MMAC-Plus™ 9T122-24
Three Port Token Ring
MicroLAN™ Switch Module
User's Guide

CABLETRON
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The Complete Networking Solution™

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

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Consequently, when used in a residential area or in an adjacent area thereto, radio interference may be caused to radios and TV receivers, etc.

Read the instructions for correct handling.

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Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

Contents

Introduction

The 9T122-24 MicroLAN™ Switch Module, shown in Figure 1-1, is a three port Token Ring bridge and router module. This module supports either one token ring with twenty four HUB connections, or two separate Token Rings with twelve HUB connections, and an interface to the FNB backplane.

Features

Processor
The 9T122-24 is equipped with an advanced Intel i960 microprocessor. This microprocessor provides a platform for all management functions within a scalable RISC-based architecture.

System Management
Interfaces to the two System Management Buses (SMB-1 and SMB-10) for intermodule management.

Connectivity
The 9T122-24 provides twenty four RJ-45 Trunk Coupling Unit (TCU) lobe connectors. The connectors may be configured as one twenty four port ring (default) or two twelve ports rings.

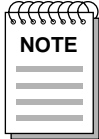### Bridging/Routing
Bridging/Routing between the front panel Token Ring connections and/or to any other module in the chassis via FNB -1 or FNB -2 of the FNB bus. The module is capable of Transparent Bridging or Source Route Bridging. IEEE 802.1d Spanning Tree Protocol is supported in all bridging functions. Translational bridging between Source Routing and Transparent Frames types is also performed.

Management Information Base (MIB) Support

The 9T122-24 module provides MIB support including:

- IETF MIB II (RFC 1213)
- IETF RMON MIB (RFC 1271 and 1513)
- IETF Bridge MIBs (RFC 1493 and 1525)
- IEEE 802.5 Token Ring MIB (RFC 1231)
- Cabletron Enterprise MIBs

NOTE

For a complete list of supported MIBs, refer to the release notes provided in the module package.

Ring Security

This feature prevents unauthorized stations from attaching to the ring. Using Local or Remote Management, the module may be configured as to which MAC addresses are allowed to operate on the ring.

Multi-Ring Out Capability

With this feature any port of the module may be configured as a ring-out port through management software. In this configuration a stand-alone passive concentrator (such as an IBM 8228 MAU) may be added to the ring.

Telnet

A telnet session can be set up with the module to provide access to the Local Management screens.

LANVIEW LEDs

The 9T122-24 use LANVIEW – the Cabletron Systems built-in visual diagnostic and status monitoring system. With LANVIEW LEDs, you can quickly identify the device, port, and physical layer status at a glance.

Hot Swapping

The 9T122-24 can be installed or removed from the chassis while the MMAC-Plus is powered up without affecting the operation of the remaining modules in the chassis.
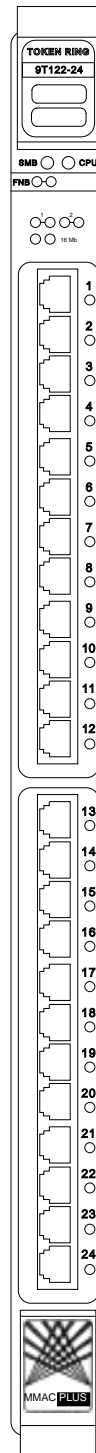
Figure 1-1. The 9T122-24 MicroLAN Module

Related Manuals

The manuals listed below should be used to supplement the procedures and technical data contained in this manual.

MMAC-Plus Installation Guide

MMAC-Plus Operations Guide

MMAC-Plus 9C300-1 Environmental Module User's Guide

MMAC-Plus 9C214-1 AC Power Supply User's Guide

MMAC-Plus Local Management User's Guide

Getting Help

If you need additional support with the MMAC-Plus, or if you have any questions, comments or suggestions concerning this manual, feel free to contact Cabletron Systems Technical Support:

