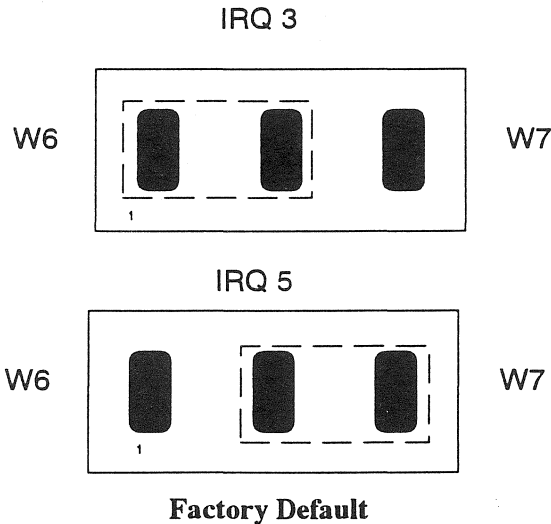
TMC-850M Alternate Address Selected: \_\_\_\_\_

### 4.3 Interrupts

---

Drivers for operating systems such as UNIX, OS/2, XENIX and Novell utilize hardware interrupts. Jumper W3/W4 selects the interrupt used by the TMC-850M. When this interrupt is used, such as under XENIX or Novell, be sure the device driver specifies the same interrupt line as is jumpered on the board. The UNIX, XENIX and Novell drivers need to be setup for the interrupt you have chosen. The TMC-850M is shipped with the jumper set for interrupt 5.

The jumper from W6 to the center post selects IRQ3. The jumper from W7 to the center post selects IRQ5, see illustration below.



For easy future reference, write on the line below, the interrupt line number you have selected.

IRQ # \_\_\_\_\_



#### 4.4 External SCSI Connector

---

The TMC-850M comes standard with an external 25-pin Apple signal connector that may be used to connect the SCSI bus to an external SCSI device or subsystem. The connector is designed to be used with a shielded 25-pin D sub-cable with a male connector on one end and a female connector on the other end.

Future Domain manufactures a shielded 25-pin D to 50-pin Amphenol (SCSI external standard) cable. This cable may be used to connect the TMC-850M directly to enclosures with the SCSI standard external connector. You may order this cable, Future Domain model HCA-120, from your dealer or distributor. The pinouts of the 25-pin connector are as follows:

PIN	SIGNAL	PIN	SIGNAL
1	REQ	14	GROUND
2	MSG	15	C/D
3	I/O	16	GROUND
4	RST	17	ATN
5	ACK	18	GROUND
6	BSY	19	SEL
7	GROUND	20	DBP
8	DB0	21	DB1
9	GROUND	22	DB2
10	DB3	23	DB4
11	DB5	24	GROUND
12	DB6	25	(TERM POWER)
13	DB7		

**25-pin Apple signal assignments  
External SCSI connector**

## 4.5 Internal SCSI Connector

---

The 50-pin SCSI header pin assignments are as follows:

Pin	Signal	Pin	Signal
1	GND-	2	SCO-
3	GND	4	SC1-
5	GND	6	SC2-
7	GND	8	SC3-
9	GND	10	SC4-
11	GND	12	SC5-
13	GND	14	SC6-
15	GND	16	SC7-
17	GND	18	SPAR-
19	GND	20	GND
21	GND	22	GND
23	GND	24	GND
25	not used	26	TERMPPOWER
27	GND	28	GND
29	GND	30	GND
31	GND	32	SATN-
33	GND	34	GND
35	GND	36	SBSY-
37	GND	38	SACK-
39	GND	40	SRST-
41	GND	42	SMSG-
43	GND	44	SSEL-
45	GND	46	SCD-
47	GND	48	SREQ-
49	GND	50	SIO-

## 4.6 Termination

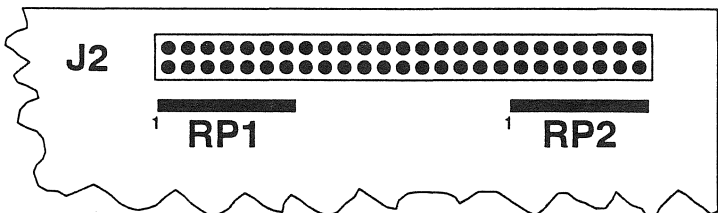
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The SCSI specification defines cable and termination requirements are listed below:

