NOTICE

Cabletron Systems reserves the right to make changes in specifications and other information contained in this document without prior notice. The reader should in all cases consult Cabletron Systems to determine whether any such changes have been made.

The hardware, firmware, or software described in this manual is subject to change without notice.

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MRX, MRX-2, MRXI, MRXI-2, LANVIEW, SPIM-T, SPIM-T1, TMS-3, FOT-F, TPT-T, SPIM-F1, SPIM-F2, SPIM-C, SPIM-A, Remote LANVIEW/Windows, SPECTRUM, and LAN-MD are trademarks of Cabletron Systems, Inc.
This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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

If this equipment does cause interference to radio or television, 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:

- Re-orient the receiving antenna.
- Relocate the antenna with respect to the MRX/MRXI.
- Move the MRX/MRXI away from the antenna.
- Plug the MRX/MRXI into a different outlet so that the MRX/MRXI and the receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communication Commission helpful:

“*How to Identify and Resolve Radio TV Interference Problems*”

CHAPTER 1 INTRODUCTION

1.1 Using This Manual ................................................................. 1-2
1.2 The 10BASE-T HUB ............................................................... 1-2
1.3 Related Manuals ................................................................. 1-4
1.4 Getting Help ........................................................................ 1-4

CHAPTER 2 INSTALLATION REQUIREMENTS/
SPECIFICATIONS

2.1 Network Requirements......................................................... 2-1
2.2 Selecting A Location For The HUB ........................................ 2-1
2.3 Network Guidelines ............................................................. 2-2
   2.3.1 10BASE-T Twisted Pair Network Requirements ......... 2-2
   2.3.2 Fiber Optic Network Requirements ............................ 2-4
   2.3.3 Thin-Net Network Requirements ................................ 2-4
   2.3.4 Transceiver/AUI Requirements ................................. 2-5
2.4 Operating Specifications ...................................................... 2-6

CHAPTER 3 INSTALLATION

3.1 Unpacking The HUB .............................................................. 3-1
3.2 Attaching The Strain Relief Bracket .................................... 3-2
3.3 Installing The HUB ............................................................... 3-2
   3.3.1 Rack Mounting The HUB ............................................ 3-2
   3.3.2 Wall Mounting The HUB ............................................ 3-4
   3.3.3 Free-Standing Installation ......................................... 3-7
3.4 Connecting The HUB To The Power Source ....................... 3-7
3.5 Connecting The HUB To The Ethernet Network ................. 3-8
   3.5.1 Connecting The Network Port Cabling (MRX/MRXI) .... 3-8
   3.5.2 Connecting The Network Port Cabling (MRX-2/MRXI-2) 3-8
   3.5.3 Connecting A Twisted Pair Segment To A SPIM-T ...... 3-9
   3.5.4 Connecting A Shielded Twisted Pair Segment To A SPIM-T1 3-10
CHAPTER 3 (cont.)

3.5.5 Connecting A Fiber Optic Link Segment To A
SPIM-F1 or SPIM-F2 ..................................................... 3-11
3.5.6 Connecting A Thin-Net Segment To A SPIM-C .......... 3-14
3.5.7 Connecting An AUI Cable To A SPIM-A ....................... 3-15
3.6 Finishing The Installation ................................................. 3-16

CHAPTER 4 TESTING AND TROUBLESHOOTING

4.1 Installation Check-Out ............................................................... 4-1
4.2 Testing Segments Attached To The HUB ............................... 4-2
4.3 Using LANVIEW ................................................................. 4-5

CHAPTER 5 ADDING/REPLACING SPIMs

5.1 Opening The HUB ................................................................. 5-1
5.2 Removing A SPIM ............................................................... 5-2
5.3 Installing A SPIM ............................................................... 5-2

APPENDIX TWISTED PAIR WIRING GUIDE

A.1 Attaching Twisted Pair Segments To The HUB ................... A-1
Welcome to the Cabletron Systems MRX/MRX-2 and MRXI/MRXI-2 10BASE-T HUB Installation Guide. This manual covers installation instructions and provides reference information for the following Cabletron Systems 10BASE-T Hubs:

- **MRX**
  - 12-10BASE-T (using 50-pin Champ connector)
  - 2 Single Port Interface Module (SPIM) slots
  - No Management

- **MRX-2**
  - 12-10BASE-T (using RJ-45 connectors)
  - 2 Single Port Interface Module (SPIM) slots
  - No Management

- **MRXI**
  - 12-10BASE-T (using 50-pin Champ connector)
  - 2 Single Port Interface Module (SPIM) slots
  - SNMP Compliant Management

- **MRXI-2**
  - 12-10BASE-T (using RJ-45 connectors)
  - 2 Single Port Interface Module (SPIM) slots
  - SNMP Compliant Management

**NOTE:** The term **HUB** is used throughout this manual when describing features and functions that are common to all of the devices listed above. The terms MRX, MRX-2, MRXI and MRXI-2 are only used when it is necessary to describe features that are unique to a specific device.

All four HUBs can serve as a repeater to allow expansion of existing 802.3 networks using a variety of media. All four HUBs are 10BASE-T and 802.3 compliant.
INTRODUCTION

The MRX is functionally identical to the MRX-2 and the MRXI is functionally identical to the MRXI-2. The MRX and MRXI provide a 50-pin Champ connector for ports 1 through 12, and the MRX-2 and MRXI-2 provide twelve RJ-45 connectors.

The MRX/MRX-2 and MRXI/MRXI-2 are functionally the same, except that the MRXI/MRXI-2 provides the capability of in-band and out-of-band network management. The MRX/MRX-2 is not accessible, either in-band or out-of-band, by network management.

1.1 USING THIS MANUAL

Prior to installing and operating the HUB, read through this manual completely to familiarize yourself with its content and to gain an understanding of the features of the HUB. A general working knowledge of Ethernet and IEEE 802.3 type data communications networks and their physical layer components will be helpful when installing the HUB.

Chapter 1, Introduction, covers using this document, briefly describes features of the HUB and concludes with a list of related manuals.

Chapter 2, Requirements/Specifications, contains requirements for locating and installing the HUB and operating specifications for the MRX and MRXI.

Chapter 3, Installation, contains step-by-step installation instructions that include mounting and cabling for your HUB.

Chapter 4, Testing and Troubleshooting, contains procedures for checking for the proper installation of the HUB and a description of the LANVIEW™ LEDs and their function.

Chapter 5, Adding/Replacing SPIMs, describes removing and installing optional SPIM boards in the HUB.

Appendix, Twisted Pair Wiring Guide, serves as an aid to wiring punch-down blocks and twisted pair segments between your HUB and 10Base-T Ethernet devices.
1.2 THE 10BASE-T HUB

The Cabletron Systems HUB provides twelve 10BASE-T compliant ports (via 50 pin Champ connector) and two slots that support Cabletron Systems’ Single Port Interface Modules (SPIM). A variety of SPIMs are available permitting the expansion of an Ethernet/802.3 network via:

- Unshielded Twisted Pair Cable from the 10BASE-T Twisted Pair Interface Modules (SPIM-T).
- Shielded Twisted Pair Cable from the 10BASE-T Twisted Pair Interface Modules (SPIM-T1).
- Fiber Optic Cable, with SMA or ST connectors, from the Fiber Optic Interface Modules (SPIM-F1 or SPIM-F2).
- Thin-Net Cable from the Coaxial Interface Module (SPIM-C).
- AUI Cable, to an external transceiver, from the AUI Interface Module (SPIM-A).

![Diagram of MRX, MRX-2, MRXI and MRXI-2 10BASE-T HUBs]

Figure 1-1. MRX, MRX-2, MRXI and MRXI-2 10BASE-T HUBs
INTRODUCTION

The HUB fully conforms to the IEEE 802.3 Repeater, AUI and 10BASE-T specifications, and provides the flexibility to connect networks using IEEE 802.3, Ethernet Version 1 or Version 2 equipment. As an IEEE 802.3 compliant repeater, the HUB transmits re-timed data packets, regenerates the preamble, extends fragments, arbitrates collisions and automatically partitions problem segments, and reconnects non-problem segments. This feature minimizes the impact on network operation resulting from a problem on one segment by isolating the problem segment so that only the devices on that segment are affected. When the problem is solved, the problem segment is automatically reconnected to the network.