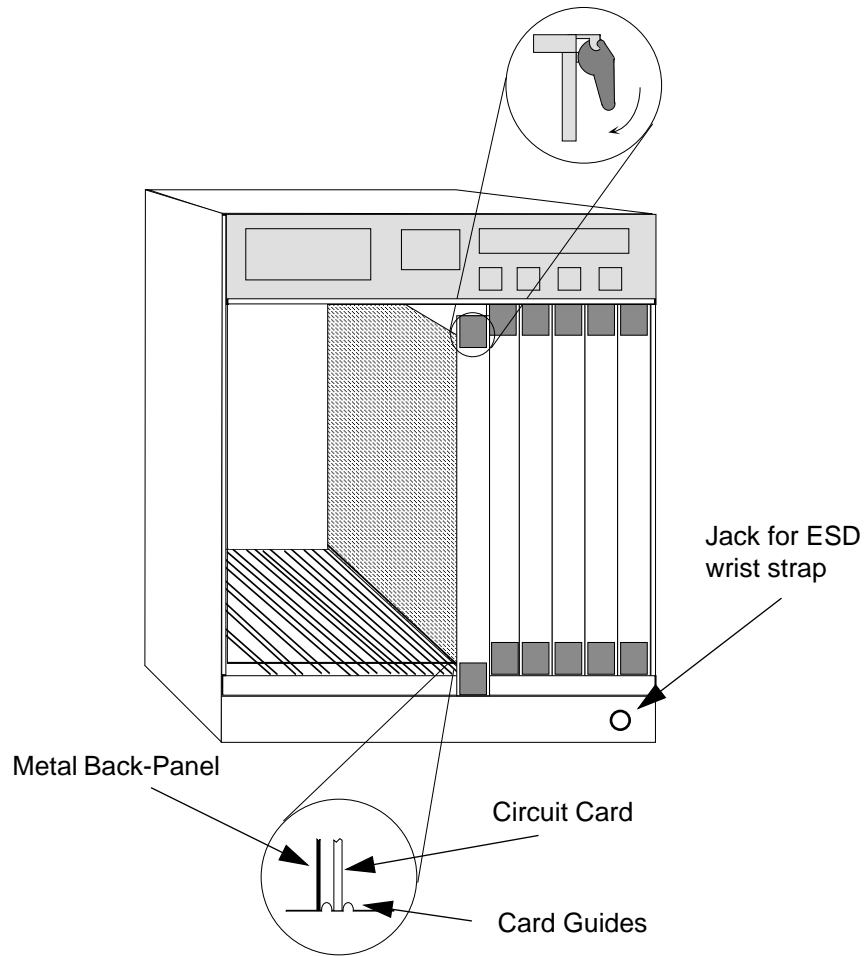|	
By phone:	(603) 332-9400
By CompuServe:	GO CTRON from any ! prompt
By Internet mail:	support@ctron.com
By mail:	Cabletron Systems, Inc. P.O. Box 5005 Rochester, NH 03867-0505

Installation

Installing the MicroLAN Module

The MMAC-Plus MicroLAN Module may be installed into any of the 14 slots that are available. To install, follow the steps below:

1. Switch off the power supplies and remove all power from the MMAC-Plus chassis.

2. Remove the blank panels, covering the slots that the module is being mounted in. All other slots must be covered, if modules are not being installed, to ensure proper airflow and cooling.

3. Carefully remove the module from the shipping box. (Save the box and packing materials in the event the module must be reshipped.)

4. Attach one end of the ESD wrist strap packaged with the MMAC-Plus chassis to your wrist. Plug the other end into the ESD Wrist Strap Grounding receptacle in the lower right corner of the MMAC-Plus Chassis shown in Figure 2-1.

5. Remove the module from the plastic bag. Observe all precautions to prevent damage from Electrostatic Discharge (ESD).

6. Carefully examine the module, checking for damage. If any damage exists, DO NOT install the module. Contact Cabletron Systems Technical Support immediately.

7. The modules are installed into the chassis by sliding them into slots and locking down both the top and bottom plastic tabs, as shown in Figure 2-1. Take care that the module slides in straight and engages the backplane connectors properly. When installing the module, ensure that both circuit cards are between the card guides, as shown in Figure 2-1. Check both the upper and lower tracks of both cards.

