

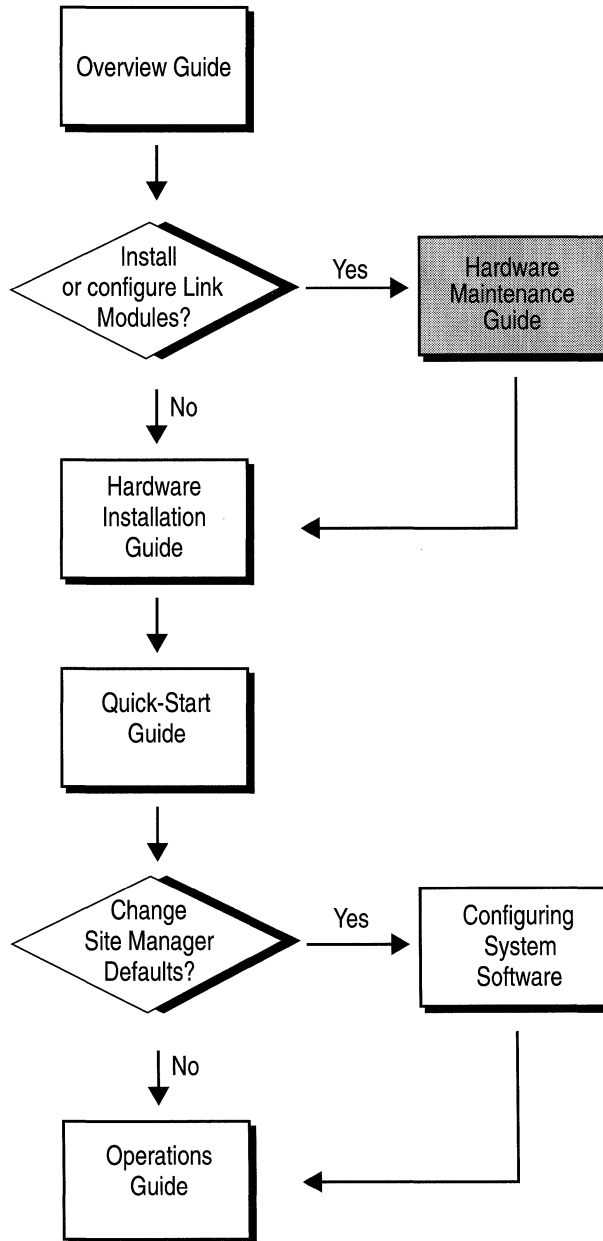
# Hardware Maintenance Guide

Software Version 7.50, Site Manager Version 1.50



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# Reading Path



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This equipment generates, uses, and can radiate radio-frequency energy. If you do not install and use this equipment according to the instruction manual, this product may interfere with radio communications. This product has been tested and found to comply with the limits for a Class A computing device, pursuant to Subpart J of Part 15 of FCC Rules; compliance with these limits provides reasonable protection against radio interference when such equipment is operated in a commercial environment. Operating this equipment in a residential area is likely to interfere with radio communications; in which case, the user, as his/her own expense, must correct the interference.

Wellfleet shielded cables must be used with this unit to ensure compliance with the Class A limits.

## **Canadian Department of Communications Radio Interference Regulations**

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

Le présent appareil numérique (le Feeder Node, le Link Node, et le Concentrator Node) n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de Classe A prescrites dans Le Règlement sur Le Brouillage Radioélectrique Édité par Le Ministère des Communications du Canada.

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SITE MANAGER SOFTWARE IS AVAILABLE FOR INSTALLATION ON EITHER SUN SPARCSTATIONS OR DOS-BASED PERSONAL COMPUTERS (PCs). SITE MANAGER MAY BE INSTALLED ON AN UNLIMITED NUMBER OF CUSTOMER SUN SPARCSTATIONS. HOWEVER, SITE MANAGER FOR DOS PCs INCLUDES DISTINCT CORPORATION'S IP RUNTIME SOFTWARE WHICH CAN BE COPIED AND INSTALLED ON UP TO 15 PCs PER NETWORK IN CONJUNCTION WITH WELLFLEET SITE MANAGER FOR DOS PCs.

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# About this Guide

## Audience and Scope

The procedures described in this guide are written for two audiences, with different skills and backgrounds. This section describes these audiences and indicates which maintenance procedures are dangerous.

Experienced network operators who are maintaining Wellfleet Backbone Link Nodes (BLNs) may follow the procedures described in the first four chapters of this guide: *Accessing the Interior*, *Hot Swapping the Hardware*, *Configuring Hardware Modules*, and *Switches and LEDs*. These chapters assume that the reader has a technical understanding of electronic apparatus and data communications.

Only service personnel may follow the procedures described in Appendix A, Replacing Fuses. These procedures are detailed in the Danger statement below.



### **Danger**

Due to high-energy hazards, the following procedures are to be performed by service personnel only: removing the fuse access shield, removing fuses, and replacing fuses.

Service personnel are required to have experience installing and servicing network hardware, and have training in taking precautions to minimize danger to themselves and others while performing a task inside a hazardous service access area.

## How to Use this Guide

Refer to the following table for instructions on how to use this guide.

<b>For Instructions on How to:</b>	<b>Refer to:</b>
Replace a Flash memory card, a FRE module, or an SRM-F	<i>Accessing the Interior and Hot Swapping the Hardware</i>
Replace a Link Module	<i>Accessing the Interior to remove the front bezel and the antistatic wrist strap from behind the front bezel. Then refer to Hot Swapping the Hardware.</i>
Override the default configuration of jumpers and switches located on the printed circuit boards	<i>Configuring Hardware Modules</i>
Interpret LED codes and learn the function of all switches on the FRE modules and SRM-F inside the BN	<i>Accessing the Interior and Switches and LEDs</i>
Interpret LED codes and learn the function of all switches on the front and rear panels of the BN	<i>Switches and LEDs</i>
Identify the function and location of each fuse, determine if a fuse is blown, or replace a specialized fuse	<i>Replacing Fuses</i>

---

## Document Set

The following guides complete this documentation set:

### *Overview Guide*

Describes the user interface, called the Site Manager application, the system software, and the router hardware.

### *Hardware Installation Guide*

Describes how to physically install the router hardware.

### *Quick-Start Guide*

Describes how to configure the router's initial IP network interface, install the Site Manager application software, and remotely create a pilot configuration for the Wellfleet router using the Site Manager.

### *Configuring System Software, Volumes I and II*

Describes how to use the Site Manager's Configuration Manager application to set Wellfleet router parameters in one of three modes: local, remote, or dynamic.

### *Operations Guide*

Describes how to use the Site Manager to perform day-to-day operations and how to use the Technician Interface to perform software maintenance.

If you are missing any guides, contact Wellfleet Customer Support at 1-800-2LANWAN.

## Conventions

This document set uses the following conventions:

**Convention:**

*filename*

**command**

**Denotes:**

Italics denote file and directory names.

Bold text denotes text the user needs to enter.

# Chapter 1

## Accessing the Interior

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# Accessing the Interior

## About this Chapter

This chapter describes how to do the following:

- ❑ Remove the front bezel.
- ❑ Attach the antistatic wrist strap to avoid damage to electronic components when handling hardware modules.

The antistatic strap is in a plastic pouch attached to the inside of the front bezel (panel).

- ❑ Remove the RFI shield from the front panel of the BN to access the BN interior.

You need to access the BN interior to replace or insert additional Flash memory cards and FRE modules.

- ❑ Remove and install an air flow module.

Each unused slot is equipped with an air flow module, which redirects cool air to the FRE module below it. You remove the air flow module to replace it with a FRE module.



## Removing and Replacing the Front Bezel

You remove the front bezel to access the antistatic wrist strap, remove and insert Flash memory cards, FRE modules, the SRM-F (System Resource Module-Front), and hardware module fuses.

You do *not* need to power down the system to replace Flash memory cards or hardware modules.



### **Danger**

Power down the system if you are replacing fuses.

Using both hands, pull the bottom of the front bezel and remove it from the chassis (see Figure 1-1).

**Note:** The front bezel should be kept on during normal operation to comply with air flow requirements.

You replace the front bezel as follows:

1. Align the mounting retainers on the inside of the bezel with the holes on the front of the RFI shield.
2. Push the sides of the bezel into place.

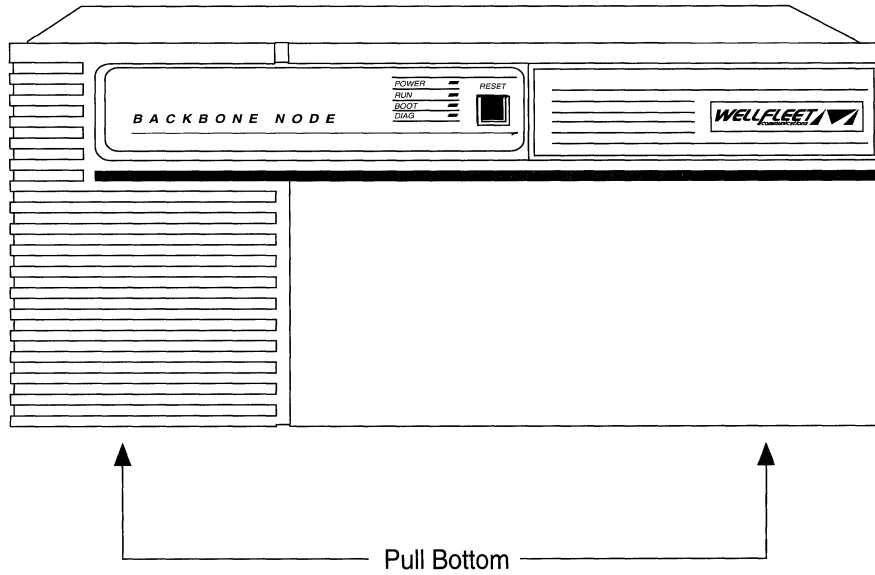


Figure 1-1. Removing the Front Bezel

## Attaching the Antistatic Wrist Strap

The antistatic wrist strap is located on the inside of the front bezel (front panel). Refer to the section *Removing and Replacing the Front Bezel* to access the antistatic strap.

Wearing an antistatic strap is required whenever you do the following:

- ❑ Remove, install, and handle Flash memory cards
- ❑ Remove, install, configure, and handle FRE (Fast Routing Engine) Modules, the SRM-F (System Resource Module-Front), and Link Modules (including the SRM-L [System Resource Module-Link]).
- ❑ Remove and replace module fuses

An antistatic strap directs the discharge of static electricity from your body to the chassis of the BN, thereby avoiding discharge to sensitive electronic components.



**Warning:** Electrostatic discharge can damage hardware. Follow the procedure in this section to protect your equipment from damage.

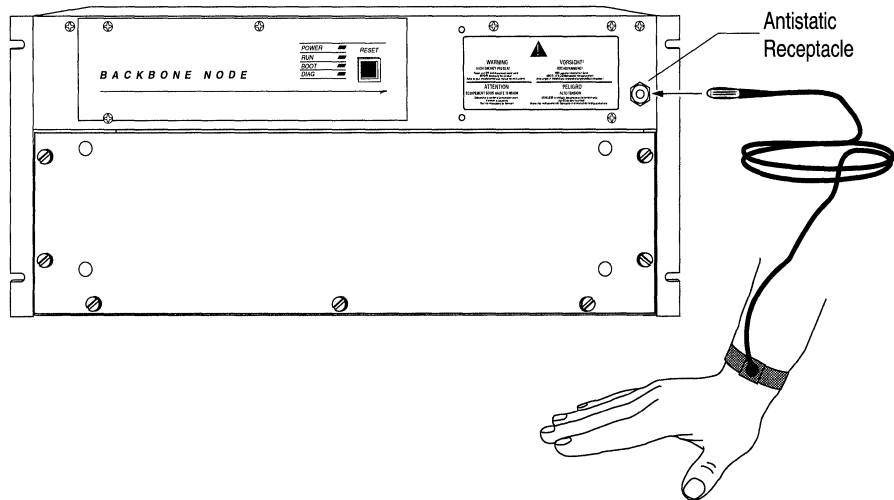
Attach the antistatic wrist strap as follows (see Figure 1-2):

1. Remove the front bezel (refer to *Removing and Replacing the Front Bezel*).
2. Remove the strap from the package attached to the back of the front bezel.
3. Insert your hand inside the band at one end of the antistatic strap.

Ensure the metal buckle inside the band is in contact with your skin. (Swing open the metal buckle to adjust the strap to form a snug fit if necessary).

4. Remove the alligator clip from the wrist strap and insert the end of the wrist strap into the antistatic receptacle if you are accessing a Flash card or hardware module (see Figure 1-2).

If you are replacing fuses, refer to the appendix *Replacing Fuses* for the correct place to connect the wrist strap.



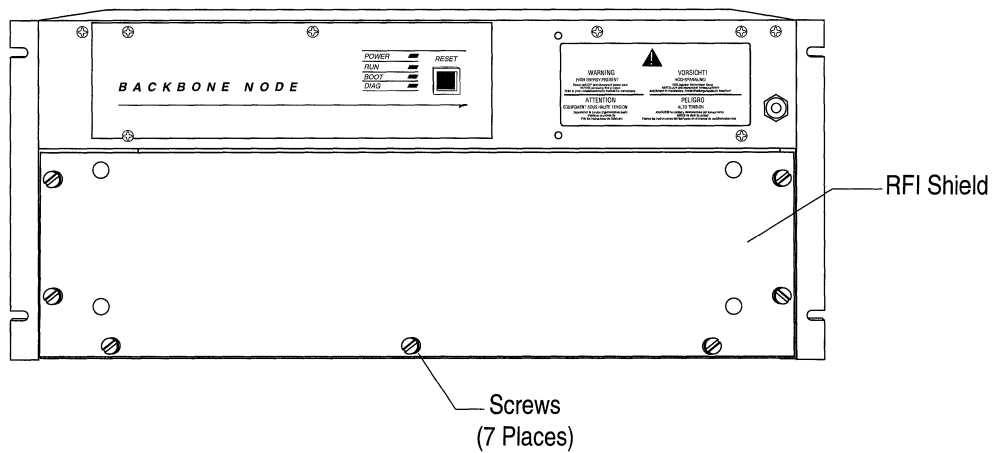
**Figure 1-2. Attaching the Wrist Strap**

## Removing and Replacing the RFI Shield

You remove the radio frequency interference (RFI) shield to access the Flash memory cards and FRE modules.

You remove the RFI shield as follows (see Figure 1-3):

1. Remove the front bezel (refer to the previous section for instructions).
2. Loosen the seven captive screws that fasten the RFI shield to the chassis.
3. Remove the RFI shield from the chassis.



**Figure 1-3. Removing the BLN RFI Shield**

The RFI shield must be in place to replace the front bezel. You replace the RFI shield as follows:

1. Position the RFI shield in front of the chassis.
2. Tighten the screws that fasten the RFI shield to the chassis.

Refer to the previous section to replace the front bezel.

## Removing and Installing an Air Flow Module

Wellfleet ships an air flow module in each slot that does not include a FRE module (see Figure 1-4). Each air flow module redirects cool air to the FRE module below it. You remove the air flow module to replace it with a FRE module.

You remove an air flow module as follows:

1. Remove the front bezel (refer to the section *Removing and Replacing the Front Bezel*).
2. Remove the RFI shield (refer to the section *Removing and Replacing the RFI Shield*).
3. Use a Phillips screwdriver to remove the screw that fastens the bottom of the board retainer bracket to the chassis.
4. Remove the board retainer bracket.
5. Pull the sides of the air flow module to remove it.

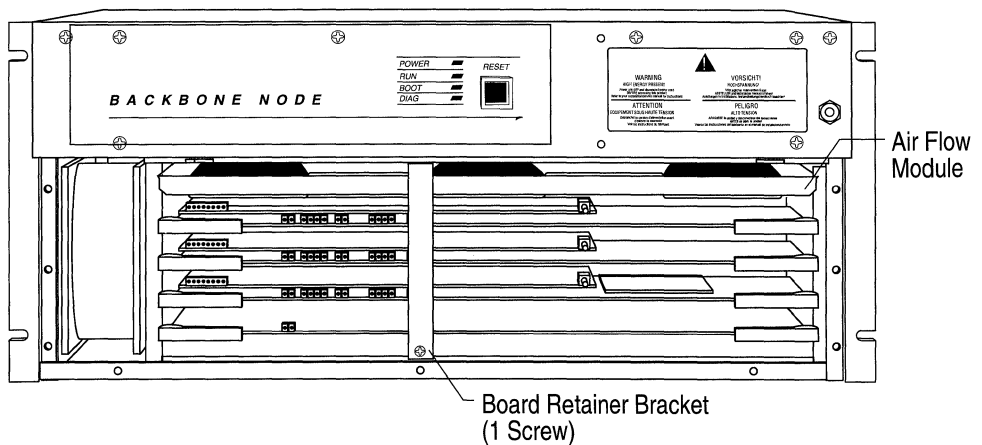


Figure 1-4. BLN with Air Flow Module

To install an air flow module, hold it by its sides and insert it, back edge first, into the desired slot along the card guides.

The back edge of the air flow module contains spaces to accommodate the slot's power connector and locating pin (see Figure 1-5).



**Figure 1-5. Back Edge of Air Flow Module**

# Chapter 2

## Hot Swapping the Hardware

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# Hot Swapping the Hardware

## About this Chapter

This chapter describes how to replace Flash memory cards, Link Modules, and FRE modules. The BN's hot swap capability allows you to replace these components with the power on. The procedures for replacing these components are the same whether the power is off or on.

