

SA-H188

**Expansion Chassis for  
Four 5 $\frac{1}{4}$ " Removable Drives  
Manual**

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## Notes

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# 1. General Information

## 1.1 Introduction

---

This manual provides general information, drive installation, and power supply adjustments for the SA-H188 drive expansion chassis manufactured by Sigma Information Systems, Anaheim, California. The material is arranged into the following sections.

**Chapter 1 – General Information.** This section provides a general description of the SA-H188 chassis. Specifications are included.

**Chapter 2 – Installation.** This section describes the procedures for mounting drives into the chassis. Drive cabling and power connectors are also described.

**Chapter 3 – The Power Supply.** This section provides the information needed to replace power supply modules and to convert AC input.

**Appendices.** The appendices consists of the front panel schematic and DC power supply schematic. A system wiring diagram is also provided.

## 1.2 Versions and Options

The SA-H188 is available in either tabletop or rackmount versions, and with a wide range of ESDI, SCSI, and universal controller I/O panels. (Figure 1-4) Sigma also offers optional drive front console and cable kits for the chassis.

### 1.2.1 Versions

The version numbers and their associated configurations are:

MODEL #	I/O PANEL	INSTALLATION
SA-H188-200	SCSI SUN	TABLETOP
SA-H188-201	SCSI SUN	RACKMOUNT
SA-H188-202	SCSI RIBBON	TABLETOP
SA-H188-203	SCSI RIBBON	RACKMOUNT
SA-H188-204	SCSI IEEE	TABLETOP
SA-H188-205	SCSI IEEE	RACKMOUNT
SA-H188-206	ESDI	TABLETOP
SA-H188-207	ESDI	RACKMOUNT
SA-H188-208	UNIVERSAL	TABLETOP
SA-H188-209	UNIVERSAL	RACKMOUNT

### 1.2.2 Options

The standard SA-H188 chassis contains a power ON/OFF switch on the front panel area. The chassis can be ordered with an optional front console with ESDI or SCSI drive switches and LEDs – or the front console kit can be added at a later time.

*Warning*

The front panel is compatible with Sigma's SDC-RQD11-EC (ESDI), SDC-RQD11-D (ST-506), SDC-RQD11-SC or SDC-RQD11-SCH (SMD), or SDC-RQD11-SCSI (SCSI) controllers. Other controllers may be damaged if they are

Internal cabling can also be ordered as an option. Cable kits are available for all versions except those with a universal I/O panel.

Part numbers for the optional kits are

#### Internal Drive Cable Kits

P/N 502256	SCSI SUN Cable Kit
P/N 502257	SCSI Ribbon Cable Kit
P/N 502258	SCSI IEEE Cable Kit
P/N 502259	ESDI Cable Kit

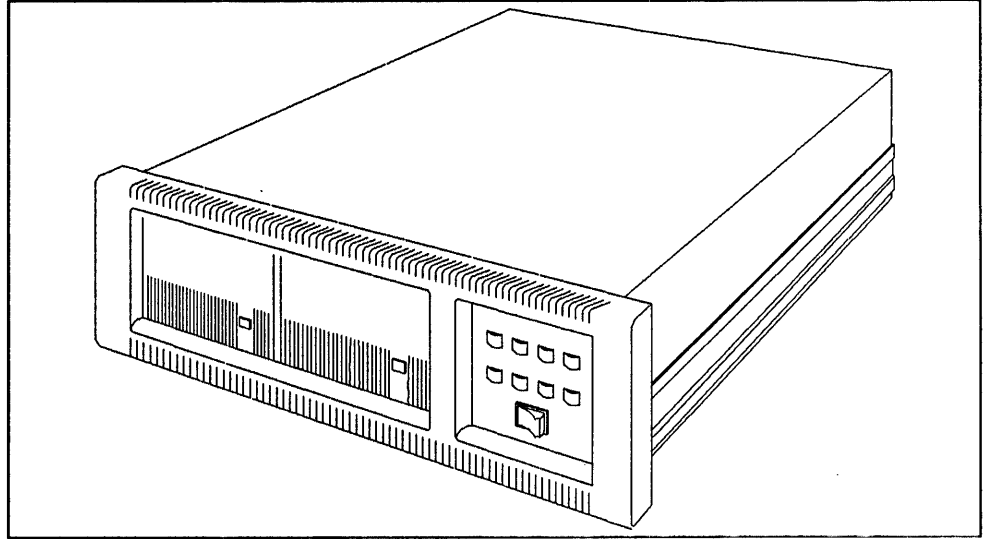
#### Front Panel Assembly Kits

P/N 502260	SCSI Front Panel Kit
P/N 502261	ESDI Front Panel Kit

# 1.3 General Description

The SA-H188 is a rackmount chassis designed for mounting four 5-1/4" drives. Two of the drives can be removable media devices. Figure 1-1 shows an exterior view of the SA-H188 chassis.