Jack for ESD
wrist strap

Metal Back-Panel

Circuit Card

Card Guides

Warning:
Ensure that the circuit card is between the card guides.
Lock down the top and bottom plastic tabs
at the same time, applying even pressure.

Figure 2-1. Installing the MicroLAN Module

The Reset Switch

The Reset switch is located on the front panel, under the top plastic tab as shown in Figure 2-2. It serves two functions:

- Pressing the reset switch twice within three seconds causes the processor (i960) to reset.
- Pressing and holding the switch on for three or more seconds causes the module to shutdown. Pressing and holding again for three seconds restarts the module.

SNMP management may be used to disable this switch to enhance module security.

Figure 2-2. The Reset Switch

User Accessible Components

Figure 2-3 shows the various components that are accessible to the user. These consist of an eight position dip switch (explained in the next section), replaceable PROMs and sockets for RAM. These will be used for future upgrades.

SMB-1 PROM

i960 Processor

Flash SIMM Socket

DIP Switch

Boot PROM

Shared Packet Memory SIMM

Local Program Memory SIMM Socket

Figure 2-3. User Accessible Components

Setting the Module Card DIP Switch

An eight switch DIP switch is located on the module card as shown in position 8 in Figure 2-3 and in Figure 2-4. The function of the switches are listed in Table 2-1.

Figure 2-4. Location of Module DIP Switch

See the **Cautions** at the end of this table.
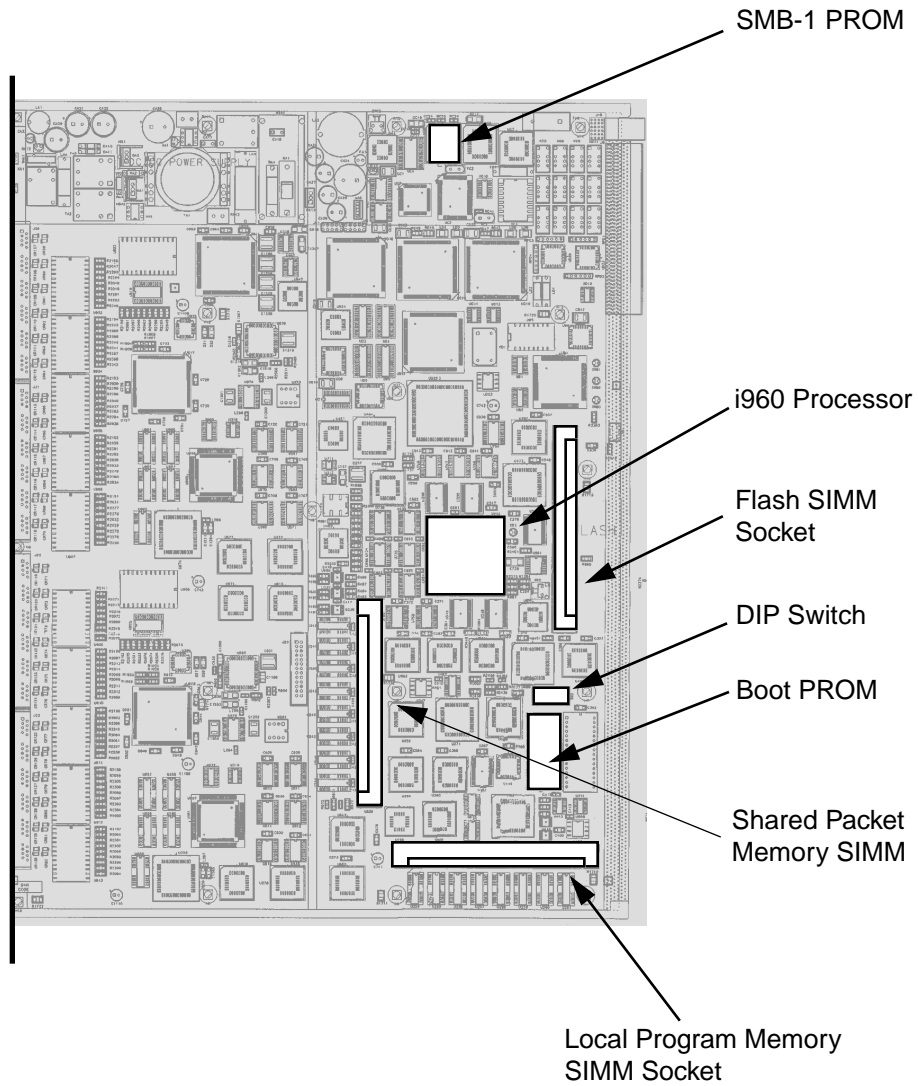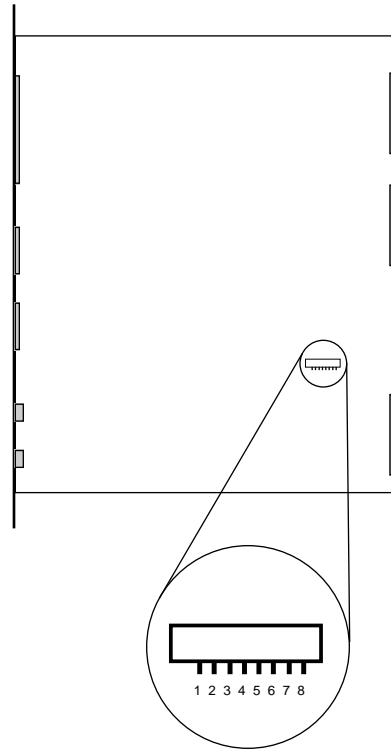
Table 2-1. Function of DIP Switch