Since the HUB utilizes polarity detection and correction, the twisted pair connections are not sensitive to signal polarity. The network will still function properly with the (+) and (–) lines within a pair reversed. The LINK LED for the port with reversed polarity will flash to indicate this condition. Operating in this condition is not recommended and if this condition is discovered, the segment should be removed from the network and wired correctly by a technician. This reduces the potential for problems in the future if equipment changes are made. Connector pinouts are provided in Chapter 2, Installation Requirements/Specifications.

All four HUBs incorporate Cabletron Systems’ LANVIEW™ status monitoring and diagnostic system. LANVIEW is a convenient troubleshooting tool that allows you to monitor power, and data activity and help you diagnose power failures, collisions, cable faults, and link problems.

The MRXI provides an RS-232 Console port (not available in the MRX) that supports a Digital Equipment Corporation™, VT220™ or PC emulation of the VT220™ terminal. The terminal serves as a local management console, providing out-of-band access to MRXI/LM™, Local Management for the Cabletron Systems MRXI/MRXI-2. MRXI/LM is an effective menu driven tool that presents screens that integrate network status and network control. Several menus permit the network manager to manage and monitor the flow of traffic and access a summary of errors to pinpoint potential problem areas in a network. This capability gives the network manager the ability to interpret status and establish parameters to obtain optimal performance for the network and, if necessary, permit diagnosis of network problems. For additional information, refer to the MRXI/LM, Local Management for the Cabletron Systems MRXI/MRXI-2, User’s Manual.

Page 1-4
INTRODUCTION

The MRXI/MRXI-2 can also be controlled and managed in-band using Cabletron Systems’ LANVIEW/Windows, SPECTRUM, and SNMP network control management software.

1.3 RELATED MANUALS

The manuals listed below should be used to supplement the procedures and other technical data provided in this manual. The procedures contained in these manuals will be referenced where appropriate, rather than repeated.


1.4 GETTING HELP

If additional support is needed related to the Cabletron Systems HUB, or if you have any comments, suggestions, or questions relating to this manual contact Cabletron Systems Technical Support at:

Cabletron Systems, Inc.
P.O. Box 5005
Rochester, NH 03867-5005
Phone: (603) 332-9400
This Chapter describes the network and power requirements and operating specifications for the MRX, MRX-2, MRXI, and MRXI-2 10BASE-T HUBs. Before you attempt to install any of these HUBs, review the installation requirements and operating specifications that are outlined in this chapter. Your network installation must meet the conditions, guidelines, specifications, and requirements included in this chapter to obtain satisfactory performance from this equipment. Failure to follow these guidelines could produce poor network performance.

2.1 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 are critical factors in determining the reliability of your network. The following sections describe the network requirements to operate this equipment.

2.2 SELECTING A LOCATION FOR THE HUB

The HUB can be rack mounted, wall mounted, or placed on any horizontal surface. If not installed in a 19-inch rack, the following requirements must be met when selecting a location for your HUB.

NOTE: Be sure that the location selected is within reach of the network cabling.

- An unrestricted free surface area 21 inches wide, 18 inches deep and 6 inches high is needed.

- A single phase 120 Vac, 15A, grounded power receptacle must be located within 7 feet of the site.
REQUIREMENTS/SPECIFICATIONS

• If a shelving unit is to be used, it must be able to support 30 pounds of static weight.

• The temperature for the selected location must be maintained between 5° and 50° C, and less than 10° C per hour temperature change.

2.3 NETWORK GUIDELINES

The following network design guidelines must be followed when connecting the HUB to your network:

• As a general rule, 130 meters is the maximum length for an unshielded twisted pair segment. However, losses introduced by connections at punch-down blocks and other equipment serve to reduce this limit. In most installations, the optimal unshielded twisted pair length is 100 meters using standard PVC phone wire.

   Maximum link length is largely dependent on cable quality. If high quality, low attenuation cable is used, link lengths of up to 200 meters are achievable.

• The device at the other end of the twisted pair segment must meet IEEE 802.3 10BASE-T specifications.

• The transceivers that will be connected to the HUB (via a SPIM-A) must meet IEEE 802.3 standards and must not have the SQE test function enabled.

2.3.1 10BASE-T Twisted Pair Network Requirements

When connecting a 10BASE-T Twisted Pair Segment at any of the 10BASE-T Twisted Pair HUB Ports (Ports 1 through 12, a Single Port 10BASE-T Twisted Pair Segment Interface module [SPIM-T or SPIM-T1]), the following network requirements must be met:

• **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.
As a general rule, links up to 130 meters in length for unshielded twisted pair and 200 meters in length for shielded twisted pair are achievable. For each connector or patch panel in the link, subtract 12 meters from the 150 meter limit. This will allow for links of up to 126 meters using standard 24 AWG UTP wire and two patch panels within the link. Higher quality low attenuation cables may be required when using links of greater than 126 meters. Due to cable delay, the maximum link length is always limited to 200 meters, regardless of the cable type.

- **Insertion Loss** - The maximum insertion loss allowed for a 10BASE-T link is 11.5 dB at all frequencies between 5.0 and 10 MHz. This includes the attenuation of the cables, connectors, patch panels, and reflection losses due to impedance mismatches in the link segment.

- **Impedance** - Unshielded twisted pair cables typically have an impedance of between 85 to 110 ohms. Shielded twisted pair cables, such as IBM Type 1 cable, can also be used. You should remember that the impedance of IBM Type 1 cable is typically 150 ohms. This increases the signal reflection caused by the cable, but since the cable is shielded, this signal reflection has little effect on the received signal's quality due to the lack of crosstalk between the shielded cable pairs. Cabletron Systems’ 10BASE-T Twisted Pair products will work on twisted pair cable with 75 to 165 ohms impedance.

- **Jitter** - Intersymbol interference and reflections can cause jitter in the bit cell timing, resulting in data errors. A 10BASE-T link must not generate more than 5.0 nsec. of jitter. If your cable meets the impedance requirements for a 10BASE-T link, jitter should not be a concern.

- **Delay** - The maximum propagation delay of a 10BASE-T link segment must not exceed 1000 nsec. This 1000 nsec. maximum delay limits the maximum link segment length to no greater than 200 meters.

- **Crosstalk** - Crosstalk is caused by signal coupling between the different cable pairs contained within a multi-pair cable bundle. 10BASE-T transceivers are designed so that the user does not need to be concerned about cable crosstalk, provided the cable meets all other requirements.
REQUIREMENTS/SPECIFICATIONS

- **Noise** - Noise can be caused by either crosstalk or externally induced impulses. Impulse noise may cause data errors if the impulses occur at very specific times during data transmission. Generally, the user need not be concerned about noise. If noise-related data errors are suspected, it may be necessary to either 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 to 10 dB/100 m at 20°C (78°F). The attenuation of PVC insulated cable varies significantly with temperature. At temperatures greater than 40°C (104°F), it is strongly recommended that you use plenum-rated cables to ensure that cable attenuation remains within specification.

2.3.2 Fiber Optic Network Requirements

When connecting a Fiber Optic Link Segment to the HUB with a Single Port Fiber Optic Interface module (SPIM-F1 or SPIM-F2), the following network requirements must be met:

- **Cable Type** - The SPIM-F1 and SPIM-F2 are designed for use with one of 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** - The fiber optic cable must be tested with a fiber optic attenuation test set that is adjusted for an 850 nm wavelength. This test verifies that the signal loss in a cable is within an acceptable level:
  - 13.0 dB or less for 50/125 fiber cable segment.
  - 16.0 dB or less for 62.5/125 fiber cable segment.
  - 19.0 dB or less for 100/140 fiber cable segment.
• **Budget and Propagation Delay** - When determining the maximum fiber optic cable length, the fiber optic budget delay and total network propagation should be calculated and taken into consideration before fiber optic cable runs are incorporated in any network design. Fiber optic budget is the combination of the optical loss due to the fiber optic cable, in-line splices, and fiber optic connectors. Propagation delay is the amount of time it takes a packet to travel from the sending device to the receiving device.

