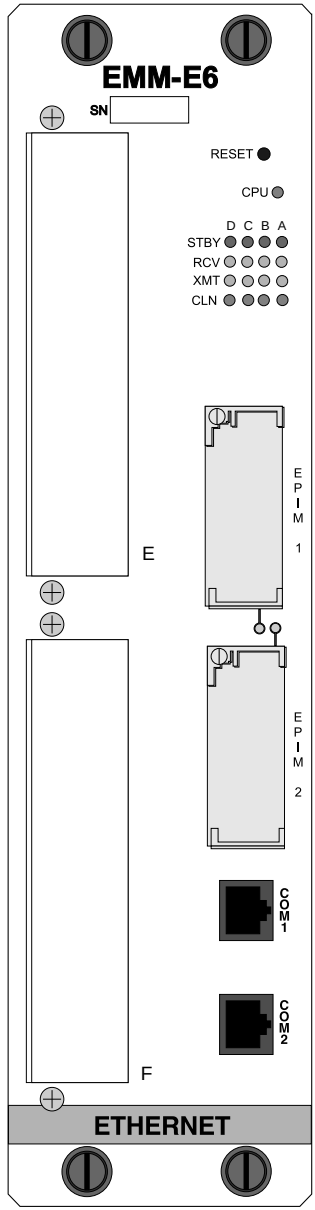
EMM-E6
ETHERNET BRIDGE/ MANAGEMENT MODULE INSTALLATION GUIDE



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Application of Council Directive(s):	**89/336/EEC** **73/23/EEC**
Manufacturer's Name:	**Cabletron Systems, Inc.**
Manufacturer's Address:	**35 Industrial Way** **PO Box 5005** **Rochester, NH 03867**
European Representative Name:	**Mr. J. Solari**
European Representative Address:	**Cabletron Systems Limited** **Nexus House, Newbury Business Park** **London Road, Newbury** **Berkshire RG13 2PZ, England**
Conformance to Directive(s)/Product Standards:	**EC Directive 89/336/EEC** **EC Directive 73/23/EEC** **EN 55022** **EN 50082-1** **EN 60950**
Equipment Type/Environment:	**Networking Equipment, for use in a Commercial or Light Industrial Environment.**

We the undersigned, hereby declare that the equipment packaged with this notice conforms to the above directives.

Manufacturer	Legal Representative in Europe
Mr. Richard Michaud	Mr. J. Solari
Full Name	Full Name
Manager of Engineering Services	Managing Director - E.M.E.A.
Title	Title
Rochester, NH, USA	Newbury, Berkshire, England
Location	Location

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CHAPTER 1
INTRODUCTION

Welcome to the Cabletron Systems **EMM-E6 Installation Guide**. This manual provides installation instructions and reference information for the EMM-E6 Ethernet Bridge/Management Module.

1.1 EMM-E6 OVERVIEW

The EMM-E6 is a high-speed Ethernet bridge that also performs comprehensive SNMP-based chassis and network management functions. The EMM-E6 provides six bridge ports consisting of three chassis interfaces, one external interface, and two Bridge/Router Interface Module (BRIM) interfaces.

1.2 HOW TO USE THIS MANUAL

To gain a full understanding of this device and its capabilities, and to help eliminate any potential problems during or after installation, please be sure to read and understand all of the instructions/information in this document and in the release notes supplied with your EMM-E6.

You should have a general working knowledge of Ethernet or IEEE 802.3 type data networks prior to installing the EMM-E6. The following summarizes the organization of this manual.

Chapter 1, **Introduction**, discusses the use and conventions of the **EMM-E6 Installation Guide**, details the procedures to follow for obtaining assistance from Cabletron Systems, and provides a list of related documentation.

Chapter 2, **Controls and Indicators**, identifies and describes the components and monitoring indicators that make up the EMM-E6. This chapter contains information that is essential to the understanding of the procedures in the rest of the manual.

Chapter 3, **Installation**, details the procedures to follow when unpacking, testing, and installing the EMM-E6. This chapter contains information and step-by-step instructions for connecting network cabling to the EMM-E6 and closes with a procedure which may be used to test the operation of the EMM-E6 in the network.

Chapter 4, **Troubleshooting**, describes how to use LANVIEW LEDs on the EMM-E6. The chapter defines the different LED conditions and provides a table of simple troubleshooting instructions for module-related difficulties.

Appendix A, **Specifications**, provides the physical specifications and operating requirements of the EMM-E6. This appendix also contains serial port pinout tables for constructing Local Management cables.

Appendix B, **Upgrading the EMM-E6**, details the procedures that must be followed when expanding the capabilities of the EMM-E6. This appendix contains information on memory upgrades and the addition of EPIM modules to the EMM-E6.

Appendix C, **Ethernet Cabling Requirements**, describes the test characteristics that Ethernet cables must adhere to in order to be standards-compliant. Any Ethernet link or cable that is to be connected to the EMM-E6 should be verified to be within the specifications and limitations provided in this appendix.

1.3 DOCUMENT CONVENTIONS

The following conventions are used throughout this document:

Note symbol. Calls the reader's attention to any item of information that may be of special importance.

Caution symbol. Contains information essential to avoid damage to the equipment.

Electrical Hazard Warning symbol. Warns against an action that could result in personal injury or death due to an electrical hazard.

Figures throughout the document are identified by chapter and illustration number. Many figures contain small numbers at the lower right-hand corner of the illustration. These are Cabletron Systems document control numbers and are not essential to an understanding of the document.

References to chapters or sections within this document will be printed in **boldface** type.

References to other publications or documents will be printed in *italic* type.

1.4 RELATED DOCUMENTS

Use the following manuals to supplement the procedures and other technical data provided in this manual. This manual references procedures in these manuals, where appropriate, but does not repeat them.

Cabletron Systems *MMAC Overview and Setup Guide*

Cabletron Systems *EMM-E6 Local Management Guide*

Cabletron Systems *SPECTRUM Element Manager User's Guide*

1.5 GETTING HELP

If you need additional support related to this device, or if you have any questions, comments, or suggestions concerning this manual, contact Cabletron Systems Technical Support:

By phone	(603) 332-9400
	Monday – Friday; 8 A.M. – 8 P.M. Eastern Time
By CompuServe	GO CTRON from any ! prompt
By Internet mail	support@ctron.com
By FTP	ctron.com (134.141.197.25)
Login	*anonymous*
Password	*your email address*

Before calling Cabletron Systems Technical Support, have the following information ready:

- A description of the failure
- A description of any action(s) already taken to resolve the problem (e.g., changing mode switches, rebooting the unit, etc.)
- A description of your network environment (layout, cable type, etc.)
- Network load and frame size at the time of trouble (if known)
- The serial and revision numbers of all Cabletron Systems products in the network
- The device history (i.e., have you returned the device before, is this a recurring problem, etc.)
- Any previous Return Material Authorization (RMA) numbers.

CHAPTER 2
CONTROLS AND INDICATORS

This chapter identifies and describes the components and operational indicators of the EMM-E6.

2.1 THE FACEPLATE

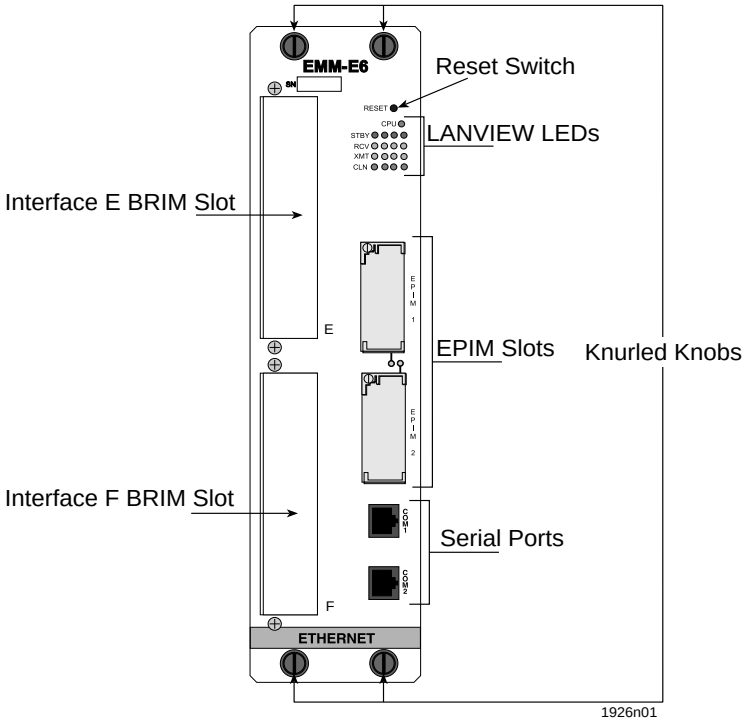


Figure 2-1 The EMM-E6 Faceplate

Knurled Knobs

The black plastic knurled knobs on the faceplate of the EMM-E6 are used to turn the securing screws that hold the EMM-E6 module in place in the MMAC chassis.

Reset Switch

The recessed reset switch re-initializes the EMM-E6 processor. The activation of this switch will not initialize Non-Volatile Random Access Memory (NVRAM) where the EMM-E6 stores configuration and management parameters. The reset switch may be pressed with the point of a pencil or pen. Once pushed in, the EMM-E6 will re-initialize itself.