Switch	Function	Description
8	Clear Password [1]	When toggled, this switch clears user-entered passwords stored in NVRAM, and restores the default passwords. Once reset you can use the defaults or enter new passwords.
7	Clear NVRAM [2]	The module uses NVRAM to store user entered parameters such as IP addresses, device name, etc. To reset these parameters to the factory defaults, toggle this switch. Once reset you can use the defaults or enter new parameters which are stored in NVRAM when the module is powered down, and remain there until the switch is toggled again.
6	Force BootP Download	Toggling this switch after pulling the board out of the MMAC-Plus, clears download information from NVRAM and forces image files to be downloaded from the station configured to act as that modules' BOOTP server.
5	Reserved	For Factory Use Only
4	Reserved	For Factory Use Only
3	Reserved	For Factory Use Only
2	Reserved	For Factory Use Only
1	Ring Configuration	Off= One ring of 24 ports (factory default) On = two rings of 12 ports each

1. **Caution:** Do not toggle Switch 8 unless you intend to reset the user configured passwords to their factory default settings.

2. **Caution:** Do not toggle Switch 7 unless you intend to reset the user parameters to the factory default settings.

Ring Speed

The module defaults to a 16Mbps ring speed on all rings. This may be changed though local management.

Multi-Ring Out Capability

Any port of the module may be configured as a ring-out port through management software. In this configuration a stand-alone passive concentrator (such as an IBM 8228) may be added to the ring as shown in Figure 2-5. This allows for a star-wired network with the MMAC-Plus at the center. Consult the **MMAC-Plus Local Management Guide** for information on configuring the ports.
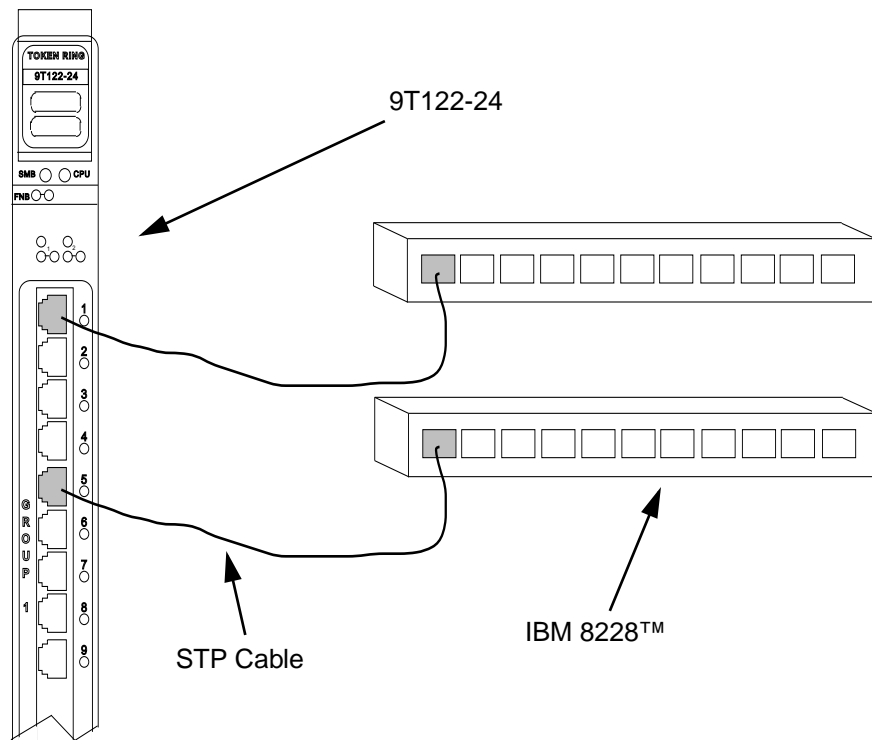