• **Length** - The maximum allowable fiber optic cable length is 2 km. However, IEEE 802.3 specifications allow for a maximum of 1 km.

### 2.3.3 Thin-Net Network Requirements

When connecting a Thin-net segment to the HUB with a Single Port Coax Interface Module (SPIM-C), the following network requirements must be met:

• **Cable Type** - 50 ohm RG-58A/U type coaxial cable must be used when making up a thin-net cable segment.

• **Length** - The thin-net segment must be no longer than 185 meters.

• **Terminations** - A 50 ohm terminator must be connected to the far end of each thin-net segment.

• **Connections** - A maximum of 29 tee-connectors may be used throughout the length of cable segment for host connections. If an excessive number of barrel connectors are used within the cable segment, such as finished wall plates with BNC feed-throughs, then a reduced number of host connections may be required. For special network design, contact Cabletron Systems Technical Support.

• **Grounding** - For safety, only one end of a thin-net segment should be connected to earth ground. Connection to earth ground at more than one point on the segment could produce dangerous ground currents.
WARNING: Do not connect the shield at both ends of a thin net segment to ground. Only one end of the shield should be connected to earth ground.

The BNC ports of the Coaxial Interface Modules are not connected to earth ground.

2.3.4 Transceiver/AUI Requirements

When connecting an external network segment, via a transceiver and an AUI cable, to the HUB with a Single Port AUI Interface module (SPIM-A), the following network requirements must be met:

• **Transceiver/Ethernet Device** - The transceiver or Ethernet Device to which the module will be connected must meet IEEE 802.3 standards, and/or Ethernet Version 1.0 or Version 2.0 requirements.

• **AUI Cable** - The AUI cable connecting the module to a device must be IEEE 802.3 type cable.

• **Length** - The AUI Cable must not exceed 50 meters in length. If 28 AWG thin office drop AUI cable is used, then the maximum cable length is limited to 50 feet (15.24 meters).
2.4 OPERATING SPECIFICATIONS

The operating specifications for the Cabletron Systems’ HUB are described in this section. Cabletron Systems reserves the right to change these specifications at any time without notice.

GENERAL

MRXI/MRXI-2 Only

Packet Buffer Memory (RAM): 64 KB
Internal Processor: Intel 80186 operating at 10 MHz
Ethernet Controller: National Semiconductor DP8390
Static RAM: 128 KB
EPROM: 256 KB

MRX/MRX-2 and MRXI/MRXI-2

<table>
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<th>Delay Times:</th>
<th>In</th>
<th>Out</th>
<th>Delay Typ.</th>
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<td>SPIM</td>
<td>1000 nsec.</td>
</tr>
<tr>
<td></td>
<td>Twisted Pair</td>
<td>Twisted Pair</td>
<td>1000 nsec.</td>
</tr>
<tr>
<td></td>
<td>SPIIM</td>
<td>SPIIM</td>
<td>1300 nsec.</td>
</tr>
<tr>
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<td>SPIIM</td>
<td>Twisted Pair</td>
<td>1300 nsec.</td>
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<td>SPIIM</td>
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<td>700 nsec.</td>
</tr>
<tr>
<td></td>
<td>SPIIM</td>
<td>Twisted Pair</td>
<td>1000 nsec.</td>
</tr>
</tbody>
</table>

Preamble:

Input: Minimum of 20 bits required.
Output: 64 bits min. (last 2 bits are 1, 1).

J AM Output: Collisions are propagated through the network using the J AM signal of an alternating pattern of 1’s and 0’s in accordance with 802.3 specifications for a repeater unit.
REQUIREMENTS/SPECIFICATIONS

**Fragment Extension:** Packet fragments are extended to a minimum of 96 bits using the JAM [1,0].

**Fault Protection:** Each segment will disconnect itself from the other segments if 33 consecutive collisions occur, or if the collision detector of a segment is on for longer than approximately 210 µs. This fault protection will reset automatically after one packet is transmitted/received onto the fault protected segment without causing a collision.

INTERFACE CONNECTORS

**Network (Twisted Pair) Interface (Ports 1 through 12)**

**Internal Transceiver:** Cabletron Systems TPT-T Transceiver. For further information, refer to the TPT-T Twisted Pair Transceiver User’s Manual.

**MRX/MRXI**

**Type:** 50-Pin Champ Connector

<table>
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<tr>
<th>Pin</th>
<th>Signal</th>
<th>Wire Color</th>
<th>Pin</th>
<th>Signal</th>
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<td>RX1–</td>
<td>Blue/White</td>
<td>26</td>
<td>RX1+</td>
<td>White/Blue</td>
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<tr>
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<td>TX7+</td>
<td>Black/Brown</td>
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## REQUIREMENTS/SPECIFICATIONS

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<th>Signal</th>
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<td>RX8+</td>
<td>Black/Gray</td>
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<td>TX12–</td>
<td>Brown/Violet</td>
<td>49</td>
<td>TX12+</td>
<td>Violet/Brown</td>
</tr>
<tr>
<td>25</td>
<td>N/C</td>
<td>Gray/Violet</td>
<td>50</td>
<td>N/C</td>
<td>Violet/Gray</td>
</tr>
</tbody>
</table>

### Network (Twisted Pair) Interface (Ports 1 through 12)

**MRX-2/MRXI-2**

Type: Internally Crossed Over RJ-45 Jack (12)

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Wire Color</th>
<th>Pin</th>
<th>Signal</th>
<th>Wire Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RX+</td>
<td></td>
<td>5</td>
<td>No Connection</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>RX-</td>
<td></td>
<td>6</td>
<td>TX-</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>TX+</td>
<td></td>
<td>7</td>
<td>No Connection</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>No Connection</td>
<td></td>
<td>8</td>
<td>No Connection</td>
<td></td>
</tr>
</tbody>
</table>

### ETHERNET PORT - SPIM-T

*(10BASE-T TWISTED PAIR PORT)*

**Internal Transceiver:** Cabletron Systems’ TPT-T™ 10BASE-T Twisted Pair Transceiver

Type: Internally Crossed Over RJ-45 Jack

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Wire Color</th>
<th>Pin</th>
<th>Signal</th>
<th>Wire Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RX+</td>
<td></td>
<td>5</td>
<td>No Connection</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>RX-</td>
<td></td>
<td>6</td>
<td>TX-</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>TX+</td>
<td></td>
<td>7</td>
<td>No Connection</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>No Connection</td>
<td></td>
<td>8</td>
<td>No Connection</td>
<td></td>
</tr>
</tbody>
</table>
### REQUIREMENTS/SPECIFICATIONS

#### ETHERNET PORT - SPIM-T1  
**10BASE-T TWISTED PAIR PORT**

Internal Transceiver: Cabletron Systems' TPT-T 10BASE-T Twisted Pair Transceiver  
Type: DB-9 Port  

<table>
<thead>
<tr>
<th>Pin</th>
<th>TX+</th>
<th>Pin</th>
<th>RX-</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>No Connection</td>
<td>6</td>
<td>TX-</td>
</tr>
<tr>
<td>3</td>
<td>No Connection</td>
<td>7</td>
<td>No Connection</td>
</tr>
<tr>
<td>4</td>
<td>No Connection</td>
<td>8</td>
<td>No Connection</td>
</tr>
<tr>
<td>9</td>
<td>RX+</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### ETHERNET PORT - SPIM-F1 OR SPIM-F2  
**FIBER OPTIC PORT**

Internal Transceiver: Cabletron Systems' FOT-F™ Fiber Optic Transceiver  

Type:  
- **SPIM-F1**: SMA fiber optic ports.  
- **SPIM-F2**: ST fiber optic ports.  

