

MMAC-Plus™ 9F310-02 & 9F315-02  
FDDI Switch Module  
User's Guide

**CABLETRON**  
*SYSTEMS*  
The Complete Networking Solution™



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This device complies with Part 15 of the 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.

**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.

**WARNING:** Changes or modifications made to this device which are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

## DOC Notice

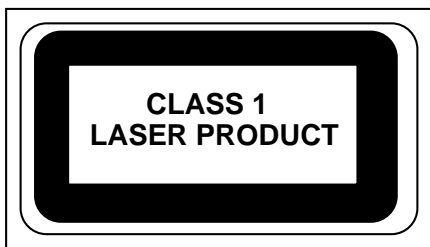
This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

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.

## Safety Information

### CLASS 1 LASER TRANSCEIVERS

The 9F315-02 is a Class 1 Laser Product



**The 9F315-02 uses Class 1 Laser transceivers. Read the following safety information before installing or operating these adapters.**

The Class 1 laser transceivers use an optical feedback loop to maintain Class 1 operation limits. This control loop eliminates the need for maintenance checks or adjustments. The output is factory set, and does not allow any user adjustment. Class 1 Laser transceivers comply with the following safety standards:

- 21 CFR 1040.10 and 1040.11 U.S. Department of Health and Human Services (FDA).
- IEC Publication 825 (International Electrotechnical Commission).
- CENELEC EN 60825 (European Committee for Electrotechnical Standardization).

When operating within their performance limitations, laser transceiver output meets the Class 1 accessible emission limit of all three standards. Class 1 levels of laser radiation are not considered hazardous.

## Safety Information

### CLASS 1 LASER TRANSCEIVERS

#### Laser Radiation and Connectors

When the connector is in place, all laser radiation remains within the fiber. The maximum amount of radiant power exiting the fiber (under normal conditions) is -12.6 dBm or  $55 \times 10^{-6}$  watts.

Removing the optical connector from the transceiver allows laser radiation to emit directly from the optical port. The maximum radiance from the optical port (under worst case conditions) is  $0.8 \text{ W cm}^{-2}$  or  $8 \times 10^3 \text{ W m}^{-2} \text{ sr}^{-1}$ .

**Do not use optical instruments to view the laser output. The use of optical instruments to view laser output increases eye hazard. When viewing the output optical port, power must be removed from the network adapter.**

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## Introduction

The 9F310-02 and 9F315-02 are three port switch modules with two front panel FDDI interfaces and one INB-1 backplane interface. The external FDDI networks are connected to the modules using standard FDDI A/B ports on the front panel. The 9F310-02 uses multi mode fiber, and the 9F315-02 uses single mode fiber optic cables for this connection. The 9F310-02 and 9F315-02 modules employ the Fast Packet Switch (FPS), a high performance switch design, and the Intel i960 microprocessor. The modules can redirect one or both of its front panel FDDI Interfaces to the FNB backplane, creating an INB-1 to FNB bridge/switch product that allows a migration from FNB modules to INB-1 modules.

## Features

### Processor

The 9F310-02 and 9F315-02 are equipped with an advanced Intel i960 microprocessor. This microprocessor provides a platform for all management functions within a scalable RISC-based architecture.

### Packet Switch Engine

The 9F310-02 and 9F315-02 module incorporates the Fast Packet Switch (FPS), a collection of custom ASICs designed specifically for high speed switching. The FPS bus is 64 bits wide with a bandwidth of 320 Mbps. Since all frame translation, address lookups, and forwarding decisions are performed in hardware, the 9F310-02 and 9F315-02 can obtain a throughput performance of greater than 150K pps.

### Management

The 9F310-02 and 9F315-02 modules have two full implementations of SMT (Version 7.3), one per interface, and SNMP for local and remote management. Local management is provided through the RS-232 Com ports on the MMAC-Plus Environmental Module using a standard VT-220 terminal or emulator. Remote management is possible through Cabletron's SPECTRUM or any SNMP compliant management tool as well as telnetting to the module. Management features including module insert/bypass control, MAC placement, front panel/FNB configuration, and SMT statistics. Bridging statistics on both FDDI

interfaces provide frames filtered, frames forwarded, and all Spanning Tree Protocol parameters. The 9F310-02 and 9F315-02 modules support the IETF FDDI MIB (RFC-1512), IETF MIB II (RFC-1213), IETF BRIDGE MIB (RFC-1493), and a host of Cabletron enterprise MIBs. In addition, the front panel provides LEDs for FDDI link status per port as well as transmit and receive activity.