LANVIEW LEDs

The EMM-E6 incorporates the LANVIEW status monitoring and diagnostic system. LANVIEW LEDs can help diagnose many problems, such as a fault in network cabling. LANVIEW LEDs are identified in Section 2.3, **LANVIEW LEDs**.

EPIM (Ethernet Port Interface Module) Slot

The EPIM slot is a covered opening in the EMM-E6 faceplate that can be configured with an optional EPIM module.

Serial Ports

The EMM-E6 faceplate provides two serial communications ports for the connection of out-of-band management devices.

BRIM (Bridge/Router Interface Module) Slots

The BRIM slot is a covered opening in the faceplate that can be configured with a BRIM module.

2.2 INTERNAL COMPONENTS

The components listed in the following entries are all hidden inside the MMAC chassis when the EMM-E6 has been installed. These components may be located by removing the EMM-E6 from the chassis and holding the module in the orientation shown in Figure 2-2 and Figure 2-3.

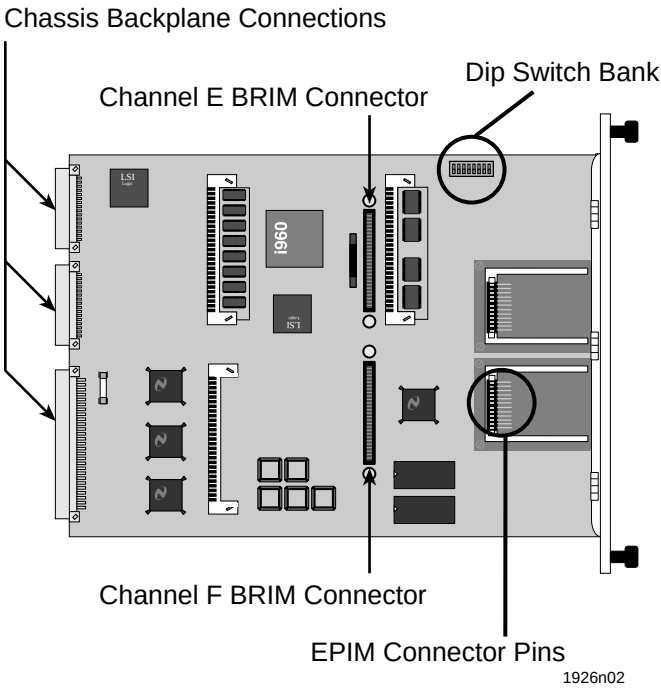


Figure 2-2 EMM-E6 Internal Components

Chassis Backplane Connections

The EMM-E6 connects to the backplane buses of the MMAC chassis through these multipin connectors.

Dip Switch Bank

The EMM-E6 provides a bank of eight dual-position, or “dip” switches. Several of these switches are used for testing purposes during the manufacturing process. The dip switches can also be used to clear the NVRAM of the EMM-E6, which contains configuration and local management settings, or to force the EMM-E6 to request a new firmware image from a properly configured BootP server.

BRIM Connectors

The Channel E and Channel F BRIM connectors allow the EMM-E6 to connect BRIM modules to Ethernet Channels E and F of the EMM-E6.

EPIM Connector Pins

The EPIM connector pins are two sets of built-in pins that connect the EMM-E6 Ethernet Channel D to optional EPIM modules. The proper insertion of the EPIM will automatically connect these pins to the connector located on the EPIM.

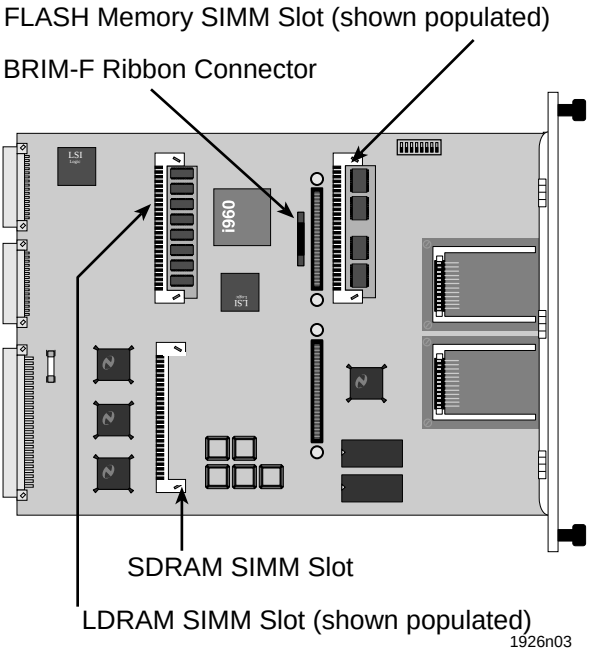


Figure 2-3 EMM-E6 Internal Components

SDRAM SIMM Slot

The EMM-E6 motherboard provides the option of upgrading memory capacity by using Single In-line Memory Modules (SIMMs).

The EMM-E6 comes with 4 Megabytes (MB) of Shared Dynamic Random Access Memory (SDRAM) built into the module. The SDRAM temporarily stores the packets received be the module while forwarding, filtering, and error checking operations are performed.

LDRAM SIMM Slot

The EMM-E6 comes with 4 MB of Local Dynamic Random Access Memory (LDRAM) built into the module and one 4 MB SDRAM SIMM, for a total of 8 MB of Shared Dynamic RAM. LDRAM is the "Main" memory from which the switching functionality of the EMM-E6 operates.

Some advanced EMM-E6 operations, such as extended RMON or Cabletron Systems Routing Services, require an EMM-E6 with greater than 8 MB of LDRAM. In these cases, the 4 MB SIMM that is shipped in the LDRAM slot must be upgraded to a higher-capacity SIMM. Contact your Cabletron Systems Sales Representative for more information about available memory upgrades for the EMM-E6.

FLASH Memory SIMM Slot

The EMM-E6 incorporates 2 MB of FLASH Electrically Erasable Programmable Read Only Memory (FLASH EEPROM). FLASH memory holds the operating instruction code of the EMM-E6. When the module is activated, the instruction code (firmware) held in FLASH memory is forwarded to Main memory, decompressed, and used to start up the EMM-E6.

The use of FLASH memory, in conjunction with the runtime download capabilities of the EMM-E6, allows the downloading of firmware to the module without requiring that the module be shut down. The firmware download may be performed at any time during the operation of the module, and the new firmware image will be used at the next reset of the module.

BRIM-F Ribbon Connector

The BRIM-F ribbon connector provides a connection point for the special ribbon cable used to connect FDDI BRIMs (the BRIM-F6 or BRIM-F0) to Ethernet Channel E of the EMM-E6.

2.3 LANVIEW LEDs

The LANVIEW LEDs on the EMM-E6 faceplate provide diagnostic and status monitoring information. The LEDs are identified by labels which border the LED in question.

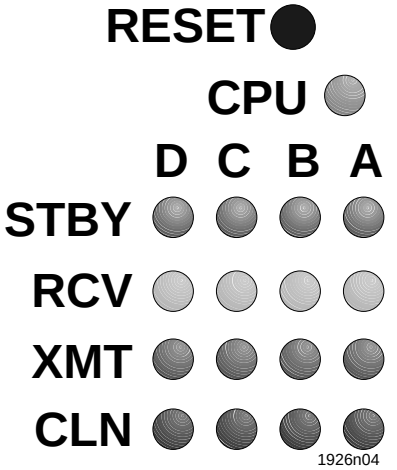


Figure 2-4 EMM-E6 LANVIEW LEDs

The use of these LEDs for troubleshooting is covered in Chapter 4, **Troubleshooting**. The following LEDs are on the faceplate of the EMM-E6:

CPU

The CPU LED indicates the operating status of the EMM-E6, and is primarily concerned with the operation of the onboard i960 RISC processor.

The STBY, RCV, XMT, and CLN LEDs are in a matrix, which provides these indicators for four of the EMM-E6 Ethernet channels. To read the LEDs, the vertical column indicates the interface or channel the LED designates (D, C, B, or A), while the horizontal row denotes the condition or statistic being monitored.

STBY
The STBY LED lights to indicate the associated port has been placed in standby mode, either through management operations or by the operation of the Spanning Tree Algorithm.

RCV
The RCV LED indicates the reception of Ethernet frames by the associated port or interface.

XMT
The XMT LED indicates the transmit status of the associated port or interface.

CLN
The CLN LED flashes to indicate that a collision has been detected on the associated segment.

CHAPTER 3
INSTALLATION

This chapter contains instructions for the following procedures:

- Preparing the EMM-E6 for installation
- Testing the EMM-E6 prior to network connection
- Installing the EMM-E6 into a Multi Media Access Center (MMAC)
- Connecting the EMM-E6 to a network
- Testing the installed EMM-E6

3.1 UNPACKING THE EMM-E6

Unpack the EMM-E6 as follows:

Observe all antistatic precautions when handling sensitive electronic equipment.