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Typical Value</th>
<th>Worst Value</th>
<th>Worst Case Budget</th>
<th>Typical Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receive Sensitivity:</td>
<td>-30.5 dBm</td>
<td>-28.0 dBm</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Peak Input Power:</td>
<td>-7.6 dBm</td>
<td>-8.2 dBm</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Transmitter Power</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50/125 µm fiber:</td>
<td>-13.0 dBm</td>
<td>-15.0 dBm</td>
<td>13.0 dB</td>
<td>17.5 dB</td>
</tr>
<tr>
<td>62.5/125 µm fiber:</td>
<td>-10.0 dBm</td>
<td>-12.0 dBm</td>
<td>16.0 dB</td>
<td>20.5 dB</td>
</tr>
<tr>
<td>100/140 µm fiber:</td>
<td>-7.0 dBm</td>
<td>-9.0 dBm</td>
<td>19.0 dB</td>
<td>23.5 dB</td>
</tr>
<tr>
<td>Error Rate:</td>
<td>Better than 10⁻¹⁰</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
NOTE: The transmitter power levels and receive sensitivity levels given above are Peak Power Levels after optical overshoot. A Peak Power Meter must be used to correctly compare the values given above to those measured on any particular port. If Power Levels are being measured with an Average Power Meter, then 3 dBm must be added to the measurement to correctly compare those measured values to the values listed above (i.e. -30.5 dBm peak = -33.5 dBm average).

ETHERNET PORT - SPIM-C (BNC PORT)

<table>
<thead>
<tr>
<th>Internal Transceiver:</th>
<th>Cabletron Systems’ TMS-3™ Transceiver.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Termination:</td>
<td>The port on the module can be internally terminated, to an internal 50 Ohm terminator, utilizing the switch located to the left of the port. This eliminates the need to connect the port to a Tee Connector and terminator.</td>
</tr>
<tr>
<td>Type:</td>
<td>BNC receptacle, with gold center contact, for use with BNC type tee-connectors and RG-58 thin-net cable.</td>
</tr>
<tr>
<td>Grounding:</td>
<td>For safety, only one end of a thin-net segment should be connected to earth ground. Connection to earth ground at more than one point on the segment may allow for the occurrence of dangerous ground currents. The BNC port of the Coaxial Interface Modules is not connected to earth ground.</td>
</tr>
</tbody>
</table>
REQUIREMENTS/SPECIFICATIONS

ETHERNET PORT - SPIM-A (AUI PORT)

Interface Connector: DB15 Port

Type: 15 position D type receptacle

<table>
<thead>
<tr>
<th>Pin</th>
<th>Logic Ref.</th>
<th>Pin</th>
<th>Collision -</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Logic Ref.</td>
<td>9</td>
<td>Collision -</td>
</tr>
<tr>
<td>2</td>
<td>Collision +</td>
<td>10</td>
<td>Transmit -</td>
</tr>
<tr>
<td>3</td>
<td>Transmit +</td>
<td>11</td>
<td>Logic Ref.</td>
</tr>
<tr>
<td>4</td>
<td>Logic Ref.</td>
<td>12</td>
<td>Receive -</td>
</tr>
<tr>
<td>5</td>
<td>Receive +</td>
<td>13</td>
<td>Power (+12 Vdc)</td>
</tr>
<tr>
<td>6</td>
<td>Power Return</td>
<td>14</td>
<td>Logic Ref.</td>
</tr>
<tr>
<td>7</td>
<td>No Connection</td>
<td>15</td>
<td>No Connection</td>
</tr>
<tr>
<td>8</td>
<td>Logic Ref.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Connector Shell: Protective Ground

CONSOLE PORT (MRXI/MRXI-2 Only)

The Console (RS-232) Port supports access to Remote LANVIEW via a Local Management Console connected at the front panel of the MRXI/MRXI-2. The console port supports a Digital Equipment Corporation, VT220™ terminal or PC emulation of the VT220™ terminal.

Type: 9-pin (DB-9) RS232 Port

<table>
<thead>
<tr>
<th>Pin</th>
<th>Carrier Detect (CD)</th>
<th>Pin</th>
<th>Not Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Carrier Detect (CD)</td>
<td>6</td>
<td>Not Used</td>
</tr>
<tr>
<td>2</td>
<td>Transmit Data (TX)</td>
<td>7</td>
<td>Request to Send (RTS)</td>
</tr>
<tr>
<td>3</td>
<td>Receive Data (RX)</td>
<td>8</td>
<td>Clear to Send (CTS)</td>
</tr>
<tr>
<td>4</td>
<td>Data Terminal Ready (DTR)</td>
<td>9</td>
<td>Ring Indicator (RI)</td>
</tr>
<tr>
<td>5</td>
<td>Signal Ground (SG)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
INDICATORS

POWER
(green)
Indicates that the repeater is receiving power.

LINK
(green)
Indicates that a link has been established between the module and the 10BASE-T device at the other end of the twisted pair segment. This LED remains lit as long as the link is maintained. (The LINK LED flashes to indicate that the HUB has established a link with reversed polarity.)

RECEIVE
(yellow)
Indicates that the repeater is receiving a data packet on that segment.

COLLISION
(red)
Indicates that a collision is occurring on a system level.

MGMT
(yellow)
(MRXI/MRXI-2 only)
Flashes to indicate that the Remote LANVIEW Network Control Management for the MRXI/MRXI-2 is receiving a packet directed towards management.

FAULT
(red)
(MRXI/MRXI-2 only)
Indicates an error has been detected by the MRXI/MRXI-2 software.

POWER SUPPLY REQUIREMENTS

NOTE: The HUB has a universal power supply. This unit allows you to use an input power from 85 to 264 VAC, 47-63 Hz.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Typical Value</th>
<th>Worst Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Current:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MRX/MRX-2</td>
<td>0.5 amp</td>
<td>0.75 amp</td>
</tr>
<tr>
<td>MRXI/MRXI-2</td>
<td>0.75</td>
<td>1.0</td>
</tr>
<tr>
<td>Overload Protection - Output:</td>
<td>(1) 2AG 1 amp fuse.</td>
<td></td>
</tr>
</tbody>
</table>

Page 2-13
REQUIREMENTS/SPECIFICATIONS

ENVIRONMENTAL REQUIREMENTS

Operating Temperature:  +5° to +50° C

Non-operating Temperature:  -30° to +90° C

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

SAFETY

Designed in accordance with UL478, UL910, NEC 725-2(b), CSA, IEC, TUV, VDE class A. Meets FCC part 15, Class A limits.

WARNING: It is the responsibility of the person who sells the system to which the HUB will be a part to ensure that the total system meets allowed limits of conducted and radiated emissions.

SERVICE

MTBF (MHBK-217D):

MRX/MRX-2  > 132,046 hrs. projected
MRXI/MRXI-2  > 88,610 hrs. projected

MTTR:  < 0.5 hr.

PHYSICAL

Dimensions:  3.2H x 17.0W x 8.9D inches
             (8.13 x 38.1 x 22.5 cm)

Weight:

MRX/MRX-2
Unit:  3.175 kg. (7 lbs.)
Shipping:  3.629 kg. (8 lbs.)

MRXI/MRXI-2
Unit:  3.175 kg. (7 lbs.)
Shipping:  3.629 kg. (8 lbs.)
CHAPTER 3

INSTALLATION

This chapter outlines the procedure for installing an MRX, MRX-2, MRXI, or MRXI-2 10BASE-T HUB and connecting it to your network. Be sure that the guidelines and requirements outlined in Chapter 2, Requirements/Specifications, are met before installing the HUB.

3.1 UNPACKING THE HUB

Before you install the HUB, you should check the contents of the accessory package.

- Remove the two plastic bags containing the accessories and check that all items listed below are included:

  One cable support bracket
  One 7.5-foot USA power cord
  18 6-inch cable ties
  Two rack/wall mount brackets
  Four 8-32 x 3/8" screws.
  Two wall mount brackets

**NOTE:** 1/4-inch Molly screw anchors for wall mounting are not included.

- Remove the HUB from the shipping box.

- Slide the two foam end caps off the HUB.

- Remove the HUB from the protective plastic bag and set it aside to prevent it from being damaged.

**NOTE:** Save the box and shipping materials in the event the HUB will have to be shipped in the future.

Contact Cabletron Systems Technical Support immediately if any discrepancy exists in the materials.
3.2 ATTACHING THE STRAIN RELIEF BRACKET

Attach the strain relief bracket to the front of the HUB as follows:

1. Locate the strain relief bracket and four 8-32 x 3/8" screws from the HUB installation kit.

2. Attach the strain relief bracket to the rear of the HUB as shown in Figure 3-1.

![Figure 3-1. Attaching the Strain Relief](image)

3.3 INSTALLING THE HUB

The HUB can be rack-mounted in a 19-inch rack, wall mounted or free-standing on any horizontal surface (i.e., shelf or desk, etc.). Select one of the following subsections and perform the steps that are applicable for your installation:

3.3.1 Rack Mounting the HUB
3.3.2 Wall Mounting the HUB
3.3.3 Free-Standing Installation
3.3.1 Rack Mounting the HUB

Refer to Figure 3-2 and perform these steps to install the HUB in a 19-inch rack.