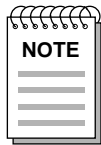
### **Connectivity**

The 9F310-02 and 9F315-02 modules have one interface to the INB-1, two front panel FDDI interfaces, or two FNB interfaces to the MMAC-Plus FNB backplane. The front panel A/B port connections are via standard fiber FDDI MIC connectors. The INB-1 interface is fixed, however, and the two FDDI interfaces can attach to one or both of the front panel connectors, one or both of the FNB interfaces (FDDI-1 or FDDI-2), or one of each.

### **Management Information Base (MIB) Support**

Both 9F310-02 and 9F315-02 provide MIB support including:

- IETF FDDI MIB
- IETF MIB II
- IETF Bridge MIB
- a host of Cabletron Enterprise MIBs.



For a complete list of supported MIBs, refer to the release notes provided in the 9F310-02 and 9F315-02 package.

### **LANVIEW LEDs**

The 9F310-02 and 9F315-02 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.

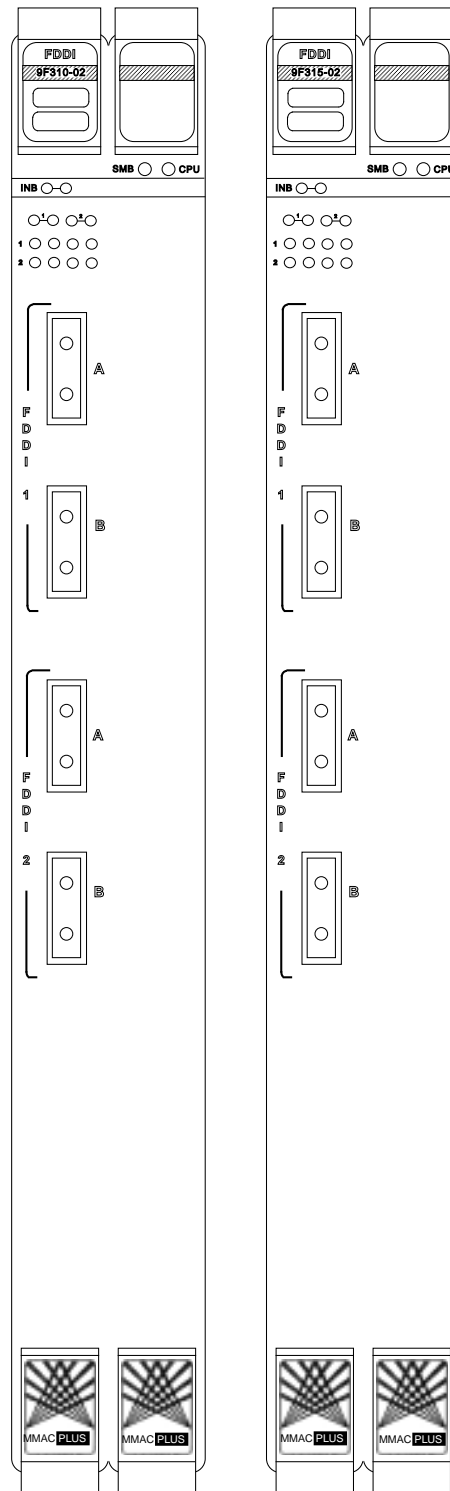


Figure 1-1. The 9F310-02 and 9F315-02 Modules

## 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**

**INB Terminator Modules Installation Guide**

**MMAC-Plus Module 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

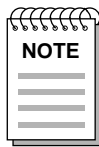
By CompuServe: GO CTRON from any ! prompt

