SmartSwitch 9000
9H531-17 & 9H532-17
17 Port Fast Ethernet Module
User's Guide

CABLETRON *SYSTEMS*

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Manufacturer's Address:	**35 Industrial Way** **PO Box 5005** **Rochester, NH 03867**
European Representative Name:	**Mr. J. Solari**
European Representative Address:	**Cabletron Systems Limited** **Nexus House, Newbury Business Park** **London Road, Newbury** **Berkshire RG14 2PZ, England**
Conformance to Directive(s)/Product Standards:	**EC Directive 89/336/EEC** **EC Directive 73/23/EEC** **EN 55022** **EN 50082-1** **EN 60950**
Equipment Type/Environment:	**Networking Equipment, for use in a Commercial or Light Industrial Environment.**

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

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

Contents

Introduction

The 9H531-17 and 9H532-17, shown in Figure 1-1, are SmartSwitch® Modules for the SmartSwitch 9000.

The 9H531-17 and 9H532-17 are seventeen port switch modules, with sixteen 10BASE-T ⁄ 100BASE-TX or 100BASE-FX ports and one VHSIM (Very High Speed Interface Module), on the front panel. The VHSIM port accepts either HSIM or VHSIM, multi-technology interface modules. This provides support for Gigabit Ethernet, ATM, Fast Ethernet, FDDI and WAN.

This module connects to the SmartSwitch 9000 INB-A and -B backplane interfaces.

Features

Connectivity
The 9H531-17 and 9H532-17 modules have one interface to each INB backplane and seventeen front panel interfaces.

The 9H531-17 has:

• 16 MT-RJ 100 Mbps multimode fiber Ethernet ports

• 1 Very High Speed Interface Module (VHSIM)

The 9H532-18 has:

• 16 RJ45 10 ⁄ 100 Mbps Unshielded Twisted Pair (UTP) Ethernet ports
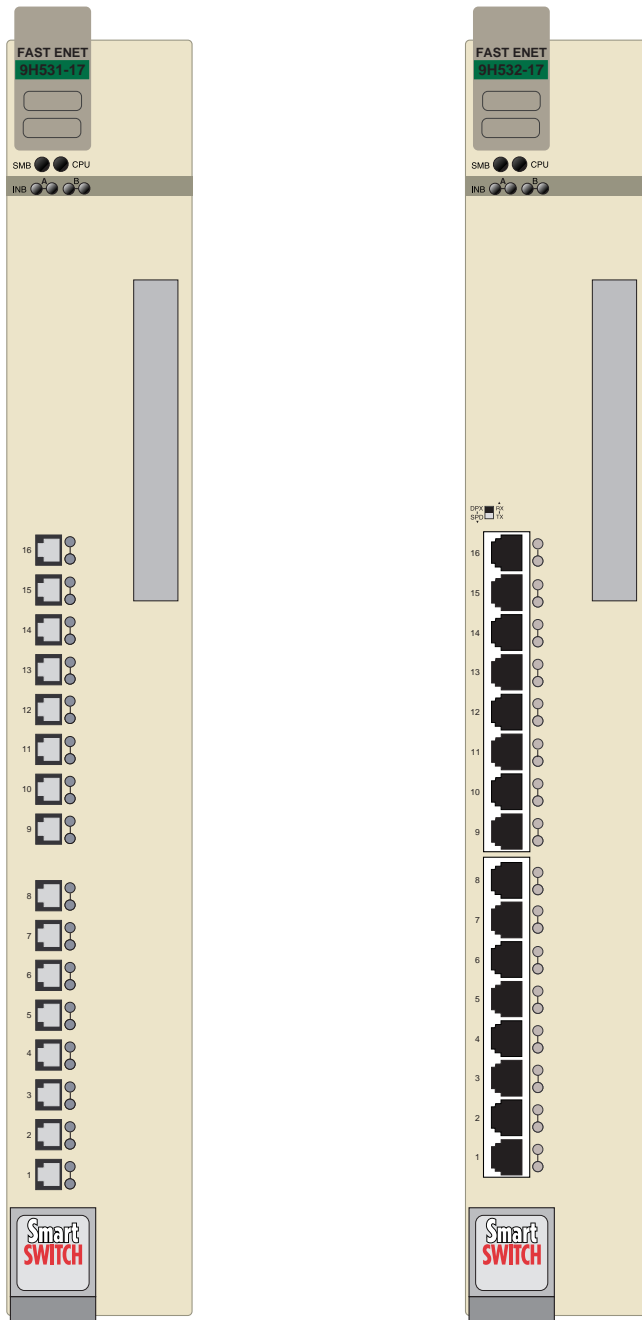
• 1 Very High Speed Interface Module (VHSIM)

Figure 1-1. The 9H531-17 and 9H532-17

Auto-Negotiation - Speed/Duplex Mode
The twisted pair ports on the front panel of the 9H532-17 module have the ability to auto-negotiate the type of connection required to provide a link to another device. During Auto-Negotiation, two devices automatically exchange information "telling" each other what their operating capabilities are. The Auto-Negotiation feature targets the maximum capabilities that can be reached between the two devices. For example, the module adjusts to 100 Mbps when the device on the other end of the connection can also adjust between 10 Mbps or 100 Mbps. If the device on the other end of the connection can only operate at 10 Mbps, then the 9H532-17 adjusts to 10 Mbps operation.