Figure 2-5. Using a Ring-Out Port

Operation

The 9T122-24 MicroLAN Module provides connectivity between the front panel Token Ring(s) and the FDDI rings on the backplane (FNB-1 or FNB-2).

MMAC-Plus modules connect to either the Internal Network Bus (INB) or the Flexible Network Bus (FNB) bus. The 9T122-24 module connects to the FNB bus. Shown in Figure 3-1 is a block diagram of the module. The front panel may be configured as one Token Ring (factory default) or as two rings. In the two ring configuration, the rings function as individual networks, each with twelve ports. Bridging/Routing may occur between these two rings and/or to any other MMAC-Plus module via the Flexible Network Bus.

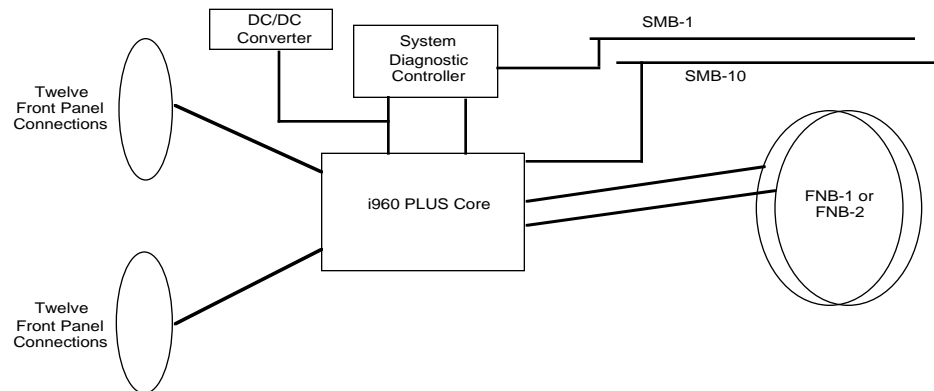Figure 3-1. 9T122-24 Block Diagram

Bridging

The 9T122-24 is configured for SRT bridging. It will pass SR (Source Routing) frames between the rings and provides translation to transparent frames over the FNB to Ethernet and FDDI modules. For information on configuring the bridging function, see the addendum to the MMAC-Plus Local Management User's Guide, containing information specific to this model.

Transparent Bridging

Transparent Bridging is accomplished by building a Source Address Table (SAT) from source MAC/physical addresses and using the SAT to make forwarding decisions.

The 9T122-24 prevents unnecessary network traffic from passing through the module by implementing two separate filtering processes — IEEE 802.1d or Cabletron's Special Filtering Database. These processes may be used individually or in tandem.

The first process, the IEEE 802.1D filtering process, begins with the creation of a list of local node addresses in a table (the SAT). When the 9T122-24 first goes on-line, it initially forwards all packets across the bridge. After receiving a packet on the bridge port, the 9T122-24 learns the address of the sending node from the packet and stores that address in the SAT. In this manner, the bridge learns the address of each node on each side of the bridge. The bridge then uses the addresses stored in the table to compare the destination address of each subsequent packet that travels to the bridge. If the destination address of a packet resides on the bridge segment, the 9T122-24 does not forward across the Token Ring link.