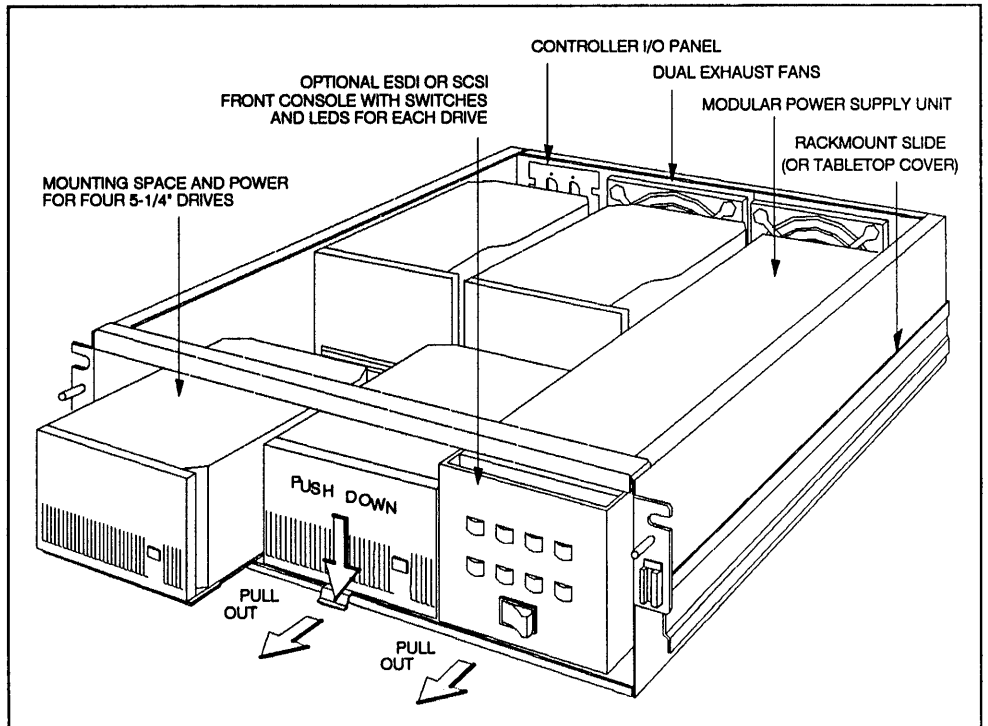
**Figure 1-1:  
SA-H188 Expansion  
Chassis**



The expansion chassis contains four drive mounting areas, a front console, and a rear controller I/O panel. The power supply unit contains individual power boards for each drive.

The major components inside the SA-H188 are shown in Figure 1-2.

**Figure 1-2:  
Inside the SA-H188  
Chassis**





## 1.4 Easy Drive Installation

Each drive mounts on an individual drive mounting bracket that is compatible with DEC's drive mounting shoe. The drive/bracket assembly slides into the chassis and is held firmly in place when a spring clip located in the chassis engages with the drive/bracket assembly.

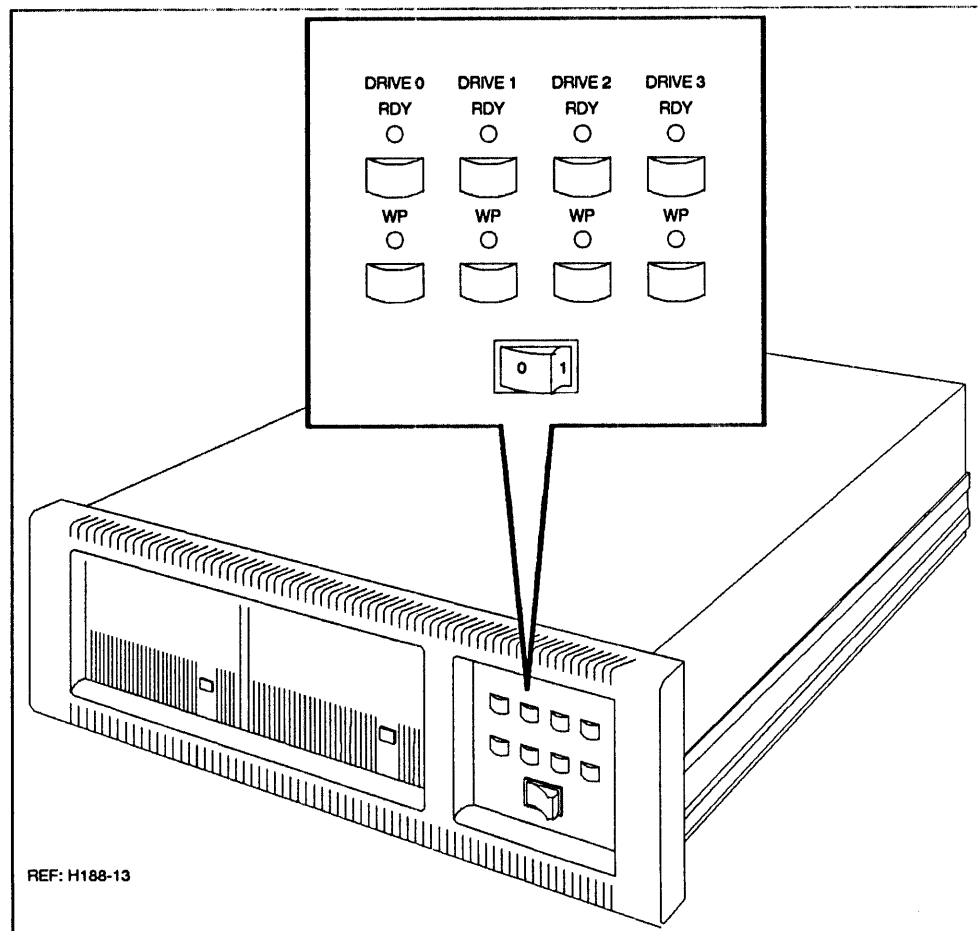
The drive/bracket assembly is removed easily by uncabling the drive, releasing the spring clip, and sliding the drive forward.