When Auto-Negotiation is supported at both ends of a link, the two devices dynamically adjust to full or half duplex operation based on the maximum capability that can be reached between the two devices. If the device connected to the 9H532-17 cannot auto-negotiate, the 9H532-17 interface operates according to the capability of the other device.

The 9H531-17 supports FDSE with 100 Mbps operation only. On the 9H532-17, each switched Fast Ethernet port can be configured to operate in Full Duplex Switched Ethernet (FDSE) mode, with 10 or 100 Mbps operation. FDSE allows each port to provide up to 200 Mbps of bandwidth.

Runtime IP Address Discovery
This feature enables the modules to automatically accept an IP address from a Boot Strap Protocol (BootP) server on the network into NVRAM without requiring a user to enter an IP address through Local Management.

When the modules are connected to the network and powered up, Runtime IP Address Discovery (RAD) checks the modules for an IP address. If one has not yet been assigned (module and SmartSwitch 9000 chassis IP address set to 0.0.0.0), RAD checks to see if any of the module interfaces have a link. If so, RAD sends out Reverse Address Resolution Protocol (RARP) and BootP requests to obtain an IP address from a RARP or BootP server on the network.

The RAD requests start at an interval of one per second. The interval then doubles after every transmission until an interval of 300 seconds is reached. At this point, the interval remains at 300 seconds. The RAD requests continue until an IP address is received from a RARP or BootP server, or an IP address is entered using Local Management.

SmartTrunk

SmartTrunk, also referred to as SmartTrunking, is Cabletron Systems' terminology for load balancing or load sharing. SmartTrunk technology provides an easy-to-implement mechanism to group, or aggregate, multiple links of any technology together to scale the backbone bandwidth beyond the limitations of a single link. All links are user-configurable so administrators can scale the backbone bandwidth by adding SmartTrunk links. The benefits of SmartTrunking include the following:

- All purchased bandwidth is used.

- Distributed, resilient links increase reliability and performance.

- Multiple technologies are supported within a single trunk for maximum flexibility.
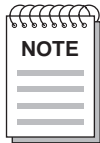
> **NOTE**
>
> *For information on SmartTrunk configuration, refer to the SmartTrunk User's Guide.*

Management

Management of the 9H531-17 and 9H532-17 modules and SmartSwitch chassis and any optional equipment is accomplished using the Local Management application or remote SNMP management stations. Local Management is accessible through the RS232 COM port on the Environmental Module using a local VT100 terminal, or a remote VT100 terminal via a modem connection, and in-band via a Telnet connection. In-band remote management is possible through WebView or any SNMP-compliant Network Management Software.

Local Management provides the ability to manage the 9H531-17 and 9H532-17. Local Management information for non-Ethernet HSIMs or VHSIMs is included in their respective user's guide. For details on how to get manuals, refer to the Related Manuals section in the Introduction.

WebView

The 9H531-17 and 9H532-17 modules can be managed by Cabletron WebView, a browser-based utility. There is no software to install as this management capability is built into each module.

Remote Monitoring (RMON)

The 9H531-17 and 9H532-17 support all nine Ethernet RMON groups. The Statistics, Alarms, Events and History groups are enabled on all ports by default.

Cabletron Systems RMON Actions is a vendor-specific extension of RMON and provides the ability to set an "Action" on any SNMP MIB variable. The Action can be triggered by setting an RMON Event and/or Alarm. An example of an Action would be to turn off a MIB-2 interface if a broadcast threshold is crossed.

Broadcast Suppression
Broadcast Suppression enables a user to set a desired limit of receive broadcast frames per port/per second to be forwarded out the other ports on the module up to the set limit. Any broadcast frames above this specified limit are dropped. In the event that broadcast frames are being suppressed, multicast and unicast frames continue to be switched.

Port Redirect Function
The Port Redirect function, also referred to as "Port Mirroring," is a troubleshooting tool used to map traffic from a single source port to a destination port within the chassis. This feature allows all packets, including those with errors, to be copied and sent to an analyzer or RMON probe. The analyzer or RMON probe will see the data as if it is directly connected to the LAN segment of the source port.

Flow Control
Flow Control is a method of managing the flow of frames between two devices. It ensures that a transmitting device does not overwhelm a receiving device with data. This enables the receiving device to communicate with the transmitting device, and to have it pause its transmission while the receiving device processes the frames already received. Flow control can be enabled or disabled on a port-by-port basis. Both devices must support the IEEE 802.3x standard for flow control to work.

The 9H531-17 and 9H532-17 support the following two types of flow control:

* Frame based 802.3x
* Back pressure

Frame based 802.3x flow control is supported on all Ethernet ports operating in the full duplex mode.

Back pressure flow control is supported on all Ethernet ports operating in the standard mode of operation.

802.1p Port Priority
The IEEE 802.1p standard is used to assign a default priority to the frames received without priority information in their tag header, and to map prioritized frames to the appropriate transmit queues.