1. Remove the shipping material covering the EMM-E6.
2. Verify the contents of the packing carton. The carton, as shipped, should contain the following items:

Table 3-1 Contents of EMM-E6 Carton

Item	Quantity
EMM-E6	1
Disks containing firmware images	2
Grounding Strap	1
RJ45 Adapter Kit	1
Release Notes	1
Cabletron Systems Hardware Manuals CD-ROM	1

3. Carefully remove the module from the shipping box. Leave the module inside its non-conductive bag until you are ready to install it.
4. Visually inspect the non-conductive bag. If there are any signs of damage, contact Cabletron Systems Technical Support immediately.
5. Place the static grounding strap properly upon your wrist before opening the non-conductive bag.
6. Open the non-conductive bag by tearing the black and yellow tape seal.

Do not cut the bag open, as damage to the EMM-E6 may result.

7. Perform a second visual inspection of the module.

3.2 SETTING MODE SWITCHES

A bank of dip switches, located at the top of the EMM-E6 (Figure 3-1), provides several configuration options. All switches ship in the OFF position.

Never adjust switch settings while the EMM-E6 is on. Not only is this dangerous, but the change in state (i.e., position) only activates the switch function after restarting or cycling power to the board.

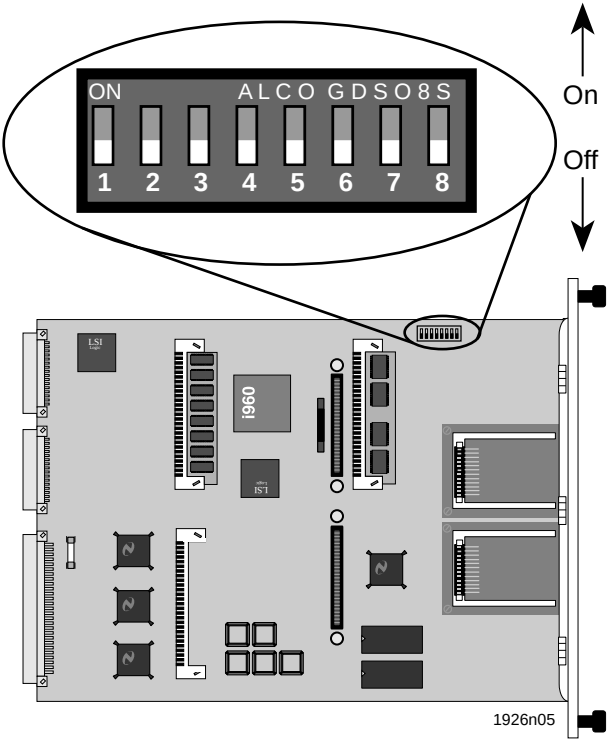


Figure 3-1 EMM-E6 Dip Switches

Switch definitions are as follows:

- Switch 1: Cabletron Systems use only.
- Switch 2: Cabletron Systems use only.
- Switch 3: Not Used.
- Switch 4: Not Used.
- Switch 5: Cabletron Systems use only.
- Switch 6: Forced Download. Changing the state of this switch (i.e., moving the switch from one position to another) forces a BootP download.

  After changing the position of Switch 6 and restarting the EMM-E6, the EMM-E6 requests a new image download until it either receives a new image or the reset button on the front panel is pressed. When the reset button is pressed, the EMM-E6 continues trying to contact a BootP server, but will timeout in approximately one minute. If the EMM-E6 times out, the image is loaded from its FLASH memory.

Do NOT change the state of Switch 6 unless you have a station acting as a BootP server for the EMM-E6. This BootP station must reference a station that is acting as a TFTP (Trivial File Transfer Protocol) server and that contains the EMM-E6 image file. The EMM-E6 will request the location of the image file from the BootP server and use TFTP to download that file from the TFTP server.

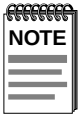
If one of these requirements is not met, the EMM-E6 Forced Download operation will not be completed correctly.

- Switch 7: NVRAM Reset. The EMM-E6 uses NVRAM to store user-entered parameters such as IP addresses, device name, etc. Changing the state of this switch (i.e., moving the switch from one position to another) resets these parameters to the factory defaults.

Once the EMM-E6 resets, you can either use the defaults or re-enter your own parameters. The EMM-E6 stores these parameters in NVRAM when the device powers down. These parameters remain in NVRAM until the state of the switch changes again.

Do not change the state of Switch 7 unless you intend to reset the EMM-E6 user parameters to the factory default settings.

- Switch 8: Password Defaults. Changing the state of this switch (i.e., moving the switch from one position to another and leaving it there) clears user-entered passwords stored in NVRAM, and restores default passwords. Once reset you can use the defaults or re-enter your passwords.



Do not change the state of Switch 8 unless you want to reset the EMM-E6 user-configured passwords to their factory default settings.

3.3 PRE-INSTALLATION TEST

Before installing the EMM-E6 in a live network, you may want to test the module in a controlled situation to ensure that it is bridging traffic. You can perform this test with two workstations (see Figure 3-2), using an MMAC with an EMM-E6 and Ethernet Media Interface Module (MIM, RMIM, or XMIM) installed and set up as follows:

1. Install the EMM-E6 into an MMAC that is not attached to a network.
2. Install an Ethernet Media Interface Module (MIM), Repeating Media Interface Module (RMIM), or Port Assignment Media Interface Module (XMIM) in the MMAC. Follow the installation instructions found in the Installation or User's Guide shipped with that product.

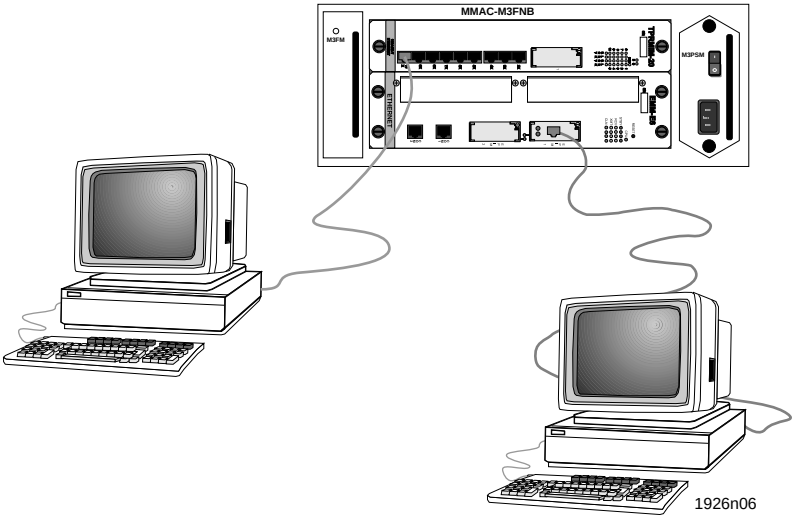


Figure 3-2 Pre-Installation Test Configuration

3. Connect the first workstation to an EPIM that has been inserted in the EMM-E6 EPIM slot 1.
4. Connect the second workstation to an active port on the Media Interface Module that has been placed in the MMAC chassis.
5. Designate the first workstation as a file server and the second one as the client (refer to individual workstation manuals for instructions on assigning server/client relationships).
6. Send packets between the two workstations to verify the proper operation of the EMM-E6.

If a failure occurs, contact Cabletron Systems Technical Support.

3.4 INSTALLATION

Installing the EMM-E6 into any MMAC hub is an easy operation and requires no special tools. However, when you install your device, keep the following in mind:

Any installation operations should be performed only by qualified personnel.

You may only install the EMM-E6 in slots 1 and 2 (farthest slots to the right) of the MMAC chassis. The EMM-E6 uses both slots.

Observe all antistatic precautions when handling sensitive electronic equipment.

Install the EMM-E6 into the MMAC-FNB (backplane) as follows:

We recommend powering down your MMAC when inserting or removing modules, even though Cabletron Systems modules have “hot swap” capabilities.

1. Remove the safety bars that protect the chassis and remove any module to be replaced or blank MMAC slot covers, in accordance with the installation and removal procedures for these items.
2. Holding the EMM-E6 by the front panel, or by the edges of the board, align the bottom and top edges of the printed circuit board with the guides. Make sure that both the bottom and top edges of the printer circuit board rest in these guides.
3. Slide the EMM-E6 (Figure 3-3) into slots 1 and 2 of the MMAC chassis.

Forcing a misaligned module into place can damage the EMM-E6 or the MMAC backplane.

4. Firmly press the module connections into the backplane. Do not try to force the module into place or use the knurled knobs to draw the module into the backplane.