The second filtering process, the Cabletron Systems Special Filtering Database, provides an additional step in the filter/forward decision. Through Remote Management, you can define up to 10 additional filtering parameters for incoming network traffic. These parameters include (but are not limited to) the:

- destination address
- source address
- type field (protocol)
- 64 bytes of the data field (using a data offset)

For example, using this process, you can ensure that the 9T122-24 always filters or forwards packets with a specific protocol or address.

Source Route Bridging

Source Route Bridging operates by transmitting frames over a designated route. Unlike Transparent Bridging, all devices in a Source Route Bridged (SRB) network "know" the locations of other stations within the network. Using a portion of the MAC frame header known as the RIF (Routing Information Field), the source device determines the route for the frames it sends.

In order for source routing to work, the source station must determine the proper route to reach the desired destination. To accomplish this:

1. The source station sends out frames called All Route Explorer (ARE) or Single Route Explorer (SRE) frames onto the network. All Source Route Bridges recognize these frames and forwards them to their outbound ports.

2. The receiving bridges append their own route information to the Route Information Field (RIF) in the MAC frame header and transmit the frame again.

3. Eventually, the original source device receives all of the ARE replies from the other end stations on the network.

4. From this information, the source device can determine a desired route for each frame it transmits.

Spanning Tree Algorithm

The 9T122-24 promotes maximum network use in multiple bridge environments. A bridge learns the bridge topology of its network from bridge protocol data that it receives from other bridges within the network. The bridges then apply the Spanning Tree Algorithm (STA) to select a root bridge, and then determine primary data paths within potential data loop configurations.

Spanning Tree Algorithm is a hierarchy (or tree) of priorities that bridges establish between themselves. This hierarchy guarantees that primary and redundant data paths are clearly defined at all times, so that the network is continuously available to users.

In a multiple bridge environment, one bridge in the network establishes itself as the root bridge. As the root, this bridge has priority over all other bridges. In a Spanning Tree, all of the bridges must determine which bridge is the root, and then determine their own relative priority within the network.

Flexible Network Bus (FNB)

The FNB consists of two dual FDDI networks, the FNB-1 and FNB-2, providing up to 400 Mbps of data bandwidth. These FDDI networks are 100% ANSI FDDI-compliant supporting SMT (version 7.3), MAC, PHY, and PMD standards. This allows the FNB to traverse multiple MMAC-Plus hubs, or connect to any ANSI FDDI-compliant device, through standard A/B port connections, using the FDDI repeater module.

System Management Buses

There are two management channels within the MMAC-Plus system: the SMB-1 and the SMB-10. These buses provide out-of-band management and inter-module management communication.

SMB-1 Bus

The SMB-1 is a 1Mbs management bus located within the MMAC-Plus. This bus is utilized by all diagnostic controllers in the system including connectivity modules, power supply modules and the environmental module. The SMB-1 transports inter-chassis information between system components, such as power and environmental information, as well as diagnostic messages. Periodic loop-back test are preformed by all modules which share this bus to ensure the validity of SMB-1. In the event a failure is detected on SMB-1, the SMB-10 may be used as an alternate communication channel.

SMB-10 Bus

The SMB-10 is a 10Mbs management bus located within the MMAC-Plus which is also used for inter-chassis communication of modules as well as serving as an out-of-band management channel into the MMAC-Plus. The SMB-10 is externalized from the chassis via an optional Ethernet Port Interface Module (EPIM) located on the front of the Environmental Module. Through an EPIM connection, full SNMP management of the MMAC-Plus is available out-of-band from user data. Modules which share the SMB-10 bus periodically send out loop-back packets to ensure the validity of SMB-10. In the event a fault is detected on the SMB-10, the SMB-1 can be used as an alternate communication channel by the modules.