The default priority-to-queue mappings are shown in Table 1-1. This configuration can be changed by the administrator.

Table 1-1. Priority Queuing Configuration

Priority Indicator	Transmit Queue
7	3
6	3
5	2
4	2
3	1
2	0
1	0
0	1

Switching Options

The 9H531-17 and 9H532-17 provide IEEE Standard-based 802.1 switching or SecureFast Switching Virtual Network Services. In the 802.1 mode (the default mode of operation), the switch functions as an 802.1D switch. When until VLANs are configured, it operates as an 802.1Q switch.

Standards Compatibility

The 9H531-17 and 9H532-17 are fully compliant with the IEEE 802.3, 802.3x, 802.3u, 802.1Q, and 802.1p standards. The 9H531-17 and 9H532-17 provide IEEE 802.1D Spanning Tree Algorithm (STA) support to enhance the overall reliability of the network and protect against "loop" conditions. The 9H531-17 and 9H532-17 support a wide variety of industry standard MIBs including RFC 1573 (MIB II), RFC 1271 (RMON), RFC 1493 (Bridge MIB), RFC 1354 (FIB MIB), and RFC 1190 (Path MTU Discovery). A full suite of Cabletron Systems Enterprise MIBs provide a wide array of statistical information to enhance troubleshooting. For information about how to extract and compile individual MIBs, contact Cabletron Systems.

GARP Switch Operation

Some or all ports on the switch may be activated to operate under the Generic Attribute Registration Protocol (GARP) applications, GARP VLAN Registration Protocol (GVRP) and/or GARP Multicast Registration Protocol (GMRP).

GARP is a protocol, or set of rules, that outlines a mechanism for propagating the port state and/or user information throughout a bridged LAN to keep track of users and VLANs on the network fabric. MAC bridges and end users alike can take part in the registration and de-registration of GARP attributes such as VLAN and multicast group membership.

Optional HSIM and VHSIM
The modules provide a slot for an optional High Speed Interface Module (HSIM) or Very High Speed Interface Module (VHSIM) for additional connectivity to various networking technologies. The Release Notes that are shipped with the product list exceptions to the HSIMs and VHSIMs that operate in the modules.

LANVIEW Diagnostic LEDs
LANVIEW diagnostic LEDs serve as an important troubleshooting aid by providing an easy way to observe the status of individual ports and overall network operations.

Year 2000 Compliance
The 9H531-17 and 9H532-17 modules and the SmartSwitch 9000 chassis have an internal clock that can maintain the time and date beyond the year 1999.

Related Manuals

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

SmartSwitch 9000 Installation Guide

SmartSwitch 9000 9C300-1 Environmental Module User's Guide

SmartSwitch 9000 9C214-1 AC Power Supply User's Guide

SmartSwitch 9000 9X5XX Series Local Management User's Guide

Cabling Guide

Ethernet Technology Guide

Network Troubleshooting Guide

WebView User's Guide

SmartTrunk User's Guide

HSIM-A6DP User's Guide

HSIM-F6 User's Guide

HSIM-FE6 User's Guide

HSIM-G01/G09 User's Guide

HSIM-W6 User's Guide

HSIM-W84 User's Guide

HSIM-W85 User's Guide

HSIM-W87 User's Guide

VHSIM-A6DP User's Guide

VHSIM-G6 User's Guide

Getting Help

For additional support related to this device or document, contact Cabletron Systems using one of the following methods:

World Wide Web	http://www.cabletron.com/
Phone	(603) 332-9400
Internet mail	support@cabletron.com

FTP
    Login
    Password
	ftp://ftp.cabletron.com/
	anonymous
	your email address

To send comments or suggestions concerning this document, contact the Cabletron Systems Technical Writing Department via the following email address: **TechWriting@cabletron.com** *Make sure to include the document Part Number in the email message.*	

Before calling Cabletron Systems, have the following information ready:

• Your Cabletron Systems service contract number

• A description of the failure

• A description of any action(s) already taken to resolve the problem (e.g., changing mode switches, rebooting the unit, etc.)

• The serial and revision numbers of all involved Cabletron Systems products in the network

• A description of your network environment (layout, cable type, etc.)

• Network load and frame size at the time of trouble (if known)

• The device history (i.e., have you returned the device before, is this a recurring problem, etc.)

• Any previous Return Material Authorization (RMA) numbers

Installing the SmartSwitch 9000 Module

Only qualified personnel should perform installation procedures.

Unpacking the Module

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

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

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

Installing an HSIM or VHSIM

You can install an HSIM or VHSIM in any Cabletron Systems device that supports HSIMs and VHSIMs. Refer to the release notes for the version of firmware running on the Cabletron Systems device to ensure that the HSIM or VHSIM is supported.