## 1.5 Front Console Option

The standard SA-H188 contains a power ON/OFF switch on the front panel. Optional ESDI or SCSI switch panels contain WRITE PROTECT and READY switches and LEDs for each drive. These switches and LEDs are compatible with active front panel functions of Sigma's SDC-RQD11-EC ESDI and SDC-RQD11-SCSI SCSI controller.

Figure 1-3 shows the ESDI front panel. The SCSI front panel is similar.

Figure 1-3:  
Optional ESDI Front  
Console



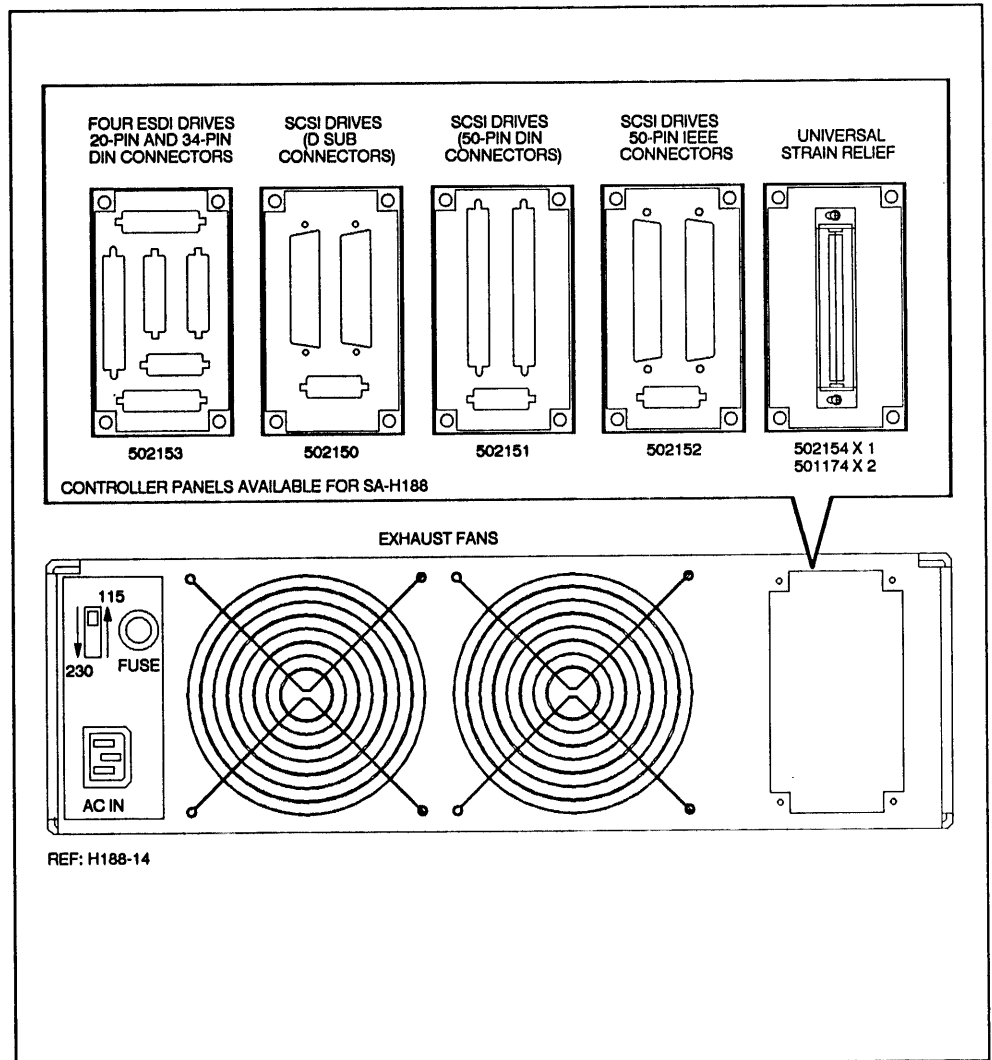
## 1.6 Rear Panel and Controller I/O Cabling

The rear of the SA-H188 chassis contains an AC input area with a fuse, AC connector, and a switch for easy conversion between 115VAC and 230VAC.