System Diagnostic Controller

This diagnostic controller is composed of a Z-80 microprocessor and it's supporting logic. The diagnostic controller is designed to control the power-up sequencing of modules, monitor the 9T122-24 input and output power parameters, keep watch over the main host processor, as well as monitor the temperature and control the SMB LANVIEW diagnostic LED. Although the diagnostic controller and the main host processor can operate independent of each other if needed, they exchange information about each others status and overall module condition. The information gathered by the diagnostic controller is available to the network manager via local/remote management and the LCD located on the environment module. The 9T122-24 have been designed so that in the event of a diagnostic controller fault, the modules will continue to function.

DC/DC Converter

The DC/DC converter converts the 48 VDC on the system power bus to the necessary operating voltages for its host network services module. The diagnostic controller controls the operation of the DC/DC converter.

FNB Interface

MMAC-Plus modules are designed with one of two attachment policies. One allows a module to dual attach to either FNB-1 or FNB-2; the second allows dual attachment to both FNB-1 and FNB-2. The 9T122-24 have one dual attachment to the FNB backplane, connecting to either FNB-1 or FNB-2. The module can insert into the FNB or bypass it. These flexible configuration options make the MMAC-Plus ideal for networks designed to Bridge/Route multiple lower speed LANs to FDDI and/or networks designed using an FDDI collapsed backbone.

i960 Core

The i960 core in the FNB module serves two major functions: it provides the packet forwarding logic and performs all network management services. FNB modules can be configured to run as layer 2 bridges, layer 3 routers or as SecureFast Packet Switches. It is possible to run the bridging and routing options concurrently, but the SFPS option cannot run with bridging and routing.

The i960 core provides the SNMP protocol stacks, as well as support for industry standard MIBs. Additionally, Cabletron enterprise extension MIBs are supported for each media type.   Advanced management services, such as the Distributed LAN Monitor, RMON, telnet and network address to MAC address mapping, are also provided by the i960 core.

LANVIEW LEDs

The front panel LANVIEW LEDs, shown in Figure 4-1, indicate the status of the module and may be used as an aid in troubleshooting.
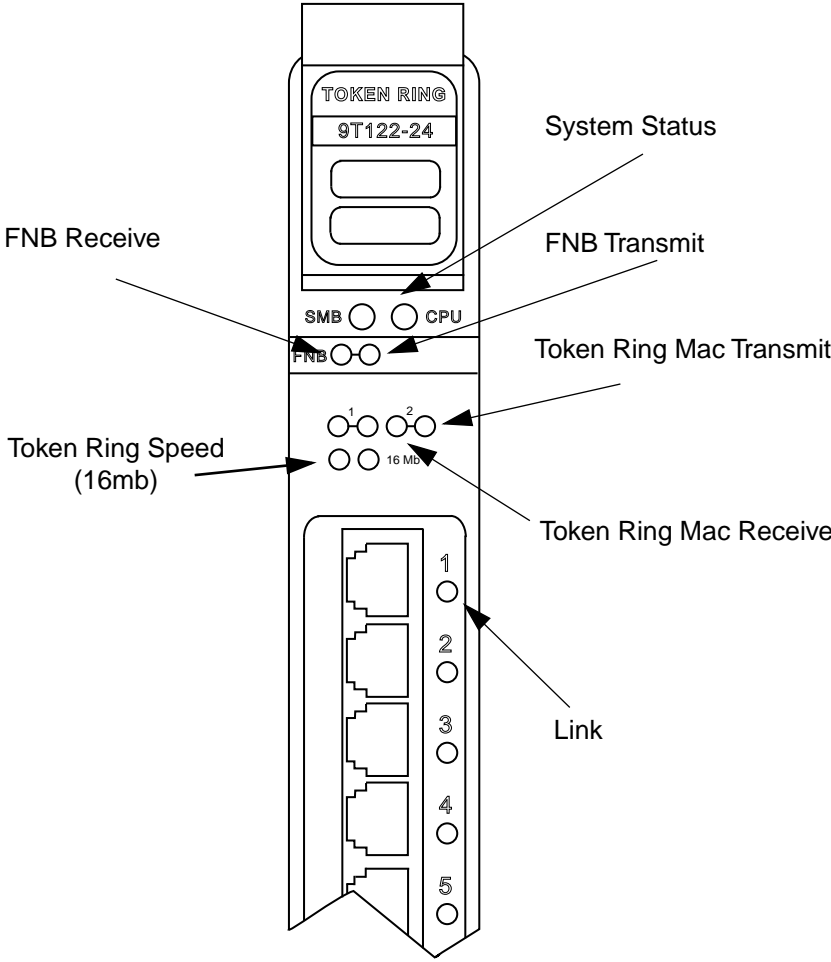