To install an HSIM or VHSIM in a module that supports HSIM/VHSIM technology:

1. Disconnect all cables from the interface module. Note the ports to which these cables attach.

2-1

2. Attach the antistatic wrist strap (refer to the instructions outlined on the antistatic wrist strap package).

3. Unlock the top and bottom plastic locking tabs of the module faceplate.

4. Slide out the module, and place it on its side with the internal components facing up.

5. Remove and save the two faceplate mounting screws securing the HSIM/VHSIM coverplate and remove the coverplate.

6. Remove and save the two standoff screws.

7. Place the HSIM/VHSIM behind the module faceplate.

8. Insert the connectors of the HSIM/VHSIM into the host device connector pins on the module.

9. Press down firmly on the back of the HSIM/VHSIM until the pins slide all the way into the connector holes.

10. Secure the HSIM/VHSIM to the faceplate using the two screws saved in step 5.

> **! CAUTION**
> *Ensure that the HSIM/VHSIM connectors align with the host device connector pins to prevent bending the pins. This can damage both the HSIM/VHSIM and the module.*

11. Secure the HSIM/VHSIM to the standoffs with the two screws saved in step 6.

12. Reinstall the interface module in the chassis.

13. Reattach the network cabling to the interface module.

> **! CAUTION**
> *In step 11 ensure that the standoffs on the interface module align with the standoff screw holes on the HSIM/VHSIM to prevent bending pins.*

User Accessible Components

Figure 2-1 shows the various components that are accessible to the user. These consist of an eight-position DIP switch, replaceable PROMs and sockets for RAM. These components will be used for future upgrades. Instructions for installing the components will be supplied with the upgrade kit.
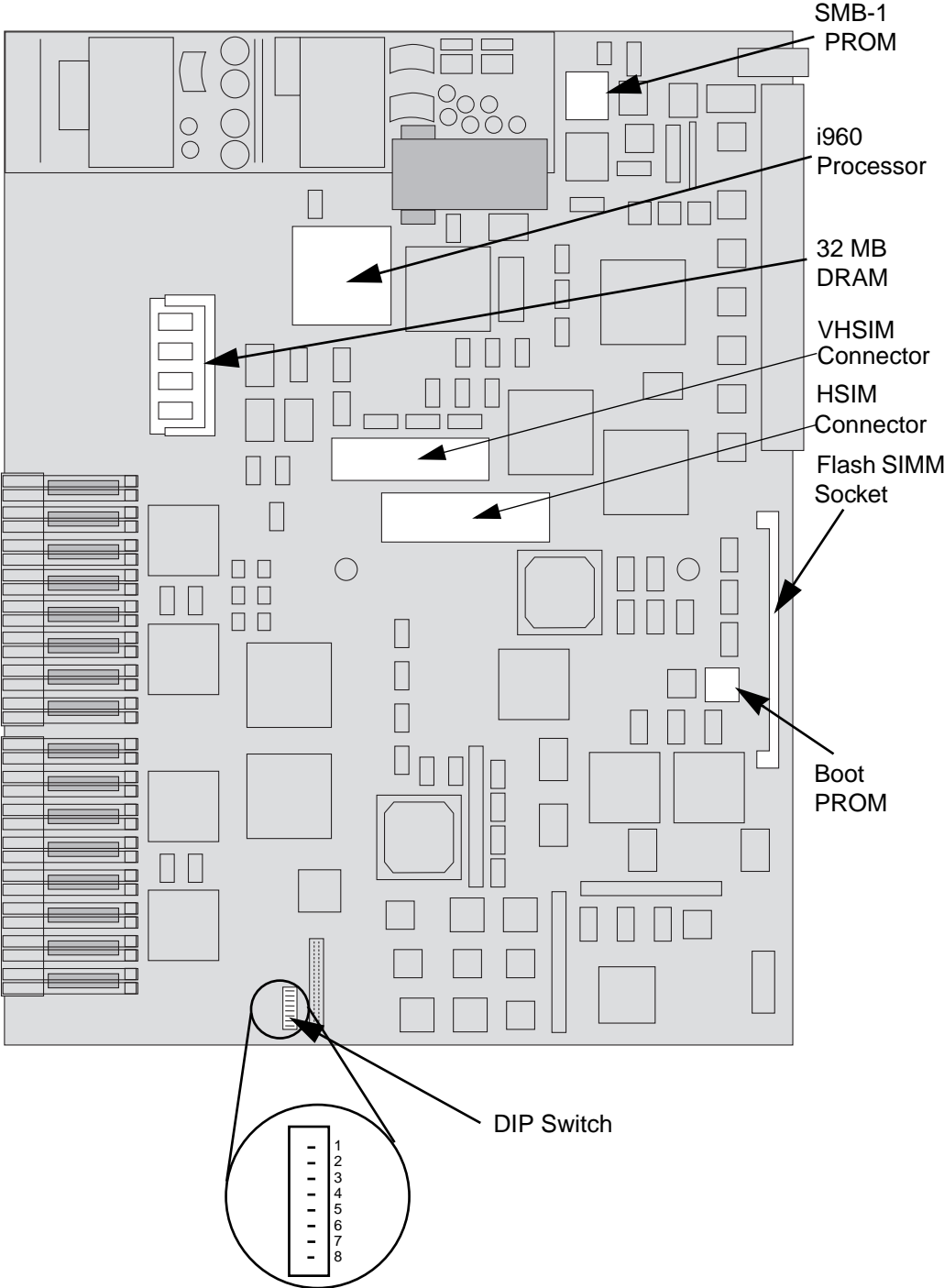
SMB-1
 PROM

i960
Processor

32 MB
DRAM

VHSIM
Connector

HSIM
Connector

Flash SIMM
Socket

Boot
PROM

DIP Switch

1
2
3
4
5
6
7
8

Figure 2-1. User-Accessible Components

An eight-position DIP switch is located on the module card as shown in Figure 2-1. 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 [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 SmartSwitch 9000, 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. (See section titled **Using DIP Switch 6** on page 2-5.)
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.*