1. Remove four cover screws (two from each side) located along the rear edges of each end of the HUB.

2. Using the four cover screws (removed in step 1), attach the rack mounting brackets to each end of the HUB. Be sure to use the two holes nearest the bend in the bracket so that the bracket is mounted flush with the rear of the HUB.

3. With the mounting brackets installed, position the HUB between the vertical frame members of the 19-inch rack and fasten it securely with the mounting screws (see Figure 3-3).
3.3.2 Wall Mounting the HUB

The HUB can be wall mounted in either of two positions. Select one of the following procedures to provide the desired wall mounting orientation.

**Flat Mounting**

When the HUB is flat-mounted on a wall surface, it must be installed with the cable connections facing down. Refer to Figure 3-4 and perform the following steps to install the HUB as a wall mounted device.

1. Remove the four cover screws (two from each side) located along the bottom edges of each end of the HUB.

2. Using the four cover screws (removed in step 1), attach one wall mounting bracket to each end of the HUB. The bracket should be flush with the bottom of the HUB.

Figure 3-3. Installing the HUB in the Rack
3. Select a wall location for the HUB within 7 feet of a power outlet.

**WARNING:** There is a potential **SHOCK HAZARD** if there is electrical wiring within the wall that interferes with drilling for pilot holes. Select a wall location where drilling pilot holes for the Molly screws will not come in contact with electrical wiring in the wall.

4. You will need a pencil for this step. With the wall mounting brackets attached to the HUB, position the HUB against the wall where it will be permanently mounted with the strain relief bracket facing down. Using your pencil, mark the wall location for the four pilot holes.
INSTALLATION

5. Set the HUB aside and carefully drill four 1/4" pilot holes, one for each of the Molly screw anchors and insert the four Molly screw anchors into the holes just drilled.

6. Tighten each of the anchor screws until the anchor expands holding the anchor firmly in the wall, then remove the screws completely.

7. Position the HUB on the wall over the anchors and reinstall the four anchor screws to attach the HUB to the wall. Tighten the four anchor screws.

Perpendicular Wall Mounting
Refer to Figure 3-5 and perform the following steps to install the HUB perpendicular to the wall surface.

WARNING: This mounting method is not intended for installation on drywall or other composition wall materials. The weight of cabling connected at the HUB could cause the HUB to break away from the wall causing damage to the wall and HUB.

1. Remove the four cover screws (two from each side) located along the front edges of each end of the HUB.

2. Using the four cover screws (removed in step 1), attach one rack/wall mounting bracket to each end of the HUB. You must use the mounting holes indicated in Figure 3-5 (farthest away from the bend in the bracket). This provides the necessary space for ventilation of the HUB.

3. Select the wall location for the HUB within 7 feet of a power outlet.

WARNING: There is a potential SHOCK HAZARD if there is electrical wiring within the wall that interferes with drilling for pilot holes. Select a wall location where drilling pilot holes for the Molly screws will not come in contact with electrical wiring in the wall.
4. You will need a pencil for this step. With the wall mounting brackets attached to the HUB, position the HUB against the wall where it will be permanently mounted. Using your pencil, mark the wall location for the four pilot holes, using the outermost holes as indicated in Figure 3-5.

5. Set the HUB aside and carefully drill four 1/4" pilot holes, one for each of the Molly screw anchors and insert the four Molly screw anchors into the holes just drilled.

6. Tighten each of the anchor screws until the anchor expands holding the anchor firmly in the wall, then remove the screws completely.

7. Position the HUB on the wall over the anchors and reinstall the four anchor screws to attach the HUB to the wall. Tighten the four anchor screws.
3.3.3 Free-Standing Installation

For a free-standing installation, locate the HUB within 7 feet of its power source and with an unrestricted free surface area 21 inches wide, 18 inches deep and 6 inches high.

3.4 CONNECTING THE HUB TO THE POWER SOURCE

Connect the HUB to the power source as follows:

**NOTE**: The HUB has a universal power supply. This allows you to connect the HUB to power sources from 85 Vac to 264 Vac, 47-63Hz.

1. Plug the power cord (see Figure 3-6) into the power receptacle located on the rear of the HUB.

2. Plug the power cord into a grounded wall outlet.

After you have made the power connection, verify that the POWER LED is lit, indicating that the HUB is receiving power.
3.5 CONNECTING THE HUB TO THE ETHERNET NETWORK

The procedure for connecting Ethernet segments to the unit will vary depending on the media and ports being connected. Refer to the following list and perform the procedure described in the subsections that apply to your HUB:

- Network Port (MRX/MRXI) 3.5.1
- Network Port (MRX-2/MRXI-2) 3.5.2
- SPIM-T 3.5.3
- SPIM-T1 3.5.4
- SPIM-F1 3.5.5
- SPIM-F2 3.5.6
- SPIM-C 3.5.7
- SPIM-A 3.5.8

3.5.1 Connecting the Network Port Cabling (MRX/MRXI)

The MRX and MRXI Network Port cabling uses a 50-pin Champ connector to attach up to twelve unshielded twisted pair segments to the HUB. The Network feeder cable typically connects to a punch-down block using a 50-pin Champ connector, but in some cases the connection could require wiring the block for the individual twisted pairs. The Appendix provides a guide to wiring the punch-down block when a 50-pin Champ connector is not being used.

3.5.2 Connecting the Network Port Cabling (MRX-2/MRXI-2)

The MRX-2 and MRXI-2 Network Port consists of 12- RJ-45 connectors, used to attach up to twelve unshielded twisted pair segments to the HUB. The X associated with each port number indicates that the port is internally crossed over.

**NOTE:** The X indicating crossover is omitted on some units. However, the RJ-45 Network ports are internally crossed over.

1. Connect twisted pair segments (see Figure 3-7) to the HUB Network Port by inserting the RJ-45 connector from each twisted pair segment into the desired RJ-45 port number on the HUB.
2. Check that the associated LNK LED for the port is lit. If the LED is not lit, perform each of the following steps until it is:

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

   b. Verify that the RJ -45 connector on the twisted pair segment has the proper pinouts (see Figure 3-8).

   c. Check the cable for continuity.

   d. Check that the twisted pair connection meets dB loss and cable specifications outlined in 10BASE-T Twisted Pair Network Requirements.

If a link still has not been established, contact Cabletron Systems Technical Support.

Page 3-10
3.5.3 Connecting a Twisted Pair Segment to a SPIM-T

The X to the left of the RJ-45 port on the SPIM-T indicates that the port is internally crossed over. This eliminates the need to cross over the twisted pair segment attached to the SPIM-T port. To connect a SPIM-T to a Twisted Pair Segment:

1. Connect the twisted pair segment (see Figure 3-9) to the module by inserting the RJ-45 connector on the twisted pair segment into the RJ-45 port on the module.

![Figure 3-9. Connecting a Twisted Pair Segment to a SPIM-T](image)

2. Check that the LNK LED for the port is lit. If the LED is not lit, perform each of the following steps until it is:
   a. Check that the 10BASE-T device at the other end of the twisted pair segment is powered up.
   b. Verify that the RJ-45 connector on the twisted pair segment has the proper pinouts (see Figure 3-10).
   c. Check the cable for continuity.
   d. Check that the twisted pair connection meets dB loss and cable specifications outlined in 10BASE-T Twisted Pair Network Requirements.
3.5.4 Connecting an STP Segment to a SPIM-T1

The Shielded Twisted Pair segment that attaches to the SPIM-T1 must be wired according to the pinout shown in Figure 3-12.