By Internet mail: support@ctron.com

By mail: Cabletron Systems, Inc.  
P.O. Box 5005  
Rochester, NH 03867-0505

# Installing the MMAC-Plus modules

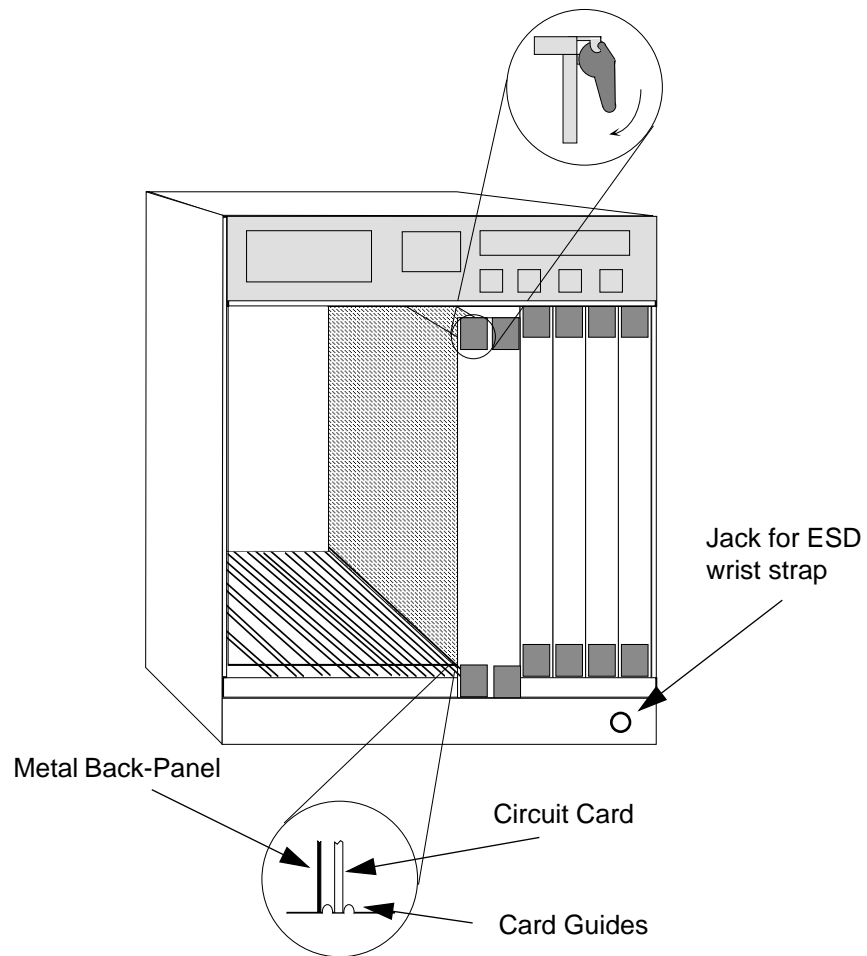
The 9F310-02 and 9F315-02 modules occupy two slots in the MMAC-Plus chassis. The modules must be installed with the left side (as viewed from the front) in an odd numbered slot, and the right side in an even numbered slot.



*The INB Terminator Modules must be installed on the rear of the chassis before powering up this module. Refer to the **INB Terminator Modules Installation Guide** for information and installation procedure.*

To install the 9F310-02 and 9F315-02, 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.



**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 9F310-02 and 9F315-02 Modules

## The Reset Switch

The Reset switch is located on the rightmost 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.

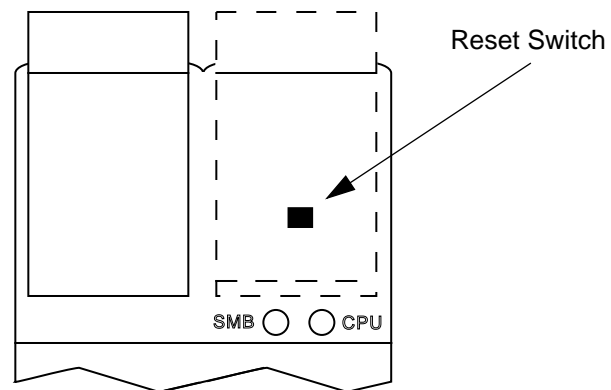


Figure 2-2. The Reset Switch

## 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 below), replaceable PROMs and sockets for RAM. These will be used for future upgrades. Instructions for installing the components will be supplied with the upgrade kit.