The system responds dynamically when you remove hardware as follows:

- ❑ When you remove a Flash card, the Non-Volatile File System (NVFS) removes access to the card.
- ❑ When you remove a Link Module or FRE Module, connectivity to the slot in question and the services provided by the slot are disrupted. The other FRE modules resynchronize their routing tables after the slot fails to receive packets.

The system also responds dynamically when you insert hardware as follows:

- ❑ When you insert a formatted Flash card in a BN or insert a card and format it, the NVFS automatically provides access to the card.
- ❑ When you insert a FRE module or Link Module in a slot, the FRE module in that slot automatically resets as follows:
  1. The Gate Access Management Entity (GAME) operating system software running on the FRE module in the slot forwards a boot request to the other FRE modules.

2. The first FRE module to respond to the boot request forwards the boot image resident in its memory.
3. The newly inserted FRE module receives and executes the boot image.
4. The resetting FRE module requests a configuration. The first available FRE module forwards the configuration resident in its memory.
5. The resetting FRE module loads the configuration image and initiates the services provided by the slot; connectivity is thus reestablished. The resetting FRE module alerts the other FRE modules that it can receive packets.
6. The FRE modules resynchronize their routing tables accordingly.

## Replacing a Flash Memory Card

This section describes how to hot swap a Flash memory card. You have at least one Flash card installed in your BN (see Figure 2-1). However, the BN supports one Flash card per FRE module. You install additional cards to provide redundancy or add storage capacity.



Figure 2-1. Wellfleet Flash Memory Card



**Warning:** Electrostatic discharge can damage hardware. You must remove the front bezel, attach the antistatic strap to your wrist, and connect it to the antistatic receptacle before you remove or install a Flash card (refer to the chapter *Accessing the Interior* for instructions.)

Table 2-1 lists the 2 Mb, Personal Computer Memory Card International Association (PCMCIA) standard Flash memory cards that are qualified for use in a BN:

**Table 2-1. Flash Memory Card Approved Vendors**

<b>Vendor</b>	<b>Part Number</b>
Maxell	EF2MTB (AA)
Maxell	EF2MTB (BA)
INTEL	IMONC002FLKA
AMD	AMC002FLKA
Mitsubishi	MF82M1-G1EAT01
C Centennial	CC2048FLXX-15
Fujitsu	MB98A811220

Remove a Flash card as follows:

1. Press the rectangular button adjacent to the Flash card receptacle (see Figure 2-2).
2. Pull the Flash card toward you.

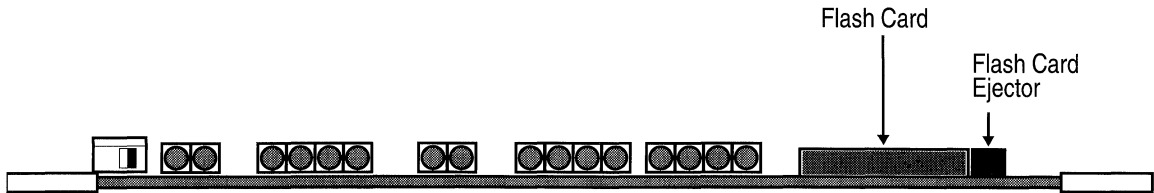


Figure 2-2. Removing a Flash Card

You insert a Flash card into any FRE module as follows:

1. Position the Flash card with the label facing up and the INSERT arrow pointing toward the BN.
2. Insert the Flash card into the Flash card receptacle.
3. Gently push the Flash card until it fits snugly into place.

You close the BN as follows (refer to the chapter *Accessing the Interior* for detailed instructions.)

1. Replace the RFI shield.
2. Insert the wrist strap into the wrist strap pouch attached to the back of the front bezel.
3. Replace the front bezel.

Format the Flash card using the Site Manager or TI **format** command before attempting to write to it if the card is new and you did not obtain it from Wellfleet. (Refer to the *Operations Guide* for instructions.)

## Replacing a Link Module

You can remove and replace a Link Module with the power on or off. Follow the same procedure to replace a Link Module or an SRM-L.



**Warning:** Electrostatic discharge can damage hardware. You must remove the front bezel, attach the antistatic strap to your wrist, and connect it to the antistatic receptacle before you handle BN components (refer to the chapter *Accessing the Interior* for instructions).

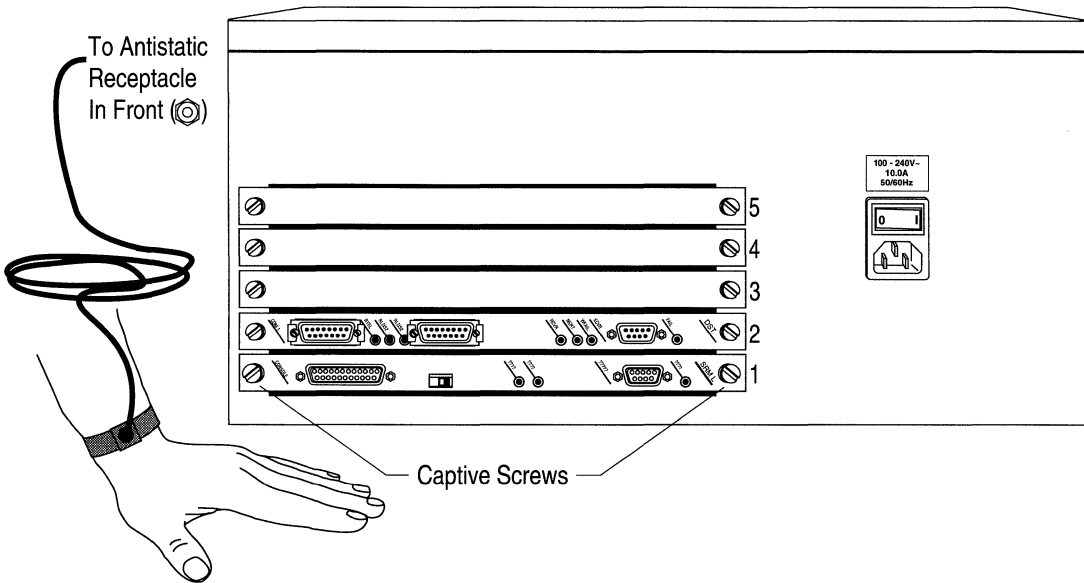
**Note:** All backbones become inactive when both the SRM-F and SRM-L are removed.

Remove a Link Module as follows (see Figure 2-3):

1. Disconnect all exterior cables (device, LAN, and/or WAN connections).
2. Twist off the two captive screws on each end of the board.
3. Grasp the sides of the Link Module and pull it out of the node.
4. Place the Link Module in an antistatic protective bag.

Install a Link Module as follows:

1. Slide the Link Module into the desired slot inside the card guides until the board's connector panel is up against the BN's rear panel.
2. Secure the two captive screws on both sides of the Link Module.
3. Connect any device cables or LAN/WAN interface cables to the Link Module.



**Figure 2-3. Removing a Link Module**

**Note:** Wellfleet recommends that you issue the **diags** command to the associated slot immediately after you insert a Link Module (refer to *the Operations Guide: Technician's Interface*). Otherwise, the Link Module FAIL LED will remain lit, indicating diagnostics have *not* been run on the ILI (refer to the *Switches and LEDs* chapter). However, regardless of whether you issue the **diags** command, the Link Module will be initialized and become operational if it is functional and its ports are configured.



## Replacing a FRE or SRM-F

You can remove and replace a FRE module or SRM-F with the power on or off. You must remove the front bezel and RFI shield to access it (refer to the chapter *Accessing the Interior* for instructions.)



**Warning:** Electrostatic discharge can damage hardware. You must attach the antistatic strap to your wrist and connect it to the antistatic receptacle before you handle BN components (refer to the chapter *Accessing the Interior* for instructions).

**Note:** All backbones become inactive when both the SRM-F and SRM-L are removed.

Slot 1 (the bottom slot) in the BLN can contain the SRM-F. The remaining slots in the BLN are available for FREs.

Remove a FRE or SRM-F as follows (see Figure 2-4):

1. Use a Phillips screwdriver to release the screw that fastens the board retainer bracket to the chassis.
2. Pull the bottom of the board retainer bracket to remove it.
3. Swing open the extractors at each end of the board that you are removing by gently pulling the inside of the extractors toward you.
4. Pull the extractors to remove the board.
5. Place the FRE or SRM-F in an antistatic protective bag.

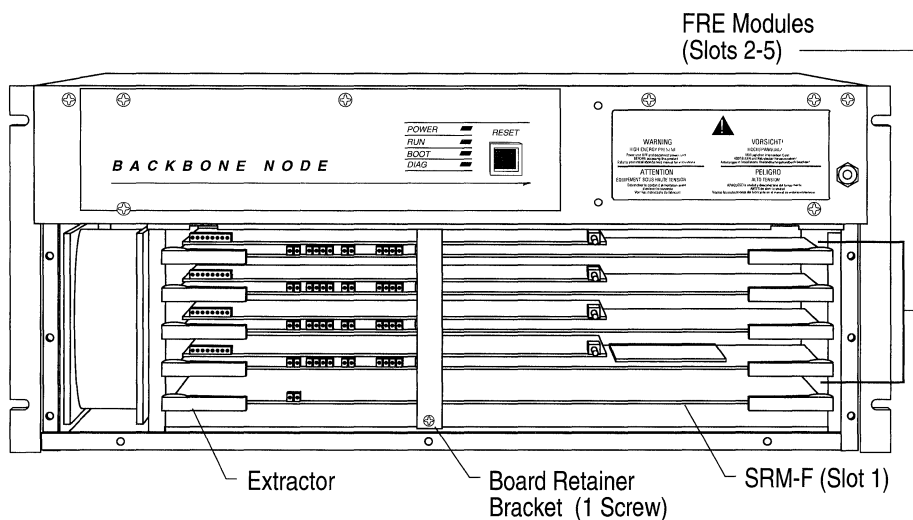


Figure 2-4. Removing a FRE or SRM-F



### Warning - High Energy

A potential energy hazard exists during power on (hot swap) service of link modules. Do not remove more than two (2) adjacent boards/brackets without powering off the unit and removing the power cord.



**Warning:** Electrostatic discharge can damage hardware. You must attach the antistatic strap to your wrist and connect it to the antistatic receptacle before you handle BN components (refer to the chapter *Accessing the Interior* for instructions).

Install a FRE or SRM-F as follows:

1. Use a Phillips screwdriver to remove the screw that fastens the bottom of the board retainer bracket to the chassis.
2. Pull the bottom of the board retainer bracket toward you to remove it.
3. Holding the board extractors open, slide the FRE into the desired slot inside the card guides.  
  
Slot 1 (the bottom slot) always contains the SRM-F; the remaining slots are available for FREs.
4. Lift the middle of the board slightly and push it gently to ensure the connector in the middle engages.
5. Push the extractors forward to lock the board in place.

**Note:** Slide the board out and repeat steps 4 through 6 if the extractors do not lock into place easily.

6. Slide the top of the board retainer bracket into its designated ridge and align the bottom of the bracket with the screw hole at the bottom of the chassis.
7. Use a Phillips screwdriver to secure the board retainer bracket to the chassis.

8. Ensure the power switch on the board you inserted is pushed to the right if it is equipped with a power switch (see Figure 2-5).
9. Disconnect the wrist strap from the chassis.
10. Replace the RFI shield (refer to the chapter *Accessing the Interior* for instructions.)
11. Insert the wrist strap into the wrist strap pouch attached to the back of the front bezel.
12. Replace the front bezel.



**Figure 2-5.** Location of Power Switch on FRE and SRM-F

**Note:** If your FRE or SRM-F is *not* equipped with a power switch, it powers on automatically when you connect it.

# Chapter 3

## Configuring Hardware Modules

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# Configuring Hardware Modules

## About this Chapter

This chapter shows the jumper and switch settings of the hardware modules in the BN. Both factory-default jumper and switch settings and optional configuration settings are shown.

Each section title in this chapter identifies a board's 4-digit Link Module (LM) model number, name, and 6-digit part number (PN). Before configuring a board, be sure its part number matches the one in the section title. Part numbers are printed on the boards.

Each illustration shows the cable connector panel and the component side of the board. The illustration of the board shows the factory-default positions of the jumpers and switches. The pins that are jumpered on the solder (back) side of the board are *not* configurable. Also, some pins identified as “not configurable” may not appear on the board, depending on the release of the board.

A table after each illustration shows the option (function) of each jumper/switch, a description of the factory-default setting (if configurable), and the associated jumper/switch position.

The term “not configurable” in the Setting column means that changing the setting could jeopardize the functioning of the board. If an option is user-configurable, alternative settings and associated jumper/switch positions are listed after the factory-default setting.

**Note:** S1 jumpers are *not* included in the drawings and tables. S1 jumpers designate the current revision of the board; they are *not* user-configurable.

# 5200 and 5201 Dual Port T1 Framer Link Module (PN 100831 and 101667)

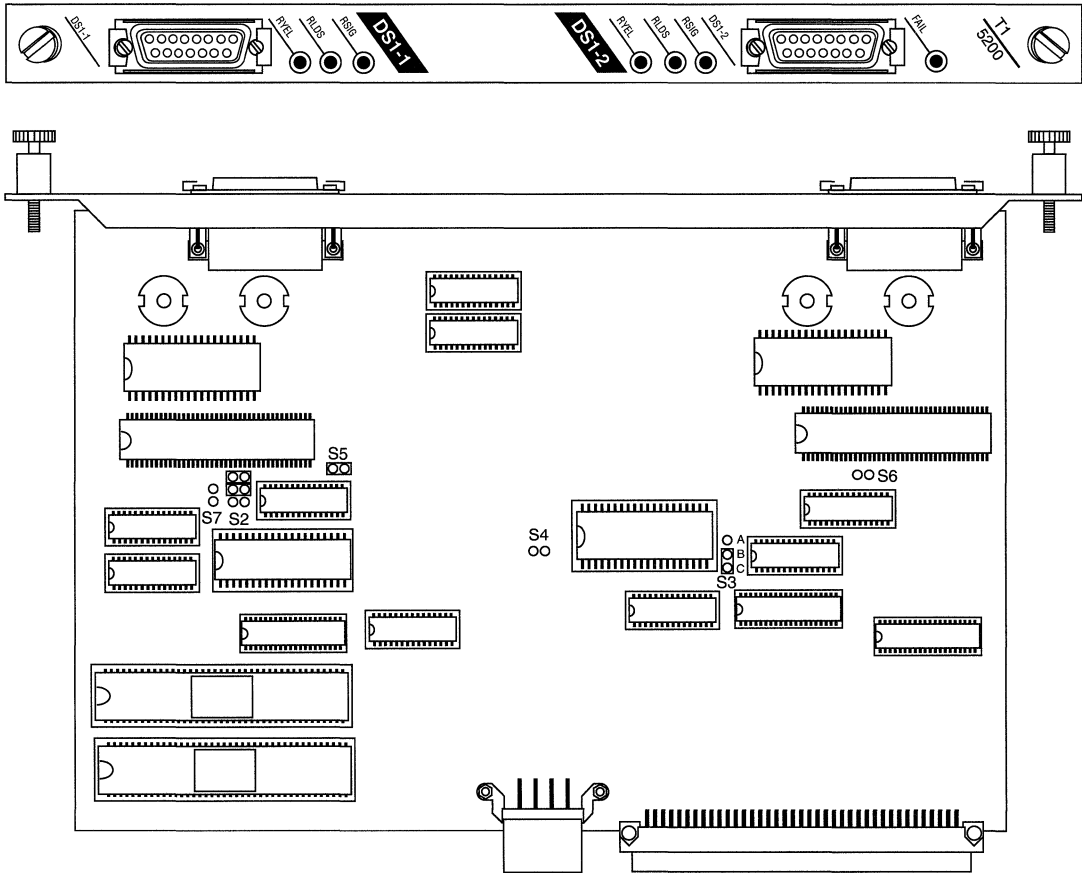









Figure 3-1. Dual Port T1 Framers

**Table 3-1. 5200 and 5201 Dual Port T1 Framer Settings (PN 100831 and 101667)**

Option	Setting	Jumper
Option	Not configurable	S2 
32-pin EPROM option	Not configurable	S3 
Power for 28-pin EPROM	Not configurable	S4 
Internal clock	Enabled (master)	S5 
	Disabled (slave)	S5 
Unused (Installed on E1)	Not configurable	S6  S7 

The jumper settings for both models (5200 and 5201) are the same.

**Note:** A T1 framer normally reports a yellow alarm whenever it receives a 0 in Bit 2 of 256 consecutive channels. Wellfleet uses several encoding algorithms to prevent the reporting of a false alarm when a normal data stream happens to contain a 0 in Bit 2 of 256 consecutive channels.

The DACS T1-64K model (Model 5200; PN 101667) uses a proprietary encoding algorithm to accept an all 0's condition without reporting a false yellow alarm. However, a Wellfleet DACS T1-64K must be on the other side of the wire to decode the data.

The DACS T1-56K model (Model 5201; PN 100831) sets Bit 7 of every channel to a 1. This prevents the false yellow alarm by forcing every eighth bit to a 1. Even if an all 0's condition occurs, the 1 maintains framer sync. This method allows the use of any standard T1 framer on the other side of the wire, but reduces the bandwidth to 56K.