Using DIP Switch 6

The purpose of DIP switch 6 is to force a Flash download from a BootP server through the EM-EPIM. The first step in this process is to configure the BootP server. Configurations of BootP servers can differ from platform to platform and from one operating system to another. Read the user's manual on BootP and TFTP serving for the correct files to edit and the correct files to execute for the server. After configuration of the BootP server the module can then have the switch state changed on dip switch 6 to initiate BootP and TFTP requests.

When the state of dip switch 6 is changed, the module begins requesting a BootP server in an attempt to receive a Flash image download. The modules boot PROM initiates a BootP sequence. During this sequence, the module requests an IP address and a filename from the BootP server. The module then requests a TFTP of the file and receives the download of the image. The module will not function until the Flash image is downloaded from the BootP and TFTP server.

If a BootP and TFTP are not intended at this time, this process may be stopped by resetting the module. Resetting is done by pushing the reset button on the module, power cycling the chassis, or removing the module from the chassis and re-inserting. (See section titled **The Reset Switch** on page 2-8.) After resetting, the module again looks for a BootP server, but will time-out after about four minutes. After the time-out, the module boots from Flash memory. The next time the power is cycled, the module will boot from Flash memory and not request the BootP server.

Installing the Module into the SmartSwitch 9000 Chassis

To install the SmartSwitch 9000 module, follow the steps below:
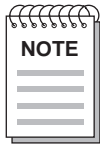
> **NOTE**
>
> *The INB Terminator Modules must be installed on the rear of the fourteen slot chassis before powering up this module. The INB Terminator Modules are not required on the six slot chassis. Refer to the* **INB Terminator Modules Installation Guide** *for information and installation procedure.*

1. Remove the blank panel covering the two slots in which the module is being installed. All other slots must be covered, if other modules are not being installed, to ensure proper airflow and cooling.

2. Attach one end of the ESD wrist strap packaged with the SmartSwitch 9000 chassis to your wrist. Plug the other end into the ESD Wrist Strap Grounding receptacle in the lower right corner of the SmartSwitch 9000 chassis shown in Figure 2-2.

3. Grasp the module and slide it into the slots. Make sure that the module's circuit card is between the card guides, as shown in Figure 2-2. Check both the upper and lower tracks of the card. Take care that the module slides in straight and engages the backplane connectors properly.