The rear of the chassis also has an I/O panel cutout for attaching cables to installed disk drives. This cutout normally contains a blank filler plate. However, Sigma optionally provides five I/O panels for standard ESDI connectors or various IN/OUT connectors for SCSI drives. A universal strain relief panel accommodates other configurations such as three ESDI drives and a tape drive.

Figure 1-4 shows the AC input area and the controller I/O panels.

**Figure 1-4:**  
The Rear of the  
SA-H188 Chassis



## 1.7 Cooling

---

Two rear exhaust fans pull cool air over the drives and through the power supply unit. Air intake is via vents located on the front bezel.

## 1.8 Power Supply Unit

---

The 260 watt power supply assembly includes five 52 watt power supply boards. Each board powers one of the four drives. The fifth board powers the fans and front panel functions. Power cabling is independent so that each power supply can be replaced without affecting operation of the other drives in the chassis.

The fused AC input can be converted between 115VAC and 230VAC via a slide switch located at the rear of the unit. Each power board provides +5VDC at 2 amps (3 amps peak) and +12V at 2.5 amps (5 amps peak). The DC outputs are cabled to the drives via a power harness from the power supply unit.

## 1.9 Specifications

---

Drives Supported:	Up to four 5-1/4" winchester drives. Supports ESDI, ST-506, or SCSI type interfaces. Drive type must be specified at time of order for proper front panel and I/O interface.
Drive Cabling:	Includes drive power cables. User must supply drive signal cables depending on drive types to be installed.
Controller I/O:	Controller I/O cutout contains a blank filler panel. Optional controller I/O panels are available for four ESDI drives or for SCSI drives with D sub, DIN, or micro ribbon cable connectors. A universal strain relief panel accommodates other drive configurations.
Front Console Option:	AC ON/OFF switch standard. Optional Write Protect panel contains individual WRITE PROTECT and READY switches and LEDs for each drive. Front panel functions are compatible with the SDC-RQD11-EC (ESDI) or SDC-RQD11-SCSI (SCSI) controllers.
Chassis Installation:	
Rackmount:	Installs in standard 19" RETMA rack. Allow 0.5" for rear cable egress.
Tabletop:	Sits on any desktop area. Allow room at the rear for cooling and cabling.

<b>Dimensions:</b>	19" wide x 22.25" deep x 5.25" high.
<b>Power Supply:</b>	Contains five power boards. Each board provides power to an individual drive or the fan/front panel assembly.
<b>AC Input:</b>	3.0A @ 115VAC 60Hz or 1.5A @ 230VAC 50Hz MAX. 115VAC/230VAC jumper selectable.
<b>DC Output:</b>	Not to exceed 52 watts total outputs for each power board. +5VDC @ 2A (3A peak). +12VDC @ 2.5A (5A peak).
<b>Cooling:</b>	Front panel intake with rear exhaust. Includes two exhaust fans.
<b>Temperature:</b>	
<b>Operating:</b>	0°C to 50°C.
<b>Storage:</b>	-45°C to 85°C.
<b>Humidity:</b>	0% to 95% non-condensing.
<b>Altitude:</b>	
<b>Operating:</b>	0 feet to 10,000 feet.
<b>Storage:</b>	0 feet to 30,000 feet.

**Notes**

## 2. Installation

### 2.1 Unpacking and Inspection

---

Unpack the SA-H188 expansion chassis and visually inspect it for damage that might have occurred during shipment. Retain the shipping carton in case reshipment is necessary. Remove the top cover and inspect the power supply, fans, drive mounting brackets, etc., for damage. If any damage has occurred, notify Sigma Information Systems immediately.

Contact Sigma for a Return Merchandise Authorization (RMA) number before returning any equipment.

Each shipping container should include the following:

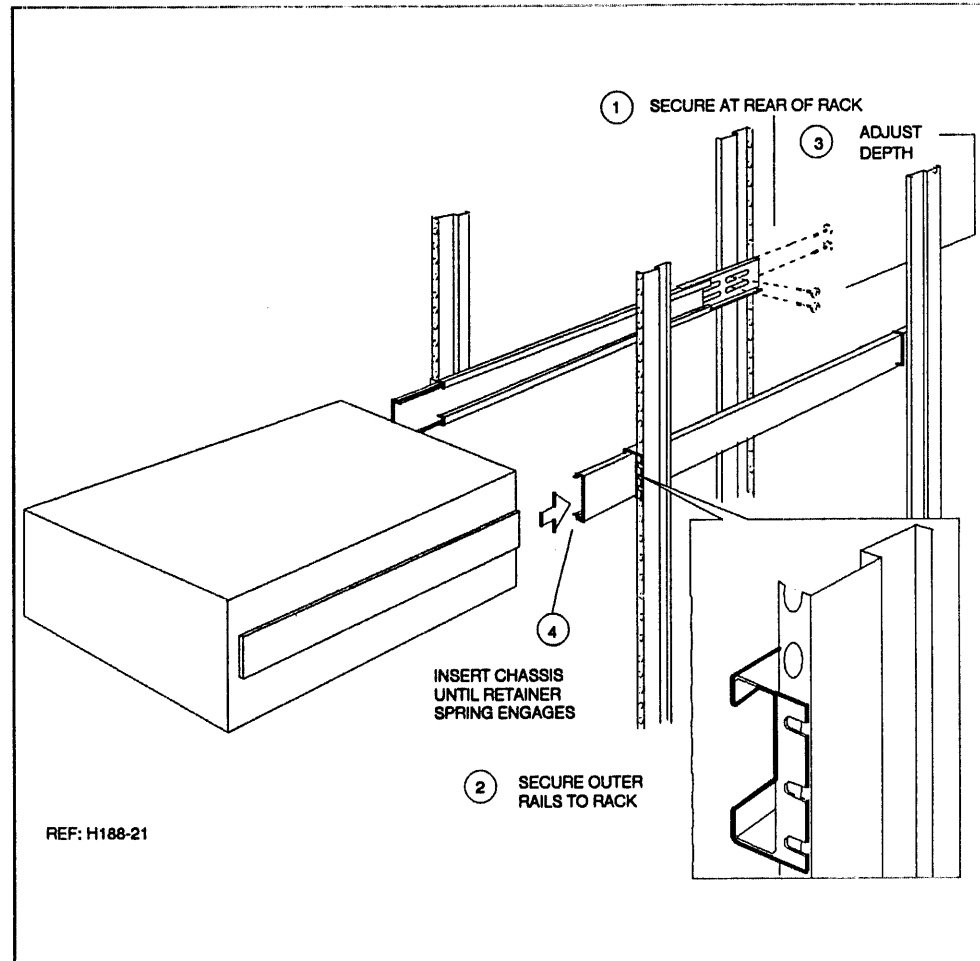
- An SA-H188 expansion chassis with power supply, front console ON/OFF switch, and rear controller I/O connector panel.
- An SA-H188 chassis manual with logic diagrams for the power supply and front panel.
- An AC power cord.
- An *optional* front ESDI or SCSI front panel (installed if specified at time of order).
- *Optional* cable kit (see Section 2.4).
- *Optional* slimline drive filler panel P/N 500345.

## 2.2 Rackmount Installation

Mount the SA-H188 in a standard 19" RETMA rack before installing the drives in the chassis.

Use Figure 2-1 and the following procedure to install the SA-H188 into a standard 19" RETMA rack and to apply AC input power.

**Figure 2-1:  
Rackmount  
Installation**



1. Remove the outer rails from the chassis by sliding them apart until the rear retaining spring button engages. Press the spring button and slip the slides free from the chassis. Set the chassis aside.
2. Place the outer mounting rails into the rack and mark the intended position of the chassis in the rack.
3. Bolt the rear extension bracket to the rear of the rack using #10-32 x 1/2" screws. All screws should use flat washers, with lock washers next to the hex nut.

4. Bolt the outer rails at the front of the rack using #10-32 x 1/2" screws. Place the rear of the rails inside the extension brackets. Adjust depth and bolt the rails in place.
5. Install the chassis slides into the outer rails. Push forward until the retaining spring engages.
6. Check the AC receptacle for proper input power. Plug the AC cord into a main receptacle and switch the power ON/OFF switch to the ON position.
7. Check DC voltages. The voltages can be measured from the drive power connectors shown in Figure 3-1.

## 2.3 Drive Installation

---

The SA-H188 provides mounting space and power for four 5-1/4" drives. Drives installed towards the front of the chassis can be removable media drives.

The chassis accommodates DEC's RD50 series winchester drives, RX50 series floppy drives and TK50 tape drives that include the standard DEC mounting shoe. If DEC drives are installed, a signal distribution board (not supplied) must be installed in the CPU chassis. The SA-H188 chassis also supports other industry-standard drives.

Before proceeding, plan the locations for each drive in the chassis. Generally, all four drives are ESDI winchesters or SCSI drives. The front panel functions are compatible with a 4-drive ESDI or SCSI configuration.