# 5250 Dual Port E1 Link Module (PN 101337)

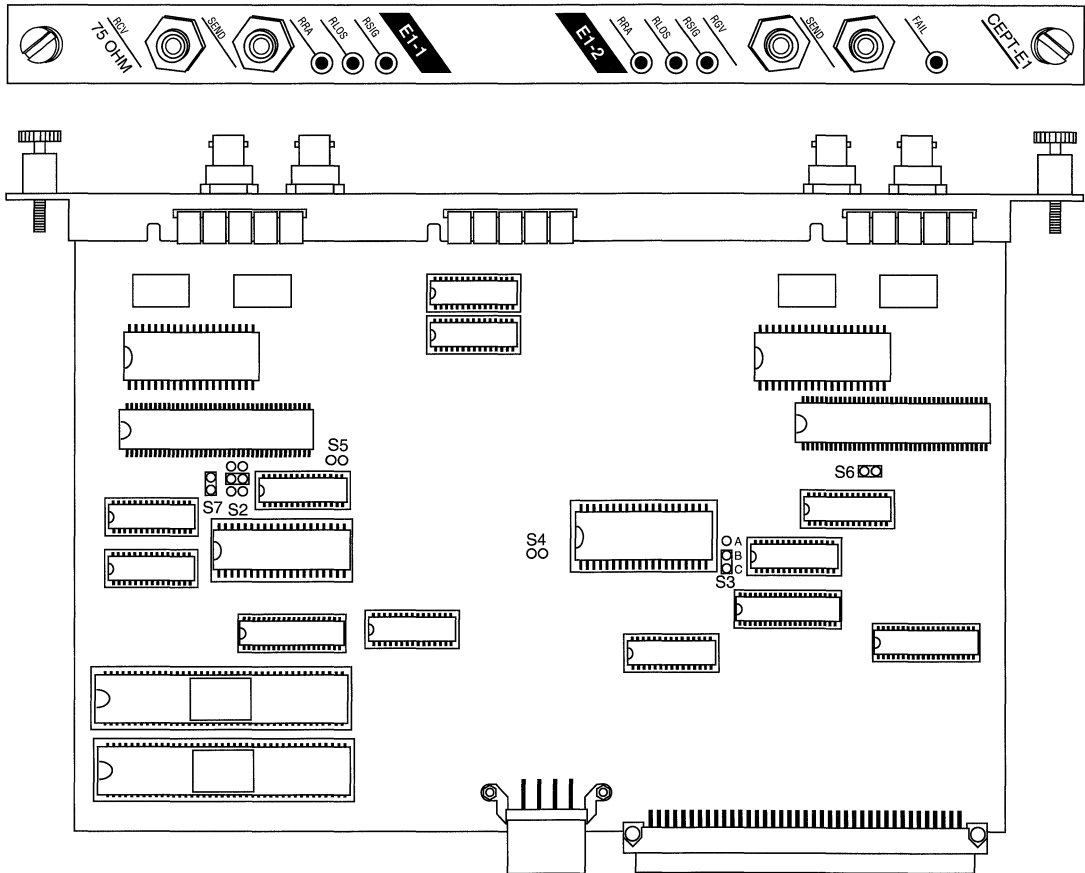









Figure 3-2. Dual Port E1

**Table 3-2. 5250 Dual Port E1 Settings (PN 101337)**

Option	Setting	Jumper
Option Setting	Not configurable	S2 
Address line for 32-pin EPROM option)	Not configurable	S3 
Power for 28-pin EPROMs	Not configurable	S4 
Internal clock	Enabled (master)	S5 
	Disabled (slave)	S5 
Installed on E1	Not configurable	S6  S7 

# 5280 Quad Port Sync Link Module (PN 102285)

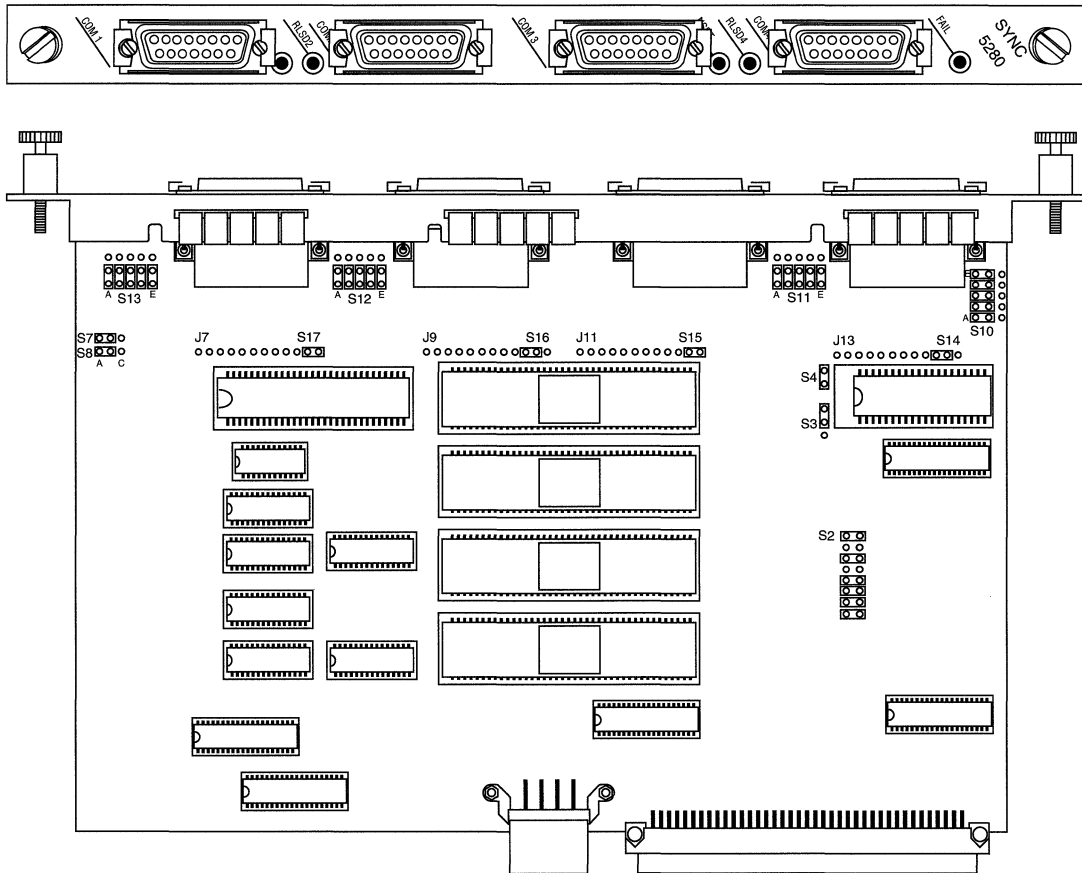















Figure 3-3. Quad Port Sync

**Table 3-3. 5280 Quad Port Sync Settings (PN 102285)**

Option	Setting	Jumper	Option	Setting	Jumper
Model ID and board option	Not configurable	S2 	Com port 1	Unbalanced signal for RS-232, RS-423, V.28	S10 
Address line for 32-pin EPROM	Not configurable	S3 		Balanced signal for RS-422, X.21	S10 
Power for 28-pin EPROM	Not configurable	S4 	Com port 2	Unbalanced signal for RS-232, RS-423, V.28	S11 
Interface Voltage ±5 or ±12	±12 for RS-232, V.28, V.35	S7  S8 		Balanced signal for RS-422, X.21	S11 
	±5 for RS-422, RS-423, X.21	S7  S8 	Com port 3	Unbalanced signal for RS-232, RS-423, V.28	S12 
				Balanced signal for RS-422, X.21	S12 
<b>Options continued on next page</b>					

**Table 3-3. 5280 Quad Port Sync Settings (PN 102285), Continued**

Option	Setting	Jumper
Com port 4	Unbalanced signal for RS-232, RS-423, V.28	
	Balanced signal for RS-422, X.21	
Daughterboard  <b>Note:</b> Each J-to-S row is in a separate location on the board.	Daughterboard <i>not</i> installed	
	Daughterboard <i>not</i> installed	



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# 5290 Single HSSI Link Module (PN 104932)

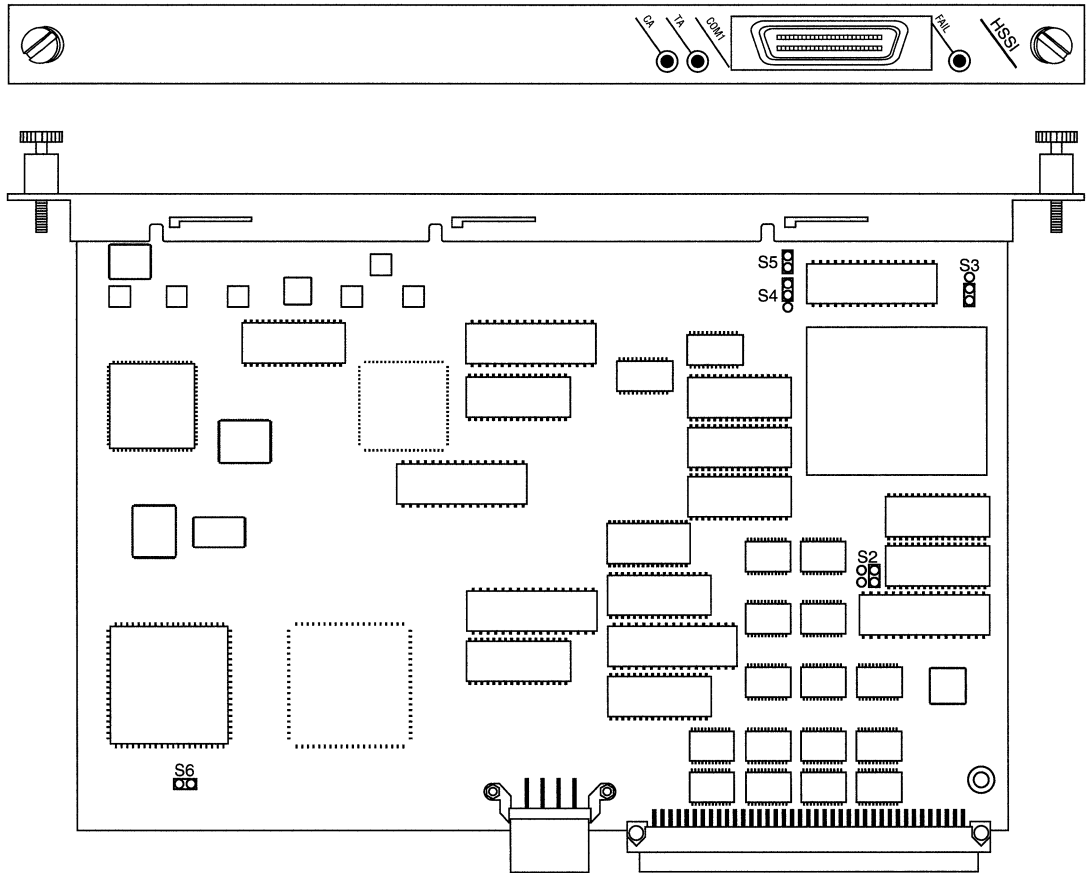







Figure 3-4. Single HSSI

**Table 3-4. 5290 Single HSSI Settings (PN 104932)**

Option	Setting	Jumper
Options	Not configurable (Single HSSI)	S2 
PROM Configuration	Not configurable	S3 
PROM Configuration	Not configurable	S4 
PROM Configuration	Not configurable	S5 
Clock select	Not configurable	S6 

# 5405 Dual Ethernet Link Module (PN 100003 or 100809)

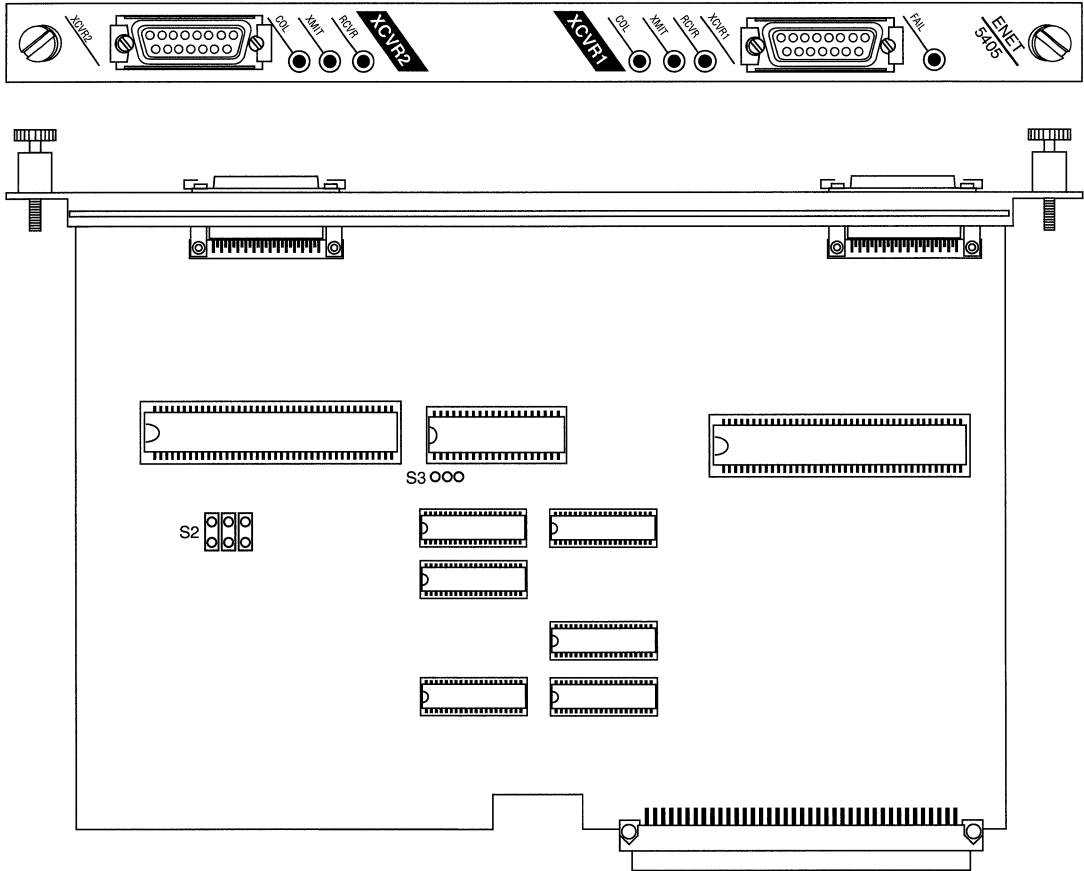



Figure 3-5. Dual Ethernet

**Table 3-5. 5405 Dual Ethernet Settings (PN 100003 or 100809)**

Option	Setting	Jumper
Model ID and board option <b>Note:</b> This jumper may be hard-wired.	Not configurable	S2 
32-bit EPROM option	Not configurable	S3 0000

# 5410 Single Sync/Single Ethernet Link Module (PN 102296)

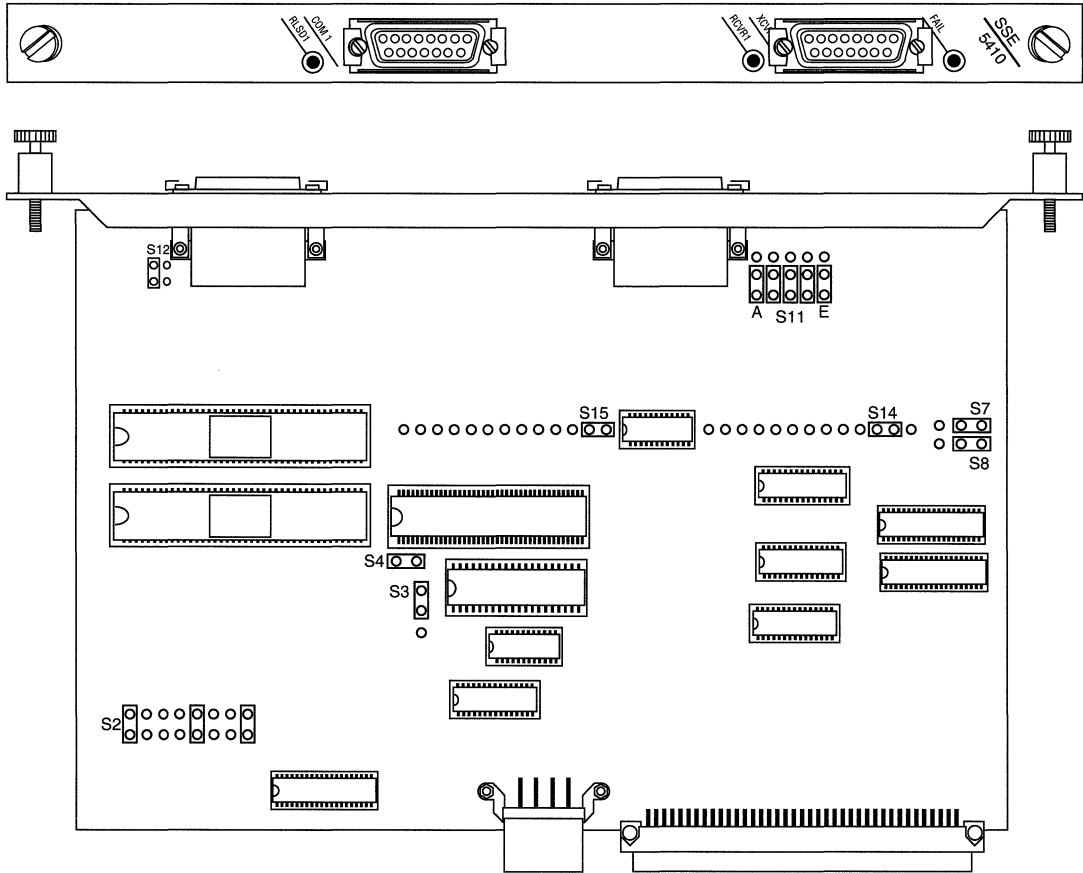

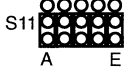

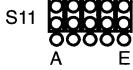










Figure 3-6. Single Sync/Single Ethernet

**Table 3-6. 5410 Single Sync/Single Ethernet Settings (PN 102296)**

Option	Setting	Jumper	Option	Setting	Jumper
Model ID and board option	Not configurable	S2 	Com port 1	Unbalanced signal for RS-232, RS-423, V.28	S11 
Address line for 32-pin EPROM	Not configurable	S3 		Balanced signal for RS-422, X.21	S11 
Power for 28-pin EPROM	Not configurable	S4 	Chassis ground connection for unused pins on J1	Not configurable	S12 
Interface Voltage $\pm 5$ or $\pm 12$	$\pm 12$ for RS-232, V.28, V.35	S7  S8 	Installation of V.35 daughter-board	Not configurable	S14  S15 
	$\pm 5$ for RS-422, RS-423, X.21	S7  S8 			