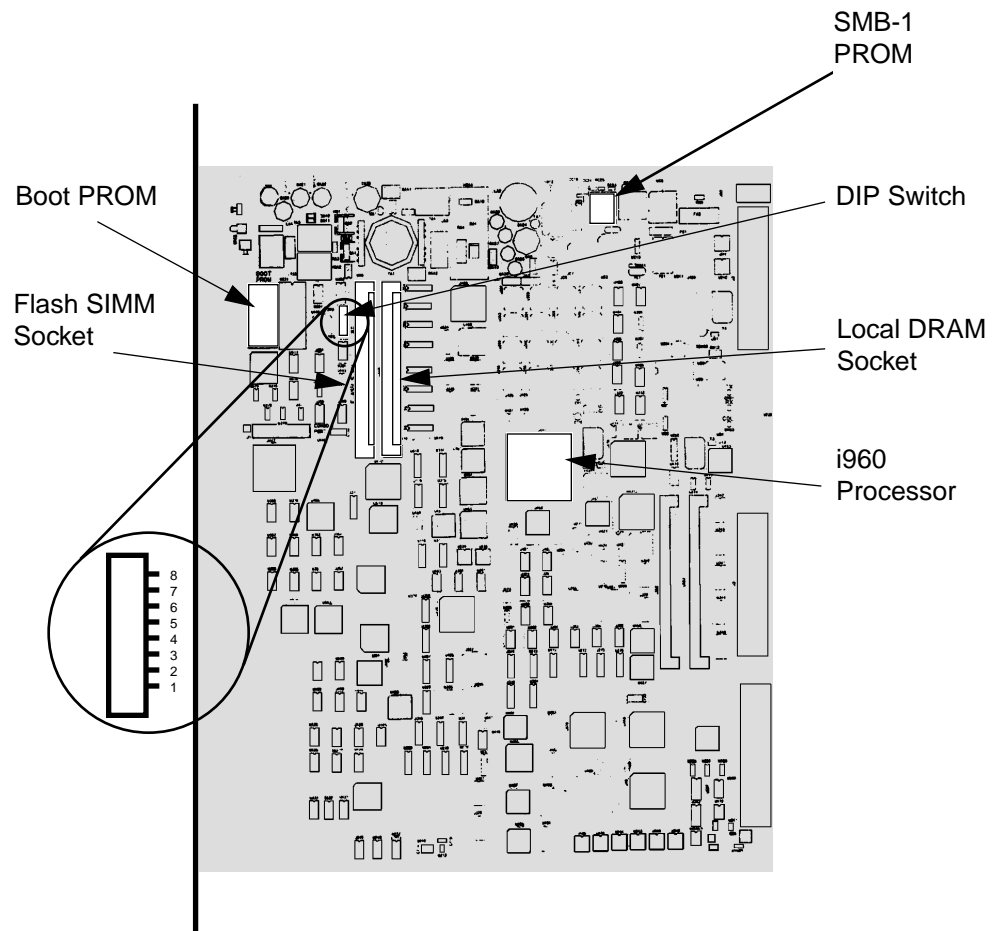


Figure 2-3. User Accessible Components

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



See the **Cautions** at the end of this table.

Table 2-1. Function of DIP Switch

Switch	Function	Description
8	Clear Password <sup>1</sup>	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 <sup>2</sup>	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 connected to the EPIM on the Environmental Module 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	Reserved	For Factory Use Only



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.



# Operation

The 9F310-02 and 9F315-02 modules are capable of bridging/switching any three, of five possible interfaces, depending on how it is configured. The INB-1 connection is always fixed. When configuring the module, the decision is made to connect both front panel ports, both FNB ports, or one front panel and one FNB port to the bridge.

As shown in Figure 3-1, packets may be received at the front panel FDDI ports, the FNB rings (FNB-1 and/or FNB-2), and/or the INB-1 bus, according to the user configuration. These packets are converted into canonical format. The Fast Packet Switching circuitry decides from header information where the packets should be sent. They are then converted from canonical format to the proper format for that interface.

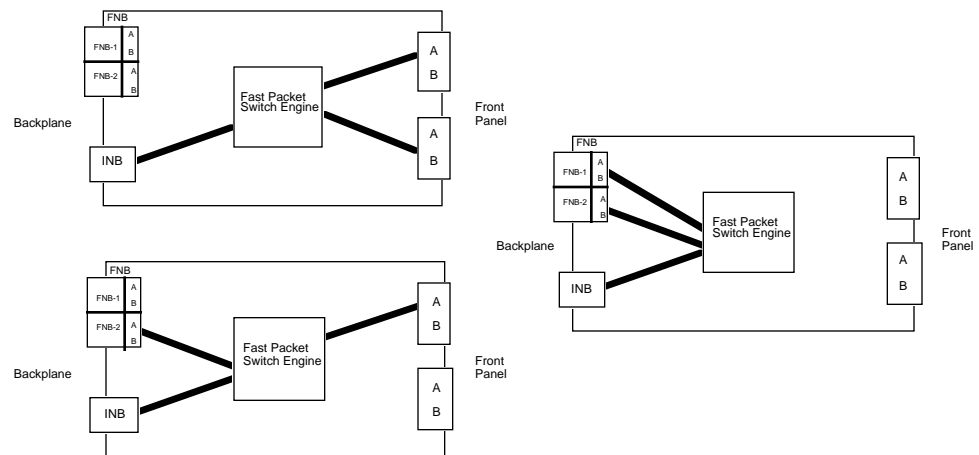


Figure 3-1. Configuration Options

## 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 performed 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 9F310-02 and 9F315-02 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 9F310-02 and 9F315-02 have been designed so that in the event of a diagnostic controller fault, the 9F310-02 and 9F315-02 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 monitors and controls the operation of the DC/DC converter.