4. Lock down the top and bottom plastic tabs, as shown in Figure 2-2.

Jack for ESD
wrist strap

Metal Back-Panel

Circuit Card
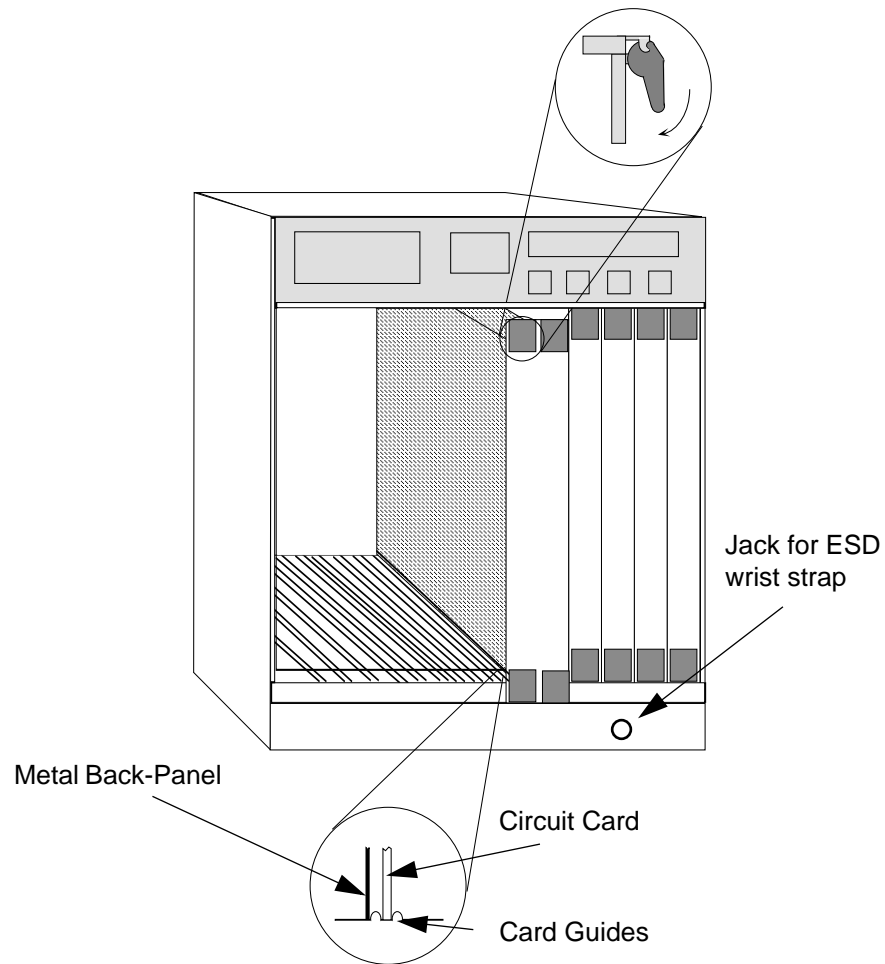
Card Guides

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 2-2. Installing the 9H531-17 and 9H532-17 Modules

The Reset Switch

The Reset switch is located under the top plastic tab as shown in Figure 2-3. Use the reset switch to reset the module's processor, shutdown (power down) the module, and/or restart the module.

- To reset the module's i960 processor, press the reset switch twice within three seconds.
- To shut down the module, press and hold the reset switch for three or more seconds.
- To restart the module, press the reset switch momentarily.

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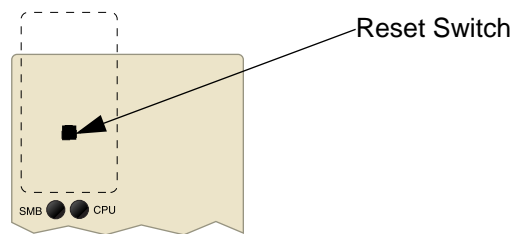

Figure 2-3. The Reset Switch

Cabling Requirements

10BASE-T Network

When connecting a 10BASE-T segment to the front panel ports of a 9H532-17 module, ensure that the network meets the Ethernet network requirements of the IEEE 802.3 standard for 10BASE-T. If a port is to operate at 100 Mbps, Category 5 cabling must be used. For 10 Mbps operation only, Category 3 cabling can be used.

100BASE-TX Network

The 9H532-17 has RJ45 connections that support Category 5 UTP cabling with an impedance between 85 and 111 ohms for 10 and 100 Mbps operation. The device at the other end of the twisted pair segment must meet IEEE 802.3u 100BASE-TX Fast Ethernet network requirements for the devices to operate at 100 Mbps. Refer to the Cabletron Systems *Cabling Guide* for details.

100BASE-FX Network

The 9H531-17 supports 100BASE-FX. When connecting a 100BASE-FX segment to any of the front panel ports, ensure that the network meets the optical performance requirements for 100BASE-FX IEEE 802.3u standard.

The 9H531-17 supports multimode fiber cables at the 1300 nm wavelength, at lengths of up to 2 km.

Technical Overview

SmartSwitch Architecture

The SmartSwitch Architecture of the 9H531-17 and 9H532-17 modules, as shown in Figure 3-1, are configurable for one of two modes of operation: traditional IEEE 802.1 switching, or SecureFast switching. The modules support only one of these modes of operation at any one time.

When operating in traditional IEEE 802.1 switch mode, the 9H531-17 and 9H532-17 make filtering/forwarding decisions based on Destination Address (DA), with standard IEEE 802.1D learning. 802.1Q VLANs are also supported.

Spanning tree operation for the 9H531-17 and 9H532-17 is configurable to adhere to IEEE 802.1D, DEC, or none. The default Spanning Tree Algorithm is 802.1D.