# 5420 Dual Sync/Single Ethernet Link Module (PN 102293)

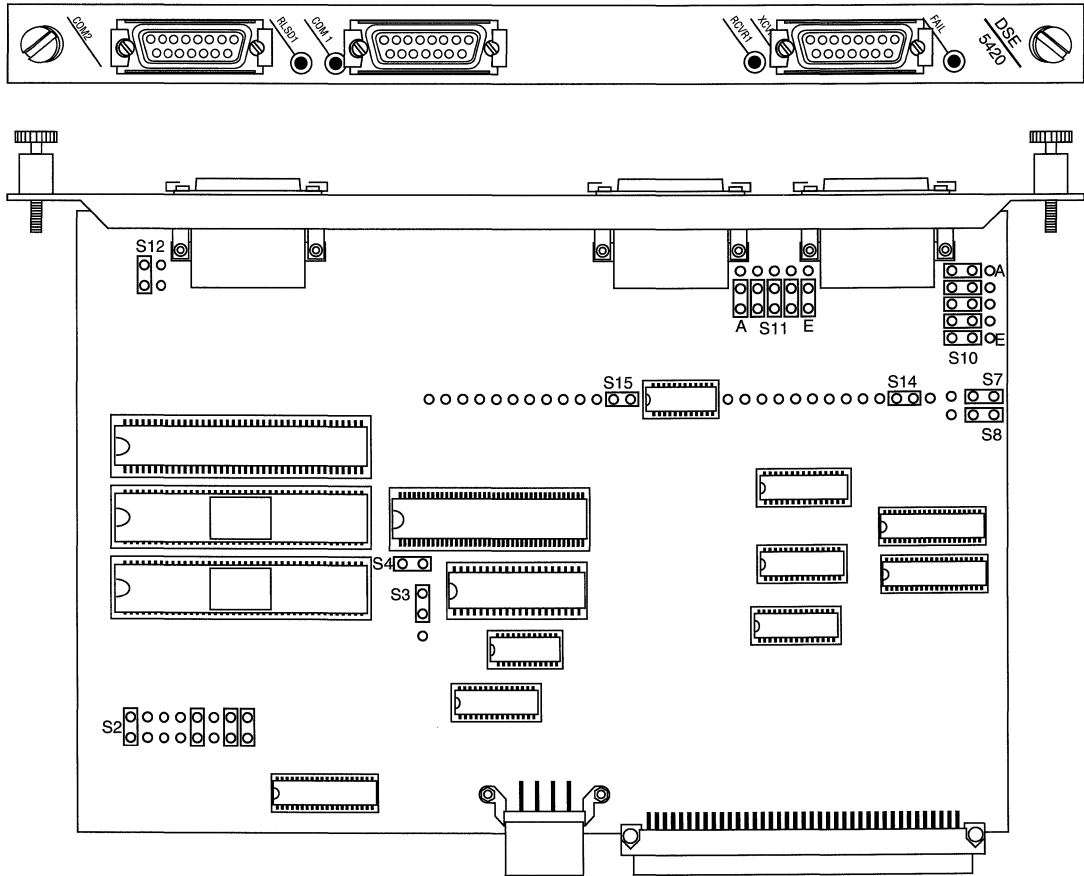

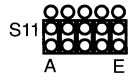

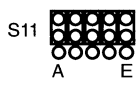










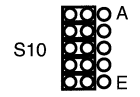
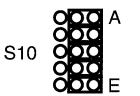


Figure 3-7. Dual Sync/Single Ethernet



**Table 3-7. 5420 Dual Sync/Single Ethernet Settings (PN 102293)**

Option	Setting	Jumper	Option	Setting	Jumper
Model ID and board option	Not configurable	S2 	Com port 1	Unbalanced signal for RS-232, RS-423, V.28	S11 
	Address line for 32-pin EPROM	S3 		Balanced signal for RS-422, X.21	S11 
Power for 28-pin EPROM	Not configurable	S4 	Chassis ground connection for unused pins on J1	Not configurable	S12 
Interface Voltage $\pm 5$ or $\pm 12$	$\pm 12$ for RS-232, V.28, V.35	S7  S8 	Installation of V.35 daughter-board	V.35 daughter-board <i>not</i> installed	S14  S15 
	$\pm 5$ for RS-422, RS-423, X.21	S7  S8 		V.35 daughter-board installed	S14  S15 
Com port 2	Unbalanced signal for RS-232, RS-423, V.28	S10 			
	Balanced signal for RS-422, X.21	S10 			

# 5430 Dual Sync/Dual Ethernet Link Module (PN 102279)

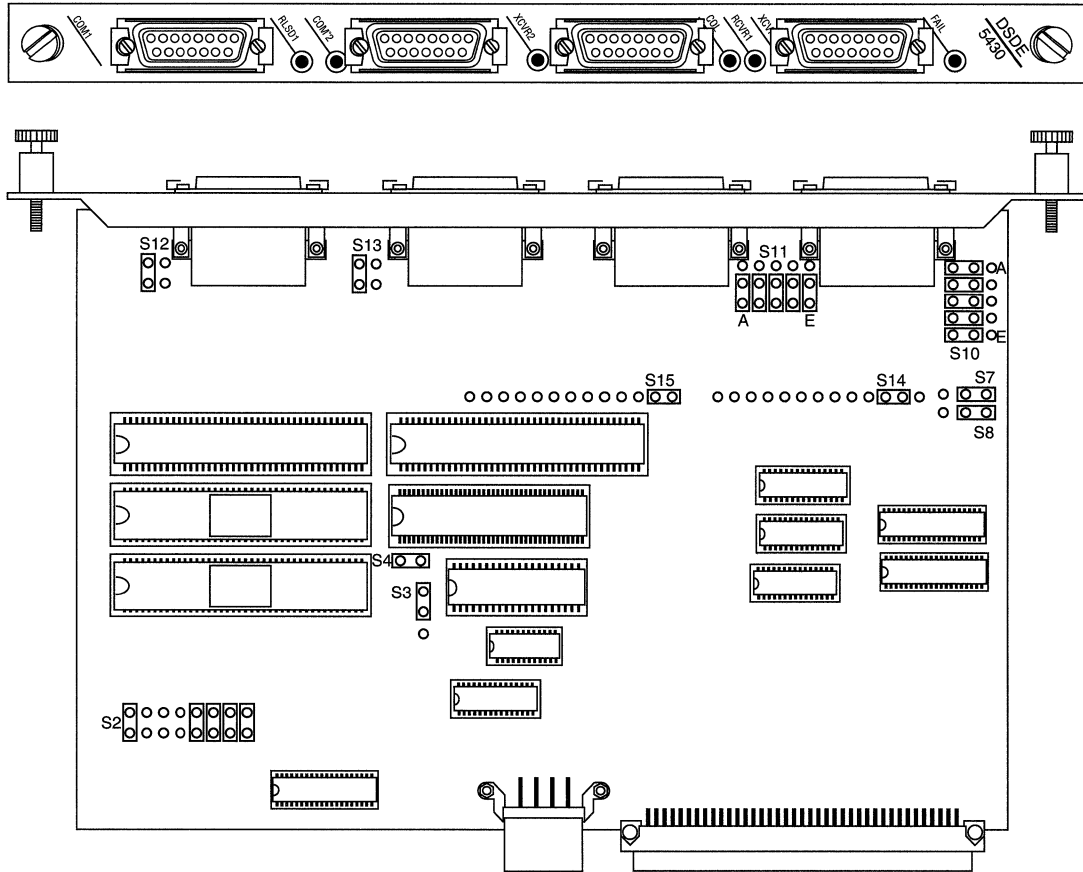

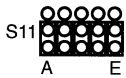

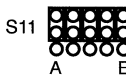













Figure 3-8. Dual Sync/Dual Ethernet

**Table 3-8. 5430 Dual Sync/Dual Ethernet Settings (PN 102279)**

Option	Setting	Jumper	Option	Setting	Jumper
Model ID and board option	Not configurable	S2 	Com port 1	Unbalanced signal for RS-232, RS-423, V.28	S11 
Address line for 32-pin EPROM	Not configurable	S3 		Balanced signal for RS-422, X.21	S11 
Power for 28-pin EPROM	Not configurable	S4 	Chassis ground connection for unused pins on J1	Not configurable	S12 
Interface Voltage $\pm 5$ or $\pm 12$	$\pm 12$ for RS-232, V.28, V.35	S7  S8 	Chassis ground connection for unused pins on J2	Not configurable	S13 
	$\pm 5$ for RS-422, RS-423, X.21	S7  S8 			
Com port 2	Unbalanced signal for RS-232, RS-423, V.28	S10 		V.35 daughter-board installed	S14  S15 
	Balanced signal for RS-422, X.21	S10 			

# 5450 Quad Ethernet Link Module (PN 102690)

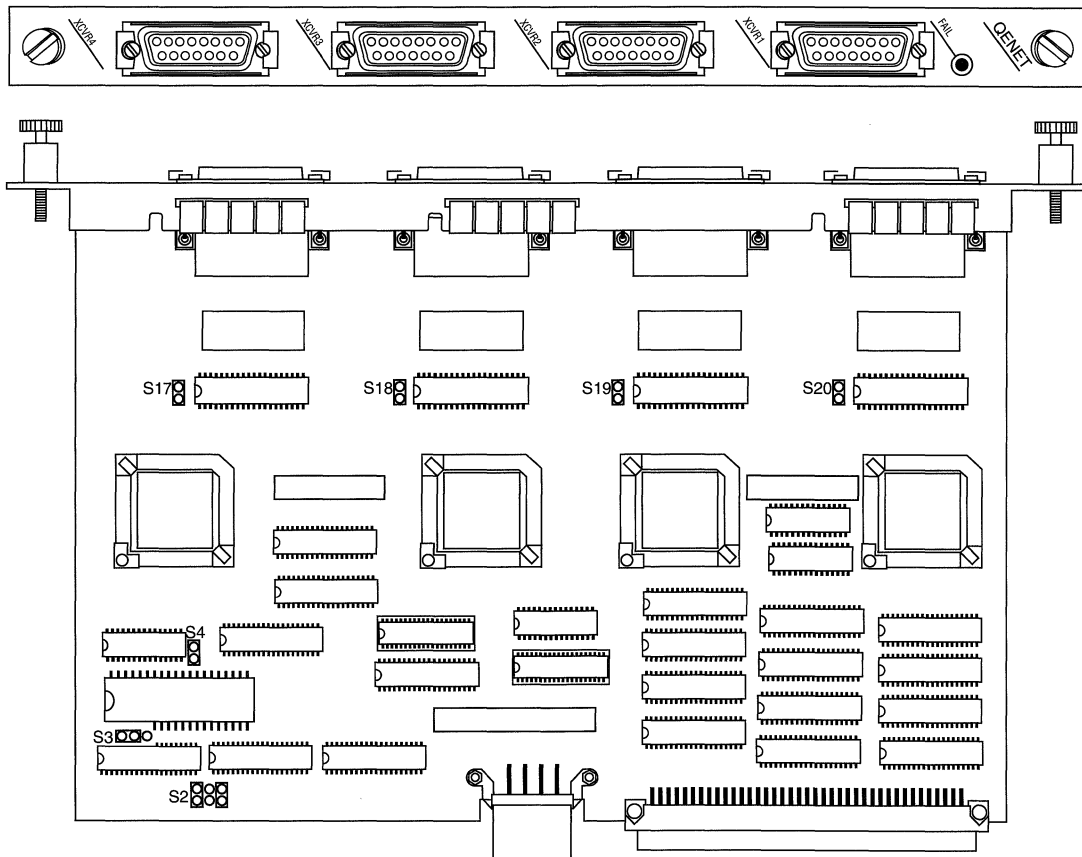
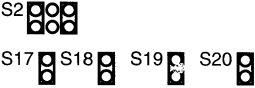
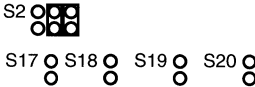



Figure 3-9. Quad Ethernet

**Table 3-9. 5450 Quad Ethernet Settings (PN 102690)**

Option	Setting	Jumper
Daughterboard  <b>Note:</b> The jumpers are in separate locations on the board.	Daughterboard <i>not</i> installed ( <i>not</i> customer-configurable)	
	Daughterboard installed ( <i>not</i> customer-configurable)	
512 K EPROM	(not configurable)	

# 5505 Dual Ethernet High Speed Filters Link Module (PN 102495)

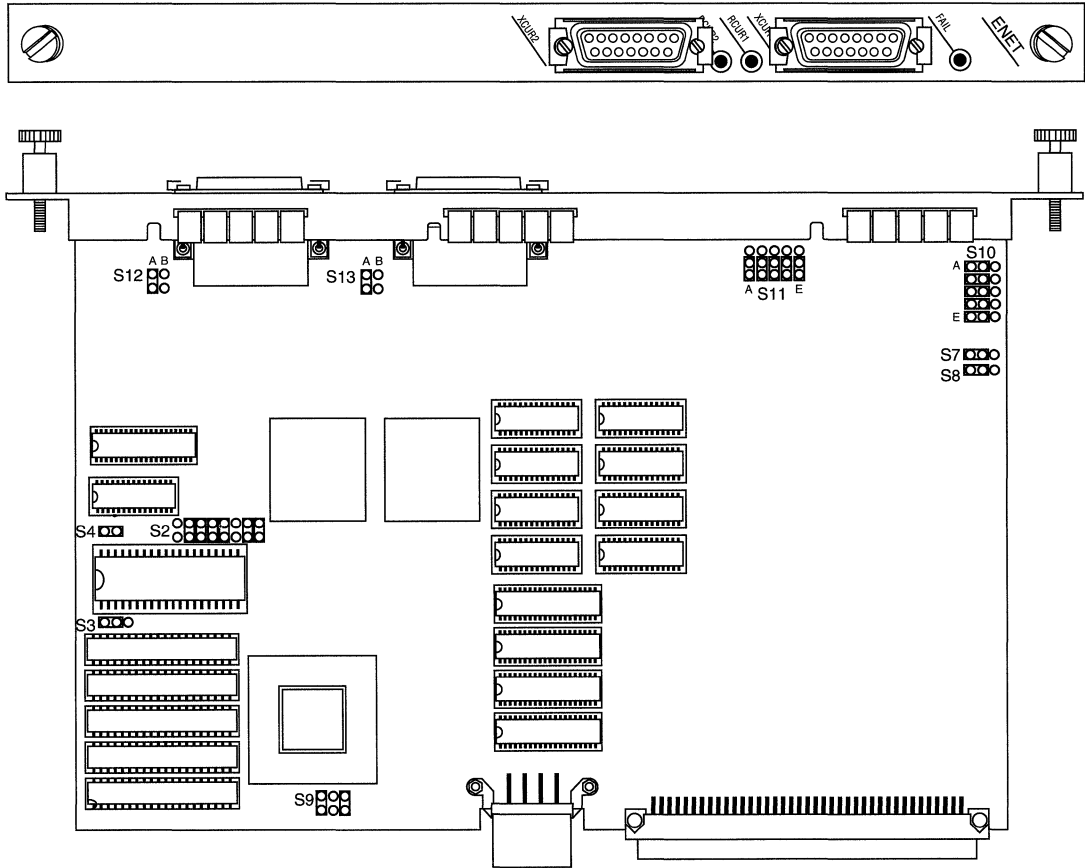








Figure 3-10. Dual Ethernet High Speed Filters

**Table 3-10. 5505 Dual Ethernet High Speed Filters Settings (PN 102495)**

Option	Setting	Jumper
Model ID and board option	Not configurable	S2 
Address line for 32-pin EPROM	Not configurable	S3 
Power for 28-pin EPROM	Not configurable	S4 
2 cams installed	Not configurable	S9 
Chassis ground connection for unused pins on J1	Not configurable	S12 
Chassis ground connection for unused pins on J2	Not configurable	S13 