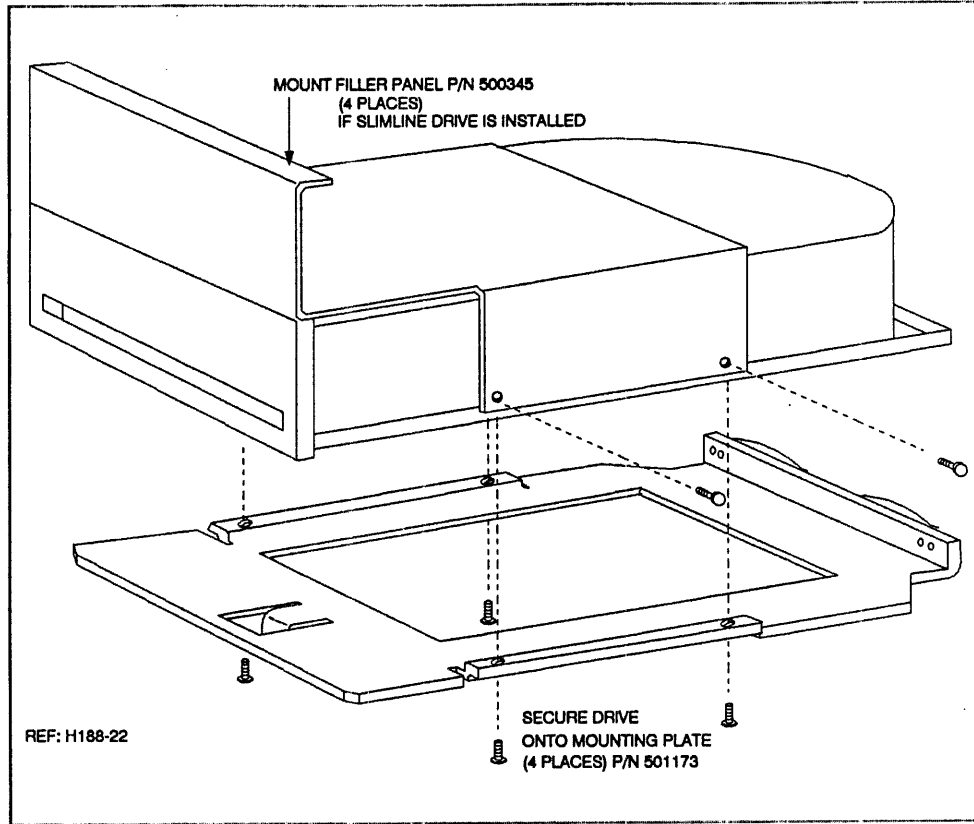
- If removable media drives are to be installed, they should be inserted in the drive slots at the front of the chassis.
- Drives to be mounted at the rear of the chassis should be installed first.

Use the following procedure to install the drives.

1. Check manufacturer's DC power specifications before applying power to the drives. Figure 3-1 shows DC power connections.
2. Terminate the drives per manufacturer's instructions.
3. DEC drives with a standard DEC mounting shoe are inserted directly into the guides in the chassis. Non-DEC industry standard drives require initial mounting onto Sigma's mounting plate P/N 501173 (Figure 2-2) before insertion into the chassis.
4. If a slimline drive is installed, mount *optional* filler panel P/N 500345 onto the drive before inserting the assembly into the chassis.

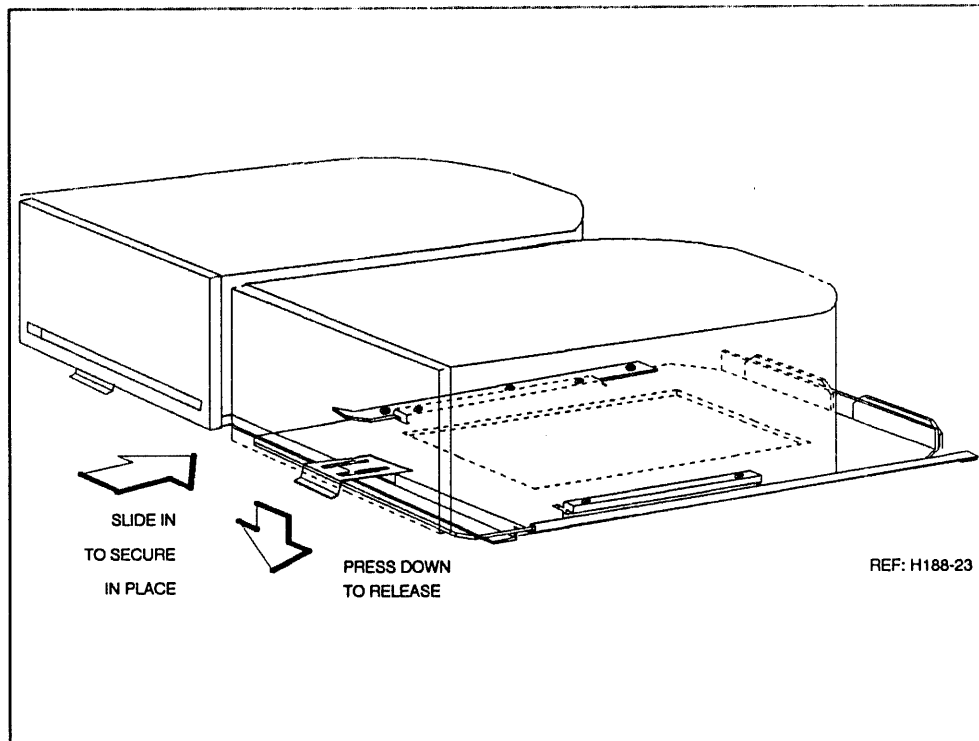


**Figure 2-2:  
Drive Shoe Mounting**



5. Insert the drive assembly into the guides in the chassis until resistance is noticed from the spring located at the rear of the mounting shoe. Further insertion engages the snap-in lever and holds the drive assembly firmly into place. See Figure 2-3 for drive insertion.