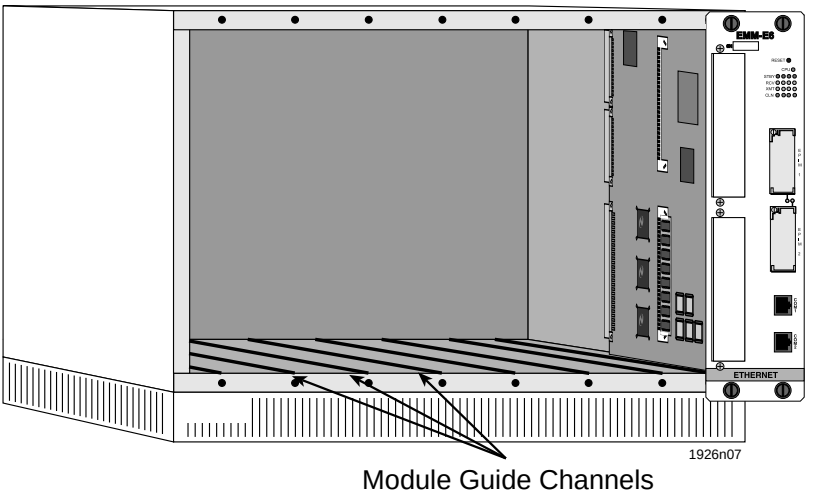


Figure 3-3 Installing the EMM-E6

5. Secure the module to the MMAC chassis by tightening the knurled knobs. If you do not tighten the knurled knobs, vibration can cause the module to lose contact with the backplane and disrupt your network.
6. Reinstall the MMAC chassis safety bars.
7. Power-up the MMAC (if it is not already **ON**).
8. Observe the status of the LANVIEW LEDs (Figure 3-4) on the EMM-E6. When the CPU LED is amber, the module is in boot state. During this approximately one minute period the EMM-E6 cycles through a series of internal diagnostics.

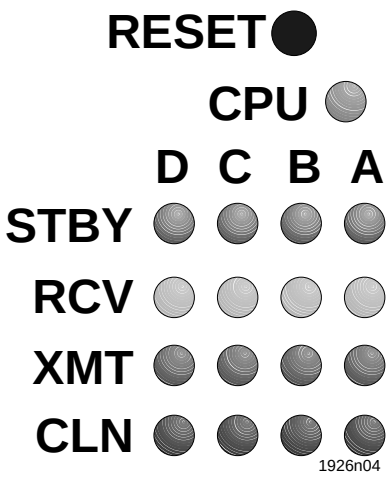


Figure 3-4 EMM-E6 LANVIEW LEDs

9. After the system boot procedure, the CPU LED should be flashing green, indicating proper EMM-E6 operation.

Proceed to Section 3.5, **Connecting to the Network**, to connect the appropriate network segments to the EMM-E6 and individual EPIMs (for connections to individual BRIMs, refer to the appropriate *BRIM Guides*).

3.5 CONNECTING TO THE NETWORK

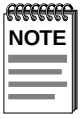
This section gives procedures for connecting the EMM-E6 and various EPIMs to the network. Refer to the list below and follow the procedures in the subsection for appropriate module type:

- **Connecting a 10BASE-T Segment to an EPIM-T**: Section 3.5.1
- **Connecting a 10BASE-F Segment to an EPIM-F2 or EPIM-F3**: Section 3.5.2
- **Connecting a 10BASE-F Segment to an EPIM-F1**: Section 3.5.3
- **Connecting an AUI Segment to an EPIM-X or EPIM-A**: Section 3.5.4
- **Connecting a 10BASE2 Segment to an EPIM-C**: Section 3.5.5

3.5.1 Connecting a 10BASE-T Segment to an EPIM-T

For proper operation, the EPIM-T module to be configured for use in the EMM-E6 module must be of EPIM board revision 04 or greater. Board revision numbers are found following the part number printed on the Printed Circuit Board of the EPIM.

Before connecting a segment to the EPIM-T, check each end of the segment to determine wire crossover. If the wires do not cross over, use the switch on the EPIM-T to internally cross over the RJ45 port. Refer to Figure 3-5 to properly set the EPIM-T crossover switch.



To establish a link, you must have an odd number of crossovers (preferably one) between 10BASE-T devices of the same type (i.e., from repeater to repeater or transceiver to transceiver).

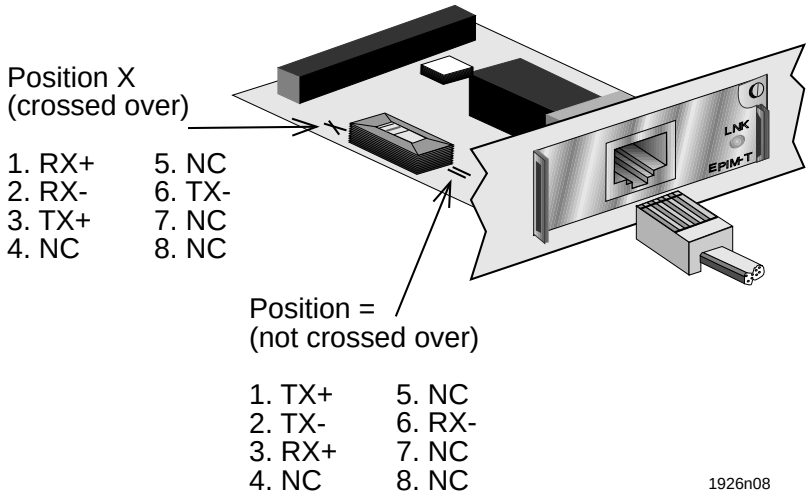


Figure 3-5 EPIM-T Crossover Switch

1. Align the RJ45 connector with the socket of the RJ45 port. The connector will only insert and lock if the raised locking clip of the RJ45 connector is inserted into the correct location.
2. Press the RJ45 connector into the port until the click of the locking clip is felt. The pressure required to perform this should be minimal. If you encounter resistance or excessive friction, remove the connector and check the port for obstruction. Also, verify that the connector and the port are of the same type.

   Once the locking clip snaps into place, the RJ45 connector will remain in the port.
3. Check that the LNK indicator LED is ON. If the indicator is not ON, the port does not have a valid link. Perform each of the following steps until you reach a resolution of the problem and achieve a link.

   a. Check that the 10BASE-T device at the other end of the twisted pair segment is ON.

   b. Verify that the RJ45 connectors on the twisted pair segment have the proper pinouts.

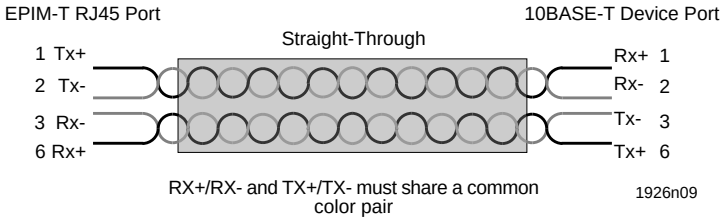


Figure 3-6 Cable Pinouts - RJ45 Port

c. Check the cable for continuity.

d. Check that the twisted pair connection meets dB loss and cable specifications outlined in Appendix C, **Ethernet Cabling Requirements**.

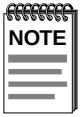
4. If you still cannot establish a link, contact Cabletron Systems Technical Support.

To remove the RJ45 connector from the port once it is locked in, grasp the cable where it enters the network device. Using your finger or a non-conductive probe (the cap of a ballpoint pen is a useful tool for recessed ports) pinch the exposed arm of the locking clip towards the main body of the housing. When the arm contacts the housing, the locking clip has been disengaged. Without releasing the arm, gently pull the RJ45 connector directly out of the port.

If the connector will not come out, there may be damage to the locking clip. Examine the arm of the locking clip. While pressing the arm back toward the shell of the connector, verify that the clip, located within the port, is being moved. If the clip is broken, you may need to use a non-conductive probe to disengage the locking clip.

Do not place foreign objects into device ports while they are connected to a power source.

3.5.2 Connecting a 10BASE-F Segment to an EPIM-F2 or EPIM-F3



For proper operation, the EPIM-F2 module to be configured for use in the EMM-E6 module must be of EPIM board revision 05 or greater. EPIM-F3 modules used in the EMM-E6 must be of EPIM board revision 02 or greater. Board revision numbers are found following the part number printed on the Printed Circuit Board of the EPIM.

Each fiber optic link consists of two strands of fiber optic cabling: the transmit (TX) and the receive (RX). The transmit strand from a module port connects to the receive port of a fiber optic Ethernet device at the other end of the segment. The receive strand of the applicable port on the module connects to the transmit port of the fiber optic Ethernet device.

Cabletron Systems recommends labeling fiber optic cables to indicate receive and transmit ends. Many cables are prelabeled, providing matching labels or tapes at both ends of each strand of cable.

Do not touch the ends of the fiber optic strands, and do not let the ends come in contact with dust, dirt, or other contaminants. Contamination of cable ends causes problems in data transmissions. If necessary, clean contaminated cable ends using alcohol and a soft, clean, lint-free cloth.

1. Remove the protective plastic covers from the fiber optic ports on the applicable port on the module, and from the ends of the connectors on each fiber strand.
2. Attach one fiber to the applicable receive port on the module. Insert the ST connector into the port with the alignment slot on the connector inserted over the locking key on the port. Turn the connector clockwise to lock it down.

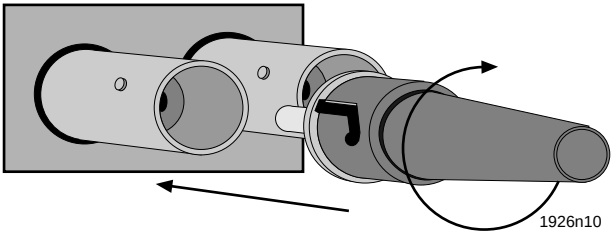


Figure 3-7 ST Connector Insertion

3. Attach the other fiber of the pair to the applicable transmit port on the module. Use the same procedure for insertion of the ST connector.
4. At the other end of the fiber optic cable, attach the fiber pair to the transmit and receive ports of the device.