Figure 4-1. LANVIEW LEDs

The functions of the two System Status LEDs, System Management Bus (SMB) and the CPU, are listed in Table 4-1.

Table 4-1. System Status LEDs (SMB and CPU)

LED Color	State	Description
Green	Functional	Fully operational.
Yellow	Crippled	Not fully operational (i.e., one bad port).
Yellow/Green	Booting	Blinks yellow and green while booting.
Red	Reset	Normal power-up reset.
Red (Flashing)	Failed	Fatal error has occurred.
Off	Power off	Module powered off.

The function of the FNB receive LED is listed in Table 4-2.

Table 4-2. FNB Receive LEDs

LED Color	State
Red	No link, Port disabled
Red (Flashing)	Link, Port disabled
Green	Link, No activity, Port enabled
Yellow (Flashing)	Activity (Flashing rate indicates rate of activity).
Off	No activity

The function of the FNB transmit LED is listed in Table 4-3.

Table 4-3. FNB Transmit LEDs

LED Color	State
Red	Port disabled
Red (Flashing)	Fault or Error (Flashing rate indicates rate)
Yellow (Flashing)	Port in standby state
Green (Flashing)	Activity (Flashing rate indicates rate of activity).
Off	No activity

The function of the Token Ring Mac receive LEDs are listed in Table 4-4.

Table 4-4. Token Ring Receive LED

LED Color	State
Red	No link, Port disabled
Red (Flashing)	Link, Port disabled
Green	Link, No activity, Port enabled
Yellow (Flashing)	Link, Activity (Flashing rate indicates rate of activity).
Off	No link, No activity, Port enabled

The function of the Token Ring Mac transmit LEDs are listed in Table 4-5.

Table 4-5. Token Ring Transmit LED

LED Color	State
Red	Port Disabled
Red (Flashing)	Fault, Ring is Beaconing
Green (Flashing)	Activity (Flashing rate indicates rate of activity).
Yellow (Flashing)	Port in standby state, Link
Off	No activity, Port enabled

The functions of the Link LED are listed in Table 4-6.

Table 4-6. Port Link LEDs

LED Color	State
Red	No link, Port disabled
Red (Flashing)	Link, Port disabled or Speed fault
Green	Link, Port enabled
Off	No link, Port enabled

The function of the Token Ring speed LEDs is listed in Table 4-7.

Table 4-7. Token Ring Speed

LED Color	State
Yellow	16 Mbs
Off	4 Mps

Specifications

Safety

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

This equipment meets the safety requirements of:

- UL 1950
- CSA C22.2 No. 950
- EN 60950
- IEC 950
- EMI Requirements of FCC Part 15 Class A
- EN 55022 Class A
- VCCI Class I
- EMC requirements of:

    EN 50082-1
    IEC 801-2 ESD
    IEC 801-3 Radiated susceptibility
    IEC 801-4 EFT

Service

MTBF (MHBK-217E)   >200,000 hrs.

MTTR   <0.5 hr.

Physical

Dimensions:

35.0 D x 44.0 H x 3.0 W centimeters
(13.8 D x 17.4 H x 1.2 W inches)

Weight:

Unit:	1.36 kg. (3lb)
Shipping:	1.81 kg. (4lb)

Electrical

CPU:	i960
Shared DRAM Memory:	4Mb (expandable to 12 Mb)
Local DRAM Memory:	4Mb (expandable to 12 Mb)
Flash:	2Mb (expandable to 14 Mb)
Token Ring Interfaces:	(2) Texas Instruments TMS380C26 Controllers
NVRAM:	128 Kb