- **Impedance:** Unshielded flat cable - 100 ohms, shielded round cable - 90 ohms
- **Active Termination:** 110 ohms via 110 ohm resistors at cable ends
- **Length:** 19.7 feet (6 meters) total maximum

All SCSI buses require termination. The following guidelines must be followed to ensure proper operation of the SCSI bus, host adapters and peripherals:

- Two terminations must be present on the bus. More than two terminations may damage the host adapter or peripherals. The end device on either side (total of two) of the SCSI bus must have the terminators.
- When installing terminator resistor packs, be sure to orient Pin 1 (dot on resistor pack indicates pin 1) of the resistor pack to Pin 1 of the device. This includes both the drive and the host adapter. See illustration below.

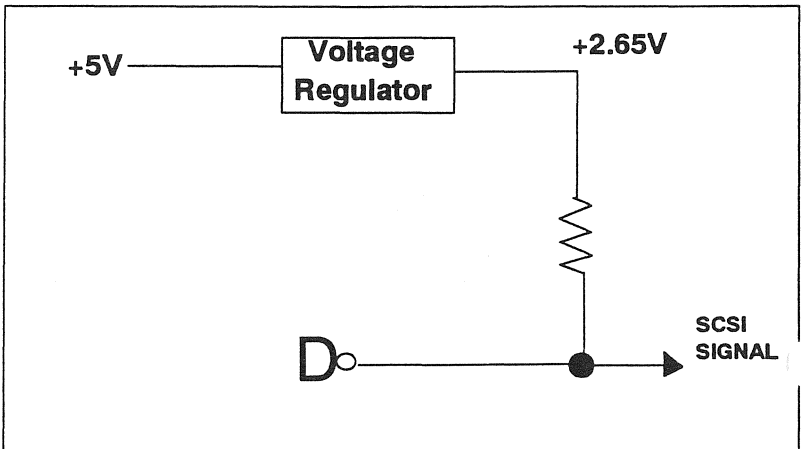
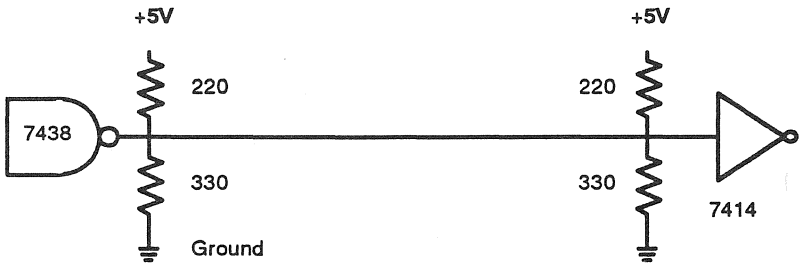


- Maximum cable lengths should not be exceeded.

The TMC-850M provides termination power (TERMPWR) to the SCSI bus on pin-25 (external Apple connector) or pin-26 (internal SCSI connector). TERMPWR is protected by a thermal self-resetting fuse on the adapter and is enabled by installing a jumper at W4.

If the host adapter is not at the end of the SCSI bus, remove the termination resistors RP1 and RP2. Make sure the terminators are in place on the devices at the end of the SCSI bus.

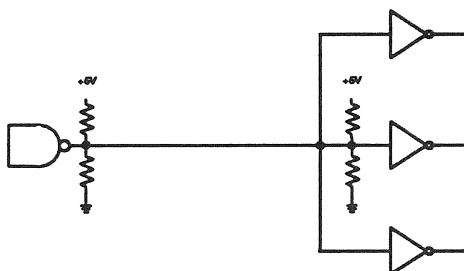
The following is a technical discussion of termination and cabling. Most users need not read this section. The SCSI standard defines the following termination scheme:



**Active SCSI Bus Termination Scheme**

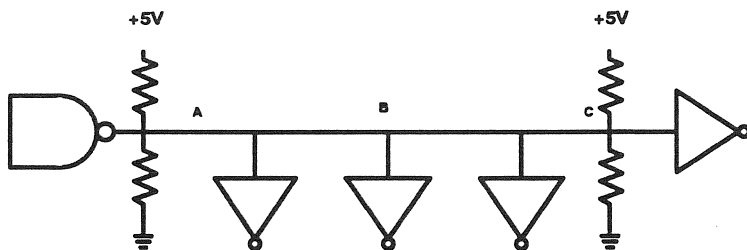
The SCSI bus is treated as a lossless, terminated uniform transmission line of characteristic impedance  $Z=100$  ohms which is terminated in a load impedance of  $Z_1$ . When a digital signal is input at one end of the transmission line, it is exactly reproduced at the output of the transmission line if  $Z=Z_1$ . In practice, the SCSI bus exhibits loss and impedance mismatches due to multiple taps to the transmission line in the form of devices.

Clustering loads at the end of the cable (see diagram below) creates an impedance mismatch.



**NOT RECOMMENDED**

To avoid this problem, group all loads evenly across the cable spaced at least .03 meters apart. Keep the tap lengths as short as possible. The SCSI Spec. ANSI X3.131-1986 requires a stub length less than .1 meter, see diagram below.



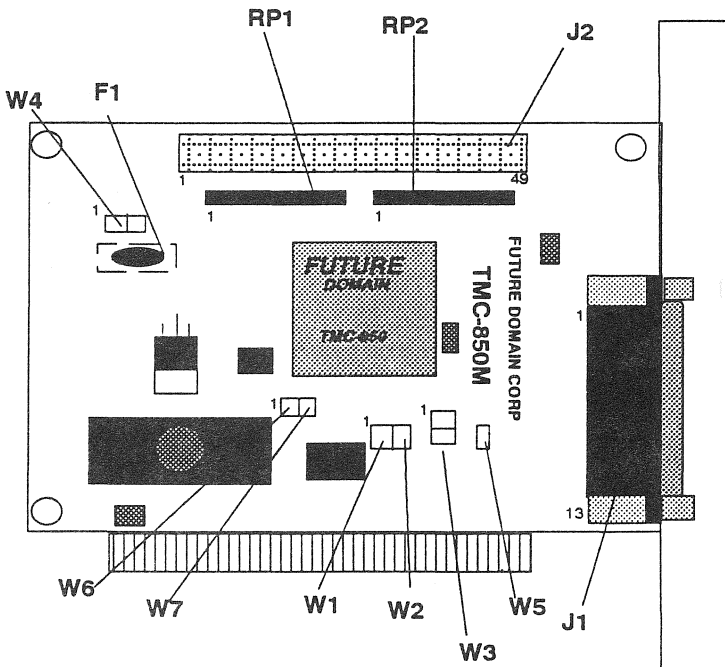
**RECOMMENDED**

- Use a cable of uniform impedance, avoid cable discontinuity.
- Do not exceed maximum cable lengths.
- Terminate at both physical ends of the SCSI cable.

Cabling problems should be addressed by a qualified electrical engineer. For more information see, **Additional Documentation**, located in the **PREFACE**.

### 4.7 Summary of Controller Options

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**TMC-850M SCSI Host Adapter**

TMC-850M SCSI Host Adapter continued...

<b>OPTION LABELING</b>	<b>FUNCTION</b>
W1, W2, W3	Memory Addressing Configuration
W4	Termination Power
W5	Zero Wait State
W6, W7	Selectable IRQs 3 or 5
F1	Thermal Fuse
RP1, RP2	Active Termination Resistor Packs

### **CONNECTORS**

J1	External SCSI Port/25-Pin Apple Type*
J2	Internal SCSI Port/50-Pin

\* Connector J1 is a 25-pin Apple signal type connector to be used in conjunction with the Future Domain HCA-120 or compatible-type cable.

**NOTES**

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## 5.0 TROUBLESHOOTING

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### 5.1 Diagnostics and Error Messages

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The TMC-850M ROM BIOS contains built-in diagnostics to verify proper host adapter operation. The diagnostic is run each time the computer is powered on or is rebooted. Diagnostics include the following:

- Checksum test of the ROM BIOS
- Loopback test of the Basic SCSI data path test (cable and connector)
- Internal Chip RAM test

A failure of any one of these tests will cause an error message to be displayed. These error messages are:

*Adapter Self Test failed*

*Adapter RAM failure*

*No SCSI drives found. Check cables and power*

*Error in Read Capacity Command*

## 5.2 Problem Determination Procedures

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This section details various situations, error messages and corrective procedures pertinent to the TMC-850M. If you encounter a situation similar to one of the following, go through each of the recommended corrective procedures. If a situation cannot be corrected, contact your authorized dealer or technical support representative.