If link indicators are present for the fiber optic connection, check that they are ON. If an indicator is present but not ON, that port does not have a valid link. Perform each of the following steps until you reach a resolution of the problem and achieve a link.

- Check that the device at the other end of the link is ON.
- Verify proper crossover of the fiber strands. Try swapping the transmit and receive connections at only one end of the link.
- Verify that the fiber connection meets the dB loss specifications outlined in Appendix C, **Ethernet Cabling Requirements**.

If you are still unable to establish a link, attempt to make the connection between the devices with another fiber optic cable. If this is unsuccessful, contact Cabletron Systems Technical Support.

3.5.3 Connecting a 10BASE-F Segment to an EPIM-F1

For proper operation, the EPIM-F1 module to be configured for use in the EMM-E6 module must be of EPIM board revision 05 or greater. Board revision numbers are found following the part number printed on the Printed Circuit Board of the EPIM.

When connecting a fiber optic link segment with SMA 906 connectors to an EPIM-F1 with SMA ports, make sure each connector uses half alignment, NOT full alignment, sleeves. A full alignment sleeve damages the receive port. SMA 905 connectors do not need alignment sleeves.

Each fiber optic link consists of two strands of fiber optic cabling: the transmit (TX) and the receive (RX). The transmit strand from a module port connects to the receive port of a fiber optic Ethernet device at the other end of the segment. The receive strand of the applicable port on the module connects to the transmit port of the fiber optic Ethernet device.

Cabletron Systems recommends labeling fiber optic cables to indicate receive and transmit ends. Many cables are prelabeled, providing matching labels or tapes at both ends of each strand of cable.

Do not touch the ends of the fiber optic strands, and do not let the ends come in contact with dust, dirt, or other contaminants. Contamination of cable ends causes problems in data transmissions. If necessary, clean contaminated cable ends using alcohol and a soft, clean, lint-free cloth.

1. Remove the protective plastic covers from the fiber optic ports on the applicable port on the module, and from the ends of the connectors on each fiber strand.
2. Attach one fiber to the receive port (RX) on the EPIM-F1. Insert the SMA connector into the port. Turn the connector clockwise until the connector will no longer turn easily. Do not overtighten the connector.

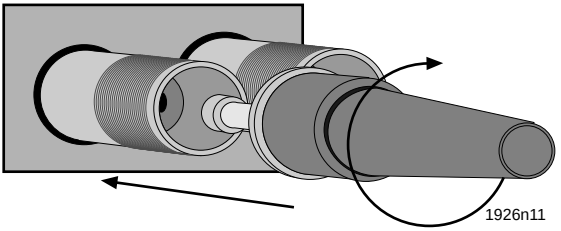


Figure 3-8 SMA Connector Insertion

3. Attach the other fiber of the pair to the applicable transmit port on the module.
4. At the other end of the fiber optic cable, attach the fiber pair to the transmit and receive ports of the device.

If link indicators are present for the fiber optic connection, check that they are ON. If an indicator is present but not ON, that port does not have a valid link. Perform each of the following steps until you reach a resolution of the problem and achieve a link.

- Check that the device at the other end of the link is ON.
- Verify proper crossover of the fiber strands. Try swapping the transmit and receive connections at only one end of the link.
- Verify that the fiber connection meets the dB loss specifications outlined in Appendix C, **Ethernet Cabling Requirements**.

If you are still unable to establish a link, attempt to make the connection between the devices with another fiber optic cable. If this is unsuccessful, contact Cabletron Systems Technical Support.

3.5.4 Connecting an AUI Segment to an EPIM-X or EPIM-A

NOTE

Ensure that the external transceiver to which the EPIM-A connects does not have the signal quality error (SQE or "heartbeat") test function enabled. The EPIM does not operate if the transceiver has the SQE test function enabled. Refer to the applicable transceiver manual for additional information.

Attach an external transceiver to the network segment intended for AUI port connection. For additional information, refer to the applicable transceiver manual.

Attach an AUI cable, no longer than 50 meters in length, to the external transceiver.

1. Align the DB15 connector of the AUI cable with the AUI port of the EPIM as shown in Figure 3-9. The port will only connect if it is properly aligned.
2. Firmly press the AUI connector over the AUI port. If there is a slide latch present for the AUI connector, slide it over the locking posts on the DB15 port.

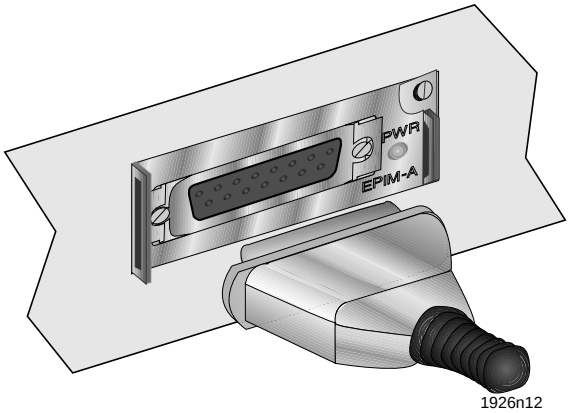


Figure 3-9 AUI Connector Insertion

3. If the transceiver **PWR** LED is OFF with the AUI cable connected, perform the following steps:

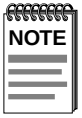
    a. Check the AUI connections for proper pinouts.

    b. Check the cable for continuity.

    c. Reconnect the AUI cable to the EMM-E6 and the device.

If the transceiver **PWR** LED remains OFF, contact Cabletron Systems Technical Support.

3.5.5 Connecting a 10BASE2 Segment to an EPIM-C



For proper operation, the EPIM-C module to be configured for use in the EMM-E6 module must be of EPIM board revision 05 or greater. Board revision numbers are found following the part number printed on the Printed Circuit Board of the EPIM.

To connect a thin coaxial cable segment to an EPIM-C perform the following steps:

Before attaching a male BNC connector to a female BNC barrel connector or terminator, look into the end of the connector to verify that the gold contact pin is present and centered. Any bent or broken pins may not connect properly and should be replaced.

1. Set the Internal Termination (TERM) switch, located to the right of the port and labeled TERM, to one of the following positions:

    a. The ON position (●) to internally terminate the thin coaxial cable segment at the port. Thin coaxial cable segments may be directly connected to the port.

    b. The OFF position (○) to not internally terminate the thin coaxial cable segment at the port. Segments may only be connected through T-connectors which are connected to properly terminated segments on both ends.

Failure to terminate each T-connector segment may result in improper segment operation. Place a terminator on any open female connection on the T-connector.

2. Align the guide channels of the BNC (male) metal housing with the locking keys of the BNC barrel (female) connector on the EPIM. Slide the metal housing of the male connector straight over the metal housing of the female connector.
3. Once the housing stops moving in, turn the metal housing clockwise while continuing to apply light forward pressure.

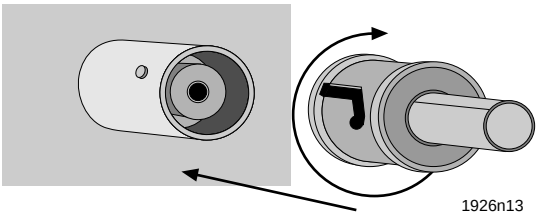


Figure 3-10 BNC Connector Insertion

4. The locking keys of the female connector will pull the connector in until they reach the circular locking holes at the end of the guide channels. The keys will click the connector into place and hold it there.

To remove the BNC connector, perform the steps above in reverse order, turning the metal housing counter-clockwise and pulling the connector straight off of the female BNC connector.

3.6 BACKPLANE TEST

Once the EMM-E6 has been installed in the network environment, you may wish to test the operation of the Ethernet bridging functionality and the EMM-E6's connection to the chassis backplane. Again, you can use two workstations set up as file server and client. See Figure 3-11.

1. After the EMM-E6 is installed in the MMAC, connect the client workstation to the EMM-E6 EPIM 1 port.
2. Connect the server workstation to another Ethernet MIM that is accessible from an Ethernet channel in the MMAC-FNB hub.
3. Send packets between the two workstations to verify the proper operation of the EMM-E6. A "ping" test will send packets from one station to another.

If a failure occurs, contact Cabletron Systems Technical Support.