When operating in SecureFast switch mode, all filtering/forwarding decisions are made on a DA-SA pair and its in and out port on a connection-orientated basis. SecureFast switching mode provides value-added network services including dynamic VLANs, Topology, Connectivity, IP Multicast, Control, Security, Application, Address Management, Dynamic Mapping, and Directory services. For example, Topology Services includes configurable options ranging from simple spanning tree implementations to fully-meshed active topologies. Other services and features supported in SecureFast switching mode are described in detail in the Cabletron White Paper, **IP Host Communication in Bridged, Routed and SecureFast Networks**.
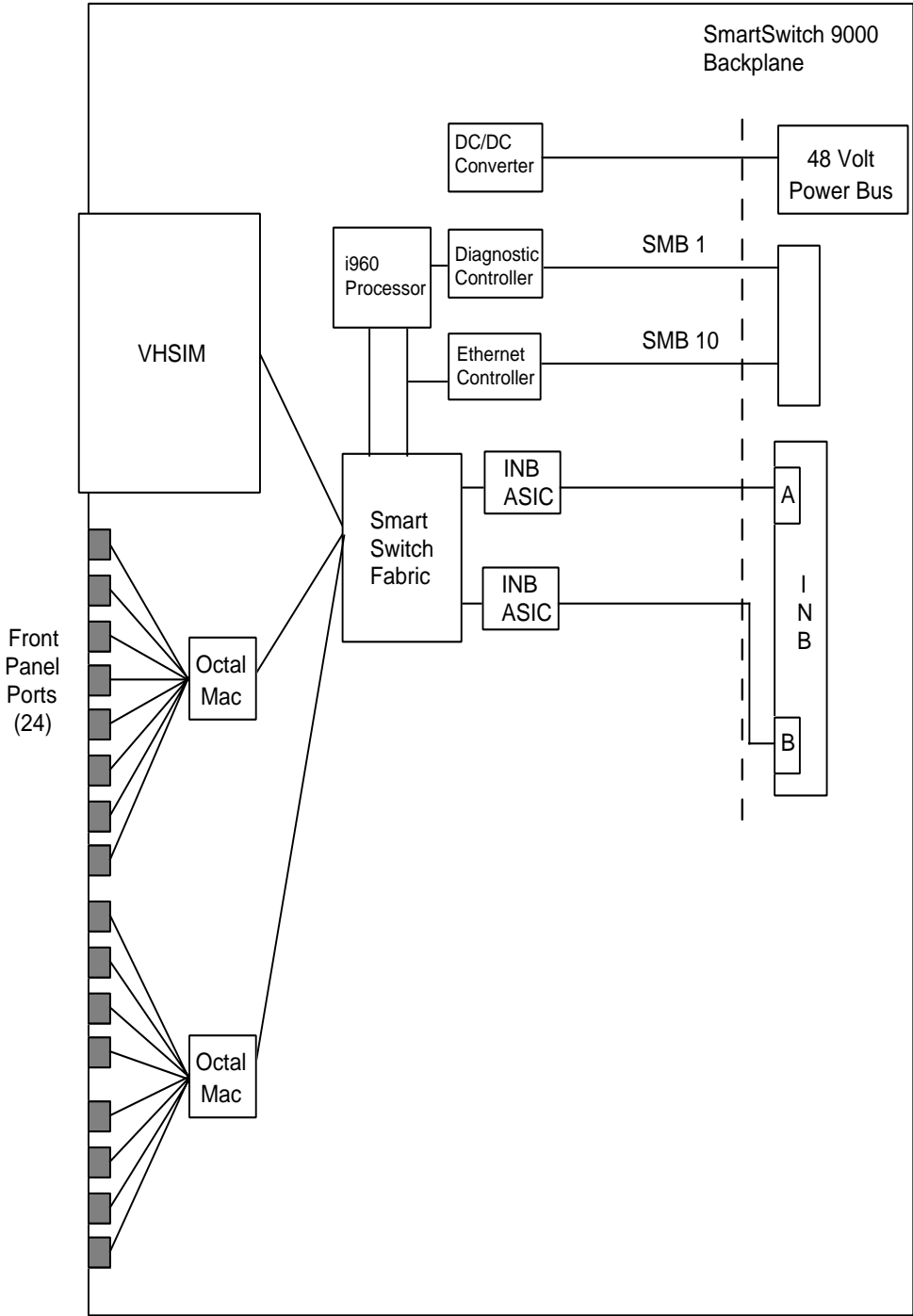
Figure 3-1. Block Diagram

System Management Buses

There are two management channels within the SmartSwitch 9000 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 1 Mbps management bus located within the SmartSwitch 9000. 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 tests are performed by all modules that 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 10 Mbps management bus located within the SmartSwitch 9000, which is also used for inter-chassis communication of modules as well as serving as an out-of-band management channel into the SmartSwitch 9000. 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 SmartSwitch 9000 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 its supporting logic. The diagnostic controller is designed to control the power-up sequencing of modules, monitor the 9H531-17 and 9H532-17 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 other's 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 Environmental Module. The 9H531-17 and 9H532-17 have been designed so that in the event of a diagnostic controller fault, the 9H531-17 and 9H532-17 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 attaches to both INB A and INB B and has two INB ASICs. The INB ASICs use 64-byte Ethernet frames for transmission onto the INBs at 66 MHz.

The 9X5XX modules are fully compatible with the first generation 9X4XX modules. The first generation modules communicate only on INB B using a 56-byte canonical frame format, at 40 MHz. If the newer module detects a first generation module on the backplane, it automatically changes from the fast 66 MHz Ethernet frames, to the first generation compatible 40 MHz canonical frame on INB B only. INB A is used only by the 9X5XX modules and remains at the higher speed.

i960 Core

The i960 core provides modules host services, the SNMP protocol stacks, to support industry standard MIBs, as well as Cabletron enterprise extension MIBs for each media type. Management services, such as telnet, WebView and network address to MAC address mapping, are also provided by the i960 core.

LANVIEW LEDs

The front panel LANVIEW LEDs indicate the status of the module and may be used as an aid in troubleshooting. Figure 4-1 shows the LANVIEW LEDs of the 9H531-17 and 9H532-17 modules.

The LED Mode Switch

The 9H532-17 has an LED mode switch, located on the front panel, that allows the user to change the function of the switch port LEDs. Refer to Figure 4-1. When the switch is in the UP position, the LEDs indicate the receive (RX) and transmit (TX) status of the fixed ports. When the mode switch is in the DOWN position, the LEDs indicate at what speed the applicable port is currently operating (10 Mbps or 100 Mbps) and if the applicable port is operating in standard (half) or full duplex mode.