**Figure 2-3:  
Inserting the Drive  
Assembly into the  
Chassis Guides**



## 2.4 Drive Cabling

This section describes the I/O panels available from Sigma, along with the type of connectors they support. Figure 2-4 illustrates the I/O panel that supports four ESDI drives. The front panel functions are compatible with Sigma's SDC-RQD11-EC disk controller.

**Figure 2-4:**  
ESDI Controller I/O Panel

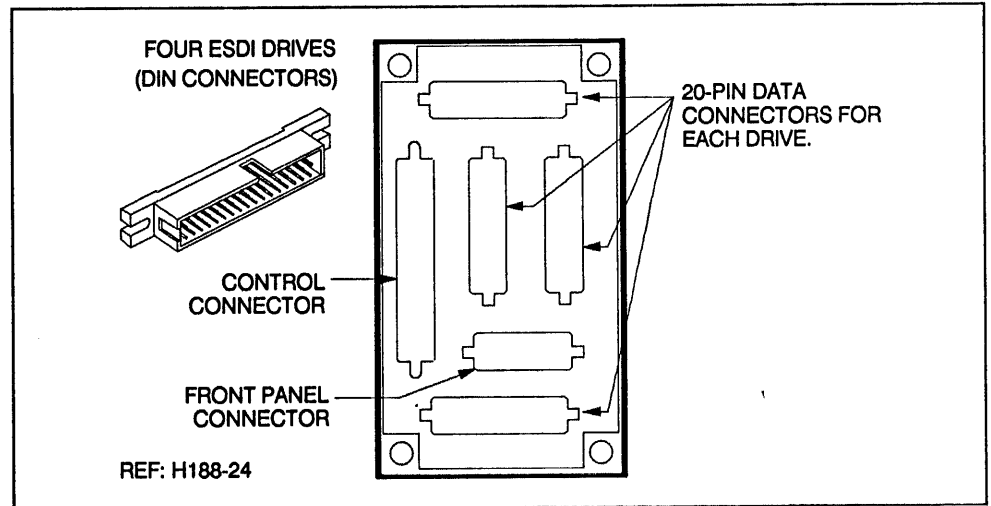
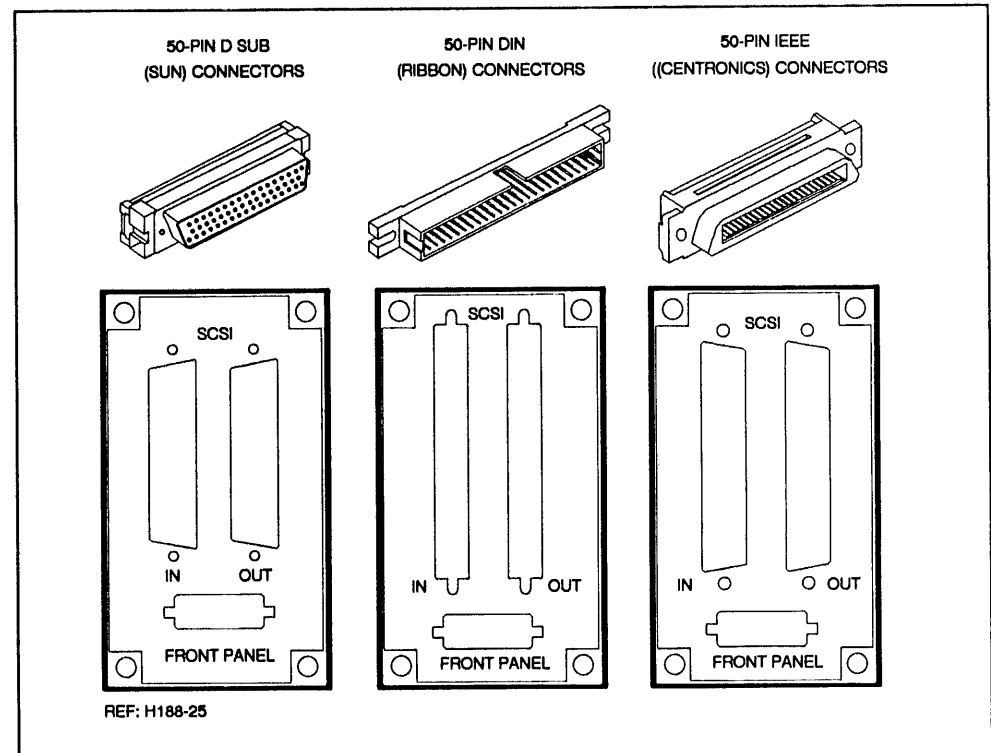