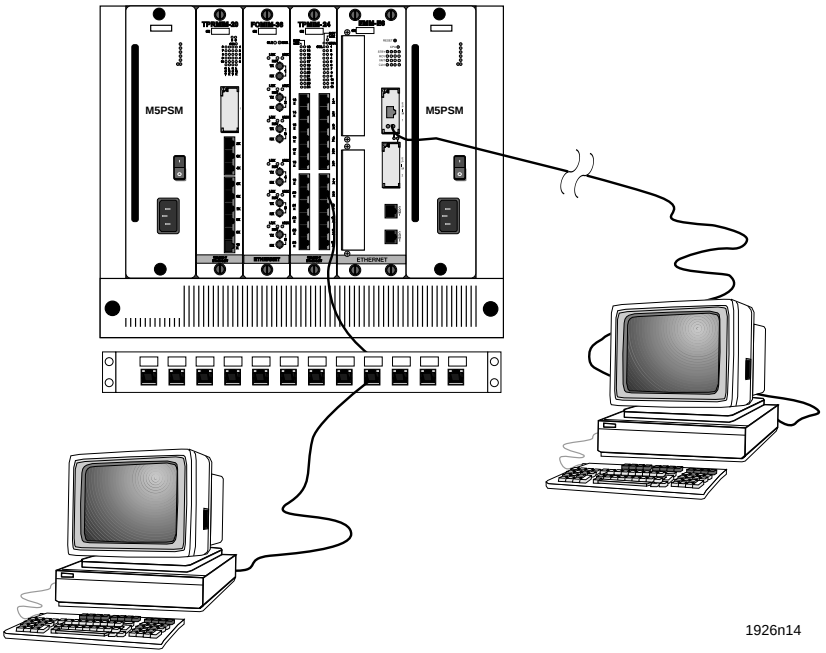


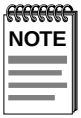
Figure 3-11 Backplane Test Configuration

CHAPTER 4
TROUBLESHOOTING

This chapter provides diagnostic and troubleshooting information.

4.1 USING LANVIEW LEDs

The EMM-E6 uses the Cabletron Systems built-in visual diagnostic and status monitoring system called LANVIEW. With LANVIEW, you can quickly scan the EMM-E6 LEDs to observe network status or diagnose network problems.



The STBY, RCV, XMT, and CLN LEDs are in a matrix, which provides these indicators for four of the EMM-E6 Ethernet channels. To read the LEDs, the vertical column indicates the interface or channel the LED designates, while the horizontal row denotes the condition or statistic being monitored.

Table 4-1 LANVIEW LED Messages

LED	Color	Description	Error Condition/ Recommended Action
CPU	Green (Flashing)	Normal operation.	If the LED is not lit, the EMM-E6 may not be receiving power. See the Troubleshooting Checklist.
	Red	CPU error condition.	Press the Reset switch on the EMM-E6 front panel to re-initialize the board. This may clear the error. If the board does not re-initialize, it has probably failed. Call Cabletron Systems Technical Support.

Table 4-1 LANVIEW LED Messages (Continued)

LED	Color	Description	Error Condition/ Recommended Action
STBY	Amber	Indicates packets will not be forwarded for one of two reasons: Either the Spanning Tree Algorithm has put the corresponding Bridge Port into a standby mode due to detecting a data loop condition, or the bridging functionality for the port has been disabled through management.	Check with your Network Administrator to find out if the EMM-E6 was placed intentionally in standby mode. If a Data loop does exist, reconfigure the network to remove the data loop.
RCV	Amber	LED flashes to indicate that a segment is receiving a frame.	If none of the receive LEDs is flashing, the EMM-E6 is not receiving frames on any of the segments. Check that each module is firmly installed in the MMAC. Ensure that all connected ports are enabled.

Table 4-1 LANVIEW LED Messages (Continued)

LED	Color	Description	Error Condition/ Recommended Action
XMT	Green	LED flashes to indicate that a segment is transmitting a frame. If not connected to the LAN, the LED flashes every two seconds to indicate the device is transmitting BPDU frames.	If none of the transmit LEDs are flashing, the EMM-E6 is not transmitting frames on any of the segments. Ensure that the network is actually producing Ethernet traffic. Contact Cabletron Systems Technical Support for assistance.
CLN	Red	Collision detected on a segment. When the LAN is operating properly, occasional flashing is normal.	Excessive flashing, or a solid light, indicates an inordinate number of collisions. Ensure that the SQE test is disabled for any transceiver connected to the EMM-E6 external channels (D, E, or F). Check cabling for data loops or defective cables.

4.2 TROUBLESHOOTING CHECKLIST

If your EMM-E6 is not operating properly, the following checklist describes some of the problems that may occur with the EMM-E6 installed in an MMAC, possible causes for the problem, and suggestions for resolving the problem.

Table 4-2 Troubleshooting Checklist

Condition	Possible Cause	Recommended Action
All LEDs are off.	Loss of power to the MMAC.	Check the proper installation of the MMAC power supply module and its access to a live outlet. Check power cables for viability. Check that the MMAC has adequate power. Some configurations, especially those including FDDI modules, require that more than one power supply be installed in the MMAC. Check to see that all power supply LEDs are green.
	EMM-E6 not properly installed.	Re-install EMM-E6 in hub according to instructions in Chapter 3.
	EMM-E6 connector pin damage.	Examine EMM-E6 backplane connectors for evidence of bent or broken pins.
	MMAC power bus failure.	Contact Cabletron Systems Technical Support.
No Local Management Password Screen.	Incorrect terminal setup.	Review terminal or emulation settings for accordance with requirements.
	Improper console cable pinout.	Refer to Appendix A for proper console port pinouts.

Table 4-2 Troubleshooting Checklist (Continued)

Condition	Possible Cause	Recommended Action
Cannot contact the EMM-E6 from in-band management.	Improperly configured Community Names table.	Refer to *EMM-E6 Local Management Guide* for Community Names table setup.
	EMM-E6 does not have an IP address.	Refer to *EMM-E6 Local Management Guide* for IP address Setup Screen information.
	No link to device.	Check link to device for validity and proper functioning of all intermediary devices.
	Frames are being bridged by a permanent entry.	Check Static Database.
A port on a MIM managed by the EMM-E6 cannot access the network, while other ports on the same MIM are able to access.	The port is either off or segmented.	Enable the port via local or remote management.
	Port cable is defective.	Try connecting the port with a different cable.
User Parameters (IP address, Device and Module Name, etc.) are lost when device is powered down.	Switch 7 has been toggled and user-entered parameters have been reset to factory default.	Reset one or more parameters and cycle power to module. If parameter altered has remained in memory, re-configure remaining parameters. *Do not* change the position of switch 7 to attempt to rectify this situation. See Chapter 3, **Installation**, for details.
	NVRAM may be defective.	If NVRAM is defective, call Cabletron Systems Technical Support.

Table 4-2 Troubleshooting Checklist (Continued)

Condition	Possible Cause	Recommended Action
No power to an external transceiver connected to an EPIM-A.	AUI cable is defective.	Replace AUI cable.
	EPIM is defective or improperly installed.	Replace EPIM. See Chapter 3, **Installation**, for details.
High number of collisions on EPIM port.	External transceiver has SQE enabled.	Disable SQE.
Ports go into standby for no apparent reason.	Configurations where devices connected across EMM-E6 channels can cause the EMM-E6 to detect a looped condition.	Discuss these configurations with Cabletron Technical Support before implementing them into your network.

4.3 USING THE RESET SWITCH

The EMM-E6 incorporates a recessed reset switch, located above the LANVIEW LEDs (See Chapter 2, **Controls and Indicators**, for location). This reset switch initializes the EMM-E6 processor. This switch does *not* initialize Non-Volatile Random Access Memory (NVRAM), the non-volatile random access memory where the EMM-E6 stores network management parameters.

To use the reset switch, use a pen or pencil to press the switch in. When this is done, the EMM-E6 initializes itself.

The reset sequence for the EMM-E6 may last approximately one minute. The final time may change depending upon the configuration of the chassis in which the EMM-E6 is located. Only after the reset sequence is completed will internetworking operations resume.

APPENDIX A
SPECIFICATIONS

This appendix lists some of the important specifications and specified requirements for the EMM-E6. Cabletron Systems reserves the right to change these specifications at any time and without notice.

A.1 PHYSICAL SPECIFICATIONS

Dimensions:	29.21 H x 7.64 W x 34.07 D cm (11.5 H x 3 W x 13.4 D in)
Weight (unit):	1.25 kg (2.75 lbs)
Weight (as shipped):	1.74 kg (3.83 lbs)

A.2 OPERATING SPECIFICATIONS

Internal Processor(s):	Intel 80960
Ethernet Controller:	4 DP83932 Controllers
Shared Memory:	4 MB (Expandable to 12 MB)
Read Only Memory (NVRAM):	128 K
FLASH Memory:	2 MB (Expandable to 14 MB)
CPU Memory (Local Memory):	8 MB (4 MB + 4 MB SIMM) (Expandable to 12 MB)
Filtering Table:	8,191 entries maximum
Aging Time:	5 minutes (default)

A.3 ENVIRONMENTAL REQUIREMENTS

Operating Temperature: 5°C to 40°C (41°F to 104°F)

Storage Temperature: -30°C to 90°C (-22°F to 194°F)

Operating Humidity: 5% to 95% (non-condensing)

A.4 CERTIFICATION

Safety: UL 1950, CSA C22.2 No. 950, EN 60950, and IEC 950

Emission: FCC Part 15 Class A, VCCI Class I, and EN 55022 Class A

Immunity: EN 50082-1

This unit has been tested by Bellcore and found to comply with the following Bellcore standards:

TR-NWT-000063 Network Equipment Building System (NEBS) Generic Equipment Requirements

GR-1098-CORE EMC and Electrical Safety Generic Criteria for Network Telecommunications Equipment

A.5 COM PORT PINOUT

Type: Standard RJ45 port

Pin	Function	Connection Attitude
1	Transmit Data (XMT)	From COM 2 port
2	Data Carrier Detect (DCD)	From COM 2 port
3	Data Set Ready (DSR)	To COM 2 port
4	Receive Data (RCV)	To COM 2 port
5	Signal Ground (GND)	NA
6	Data Terminal Ready (DTR)	From COM 2 port
7	Request to Send (RTS)	To COM 2 port
8	Clear to Send (CTS)	NA

APPENDIX B
UPGRADING THE EMM-E6

This appendix describes how to incorporate additional or expanded capabilities into the EMM-E6. This appendix describes the procedures for the addition of a BRIM or EPIM module and the addition of Single In-line Memory Modules (SIMMs).