**Note:** The S7, S8, S10, and S11 pins have no function on this board, and may or may not be installed.

# 5530 Dual Sync/Dual Ethernet High Speed Filters Link Module (PN 102494)

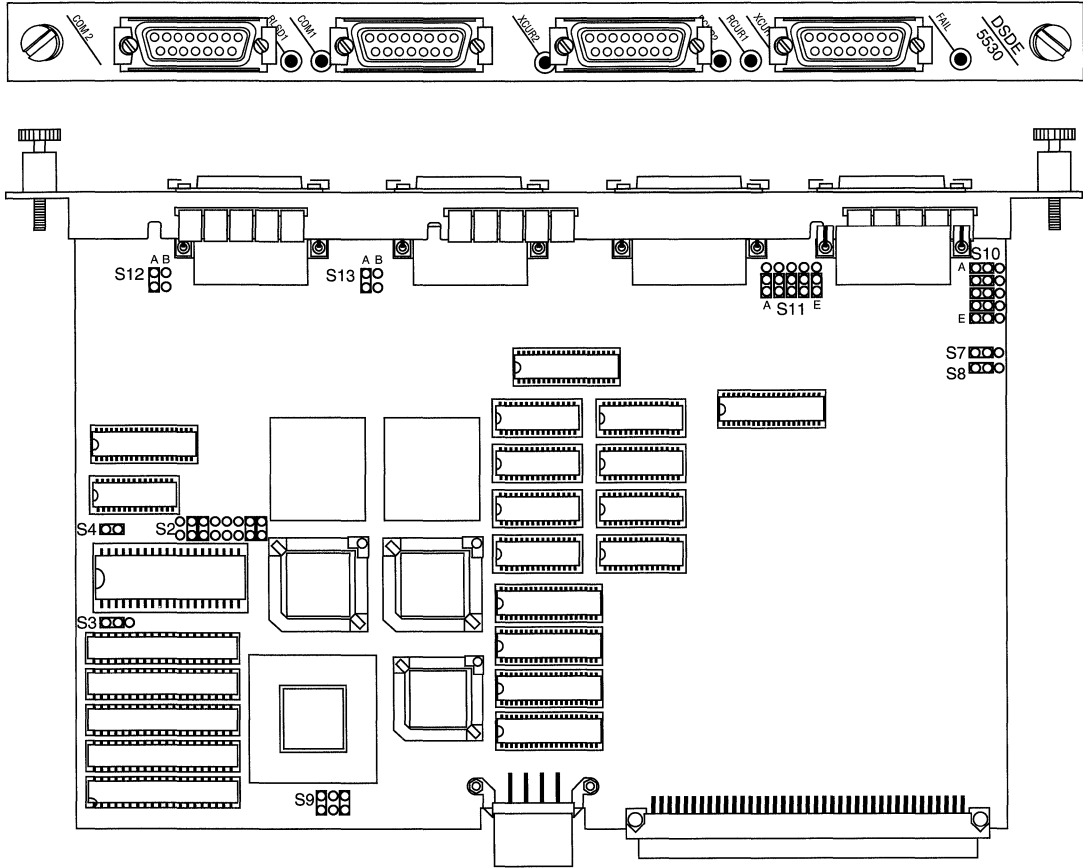
















Figure 3-11. Dual Sync/Dual Ethernet High Speed Filters



**Table 3-11. 5530 Dual Sync/Dual Ethernet High Speed Filters Settings (PN 102494)**

Option	Setting	Jumper	Option	Setting	Jumper
Model ID and board option	Not configurable	S2 	Com port 2	Unbalanced signal for RS-232, RS-423, V.28	S10 
Address line for 32-pin EPROM	Not configurable	S3 		Balanced signal for RS-422, X.21	S10 
Power for 28-pin EPROM	Not configurable	S4 	Com port 1	Unbalanced signal for RS-232, RS-423, V.28	S11 
Interface Voltage $\pm 5$ or $\pm 12$	$\pm 12$ for RS-232, V.28, V.35	S7  S8 		Balanced signal for RS-422, X.21	S11 
	$\pm 5$ for RS-422, RS-423, X.21	S7  S8 	Chassis ground connection for unused pins on J1	Not configurable	S12 
2 cams installed	Not configurable	S9 	Chassis ground connection for unused pins on J2	Not configurable	S13 

# 5705 Single Token Link Module (PN 102484)

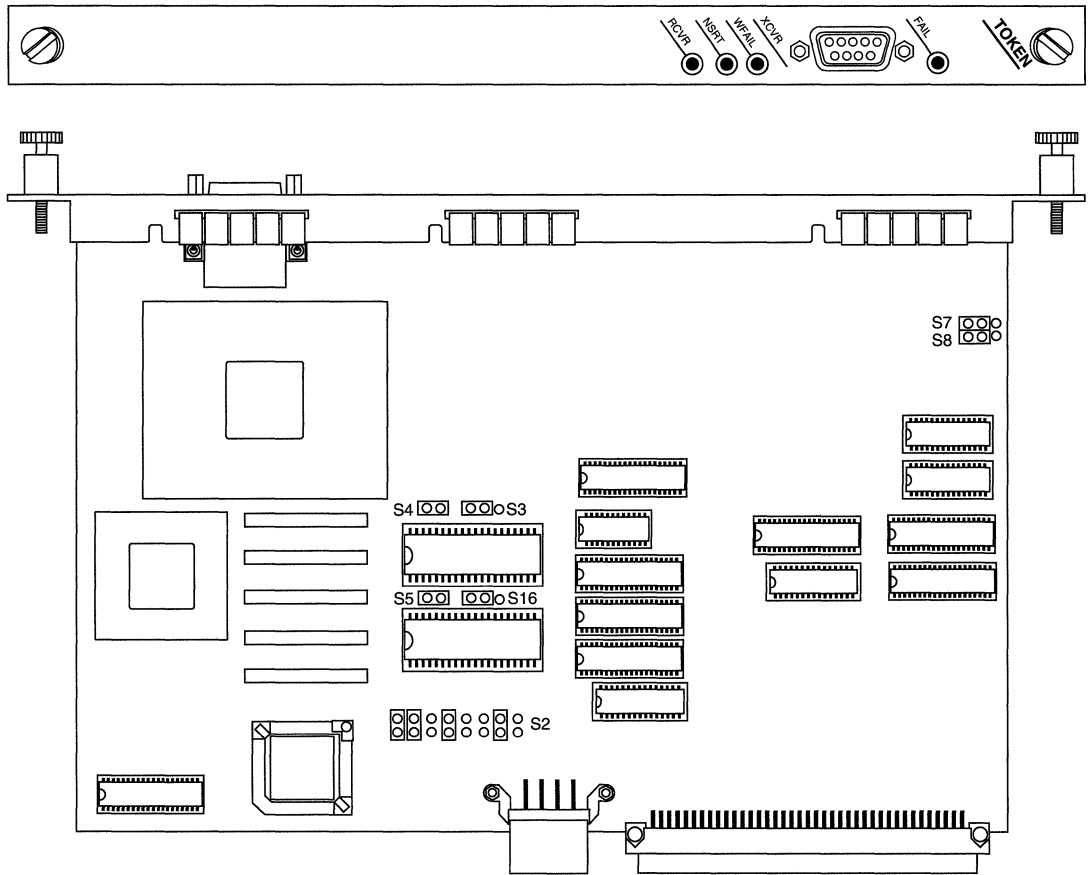









Figure 3-12. Single Token

**Table 3-12. 5705 Single Token Settings (PN 102484)**

Option	Setting	Jumper
Model ID and board option	Not configurable	S2 
Address line for 32-pin EPROM at U39	Not configurable	S3 
Power for 28-pin EPROM at U39	Not configurable	S4 
Power for 28-pin EPROM at 50	Not configurable	S5 
Reserved for future use	Not configurable	S7  S8 
Address line for 32-pin EPROM at U50	Not configurable	S16 

# 5710 Dual Token Link Module (PN 103366)

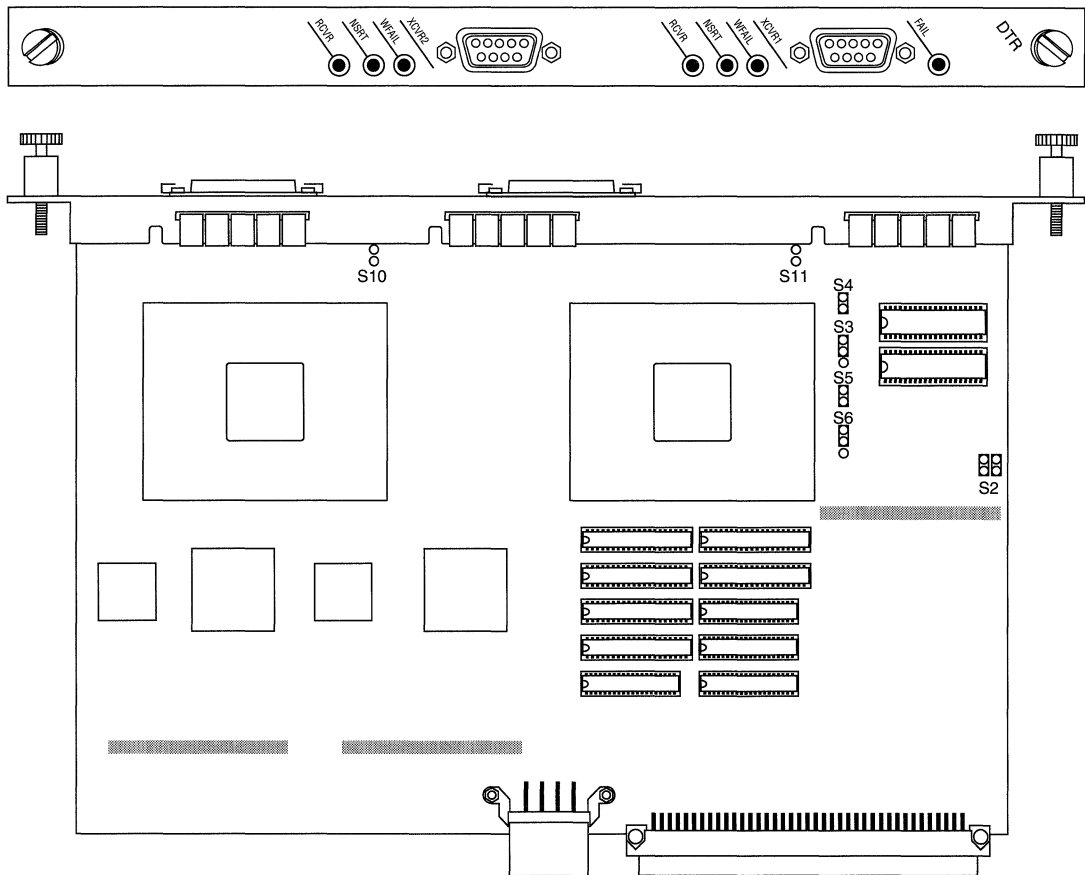









Figure 3-13. Dual Token

**Table 3-13. 5710 Dual Token Settings (PN 103366)**

Option	Setting	Jumper
Board Option	Not configurable	 S2
Address line for diagnostic EPROM at U8	Not configurable	 S3
Power for diagnostic EPROM at U8	Not configurable	 S4
Power for BUD/MAC EPROM at U11	Not configurable	 S5
Address line for BUD/MAC EPROM at U11	Not configurable	 S6
Reserved for future use	Not configurable	 S10
Reserved for future use	Not configurable	 S11

# 5720 Single Sync/Single Token Link Module (PN 102483)

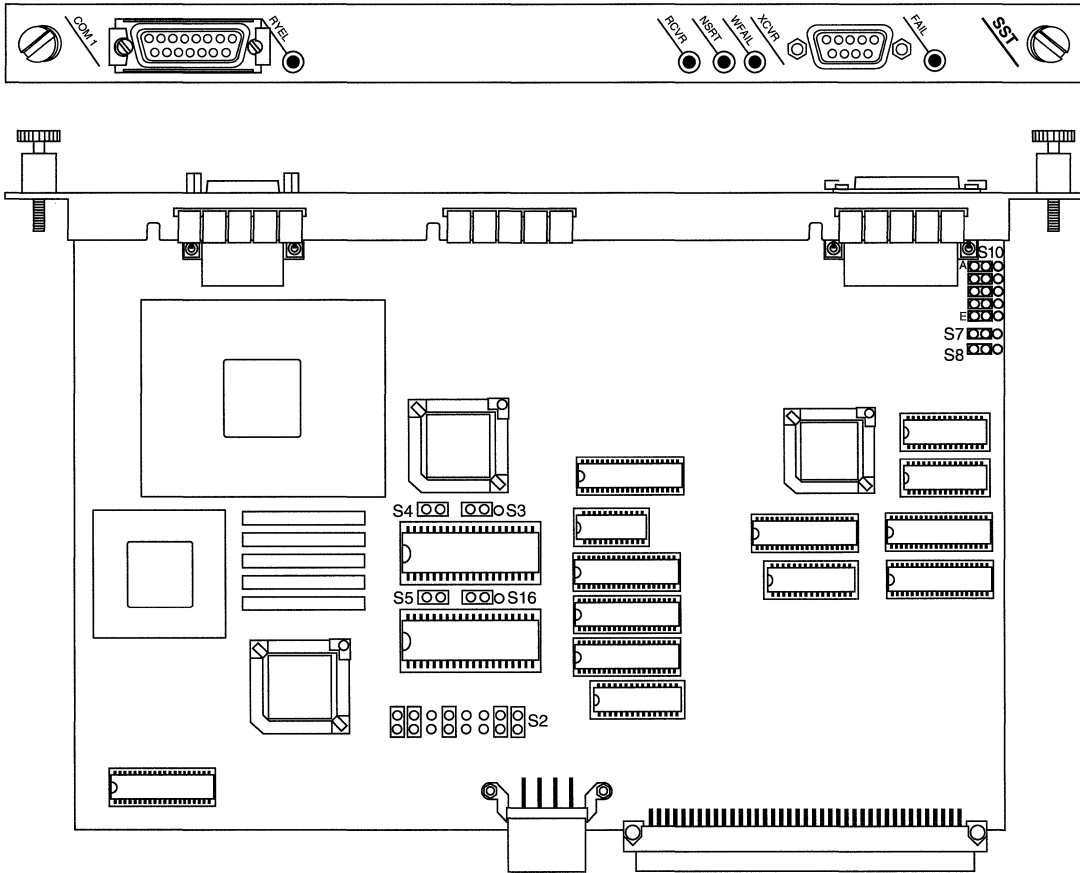













Figure 3-14. Single Sync/Single Token

**Table 3-14. 5720 Single Sync/Single Token Settings (PN 102483)**

Option	Setting	Jumper
Model ID and board option	Not configurable	S2 
Address line for 32-pin EPROM at U39	Not configurable	S3 
Power for 28-pin EPROM at U39	Not configurable	S4 
Power for 28-pin EPROM at U50	Not configurable	S5 
Address line for 32-pin EPROM at U50	Not configurable	S16 
Interface Voltage $\pm 5$ or $\pm 12$	$\pm 12$ for RS-232, V.28, V.35	S7  S8 
	$\pm 5$ for RS-422, RS-423, X.21	S7  S8 
Com port 1	Unbalanced signal for RS-232, RS-423, V.28	S10 
	Balanced signal for RS-422, X.21	S10 

# 5740 Dual Sync/Single Token Link Module (DST-4, PN 101988)

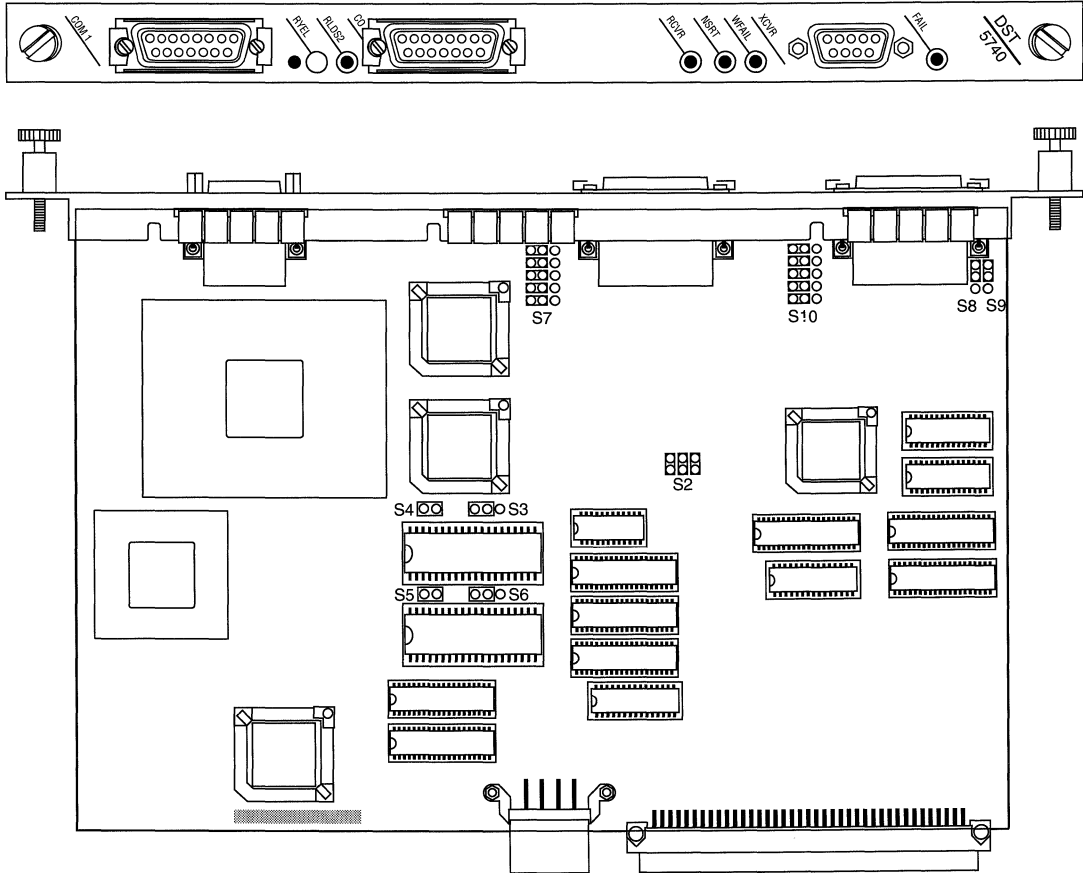













Figure 3-15. Dual Sync/Single Token (DST-4)