Table 4-4 and Table 4-5 provide the definitions of the LED states that occur when the LED mode switch is in the UP position. Table 4-6 and Table 4-7 provide the definitions of the LED states that occur when the LED mode switch is in the DOWN position.
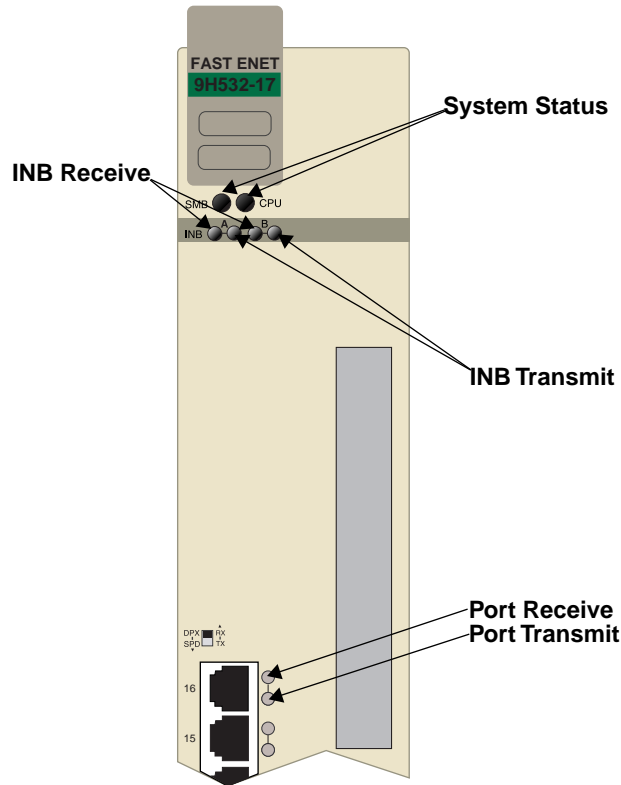
Figure 4-1. The LANVIEW LEDs (9H532-17 shown) and LED Mode Switch

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 (SMB and CPU) LEDs

LED Color	State	Description
Green	Functional	Fully operational
Yellow	Testing	Power-up testing
Yellow (Flashing)	Crippled	Not fully operational (e.g., 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 functions of the INB transmit LED are listed in Table 4-2.

Table 4-2. INB Transmit LED

LED Color	State
Green (Flashing)	Data activity
Yellow (Flashing)	Port in standby state
Red (Flashing)	Collision
Red	Fault
Off	No activity, Port disabled

The functions of the INB receive LED are listed in Table 4-3.

Table 4-3. INB Receive LED

LED Color	State
Green (Flashing)	Link, Port disabled
Green	Link, Port enabled, No activity
Yellow (Flashing)	Link, Port enabled, Activity
Red	Fault
Off	No Link

The functions of the Ethernet Transmit and Ethernet Receive LEDs are listed in Table 4-4 and Table 4-5. These LED indications are only valid when the LED MODE switch is in the RX-TX position.

Table 4-4. Ethernet Transmit LEDs

Color	State
Green (Flashing)	Activity (Flashing rate indicates rate of activity)
Yellow (Flashing)	Port in standby state
Red	Port disabled
Red (Flashing)	Collision
Off	No activity

Table 4-5. Ethernet Receive LEDs

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

The functions of the Speed and Full Duplex LEDs are list in Table 4-6 and Table 4-7. These LED indications are only valid when the LED MODE switch is in the DPX-SPD position.

Table 4-6. DPX Status LEDs (9H532-17 only)

LED Color	State
Green	Port is operating in full duplex mode (20 Mbps or 200 Mbps).
Yellow	Port is in standard (half duplex) mode (10 Mbps or 100 Mbps).

Table 4-7. SPD LEDs (9H532-17 only)

LED Color	State
Green	Port is linked and operating at 100 Mbps.
Yellow	Port is linked and operating at 10 Mbps.

Specifications

Technical Specifications

CPUs

PowerPC
Intel i960 RISC-based microprocessor

Memory

8 MB Flash Memory (expandable to 16 MB)
32 MB DRAM (local)
4 MB Memory (Shared)

Network Interface

16 RJ45 Unshielded Twisted Pair ports (9H532-17) - 10BASE-T/100BASE-TX
16 MT-RJ multimode fiber ports (9H531-17) - 100BASE-FX

Performance

Module Switch Fabric bandwidth	3.3 Gbps
Module Throughput	2.2 Mpps
Source Address Table	16 K entries

Regulatory Compliance

> ⚠ **CAUTION**
>
> *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 following safety and electromagnetic compatibility (EMC) requirements:

Safety   UL 1950, CSA C22.2 No. 950, EN 60950, IEC 950, and 73/23/EEC

Electromagnetic Compatibility (EMC)   FCC Part 15, EN 55022, CISPR 22, CSA C108.8, EN 50082-1, AS/NZS 3548, VCCI V-3, and 89/336/EEC

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: 4.5 kg (10 lb)
Shipping: 5.4 kg (12 lb)

Environment

Operating Temperature   5 to 40° C (41° to 104°F)
Storage Temperature   -30 to 73° C (-22° to 164°F)
Relative Humidity   5% to 90% non-condensing

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