B.1 LOCATING BRIM CONNECTORS

This section points out Bridge Router Interface Module (BRIM) connector locations on your EMM-E6 board. Refer to your BRIM Guide for specific installation procedures and additional information.

The following diagram (Figure B-1) shows BRIM connector locations for the EMM-E6:

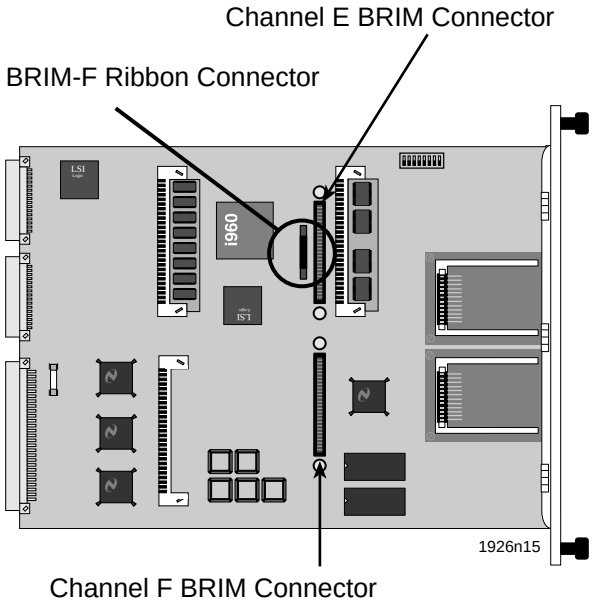


Figure B-1 BRIM Connector Locations

B.2 ADDING EPIMS

This section contains procedures for adding or replacing an Ethernet Port Interface Module (EPIM) to upgrade or change the capabilities of your EMM-E6. After installing your new EPIM, refer to Chapter 3, **Installation**, for network connection instructions.

The EMM-E6 EPIM slots are designed to provide redundancy. Only one EPIM will be active at any time. The inactive EPIM port will be held in standby, and will be immediately activated in the event of a filure ofthe primary EPIM port.

Observe all antistatic precautions when handling sensitive electronic equipment.

To install an EPIM, perform the following steps:

When removing an existing EPIM, make sure to pull the module straight out to avoid damage to the connector.

1. Remove the coverplate or the existing EPIM (whichever applies).
2. Slide your new EPIM into place, making sure the connectors on the rear of the module and inside the EMM-E6 attach properly. Refer to Figure B-2.
3. Secure the EPIM to the EMM-E6 by tightening the mounting screw.

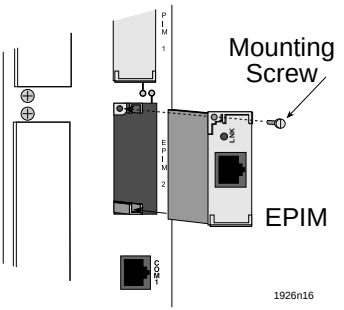


Figure B-2 Installing an EPIM

B.3 SIMM UPGRADES

The EMM-E6 allows memory upgrades for Shared DRAM, Local DRAM, and FLASH EEPROM. This section explains how to locate and add/replace a Single In-line Memory Module (SIMM) for any of these memory types. For information on the available SIMM upgrades and information on ordering them, contact your Cabletron Systems Sales Representative.

B.3.1 Locating SIMMs

Each memory type has a specific SIMM slot location on the EMM-E6 motherboard. When installing SIMM boards, make sure that you place them in their proper slots. Figure B-3 illustrates the EMM-E6 SIMM slot locations and the direction (indicated by the white arrow) in which to install the SIMMs.

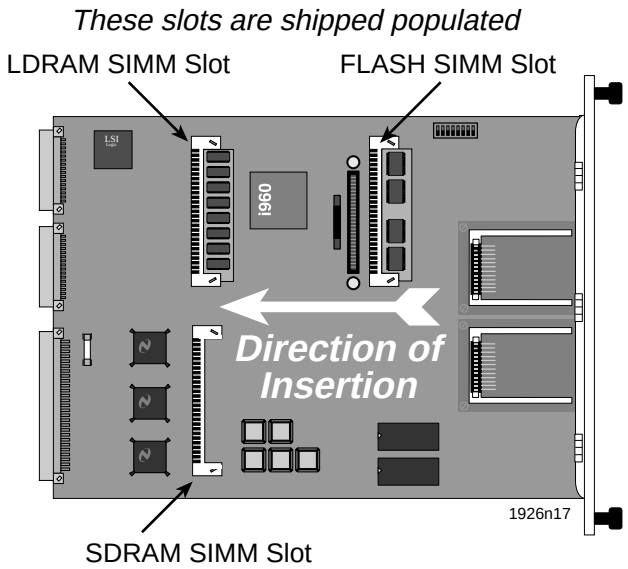


Figure B-3 SIMM Slot Locations

B.3.2 Installing SIMMs

The EMM-E6 uses an angle-down slot (where the SIMM rotates down to a horizontal locked position). Installing a SIMM in any slot is a simple two-step process. After finding the proper SIMM slot location (Figure B-3), refer to the procedures below.

Observe all antistatic precautions when handling sensitive electronic equipment.

1. Insert the SIMM between the connector teeth in the SIMM slot.
2. Pivot the SIMM down until it locks into the clips in the SIMM slot, and the SIMM holes fit over the SIMM slot posts. (See Figure B-4.)

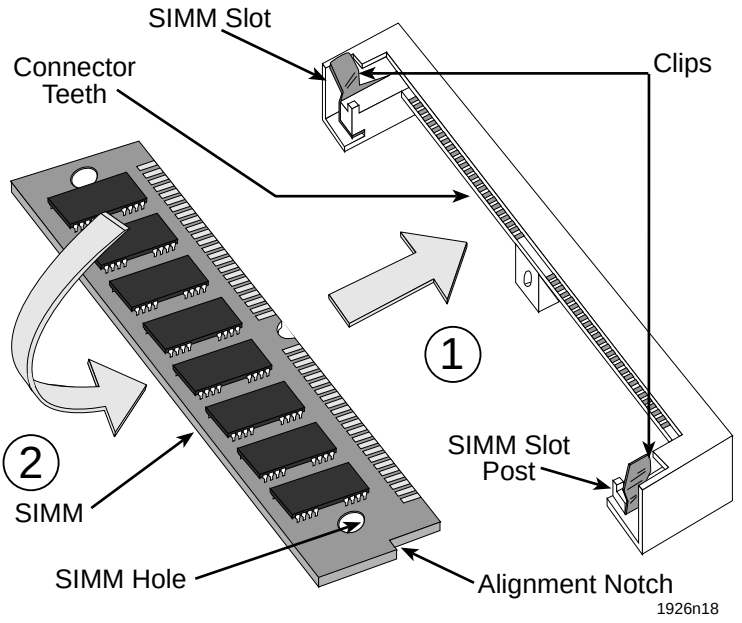
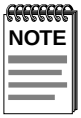


Figure B-4 Installing a Horizontal SIMM

APPENDIX C
ETHERNET CABLING REQUIREMENTS

This chapter contains general networking guidelines. Before attempting to install the EMM-E6 or any additional EPIMs or BRIMs, review the requirements and specifications outlined in this chapter.



Your network installation must meet the conditions, guidelines, specifications, and requirements included in this chapter to ensure satisfactory performance of this equipment. Failure to follow these guidelines may result in poor network performance.

C.1 NETWORK REQUIREMENTS

Take care in planning and preparing the cabling and connections for your network. The quality of the connections, the length of cables, and other conditions of the installation play critical roles in determining the reliability of your network.

Refer to the sections which follow that apply to your specific network configuration.

C.1.1 10BASE-T Twisted Pair Network

When connecting a 10BASE-T segment to an EMM-E6 (using an EPIM-T), ensure the network meets the following requirements:

- **Length**: The IEEE 802.3 10BASE-T standard requires that 10BASE-T devices transmit over a 100 meter (328 foot) link using 22-24 AWG unshielded twisted pair wire. However, cable quality largely determines maximum link length. If you use high quality, low attenuation cable, you can achieve link lengths of up to 200 meters. Cable delay limits the maximum link length to 200 meters.

Losses introduced by connections at punch-down blocks and other equipment reduce total segment length. For each connector or patch panel in the link, subtract 12 meters from the total length of your cable.