**Table 3-15. 5740 Dual/Sync Single Token Settings (DST-4, PN 101988)**

Option	Setting	Jumper	Option	Setting	Jumper
Model ID and board option	Not configurable	S2 	Com port 2	Unbalanced signal for RS-232, RS-423, V.28	S7 
32-bit EPROM option at V36	Not configurable	S3 		Balanced signal for RS-422, X.21	S7 
Power for 28-pin EPROM	Not configurable	S4 	Interface Voltage $\pm 5$ or $\pm 12$	$\pm 12$ for RS-232, V.28, V.35	S8 S9 
Power for 28-pin EPROM at U48	Not configurable	S5 		$\pm 5$ for RS-422, RS-423, X.21	S8 S9 
32-bit EPROM option at U48	Not configurable	S6 	Com port 1	Unbalanced signal for RS-232, RS-423, V.28	S10 
				Balanced signal for RS-422, X.21	S10 

# 5740 Dual Sync/Single Token Link Module (DST-4/16, PN 101531)

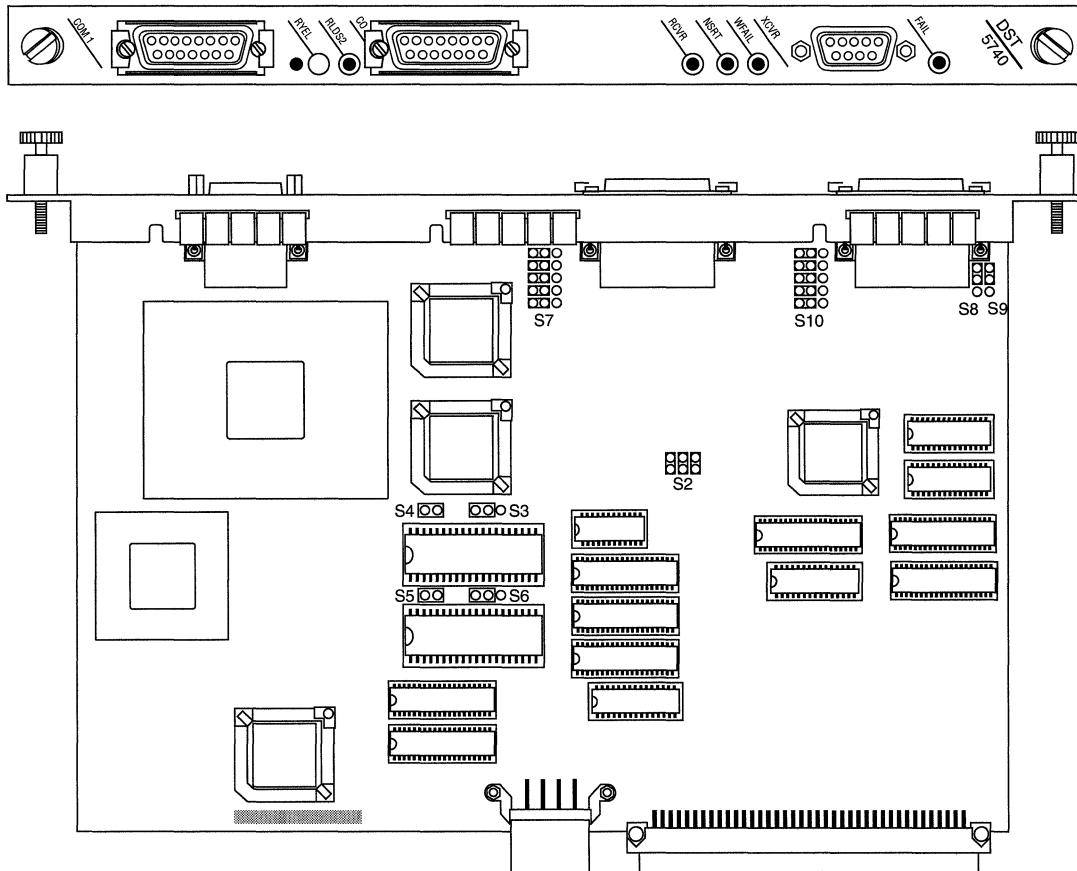













Figure 3-16. Dual Sync/Single Token (DST-4/16)

**Table 3-16. 5740 Dual Sync/Single Token Settings (DST-4/16, PN 101531)**

Option	Setting	Jumper	Option	Setting	Jumper
Model ID and board option	Not configurable	S2 	Com port 2	Unbalanced signal for RS-232, RS-423, V.28	S7 
32-bit EPROM option at V36	Not configurable	S3 		Balanced signal for RS-422, X.21	S7 
Power for 28-pin EPROM	Not configurable	S4 	Interface Voltage $\pm 5$ or $\pm 12$	$\pm 12$ for RS-232, V.28, V.35	S8 S9 
Power for 28-pin EPROM at U48	Not configurable	S5 		$\pm 5$ for RS-422, RS-423, X.21	S8 S9 
32-bit EPROM option at U48	Not configurable	S6 	Com port 1	Unbalanced signal for RS-232, RS-423, V.28	S10 
				Balanced signal for RS-422, X.21	S10 

# 5740 Dual Sync/Single Token Link Module (TS416 1X2, PN 102482)

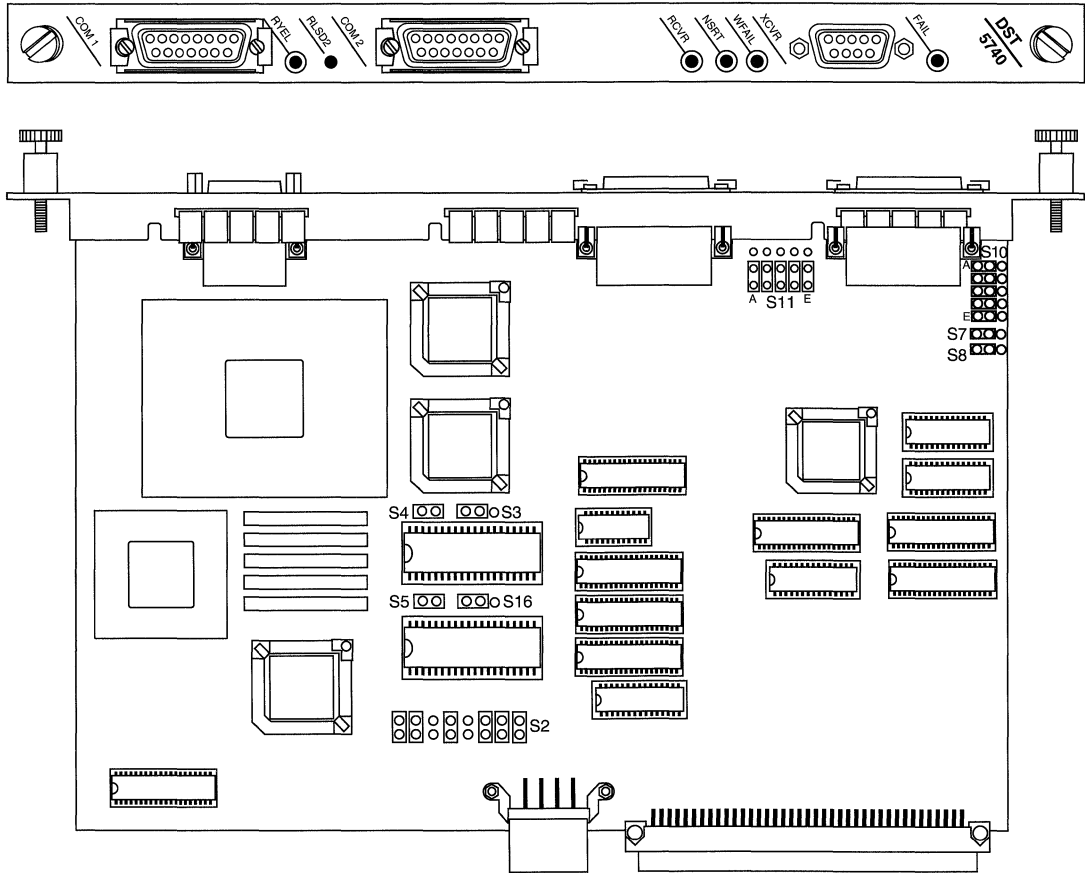















Figure 3-17. Dual Sync/Single Token (TS416 1X2)

**Table 3-17. 5740 Dual Sync/Single Token Settings (TS416 1X2, PN 102482)**

Option	Setting	Jumper	Option	Setting	Jumper
Model ID and board option	Not configurable	S2 	Interface Voltage $\pm 5$ or $\pm 12$	$\pm 12$ for RS-232, V.28, V.35	S7  S8 
Address line for 32-pin EPROM at U39	Not configurable	S3 		$\pm 5$ for RS-422, RS-423, X.21	S7  S8 
Power for 28-pin EPROM at U39	Not configurable	S4 	Com port 1	Unbalanced signal for RS-232, RS-423, V.28	S10 
Power for 28-pin EPROM at 50	Not configurable	S5 		Balanced signal for RS-422, X.21	S10 
Address line for 32-pin EPROM at U50	Not configurable	S16 	Com port 2	Unbalanced signal for RS-232, RS-423, V.28	S11 
				Balanced signal for RS-422, X.21	S11 

# 5930 FDDI Multimode Link Module (PN 102675) and 4995 Daughterboard (PN 103269)

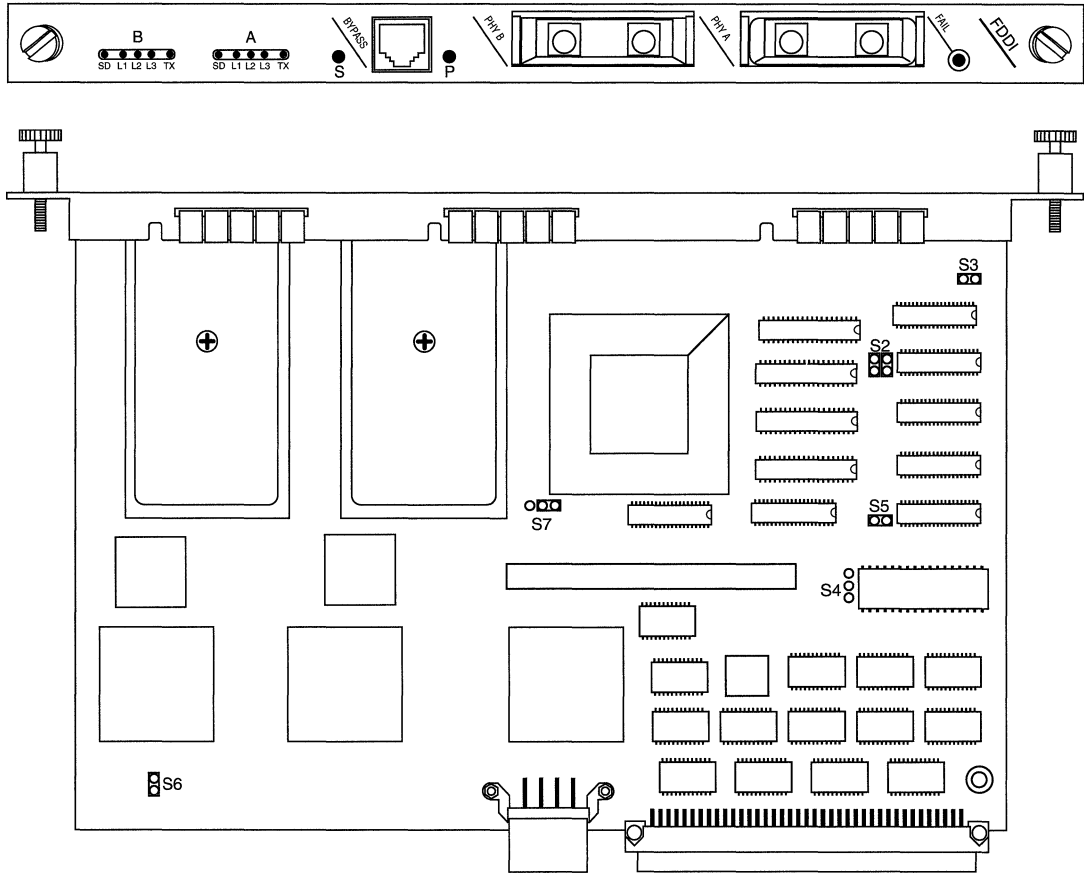
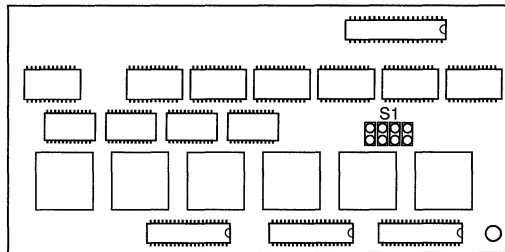


Figure 3-18. FDDI Multimode

**Table 3-18. 5930 FDDI Multimode Settings (PN 102675)**

Option	Setting	Jumper	Option	Setting	Jumper
Options	Not configurable	S2	PROM Configuration	Not configurable	S5
PROM Configuration	Not configurable	S3	Clock select	Not configurable	S6
PROM Configuration	Not configurable	S4	Future compatibility	Not configurable	S7



**Figure 3-19. FDDI Daughterboard**

The FDDI Daughterboard does *not* have user-configurable jumpers or switches.

# 5940 FDDI Single Mode Link Module (PN 103755) and 4995 Daughterboard (PN 103269)

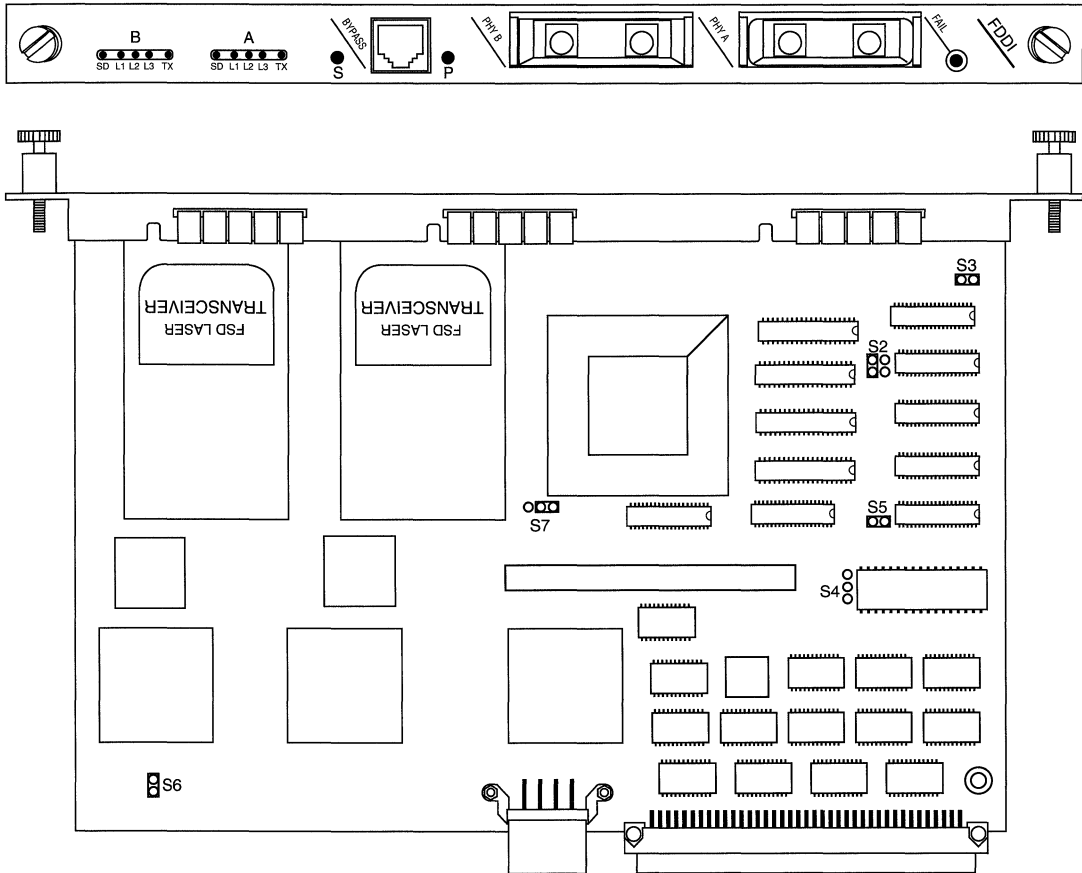






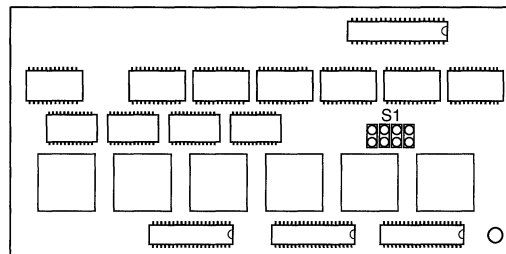


Figure 3-20. FDDI Single Mode



**Table 3-19. 5940 FDDI Single Mode Settings (PN 103755)**

Option	Setting	Jumper	Option	Setting	Jumper
Options	Not configurable	S2 	PROM Configuration	Not configurable	S5 
PROM Configuration	Not configurable	S3 	Clock select	Not configurable	S6 
PROM Configuration	Not configurable	S4 	Future compatibility	Not configurable	S7 



**Figure 3-21. FDDI Daughterboard**

The FDDI Daughterboard does *not* have user-configurable jumpers or switches.