## INB Interface

Each module that attaches to the INB has an INB Network Interface Block (NIB). The INB NIB converts canonical frames to fixed length data blocks for transmission onto the INB. For data blocks received from the INB, the INB NIB reassembles the data blocks received from the INB back into canonical frames for transmission to the Fast Packet Switch (FPS) then from the FPS to the front panel ports.

## Fast Packet Switch

The Fast Packet Switch (FPS) is a hardware based switch design that is the key building block of the MMAC-Plus. All filtering/forwarding decisions are made in hardware as opposed to software as in traditional bridges. This custom hardware allows the FPS to process over 150K frames per second. The FPS is designed to support up to 64 ports that are shared between the host processor, the INB backplane, and LAN/WAN interfaces on the front panel of MMAC-Plus modules. The FPS can operate in two modes; as a traditional bridge or as a SecureFast Packet Switch (SFPS). When operating in bridge mode, it makes filtering/forwarding decisions based on Destination Address (DA), with standard IEEE 802.1d learning. When operating in SFPS mode, all filtering/forwarding decisions are made based on a DA-SA pair and its receive port. These DA-SA pairs with the associated receive port are programmed into the switch using Cabletron's Automated Connection Management System (ACMS). This provides the network administrator with the ultimate network security without the performance degradation found when using routers or bridges with special filtering capabilities. The MMAC-Plus hub can support modules operating in bridge mode and SFPS mode simultaneously providing security when/where needed and ease of configuration where security is not required.

## i960 Core

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

The Host engine sends and receives packets via the CPU FPS Interface. This allows the bridge to perform spanning tree protocol and other bridging functions. The SMB Interfaces provide communication to the Host Engine for management functions and communication with other modules in the chassis.

# LANVIEW LEDs

The front panel LANVIEW LEDs indicate the status of the module and may be used as an aid in trouble shooting. Shown in Figure 4-1 is the LANVIEW LEDs of the 9F310-02 and 9F315-02 module.

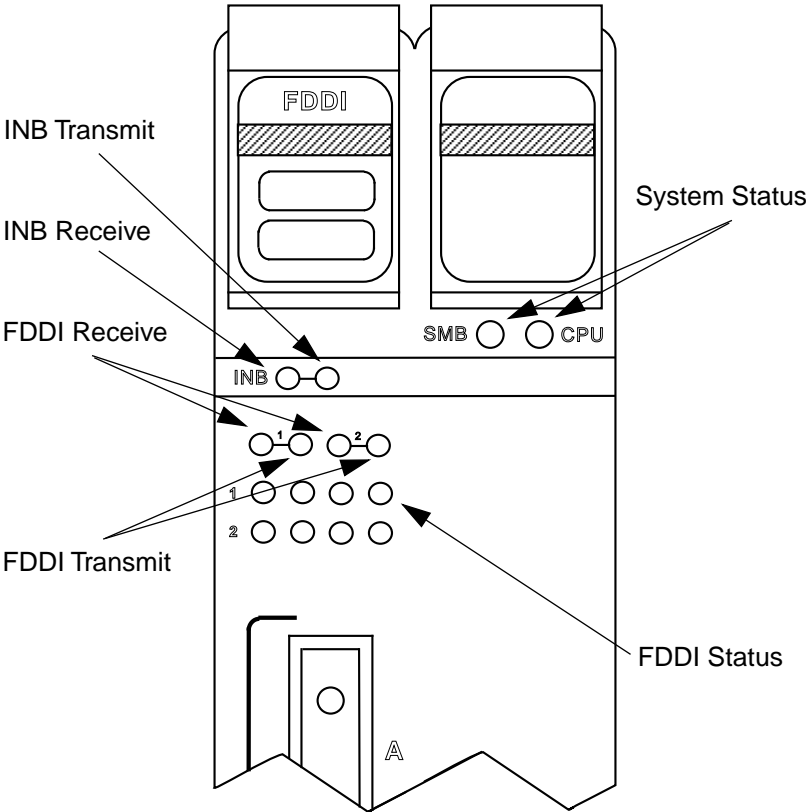


Figure 4-1. The LANVIEW LEDs

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

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

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 INB receive LEDs are listed in Table 4-2.