- **Insertion Loss**: Between frequencies of 5.0 and 10.0 MHz, the maximum insertion loss must not exceed 11.5 dB. This includes the attenuation of the cables, connectors, patch panels, and reflection losses due to impedance mismatches in the link segment.
- **Impedance**: Cabletron Systems 10BASE-T products work on twisted pair cable with 75 to 165 ohms impedance. Unshielded Twisted Pair cables typically have an impedance of between 85 and 110 ohms. You can also use Shielded Twisted Pair cables, such as IBM Type 1 cable, but keep in mind that this cable has an impedance of 150 ohms. The high impedance of the IBM Type 1 cable increases signal reflection. However, due to cable shielding and the subsequent lack of crosstalk between shielded pairs, signal reflection has little effect on the quality of the received signal.
- **Jitter**: Intersymbol interference and reflections can cause jitter in the bit cell timing, resulting in data errors. 10BASE-T links must not generate more than 5.0 ns of jitter. Make sure your cable meets 10BASE-T link impedance requirements to rule out jitter as a concern.
- **Delay**: The maximum propagation delay of a 10BASE-T link segment must not exceed 1000 ns. This 1000 ns maximum delay limits the maximum link segment length to no greater than 200 meters.
- **Crosstalk**: Signal coupling between different cable pairs within a multi-pair cable bundle causes crosstalk. 10BASE-T transceiver design alleviates concerns about crosstalk, provided the cable meets all other requirements.
- **Noise**: Crosstalk, or externally induced impulses, can cause noise. Impulse noise may cause data errors if the impulses occur at very specific times during data transmission. Generally, noise is not a concern. If you suspect noise-related data errors, you may need to reroute the cable or eliminate the source of the impulse noise.

- **Temperature**: Multi-pair PVC 24 AWG telephone cables typically have an attenuation of approximately 8-10 dB/100 m at 20°C (68°F). The attenuation of PVC insulated cable varies significantly with temperature. At temperatures greater than 40°C (104°F), we strongly recommend using plenum-rated cable to ensure attenuation remains within specification.

C.1.2 Multimode Fiber Optic Network

When connecting a multimode fiber optic link segment to the EMM-E6 (using an EPIM-F1/F2), ensure the network meets the following requirements:

- **Cable Type**: Use the following multimode fiber optic media:
  - 50/125 µm fiber optic cabling
  - 62.5/125 µm fiber optic cabling
  - 100/140 µm fiber optic cabling
- **Attenuation**: You must test the fiber optic cable with a fiber optic attenuation test set adjusted for an 850 nm wavelength. This test verifies that the signal loss in a cable falls within the following acceptable levels:
  - 13.0 dB or less for a 50/125 µm fiber cable segment
  - 16.0 dB or less for a 62.5/125 µm fiber cable segment
  - 19.0 dB or less for a 100/140 µm fiber cable segment
- **Budget and Propagation Delay**: When you determine the maximum fiber optic cable length to incorporate fiber runs into your network, you must calculate and consider the fiber optic budget (a total loss of 10.0 dB or less is permissible between stations) and total network propagation delay.

  To determine the fiber optic budget, combine the optical loss due to the fiber optic cable, in-line splices, and fiber optic connectors. Typical loss for a splice and connector (together) equals 1 dB or less.

Network propagation delay is the amount of time it takes a packet to travel from the sending device to the receiving device. Total propagation delay allowed for the entire network must not exceed 25.6 µs in one direction (51.2 µs round trip). If the total propagation delay between any two nodes on the network exceeds 25.6 µs, you must use bridges or switches.

- **Length**: The maximum possible multimode fiber optic cable length is 2 Km (1.24 miles). However, IEEE 802.3 FOIRL specifications specify a maximum of 1 Km (0.62 miles).

C.1.3 Single Mode Fiber Optic Network

When connecting a single mode fiber optic link segment to a hub (using an EPIM-F3), ensure the network meets the following requirements:

- **Cable Type**: Fiber optic link segments should consist of 8/125 or 12/125 µm single mode fiber optic cabling. You can also use 62.5/125 µm multimode cable with the EPIM-F3; however, multimode cable allows for greater optical loss, and limits the possible distance to 2 Km.
- **Attenuation**: You must test the fiber optic cable with a fiber optic attenuation test set adjusted for a 1300 nm wavelength. This test verifies that the signal loss in a cable falls within the acceptable level of 10.0 dB or less for any given single mode fiber optic link.
- **Budget and Propagation Delay**: When you determine a maximum fiber optic cable length, you must calculate and consider the fiber optic budget (a total loss of 10.0 dB or less between stations) and total network propagation delay.

  To determine the fiber optic budget, combine the optical loss due to the fiber optic cable, in-line splices, and fiber optic connectors. Typical loss for a splice and connector (together) equals 1 dB or less.

  Network propagation delay is the amount of time it takes a packet to travel from the sending device to the receiving device. Total propagation delay for the entire network must not exceed 25.6 µs in one direction (51.2 µs round trip). If the total propagation delay exceeds 25.6 µs, you must use bridges or switches to re-time the signal.

- **Length**: If you meet all system budgets, the maximum single mode fiber optic cable length can reach 5 Km (3.1 miles) with bridges or switches at each segment end. FOIRL specifications specify a maximum of 1 Km (0.62 miles).

C.1.4 10BASE2 Coaxial Cable Network

When connecting a thin coaxial cable segment to your hub (using an EPIM-C), ensure your network meets the following requirements:

- **Cable Type**: Use only 50 ohm RG-58 A/U type coaxial cable for thin coaxial cable segments.
- **Length**: The thin coaxial cable segment must not exceed 185 meters.
- **Terminators**: Terminate each end of a thin coaxial cable segment.
- **Connectors**: You can use up to 29 T-connectors throughout the length of the cable segment for host connections. Ensure that all connections are spaced 0.5 meters or more from one another or from terminators.

  If you use an excessive number of barrel connectors within the cable segment (e.g., finished wall plates with BNC feed-throughs), you may need to reduce the number of host connections. For special network design information, contact Cabletron Systems Technical Support.
- **Grounding**: For safety, ground only *one* end of a thin coaxial cable segment. Do NOT connect EPIM BNC ports to earth ground.

Connecting a thin coaxial cable segment to earth ground at more than one point could produce dangerous ground currents.

C.1.5 Transceiver Requirements

When you connect an external network segment to an EPIM-A in your hub through a transceiver, that transceiver must meet IEEE 802.3 standards or Ethernet version 1.0 or 2.0 requirements. The transceiver must also have SQE disabled.

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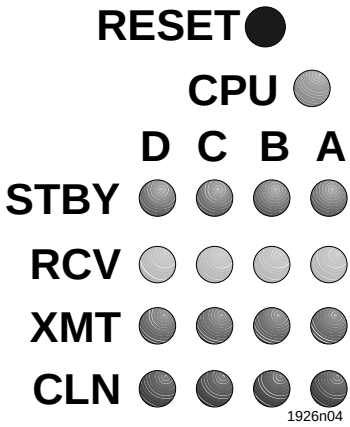


LED	Description
CPU	Green (Flashing): Operating properly.
	Red: CPU error condition.
STBY (A, B, C, or D)	Amber: Spanning Tree Algorithm has placed corresponding port in standby mode or the port has been placed in standby mode through management operations.
RCV (A, B, C, or D)	Amber: Indicates that the associated port is receiving a frame.
XMT (A, B, C, or D)	Green: Indicates that the associated port is transmitting frames.
CLN (A, B, C, or D)	Red: Lights to indicate a collision has occurred on the corresponding Ethernet segment.

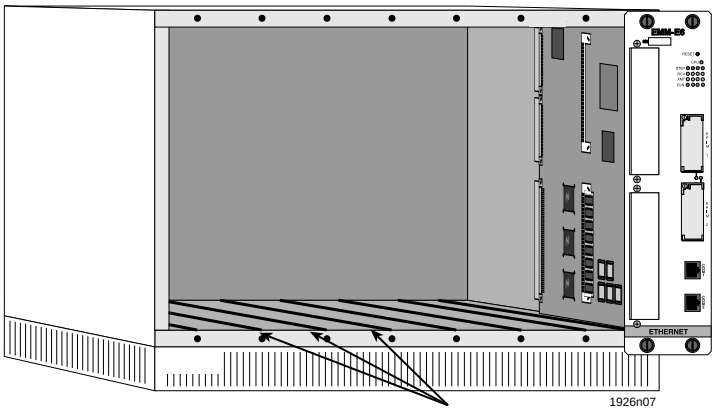
Installation

Any installation operations must be performed only by qualified personnel.

NOTE

We recommend powering down your MMAC when inserting or removing modules, even though Cabletron Systems modules have “hot swap” capabilities.

1. Power down the MMAC.
2. Remove any safety bars that protect the chassis and remove the module to be replaced or blank MMAC slot covers, in accordance with the installation and removal procedures for these items.
3. Slide the EMM-E6 into slots 1 and 2 of the MMAC as shown below.



Module Guide Channels

4. Secure the module by tightening the knurled knobs at the top and bottom of the module.
5. Replace the safety bars on the MMAC chassis.
6. Power on the MMAC chassis.