To connect a Shielded Twisted Pair Segment to a SPIM-T1:

1. Connect the DB-9 Connector (see Figure 3-11) from the shielded twisted pair segment to the DB-9 port on the module and secure the connector to the port using the screws provided with the connector.
2. Check that the Link LED is lit. If the LED is not lit, perform each of the following steps until it is:

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

   b. Verify that the DB-9 connector on the twisted pair segment has the proper pinouts (see Figure 3-12).

   c. Check the cable for continuity.

   d. Check that the twisted pair connection meets dB loss and cable specifications outlined in 10BASE-T Twisted Pair Network Requirements.

If a link still has not been established, contact Cabletron Systems Technical Support.
3.5.5 Connecting Fiber Optic Link Segments

When connecting a fiber optic link segment to a SPIM-F1 or a SPIM-F2, you must keep the following in mind:

- If you are connecting a fiber optic link segment with SMA 906 connectors to a SPIM-F1 with SMA ports, ensure that half alignment sleeves are in place on each connector. A full alignment sleeve will damage the receive port. SMA 905 connectors do not need alignment sleeves.

- If you are connecting a fiber optic link segment with ST connectors to a SPIM-F2 with ST ports, keep in mind that ST connectors attach to ST ports much like BNC connectors attach to BNC ports. The connector is inserted into the port with the alignment key on the connector inserted into the alignment slot on the port. The connector is then turned to lock it down.

- The physical communication link consists of two strands of fiber optic cabling: the Transmit (TX) and the Receive (RX). The Transmit strand from the applicable port on the module will be connected to the Receive port of a fiber optic Ethernet device at the other end of the segment. For example, TX of the applicable port on the module will go to RX of the other fiber optic device. The Receive strand of the applicable port on the module will be connected to the Transmit port of the fiber optic Ethernet device. For example, RX of the applicable port on the module will go to TX of the other fiber optic device.

It is recommended that you label the fiber optic cable to indicate which fiber is Receive and which is Transmit. When you buy fiber optic cable from Cabletron Systems, it is labeled so that: at one end of the cable, one fiber is labeled 1, and the other fiber is labeled 2. This pattern is repeated at the other end of the cable. If you did not purchase your cable from Cabletron Systems, be sure you have labeled your cable in the manner described above.

**CAUTION:** 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 the ends can cause problems in data transmissions.

If the ends become contaminated, clean them with alcohol using a soft, clean, lint free cloth.

Page 3-14
To connect a fiber optic link segment to a SPIM-F1 or a SPIM-F2:

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 the fiber labeled 1 to the applicable receive port, labeled RX, on the module (Figure 3-13).

3. Attach the fiber labeled 2 to the applicable transmit port labeled TX, on the module.

4. At the other end of the fiber optic cable, attach the fiber labeled 1 to the transmit port of the device.

5. Attach the fiber labeled 2 to the receive port.

6. Check that the Link LED on the applicable port on the module is lit. If the LED is not lit, perform each of the following steps until it is:
   
a. Check that the power is turned on for the device at the other end of the link.

   b. Verify that the fiber strands are properly “crossed over” between the applicable port on the module and the fiber optic device at the other end of the fiber optic link segment.
c. Verify that the fiber connection meets the dB loss specifications outlined in Fiber Optic Network Requirements.

If a link still has not been established, contact Cabletron Systems Technical Support.

3.5.6 Connecting a Thin-Net Segment to a SPIM-C

To connect a thin-net segment to a SPIM-C:

1. Set the Internal Termination Switch (see Figure 3-14), located to the left of the port and labeled TERM., to:
   - The on position (•) if the thin-net segment will be internally terminated at the port.
   - The off position (o) if the thin-net segment will not be terminated at the port.

2. If the Internal Termination switch is in the On position, connect the thin-net segment directly to the BNC port.

3. If the Internal Termination switch is in the Off position:
   a. Attach a BNC tee-connector to the BNC port on the module.
   b. Attach the thin-net segment (1) to one of the female connectors on the tee-connector.

   **NOTE:** Each segment attached to the tee-connector must be terminated. If a segment is not attached to one of the female connections on the tee-connector, then a terminator must be placed on that connection.

   c. Attach another thin-coax segment or a terminator to the other female connector on the tee-connector.
3.5.7 Connecting an AUI Cable to a SPIM-A

To connect a SPIM-A to an external network segment, via an AUI Cable:

1. Attach an external transceiver to the network segment that will be connected to the AUI port. Refer to the applicable transceiver manual.

2. Attach an AUI cable, no longer than 50 meters in length, to the transceiver connected to the network in step 1.

3. Connect the AUI cable to the AUI port located on the rear of the HUB (see Figure 3-15).

4. Lock the AUI connector into place using the slide latch on the connector.

**CAUTION:** Ensure that the external transceiver to which the HUB will be connected DOES NOT have the signal quality error (SQE or “heartbeat”) test function enabled. The HUB will not operate if the transceiver has the SQE test function enabled, and the network will be unusable. Refer to the applicable transceiver manual.
5. Check that the **PWR** LED on the HUB is lit. If the **PWR** LED is not lit, disconnect the AUI cable connecting the HUB and the transceiver. If the **PWR** LED is still not lit, the fuse on the SPIM-A is defective and should be replaced by qualified service personnel.

If the **PWR** LED is lit with the AUI cable disconnected, continue with the following checks:

a. Check the AUI connections for proper pinouts. The pinouts for the transceiver connection are listed in Chapter 2, *Installation Requirements/Specifications*.

b. Check the cable for continuity.

c. Reconnect the AUI cable to the HUB and the device.

If the LED is still not lit after reconnecting the segment, contact Cabletron Systems Technical Support.

### 3.6 FINISHING THE INSTALLATION

The HUB is now ready for operation. Before placing the network into service, test the installation thoroughly, making sure that all stations are able to be addressed and that the HUB and all stations are indicating normal operation. Ensure that the networking software is configured properly to match the installed network. If you encounter errors or abnormal operation, proceed to Chapter 4, *Testing and Troubleshooting*. 

---

Figure 3-15. Connecting an External Transceiver SPIM-A
This chapter contains procedures to test the HUB after it has been connected to the network. A description of LANVIEW and its function in troubleshooting physical layer network problems is also provided.

4.1 INSTALLATION CHECK-OUT

After the HUB has been connected to the network, verify that packets can be passed between all Ethernet devices connected to the HUB and any other devices connected to the network. If you encounter difficulty with any of the attached devices, check the link as follows:

1. Check that the \textbf{LINK} LED, if applicable, for the port is lit. If the LED is not lit:
   
   a. Check that the 10BASE-T device at the other end of the twisted pair segment is powered up.

   b. If you are testing a SPIM-T or SPIM-T1, verify that the connector on the twisted pair segment has the proper pinouts. Refer to Chapter 2, \textit{Requirements/Specifications}, for the pin assignments for twisted pair connectors.

   For SPIM-F1/SPIM-F2 check that the TX and RX fibers are properly connected.

   c. Check the cable for continuity. A variety of tools are available for this test, depending on the media being used.

   d. Check that the twisted pair segments meet cable specifications for dB loss described in 10BASE-T Twisted Pair Network Requirements.
TESTING AND TROUBLESHOOTING

2. If the **LINK** LED for any of the twisted pair segments (Ports 1-12 or SPIM-T/T1) flashes when the HUB is powered on or when the segment is first attached, it indicates a polarity reversal for that segment. If a reversed polarity condition is discovered, the segment should be removed from the network and wired correctly (according to the connector wiring shown in Chapter 2, *Requirements/Specifications*). This will avoid the potential for future compatibility problems.

3. If the remote station is ready and the **LINK** LED is lit, but no data is being passed through the port, one of two conditions may exist:

   - The port has been disabled by network management or
   - The port has been segmented either because the collision detector was on for more than 210 µsec. or 33 consecutive collisions were detected on the attached segment. The affected link will remain segmented until a good packet is transmitted/received without collisions.

   If the **LINK** LED is still not lit, contact Cabletron Systems Technical Support.