**Table 4-2. INB Receive LEDs**

LED Color	State
Yellow (Flashing)	Activity
Off	No Activity

The function of the INB transmit LEDs are listed in Table 4-2.

**Table 4-3. INB Transmit LEDs**

LED Color	State
Green	INB Link
Green (Flashing)	Activity
Off	No Activity



The function of the FDDI receive LEDs are listed in Table 4-4.

**Table 4-4. FDDI Receive LEDs**

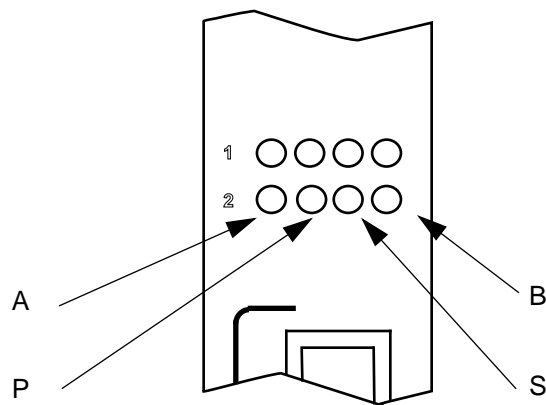
LED Color	State
Yellow (Flashing)	Activity
Off	No Activity

The function of the FDDI transmit LEDs are listed in Table 4-2.

**Table 4-5. FDDI Transmit LEDs**

LED Color	State
Green (Flashing)	Activity
Off	No Activity

The FDDI status LEDs display the status when bridging to the front panel port from either FNB ring. The "A" and "B" LEDs indicate the status of the A and B ports. The "P" and "S" LEDs indicate the status of the primary and secondary FDDI rings. When bridging between FNB rings, the FDDI status LEDs are not operational. The FDDI Status LEDs are shown in Figure 4-2.



**Figure 4-2. FDDI Status LEDs**

The functions of the FDDI Status LEDs are listed in Table 4-6.

**Table 4-6. FDDI Status LEDs**

<b>A</b>	<b>P</b>	<b>S</b>	<b>B</b>	<b>STATE</b>
Green	N/A	N/A	Green	Ports Enabled & Active
Green	Green	Off	Green	THRU A, MAC on Primary, Secondary Bypasses Board
Green	Green	Yellow	Green	THRU A, MAC on Primary, No MAC on Secondary
Green	Off	Green	Green	THRU B, MAC on Secondary, Primary Bypasses Board
Green	Yellow	Green	Green	THRU B, MAC on Secondary, No MAC on Primary
Green	Yellow	Off	Green	THRU, No MAC on Primary, Secondary Bypasses Board
Green	Off	Yellow	Green	THRU, No MAC on Secondary, Primary Bypasses Board
Green	Green	Red	Yellow	WRAP A, MAC on Primary
Green	Yellow	Red	Yellow	WRAP A, No MAC on Primary
Yellow	Green	Red	Green	WRAP B, MAC on Primary
Yellow	Yellow	Red	Green	WRAP B, No MAC on Primary
Green	Green	Red	Green	WRAP AB, MAC on Primary
Green	Off	Off	Green	BYPASS Primary & Secondary
Green	Red	Red	Green	TWISTED A-A, B-B
Yellow	Off	Off	Yellow	PCM did not complete, Not Active
Red	Off	Off	Red	Ports Disabled

# Specifications

## Technical Specifications

### CPU:

Intel i960 RISC based microprocessor

### Memory:

4 Meg. Local RAM (expandable to 12 Meg.)  
2 Meg. Flash Memory (expandable to 16 Meg.)  
2 Meg. Packet RAM

### Standards:

ANSI FDDI X3T9.5  
SMT  
MAC  
PHY  
MMF-PMD  
SMF-PMD

### Network Interfaces:

A/B ports MMF Connectors

## 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 6.0 W centimeters  
(13.8D x 17.4H x 2.4W inches)

### Weight:

Unit:	2.7kgs. (6lb)
Shipping:	3.6kgs. (8lb)

### Environment:

Operating Temperature	5 to 40° C
Storage Temperature	-30 to 90° C
Relative Humidity	5% to 95% non-condensing

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## Link Distance

### **9F310-02**

Up to 2 kilometers on multimode fiber-optic cable as specified by ANSI MMF-PMD.

### **9F315-02**

40 kilometers (max), 25 kilometer (typical) on single-mode fiber-optic cable as specified by ANSI SMF-PMD.



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