# 75000 System Resource Module-Link (PN 103782)

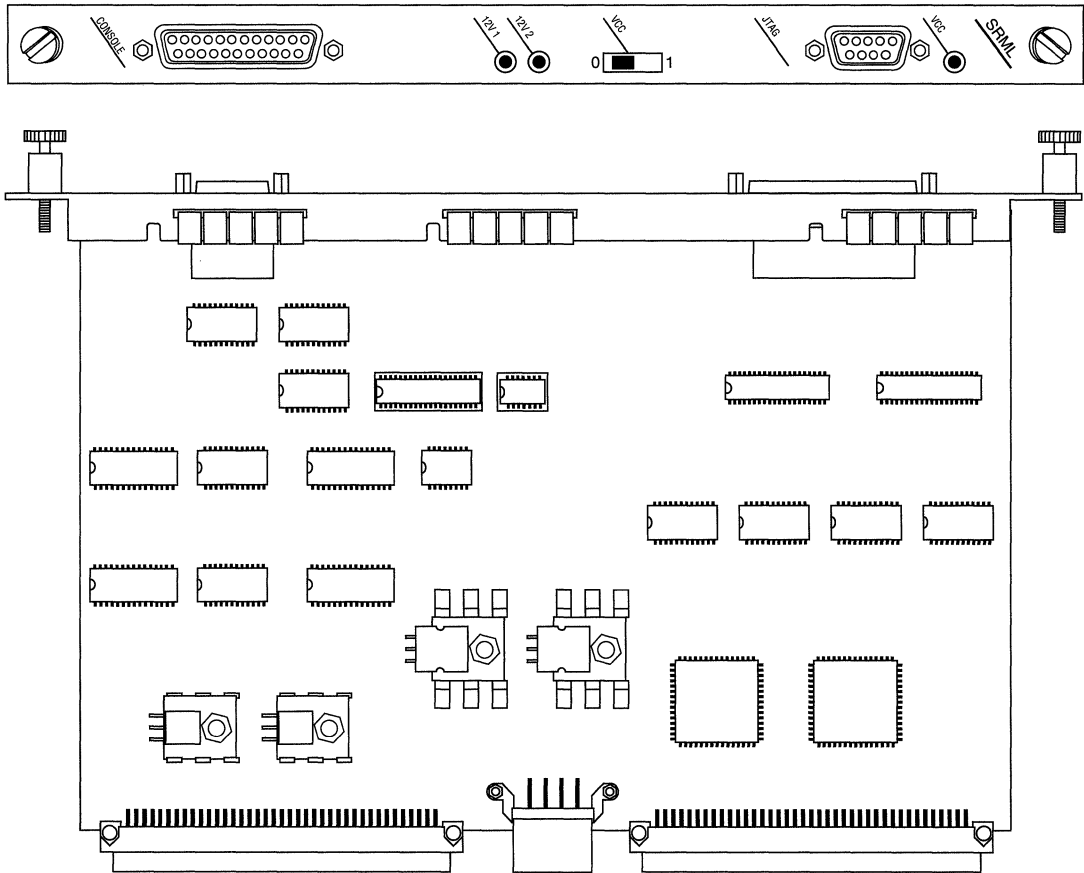


Figure 3-22. SRM-Link

**Note:** This board does *not* contain jumpers or switches.

## 75010 System Resource Module-Front (PN 103985)

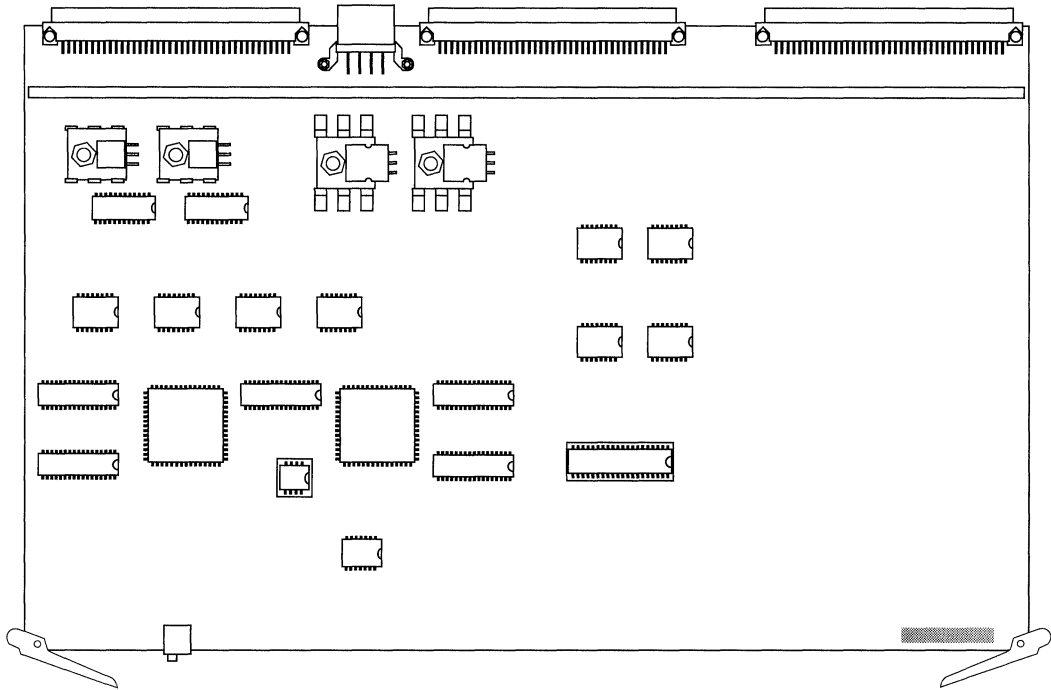


Figure 3-23. SRM-Front

**Note:** This board does *not* contain jumpers or switches.

## 75150 Fast Routing Engine (PN 103790) and Daughterboard (PN 102713)

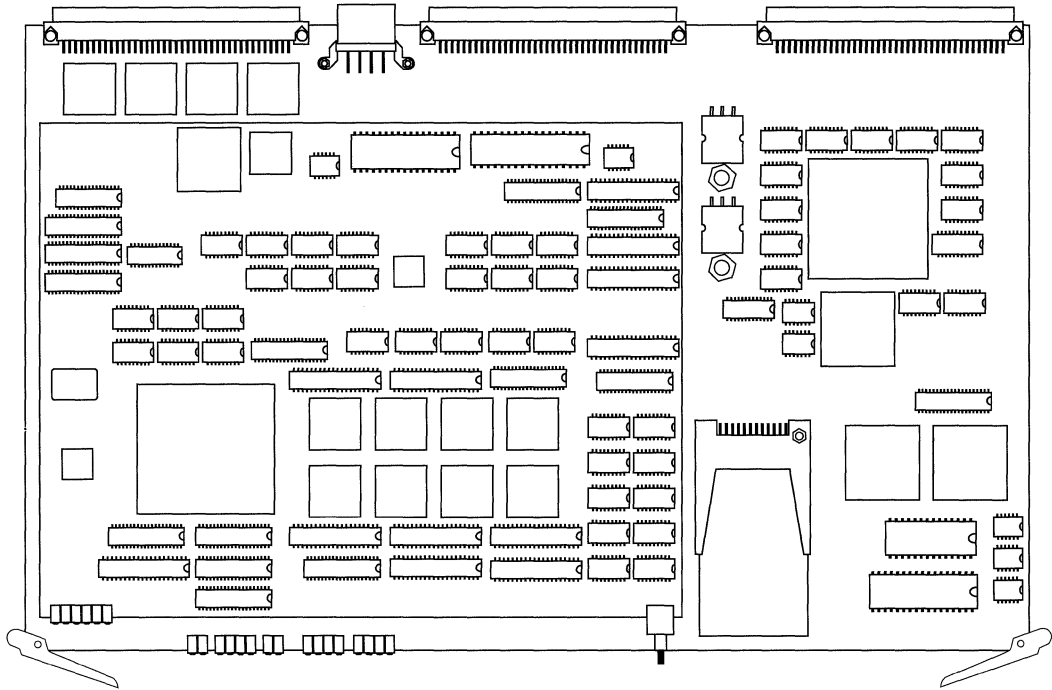


Figure 3-24. FRE and Daughterboard

**Note:** This board does *not* contain jumpers or switches.

# Chapter 4

## Switches and LEDs

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# Switches and LEDs

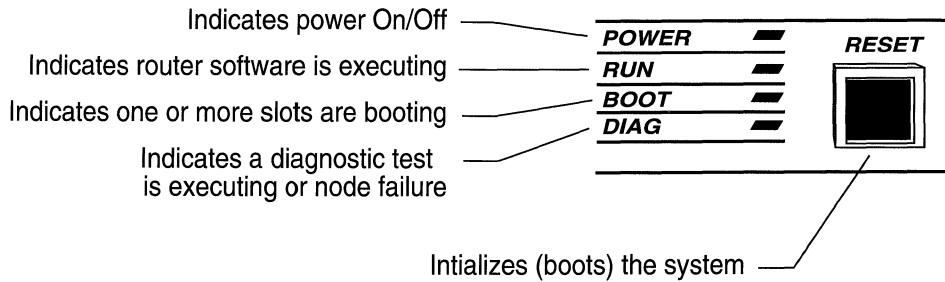
## About this Chapter

This chapter describes the function of every switch and Light Emitting Diode (LED) on the BN.

The BN is equipped with switches and LEDs on the front panel and the rear panel. Also, the front edge of each FRE module inside the BN is equipped with LEDs for diagnostic purposes and a Flash memory card ejector button.

## Front Panel

This section describes the function of the Reset switch and the LEDs on the front panel of the BN (see Figure 4-1).



**Figure 4-1. Front Panel LEDs**

The front panel displays the following switch and LEDs:

The Reset switch warm-starts the BN. It is equivalent to issuing the **boot** command from the Site Manager or the TI. Refer to the *Operations Guide* for a description of the warm-start procedure.

The Power LED indicates that the power supply voltages are within normal limits.

The Diag LED indicates that a diagnostic test is in progress on one or more slots. Diagnostic testing occurs when you cold-start the BN. You cold-start the BN when you power-cycle it or issue the **diags** command from the TI. This LED turns off when the testing terminates successfully.

The Boot LED indicates that one or more slots are booting.

The Run LED indicates that one or more slots are executing system software.

The POWER and RUN LEDs remain lit when the BN is operating normally.



## Rear Panel

The sections that follow describe the switches and LEDs on the Link Modules. You can see the Link Module switches and LEDs on the rear panel of the BN.

### SRM-L

The SRM-L is installed in the bottom slot (slot 1) on the rear panel of the BN (see Figure 4-2).

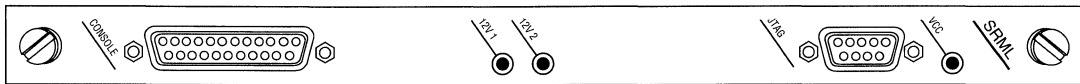


Figure 4-2. SRM-L Connector Panel

The LEDs on the SRM-L indicate the following:

- ❑ When the 12V 1 LED is *not* lit, the F7 fuse is blown. The F7 fuse supplies power to the Ethernet ports on Slots 2 and 3 (Refer to *Replacing Specialized Fuses* in the appendix *Replacing Fuses*.)
- ❑ When the 12V 2 LED is *not* lit, the F6 fuse is blown. The F6 fuse supplies power to the Ethernet ports on Slots 4 and 5 (Refer to *Replacing Specialized Fuses* in the appendix *Replacing Fuses*.)
- ❑ VCC indicates that the power supply voltages are within normal limits.

## Ethernet Link Module

The LEDs displayed on the Ethernet Link Module connector panels depend on which Ethernet Link Modules are installed in your BN. The following list includes the LEDs that may be displayed:

- ❑ COL indicates a collision detection.
- ❑ COM1 or COM2 indicates Carrier Detect is present on the respective COM port.
- ❑ FAIL indicates one of the following:
  - Diagnostic testing is in progress. Diagnostic testing occurs when you cold-start the slot. You cold-start the slot when you power-cycle the BN, issue the **diags** command from the TI, or perform a hot swap of the Link Module. This LED blinks three times and goes out when the diagnostic testing terminates successfully.
  - Power-up diagnostic testing failed and the Link Module is waiting for an automatic attempt to reinitiate diagnostic testing. If the FAIL LED lights again, please call Wellfleet Customer Service.
  - A catastrophic failure due to a hardware problem on the Link Module occurred and the Link Module is waiting for an automatic attempt to reinitiate diagnostic testing. If the FAIL LED lights again, please call Wellfleet Customer Service.

RCVR, RCVR1, or RCVR2 indicates data is being received by the respective port.

RLSD1 indicates Carrier Detect is present.

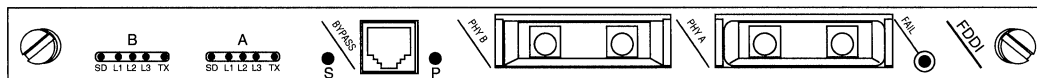
XCVR1 or XCVR2 indicates Ethernet traffic is present (either transmitting or receiving) on the respective port.

XMIT indicates data is being transmitted by the respective port.

## FDDI Link Module

This section identifies the LEDs on the FDDI Link Modules.

Figure 4-3 shows the LEDs on the FDDI Multimode Link Module.



**Figure 4-3. FDDI LEDs**

The groups of LEDs labeled **A** and **B** indicate the status of physical connectors A and B as follows:

- ❑ The yellow LED labeled SD indicates the detection of an incoming signal.
- ❑ The green LED labeled TX indicates that the FDDI is transmitting across the interface.
- ❑ The red LEDs labeled L1, L2, and L3 indicate the line state. Table 4-1 shows the L1, L2, and L3 codes.

**Table 4-1. FDDI L1, L2, and L3 LEDs**

L1	L2	L3	Line State (LS)
On	On	On	Idle 16 (ILS16)
On	On	Off	Halt (HLS)
On	Off	On	Master (MLS)
On	Off	Off	Quiet (QLS)
Off	On	On	Idle 4 (ILS4)
Off	On	Off	Reserved
Off	Off	On	Active (ALS)
Off	Off	Off	Noise

The **S** (Secondary) and **P** (Primary) LEDs light only when an optional FDDI Dual Switch Module is cabled to the **BYPASS** connector on the FDDI display panel and is in **OPERATE** mode. (The switch is in **OPERATE** mode during normal FDDI Link Module operation.)

The **S** and **P** LEDs turn off when the FDDI Dual Switch Module bypasses the physical connectors **A** and **B** and redirects the incoming and outgoing signals to its own connectors. This occurs whenever:

- ❑ The router is powered off.
- ❑ The router is reset.
- ❑ The FDDI circuit is disabled.

Table 4-2 summarizes the **S** and **P** LED codes.

**Table 4-2. FDDI S and P LEDs**

<b>S and P LEDs</b>	<b>Router Status</b>
On	Router is present on the FDDI ring.
Off	Router is bypassed (absent) from the FDDI ring.

The **FAIL** LED lights when the FDDI Link Module fails power-up diagnostics.

## HSSI Link Module

This section identifies the LEDs on the High Speed Serial Interface (HSSI) Link Modules.

Figure 4-4 shows the LEDs on the HSSI Link Module.

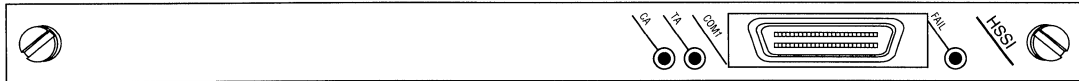


Figure 4-4. HSSI LEDs

The HSSI LEDs are as follows:

- ❑ The green LED labeled CA indicates the DSU is active and ready to receive or transmit data.
- ❑ The green LED labeled TA indicates that the router is active and ready to receive or transmit data.
- ❑ The red LED labeled FAIL indicates one of the following:
  - Diagnostic testing is in progress. Diagnostic testing occurs when you cold-start the slot. You cold-start the slot when you power-cycle the Wellfleet router, issue the **diags** command from the TI, or perform a hot swap of the Link Module. This LED blinks three times and goes out when the diagnostic testing terminates successfully.
  - Power-up diagnostic testing failed and the Link Module is waiting for an automatic attempt to reinitiate diagnostic testing. If the FAIL LED lights again, please call Wellfleet Customer Service.
  - A catastrophic failure due to a hardware problem on the Link Module occurred and the Link Module is waiting for an automatic attempt to reinitiate diagnostic testing. If the FAIL LED lights again, please call Wellfleet Customer Service.

## Token Ring Link Module

This section identifies the LEDs on the Token Ring Link Modules.

Figure 4-5 shows the LEDs on the Dual Token Ring Link Module.

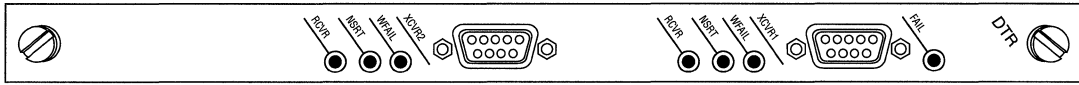


Figure 4-5. Token Ring LEDs

The Token Ring LEDs assist in monitoring receive and transmit activities across a Token Ring connection. The LEDs are as follows:

- ❑ The green LED labeled RCVR indicates that data is being received across the Token Ring connection.
- ❑ The green LED labeled NSRT indicates the node is inserted into the Token Ring connection.
- ❑ The red LED labeled WFAIL indicates a wire fault on either receive or transmit.
- ❑ The red LED labeled FAIL indicates one of the following:
  - Diagnostic testing is in progress. Diagnostic testing occurs when you cold-start the slot. You cold-start the slot when you power-cycle the Wellfleet router, issue the **diags** command from the TI, or perform a hot swap of the Link Module. This LED blinks three times and goes out when the diagnostic testing terminates successfully.
  - Power-up diagnostic testing failed and the Link Module is waiting for an automatic attempt to reinitiate diagnostic testing. If the FAIL LED lights again, please call Wellfleet Customer Service.
  - A catastrophic failure due to a hardware problem on the Link Module occurred and the Link Module is waiting for an automatic attempt to reinitiate diagnostic testing. If the FAIL LED lights again, please call Wellfleet Customer Service.