**Problem 1:** The cursor does not appear on the computer screen after installation of the host adapter?

- a. Check to see if the card is properly seated in the computer.
- b. A conflict in addressing is possible, see Section 4.2, **Address Jumpers**, and try all alternate addresses.

**Problem 2:** The Future Domain BIOS banner does not appear on screen after a several minutes, or during boot process, and I cannot access the drive(s). The message: **Adapter Ram Test Failure** is displayed.

- a. Check to see if the card is properly seated in the computer.
- b. A conflict in addressing is possible, see Section 4.2, **Address Jumpers**, and try all alternate addresses.
- c. On IBM AT models, you must run the SETUP program to configure your machine. The hard disks supported by the TMC-850M are not counted in the number of hard disks requested by the SETUP program. Check the SETUP and try again.
- d. Some EMS memory boards do not function properly in AT compatible systems. Remove an EMS memory boards and try again. Configuring the EMS board for 8-bit memory access may also correct the problem.

- Problem 3:** The Future Domain banner appears, but no hard drives are listed as connected. The message: **No SCSI Drives Found** is displayed. What should I do?
- Check the hard disk drive's power.
  - Verify the SCSI address of your device is set to a legal SCSI address for ROM BIOS support, i.e., 0-5.
  - Make sure the SCSI bus is terminated at both ends.
  - Check cable connections for proper orientation of pin 1. Turn the cable around at the hard disk's end and try again.
  - The hard disk may not support the Common Command Set. Consult your disk drive manufacturer or dealer.
  - Check for proper bus termination and termination power.
- Problem 4:** The message: **Adapter Self Test Failed** is displayed. What does this indicate?
- This usually indicates the loopback test on the SCSI bus failed, which means the 50-pin cable is installed backwards on one of the SCSI devices. Carefully check the SCSI connection of each device and verify that Pin-1 on the connector is connected to Pin-1 of the cable. Power down the system and disconnect all SCSI devices. Reconnect them one at a time. Power up after each one and continue to watch for the message. If it reappears, reverse the cable and try again.
  - Go through steps a-e of the previous question.
- Problem 5:** The message: **Error in Read Capacity** appears. What should I check?

- a. This message indicates the hard disk drive did not return the proper capacity values in response to the SCSI Read Capacity command.
- b. If a warm boot (ctl-alt-del) works, this indicates the drive took too long to reach its correct speed. Contact your drive manufacturer for additional information.
- c. Check for proper bus termination and termination power.
- d. Replace the hard disk and try again.
- e. Check with the hard disk drive manufacturer or dealer to ensure that it supports the Common Command Set.

**Problem 6:** The message: **Fatal Disk Error** appears. What should I check?

- a. This message indicates that during the setup, the SCSI drives were counted into your total amount of hard disks installed.
- b. Re-run your system setup program and indicate zero (0) if only SCSI hard disks drives are being installed or insert the number of non-SCSI hard disks to be installed.

## 6.0 NOTES

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### 6.1 ROM BIOS

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The ROM BIOS on the Future Domain host adapter, during the boot process, reads the capacity of the drive using the **READ CAPACITY** command. It takes the value the drive returns and calculates the cylinders, heads, and sectors/track to keep the cylinder count below 1024. This allows DOS to use the entire drive. When read or write operations are performed, the same algorithm is used to translate from a head, sector, cylinder location to a Logical Block Address which is used by the SCSI drive. The algorithm used by Future Domain host adapters switches between 17, 34, or 63 sectors/track depending on the capacity of the drive being used.

The values returned by the ROM BIOS are:

Sectors/Track	17 / 34 / 63	(adjusted based on capacity)
Number of Heads	variable	(adjusted based on capacity)
Cylinders	variable	(adjusted to less than 1024)

To determine the amount of storage available use the following formula:

Heads x Sector per Track x Cylinders x 512 bytes per sector

**NOTES**

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FDC-850M