4.2 TESTING SEGMENTS ATTACHED TO THE HUB

The Ethernet links connected to the HUB can be tested to determine if they comply with IEEE 802.3 specifications. This is done by using two Ethernet node testers, such as Cabletron Systems LAN-MD™ attached in place of the Ethernet devices normally attached on any two links. Figure 4-1 shows several methods for connecting the LAN-MD to test different media types and links connected to the HUB. The LAN-MDs exchange valid data packets for end-to-end testing.
To test any link; select two links, the link being tested and a second link, one that is known to be operating properly, and perform the following steps:

NOTE: The flexibility of the HUB permits a variety of media combinations, resulting in many possible test configurations. Since it is impossible to cover every combination of network media and HUB configuration, minor adjustments to the testing procedures given here may be necessary to test your specific configuration.

1. Connect two LAN-MDs, one at the end of each of the Ethernet links being tested. If you are connecting one or both of the LAN-MDs to a segment that is attached to:

   a. one of the twelve unshielded twisted pair (Network) ports, a SPIM-T or SPIM-T1 installed in the HUB:

      (1) Connect a properly functioning Cabletron Systems' TPT-T 10BASE-T Twisted Pair Transceiver to the device end of the Twisted Pair Segment coming from the applicable port on the HUB.

      (2) Connect a LAN-MD to the TPT-T using an AUI cable.

   b. SPIM-F1 or SPIM-F2 installed in the HUB:

      (1) Connect a properly functioning Cabletron Systems’ FOT-F Fiber Optic Transceiver to the device end of the Fiber Optic Link Segment coming from the SPIM-F1/F2.

      (2) Connect a LAN-MD to the FOT-F using an AUI cable.

   c. SPIM-C installed in the HUB:

      (1) Connect a transceiver and an AUI cable to the Thin-net segment.

      (2) Connect a LAN-MD to the transceiver using an AUI cable.
Figure 4-1. Test Connections for HUB Segments

d. SPIM-A installed in the HUB:

(1) Attach an external transceiver to the segment coming from the port on the SPIM-A.

(2) Connect a LAN-MD to the transceiver using an AUI cable.
2. Select and run test **6 - SERVER** on either LAN-MD connected to the Ethernet network on either side of the wide area link.

3. Verify that the Test Status **PASS** LED is lit and that the Status Code reads **000** or **001**. If these two conditions are met, the LAN-MD is now the **SERVER** unit and, when used with another LAN-MD, will echo packets.

4. Select and run test **4 - NODE CHECK** on the LAN-MD connected to the Ethernet network on the other side of the wide area link.

5. Verify that this test passes. At least 100 packets should be sent and received between LAN-MDs with no errors. Packets will be sent from this LAN-MD to the LAN-MD at the other end of the wide area link, acting as the Server, then echoed back.

When the links have successfully completed these tests, the HUB is ready for normal operation. If any failures are noted, contact Cabletron Systems Technical Support.

### 4.3 USING LANVIEW

LANVIEW is Cabletron Systems' built-in visual diagnostic and status monitoring system. Using LANVIEW, your network troubleshooting personnel can quickly scan the LANVIEW LEDs to observe network status or diagnose network problems, and determine which node or segment is faulty. The locations for the rear panel LANVIEW LEDs are illustrated in Figure 4-2.
TESTING AND TROUBLESHOOTING

MRX/MRX-2 and MRXI/MRXI-2

POWER (Green)
When this LED is lit it indicates that the HUB is receiving power. When this LED is not lit it indicates a loss of input power. Check the input power source (circuit breaker, fuse, etc.). If the proper source power is present, the problem could be with the HUB.

NOTE: There are twelve RECEIVE and LINK LEDs, one for each of the Network Ports.

RECEIVE (Yellow)
This LED flashes to indicate that the HUB is repeating data packet received from the associated Network Port (1-12) segment. The flash of the LED is pulse stretched for viewing effect.

COLLISION (Red)
This red LED flashes to indicate that a collision is occurring at a system level. The flash of the LED is pulse stretched for viewing effect.

LINK (green)
When this LED is lit for Ports 1-12, the twisted pair ports, this indicates that a link has been established between the associated twisted pair segment and the 10BASE-T device at the other end of the segment. This LED will remain lit as long as a link is maintained.

If no data has been sent for 16 msec, a positive link test pulse of 100 nsec is sent onto the transmit link of the twisted pair cable. The link pulses are received by the HUB and checked to determine if the pulse is occurring at the correct rate, polarity and pulse shape. If no pulses are received or the pulses are not correct, the transceiver will enter the Link Fail State and the LED will not be lit. The HUB will not receive or transmit data until the link is restored by receiving a correct link test pulse or a valid packet.

When the HUB is powered-on, the LINK LED flashes if the HUB detects reversed polarity on the segment attached to the associated port.
TESTING AND TROUBLESHOOTING

MRXI/MRXI-2 Only

**MGMT** (Yellow)
The management LED flashes for a management packet received for the MRXI/MRXI-2 management.

**FAULT** (Red)
Indicates an error has been detected by the software. If this problem persists, contact Cabletron Systems Technical Support.
This chapter contains procedures to replace an existing Single Port Interface Module (SPIM) or install a new SPIM to upgrade the capabilities of your HUB. The chapter is divided into three sections, Opening the HUB, Removing a SPIM and Installing a SPIM. At the end of the physical installation, you should refer to Chapter 4, Testing and Troubleshooting, to verify proper operation of the HUB.

5.1 OPENING THE HUB

The cover must be removed from the HUB to remove or install a SPIM. Remove the cover as follows:

1. Power off the HUB by removing the power cable from the wall outlet.

2. In some installations it may be necessary to move the HUB to gain access to the HUB interior. If so, label and remove the network cables attached to the HUB.

3. Remove the 16 cover screws (see Figure 5-1) and lift the cover from the HUB. Set the cover and screws aside for later installation.
5.2 REMOVING A SPIM

The steps in this section describe removing an existing SPIM. You should use this procedure only if you are replacing an existing SPIM, either to change from one media type to another or to replace a SPIM that has failed. If you are adding a new SPIM where none existed before, then you can bypass this section and go on to Installing a SPIM. The procedure is the same for both SPIM positions. Refer to Figure 5-2 and remove the existing SPIM as follows:

1. Disconnect the SPIM interface cable from the HUB mother board by opening the two latch ears on the cable connector.

2. Using the special offset 1/4-inch wrench supplied with the new SPIM, remove the two 1/4-inch hex nuts and two washers that secure the SPIM to the studs inside the HUB rear panel. Retain the nuts and washers for later installation.
3. Remove the Phillips screw near the left front corner of the SPIM that holds the SPIM to the standoff mounted on the mother board. Save the screw to install the new SPIM.

4. Slide the SPIM forward off the rear panel studs and remove the SPIM from the HUB.

5.3 INSTALLING A SPIM

1. If you are installing a new SPIM, where none existed before, you must first remove the blank panel where the new SPIM will be installed. Remove the blank panel as follows:

   a. Using the special offset 1/4-inch wrench supplied with the new SPIM, remove the two 1/4-inch hex nuts and two washers that secure the blank panel to the studs inside the HUB rear panel. Retain the nuts and washers to install the new SPIM.

2. Position the new SPIM on the studs on the inside of the rear panel and fasten the SPIM to the mounting standoff attached to the mother board with the Phillips screw from the SPIM kit (see Figure 5-2).
3. Fasten the SPIM to the rear panel studs with the previously removed washers and 1/4-inch hex nuts. Tighten the nuts with the special offset wrench.

4. Connect the SPIM interface cable to the 16-pin receptacle on the mother board. Push the cable connector all the way into the receptacle and secure it with the latch ears on the receptacle.

5. Reinstall the cover using the previously removed cover screws.

6. If cables were previously removed, reconnect them according to their labels.

7. Power on the HUB by plugging the power cable into the wall outlet.

8. Refer to Chapter 3, Installation, for specific cabling and configuration procedures for the type of SPIM that you have just installed.

9. Refer to Chapter 4, Testing and Troubleshooting, to test the SPIM and resolve any difficulties encountered following installation.
The MRX/MRXI 10BASE-T HUB has a 50-pin Champ connector that allows you to run a 50-pin feeder cable from the HUB to a punch-down block. This Appendix serves as an aid to wiring punch-down blocks and twisted pair segments between your HUB and 10Base-T Ethernet devices.