## SRM-F and FRE Modules

Use the SRM-F and FRE module LEDs for troubleshooting only. You remove the front bezel and the RFI shield to view the LEDs (refer to the chapter *Accessing the Interior* for instructions).

### SRM-F

The front edge of the SRM-F module in slot 1 inside the BN is equipped with two LEDs. A power switch may also be included (see Figure 4-6).



Figure 4-6. SRM-F LEDs

**Note:** The power switch is installed on some SRM-F modules.

The power switch powers on the SRM-F when you switch it to the right and powers off the SRM-F when you switch it to the left.

LED A, when lit, indicates the board is held in reset due to a catastrophic hardware failure.

LED B, when lit, indicates 5 Volts are available to the SRM-F.

## FRE Module

The front edge of each FRE module inside the BN is equipped with LEDs, an HDCM (Harpoon Diagnostic Console Monitor) button, and a Flash Card Ejector (see Figure 4-7). A power switch is included on some FRE modules.

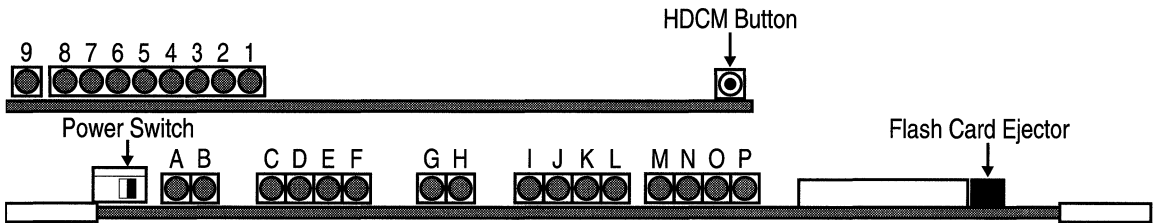


Figure 4-7. FRE Module LEDs

LEDs 1 through 9 and the HDCM button are located on the daughter board.

LEDs 1-8 indicate the following during diagnostic testing. (Diagnostic testing occurs during a cold-start (power-cycle or TI **diags** command.)

- 1 to 7 Diagnostic test number executing. The diagnostic test number is represented in hexadecimal notation. Lighted LEDs indicate 1's; darkened LEDs indicate 0's.
- 8 Diagnostic testing is in progress.

LEDs 1-8 indicate the following when LED F is also lit. (When LED F is lit, the Gate Access Management Entity [GAME] operating system is executing.)

- 1 to 6 Least significant digits of the second counter expressed in binary. The counter is updated each second. (During a boot, these LEDs flicker rapidly.)
- 7 Slot is running TI. (Only one slot runs the TI at a time.)
- 8 FRE module is booting (or resetting) and PROM read/write protection is disabled. This LED also lights during the



execution of the TI **prom -w** (write) command, which is issued to update a PROM.

LED 9 lights whenever a reset is sent to the CPU.

The HDCM button has three functions:

- ❑ Cold-starts the FRE module when you press it for more than one second and release it (regardless of the session).
- ❑ Establishes an HDCM session when pressed for less than one second and released. The HDCM is for Wellfleet Customer Service only.
- ❑ Warm-starts the FRE module when an HDCM session is established and you press it for less than one second and release it.

The LEDs A through P, the power switch, and Flash Card Ejector are located on the mother board.

The mother board LEDs indicate the following when lit:

- A The backbone is held in reset due to a hardware or software error. This LED also flashes briefly when the FRE is reinitialized or reset.
- B The backbone DMA logic is accessing the DRAM.
- C, D These LEDs display a code which reveals the diagnostic test under execution (see Table 4-3).
- E Diagnostics code execution is in progress.
- F The GAME operating system is executing.
- G The CPU is accessing the DRAM.
- H Hardware is resetting.
- I The FRE module is transmitting on Backbone A.
- J The FRE module is transmitting on Backbone B.
- K The FRE module is transmitting on Backbone C.
- L The FRE module is transmitting on Backbone D.
- M Backbone A is asserting flow control.

- N Backbone B is asserting flow control.
- O Backbone C is asserting flow control.
- P Backbone D is asserting flow control.

The power switch powers on the FRE module when you switch it to the right and powers off the FRE module when you switch it to the left. The power switch is installed on some FRE modules.

The Flash Card Ejector disconnects the Flash card.

**Table 4-3. FRE Module Diagnostic Codes**

<b>C LED</b>	<b>D LED</b>	<b>E LED</b>	<b>Diagnostic Test in Progress</b>
on	on	on	CPU
off	on	on	Backbone
on	off	on	Link Module
off	off	on	HDCM (Harpoon Diagnostic Console Monitor)

# Appendix A

## Replacing Fuses

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# Replacing Fuses

## About this Appendix

This appendix describes how to inspect specialized fuses in the BN for damage and replace them. Please observe the following warning:



### Danger

Due to high-energy hazards, all procedures described in this chapter are to be performed by service personnel only.

Service personnel are required to have experience installing and servicing network hardware, and have training in taking precautions to minimize danger to themselves and others while performing a task inside a hazardous service access area.

The BN is equipped with eight fuses to protect individual slots, the Ethernet ports, and the SRM-L Console port. Refer to this appendix if the *Slot disconnected* or *Backbone disconnected* event message is displayed on the log and one of the following occurs:

- ❑ All LEDs on a Link Module connector panel are not lit.
- ❑ The CR2 or CR3 LED on the SRM-L connector panel is not lit.
- ❑ The LEDs on a FRE module are not lit. (Refer to the chapter *Accessing the Interior* to remove the front bezel and RFI shield to view the FRE module LEDs. Then replace the RFI shield.)

The BN is also equipped with a power supply fuse to protect the power supply from excessive current. If the BN has an AC power supply, but will not power on, contact Wellfleet Customer Support. (This document does *not* provide instructions for replacing the power supply fuse.) Please observe the following warning:

## Replacing Specialized Fuses

The specialized fuses are located behind the fuse access panel, the metal panel where the Reset switch is mounted (see Figure A-1).



**Warning:** Electrostatic discharge can damage hardware. You must attach the antistatic strap to your wrist and connect it to the chassis behind the fuse access panel before you handle BN components (refer to the instructions that follow.)

Remove the fuse access panel as follows:

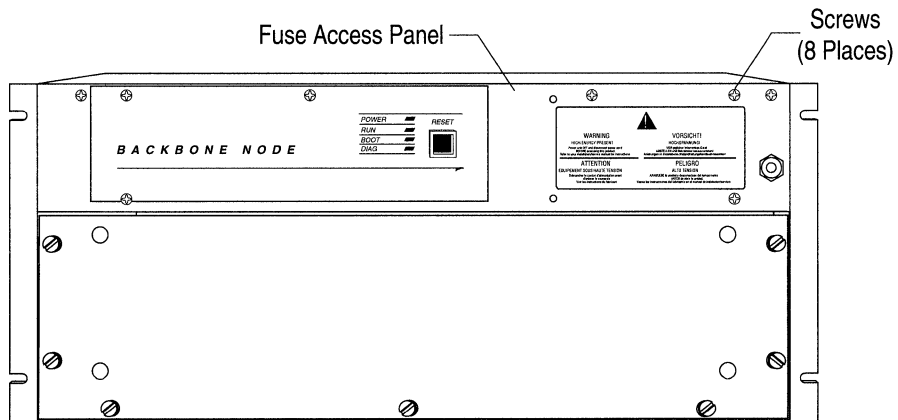
1. Power down the BN and disconnect the plug from the power receptacle.
2. Refer to the chapter *Accessing the Interior* to remove the front bezel.
3. Remove the antistatic strap, alligator clip, and fuse puller from the pouch attached to the back of the front bezel.
4. Insert the end of the antistatic strap into the hole in the alligator clip.
5. Insert your (left) hand inside the band at one end of the antistatic strap.

Ensure the metal buckle inside the band is in contact with your skin. (Swing open the metal buckle to adjust the strap to form a snug fit if necessary).

You connect the other end of the wrist strap after you remove the fuse access panel.

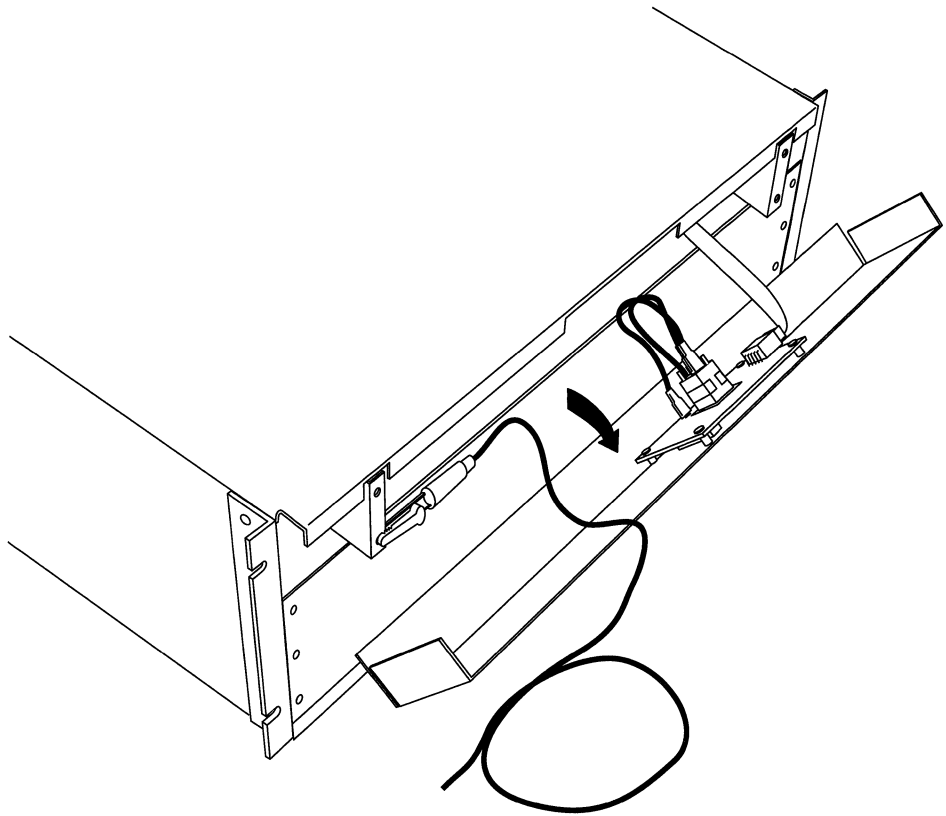
- Use a Phillips screwdriver to remove the screws that secure the fuse access panel to the chassis (see Figure A-1).

**Note:** Hold the fuse access panel in place several inches away from the chassis to avoid pulling the wires that connect the back of the panel to the BN.



**Figure A-1. Removing the Fuse Access Panel**

- Connect the alligator clip on the other end of the antistatic strap to the chassis behind the fuse access panel (see Figure A-2).

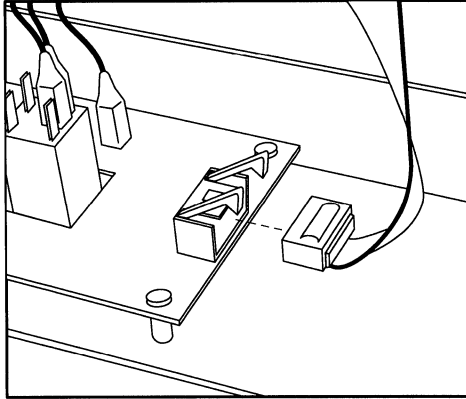


**Figure A-2. Connecting the Antistatic Strap to the Chassis**

8. Lift the ejectors behind the fuse access panel (see Figure A-3).  
The ejectors connect the component behind the fuse access panel to a ribbon cable connector.
9. Slide the component to the right to disconnect it.

**Note:** The red line on the ribbon cable connector aligns with the arrow on the connector attached to the back of the fuse access panel.

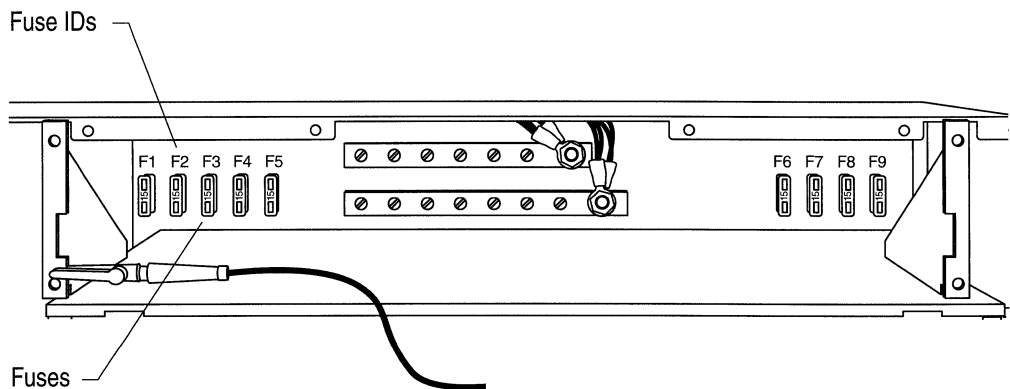




**Figure A-3. Disconnecting the Back of the Fuse Access Panel**

10. Remove the fuse access panel.

The specialized fuses are inserted in fuse connectors mounted on a vertical plane inside the BN (see Figure A-4). Each fuse connector is labeled with a fuse (F) number. Refer to Table A-1 to determine which fuse to replace.



**Figure A-4. Location of Specialized Fuses**

**Table A-1. Specialized Fuses**

<b>Physical Indicators</b>	<b>Event Messages from GAME</b>	<b>Fuse ID</b>	<b>Fuse Part No.</b>	<b>Amperage (Voltage)</b>	<b>Function</b>
All SRM-F LEDs are off.	<i>Backbone 0 became disconnected and Backbone 1 became disconnected</i>	F1	103541	25 Amp (+5 Volt)	Slot 1 SRM-F
All Link Module LEDs in slot 2 and FRE LEDs in slot 2 are off.	<i>Backbone 2 became disconnected and Backbone 3 became disconnected or Slot 2 became disconnected</i>	F2	103541	25 Amp (+5 Volt)	Slot 1 SRM-L, Slot 2 Link Module, and FRE
All Link Module LEDs in slot 3 and FRE LEDs in slot 3 are off.	<i>Slot 3 became disconnected</i>	F3	103541	25 Amp (+5 Volt)	Slot 3 Link Module and FRE
All Link Module LEDs in slot 4 and FRE LEDs in slot 4 are off.	<i>Slot 4 became disconnected</i>	F4	103541	25 Amp (+5 Volt)	Slot 4 Link Module and FRE
All Link Module LEDs in slot 5 and FRE LEDs in slot 5 are off.	<i>Slot 5 became disconnected</i>	F5	103541	25 Amp (+5 Volt)	Slot 5 Link Module and FRE
All FRE Module LEDs in slots 4 and 5 and the SRM-L 12V 2 LED in slot 1 are off.	<i>Backbone 0 became disconnected, Backbone 1 became disconnected, Slot 4 became disconnected, and Slot 5 became disconnected</i>	F6	104395	7.5 Amp (+12 Volt)	Ethernet ports on Slots 4 and 5

Table A-1. Specialized Fuses

Physical Indicators	Event Messages from GAME	Fuse ID	Fuse Part No.	Amperage (Voltage)	Function
All FRE Module LEDs in slots 2 and 3 and the SRM-L 12V 1 LED in slot 1 are off.	<i>Backbone 2 became disconnected, Backbone 3 became disconnected, Slot 2 became disconnected, and Slot 3 became disconnected</i>	F7	104395	7.5 Amp (+12 Volt)	Ethernet ports on Slots 2 and 3
No response at TI console	Not Applicable	F8	104394	5 Amp (-12 Volt)	SRM-L (TI) Console Port
Not Applicable	Not Applicable	F9	103541	25 Amp (+5 Volt)	Spare

To remove a fuse, push the forked edge of the fuse puller over the fuse until it locks into place and pull it toward you.

Replace the fuse with a new one if the fuse is smoked or the loop between the two sides of the fuse is broken (see Figure A-5).

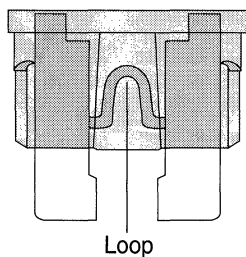


Figure A-5. Specialized Fuse (New)

To install a fuse, insert and push it into the fuse connector.

Replace the BN components as follows:

1. Hold the fuse access panel several inches away from the chassis.
2. Align the red line on the ribbon cable connector with the arrow on the connector attached to the back of the fuse access panel.
3. Close the ejectors to secure the connection.
4. Disconnect the wrist strap from the chassis.
5. Insert and tighten the screws that fasten the fuse access panel to the chassis.
6. Insert the wrist strap and fuse puller into the pouch attached to the back of the front bezel.
7. Replace the front bezel (refer to the chapter *Accessing the Interior* for instructions).

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