A.1 ATTACHING TWISTED PAIR SEGMENTS TO THE HUB

Table A-1 describes the pins and the color codes that are used in twisted wiring at the HUB and the connections to a punch-down block in the wiring closet at the HUB end of the attached segments. Table A-2 shows the pins and the color codes that are used for wiring at the punch down block at the 10BASE-T Ethernet device. Figure A-1 illustrates the pin layout for an RJ-45 connector and a punch down block and Figure A-2 shows the wiring for a twisted pair segment.

To connect the HUB into an existing twisted pair wiring system:

1. Connect a 50-pin feeder cable to the Champ connector on the HUB. In most cases, the feeder cable can be connected directly to a punch down block using a Champ connector located on the block. If not, each segment must be connected at the punch down block using the information in Figure A-2 and Table A-1. This table and figure describes the pins and the color codes that are used to wire into a punch down block.

2. Attach the feeder cable to the punch down block.

3. Wire the punch down block end of the 4 pair twisted distribution segment to the B column of the punch down block. Refer to Table A-1 and Figure A-2.

4. Wire the RJ-45 wall plate end of the 4 pair twisted distribution segment to the RJ-45 wall plate in the applicable office.

5. Connect one of the RJ-45 connectors on the office drop cable to the RJ-45 port in the office wall plate.
Figure A-1. Pin Layout
RJ-45 and 50-Pin Punch-Down Block

Table A-1
Table A-2

RJ-45
TX+
TX–
RX+
NC
NC
RX–
NC
NC
1
2
3
4
5
6
7
8

25 Pair Feeder

Wall Plate

Office Drop

Figure A-2. Typical Segment Wiring
## Table A-1. Twisted Pair Wiring at the HUB

<table>
<thead>
<tr>
<th>Port</th>
<th>RX+</th>
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<tbody>
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Page A-3
### TWISTED PAIR WIRING GUIDE

Table A-1 (cont.). Twisted Pair Wiring at the HUB

<table>
<thead>
<tr>
<th>From HUB</th>
<th>Punch-Down</th>
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<tr>
<td>50-pin</td>
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<td>Champ:</td>
<td>Feeder Cable</td>
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</table>

<table>
<thead>
<tr>
<th>PIN</th>
<th>PIN</th>
<th>PIN</th>
</tr>
</thead>
</table>

#### Port 6
- RX+ 36 36 Black/Blue RX+ A21 Black/Blue RX+
- RX- 11 11 Blue/Black RX- A22 Blue/Black RX-
- TX+ 37 37 Black/Orange TX+ A23 Black/Orange TX+
- TX- 12 12 Orange/Black TX- A24 Orange/Black TX-

#### Port 5
- RX+ 34 34 Red/Brown RX+ A17 Red/Brown RX+
- RX- 9 9 Brown/Red RX- A18 Brown/Red RX-
- TX+ 35 35 Red/Gray TX+ A19 Red/Gray TX+
- TX- 10 10 Gray/Red TX- A20 Gray/Red TX-

#### Port 4
- RX+ 32 32 Red/Orange RX+ A13 Red/Orange RX+
- RX- 7 7 Orange/Red RX- A14 Orange/Red RX-
- TX+ 33 33 Red/Green TX+ A15 Red/Green TX+
- TX- 8 8 Green/Red TX- A16 Green/Red TX-

#### Port 3
- RX+ 30 30 White/Gray RX+ A9 White/Gray RX+
- RX- 5 5 Gray/White RX- A10 Gray/White RX-
- TX+ 31 31 Red/Blue TX+ A11 Red/Blue TX+
- TX- 6 6 Blue/Red TX- A12 Blue/Red TX-

#### Port 2
- RX+ 28 28 White/Green RX+ A5 White/Green RX+
- RX- 3 3 Green/White RX- A6 Green/White RX-
- TX+ 29 29 White/Brown TX+ A7 White/Brown TX+
- TX- 4 4 Brown/White TX- A8 Brown/White TX-

#### Port 1
- RX+ 26 26 White/Blue RX+ A1 White/Blue RX+
- RX- 1 1 Blue/White RX- A2 Blue/White RX-
- TX+ 27 27 White/Orange TX+ A3 White/Orange TX+
- TX- 2 2 Orange/White TX- A4 Orange/White TX-

**NOTE:** Pins 25 and 50 on champ connector are not used.
Table A-2. Twisted Pair Wiring from the Punch-Down Block to the 10Base-T Device

<table>
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**From Punch-Down Block:** Wall Plate RJ-45 Connectors
**To RJ-45 Office Drop:**
## TWISTED PAIR WIRING GUIDE

Table A-2 (cont.). Twisted Pair Wiring from the Punch-Down Block to the 10Base-T Device

<table>
<thead>
<tr>
<th>From Punch-Down Block: RJ-45 Office Drop Wall Plate RJ-45 Connectors</th>
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<th>Port 6</th>
<th>B21 Black/Blue RX+ 1 TX+ 1 TX+ 1 TX+</th>
<th>B22 Blue/Black RX- 2 TX- 2 TX- 2 TX-</th>
<th>B23 Black/Orange TX+ 3 RX+ 3 RX+ 3 RX+</th>
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<tr>
<td>Port 4</td>
<td>B13 Red/Orange RX+ 1 TX+ 1 TX+ 1 TX+</td>
<td>B14 Orange/Red RX- 2 TX- 2 TX- 2 TX-</td>
<td>B15 Red/Gray TX+ 3 RX+ 3 RX+ 3 RX+</td>
<td>B16 Green/Red TX- 6 RX- 6 RX- 6 RX-</td>
<td></td>
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<tr>
<td>Port 3</td>
<td>B9 White/Gray RX+ 1 TX+ 1 TX+ 1 TX+</td>
<td>B10 Gray/White RX- 2 TX- 2 TX- 2 TX-</td>
<td>B11 Red/Blue TX+ 3 RX+ 3 RX+ 3 RX+</td>
<td>B12 Blue/Red TX- 6 RX- 6 RX- 6 RX-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port 2</td>
<td>B5 White/Green RX+ 1 TX+ 1 TX+ 1 TX+</td>
<td>B6 Green/White RX- 2 TX- 2 TX- 2 TX-</td>
<td>B7 White/Brown TX+ 3 RX+ 3 RX+ 3 RX+</td>
<td>B8 Brown/White TX- 6 RX- 6 RX- 6 RX-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port 1</td>
<td>B1 White/Blue RX+ 1 TX+ 1 TX+ 1 TX+</td>
<td>B2 Blue/White RX- 2 TX- 2 TX- 2 TX-</td>
<td>B3 White/Orange TX+ 3 RX+ 3 RX+ 3 RX+</td>
<td>B4 Orange/White TX- 6 RX- 6 RX- 6 RX-</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
POWER SUPPLY CORD

The main cord used with this equipment must be a 2 conductor plus ground type with minimum 0.75 mm square conductors and must incorporate a standard IEC appliance coupler on one end and a main plug on the other end which is suitable for the use and application of the product and that is approved for use in the country of application.

GERMAN:

Die Netzleitung, die mit diesem Geraet benuetzt wird, soll einen zwei Leiter mit Erdleiter haben, wobei die Leiter mindestens 0.75 mm sind, mit einer normalen IEC Geraetesteckdose an einem Ende und einem Geraetestecker am anderen Ende versehen sind, der fuer den Gebrauch und die Anwendung des Geraetes geeignet und der zum Benuetzen im Lande der Anwendung anerkannt ist.

SPANISH:

El cable principal de la red eléctrica utilizado con este equipo debe tener 2 conductores y 1 toma de tierra con un mínimo de 0.75 mm² cada uno y necesita tener un aparato de acoplamiento standard IEC en un extremo y un enchufe para el cable principal de la red eléctrica en el otro extremo, lo cual sea adecuado para el uso y aplicación del producto y lo cual sea aprobado para uso en el pais de aplicación.

FRENCH:

Le cordon d' alimentation reliant cet appareil au secteur doit obligatoirement avoir deux fils conducteurs de 0.75 mm² minimum et un fil de terre. Il doit également être équipé du côté appareil d'une fiche agréé IEC et du côte secteur, d'une prise adaptée à l'usage du produit et aux normes du pays où l'appareil est utilisé.