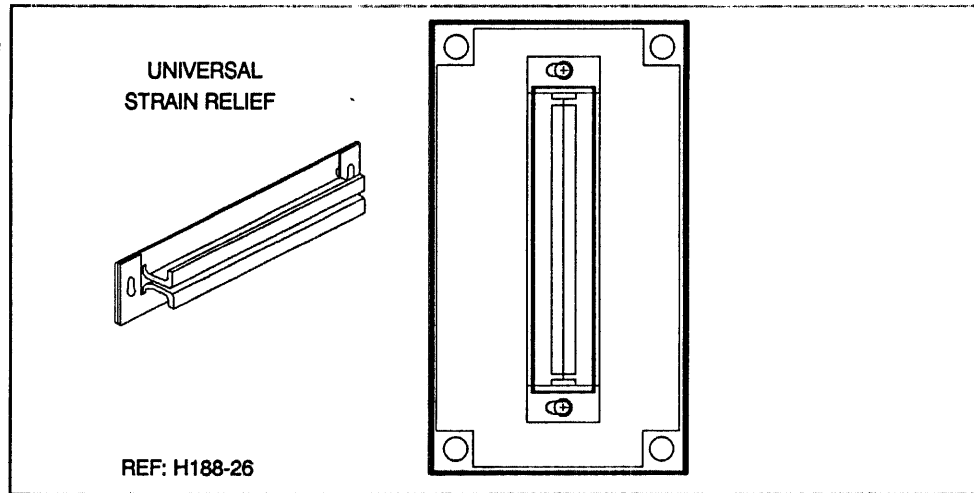
Figure 2-5 shows the various I/O panels available for SCSI drives. The panels support D sub (SUN Microsystem applications), DIN (standard), or micro ribbon (IEEE applications) cable connectors. All front panel connectors must be DIN connectors.

**Figure 2-5:**  
SCSI Controller I/O Panels



Sigma also offers an I/O panel with a universal strain relief (Figure 2-6). This panel is designed for non-standard drive configurations.

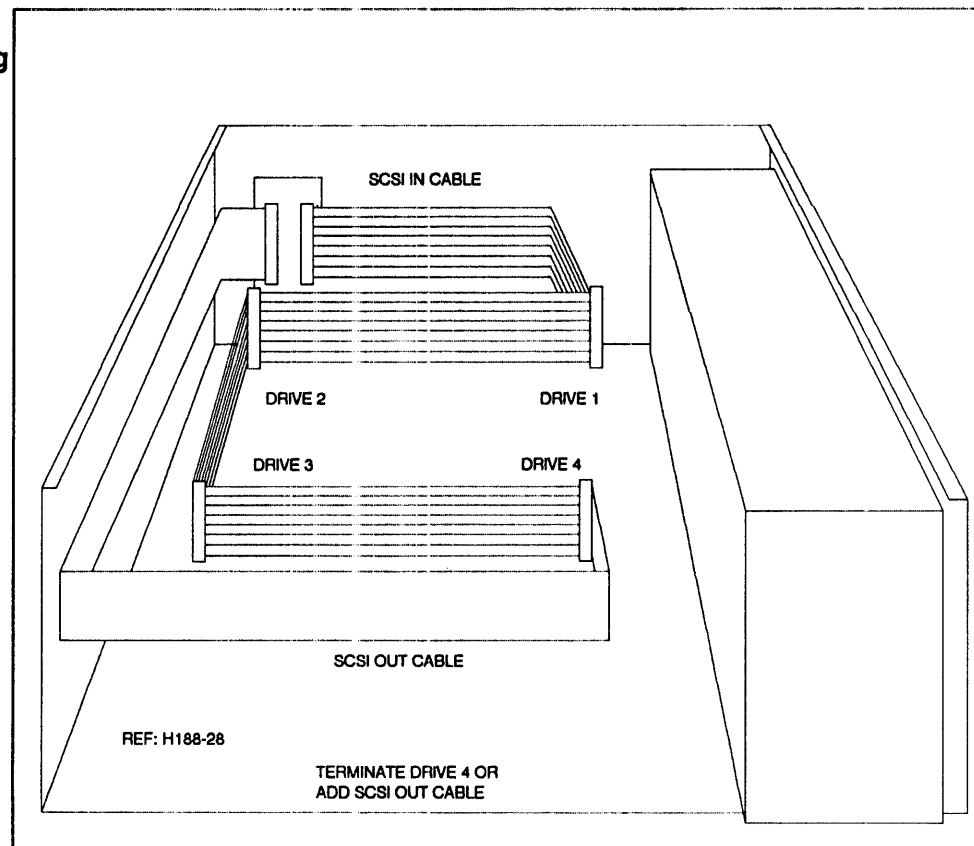
**Figure 2-6:**  
Universal Strain Relief  
for Controller I/O  
Cabling



Refer to the drives manufacturer's instructions to connect controller cables from the I/O panel to the drives.

Figure 2-7 is an example for cabling four SCSI drives. This figure is meant as a general guide for SCSI cabling. Refer to the drive manufacturer's instructions for detailed instructions for drive/controller cabling.

**Figure 2-7:**  
SCSI Example Cabling

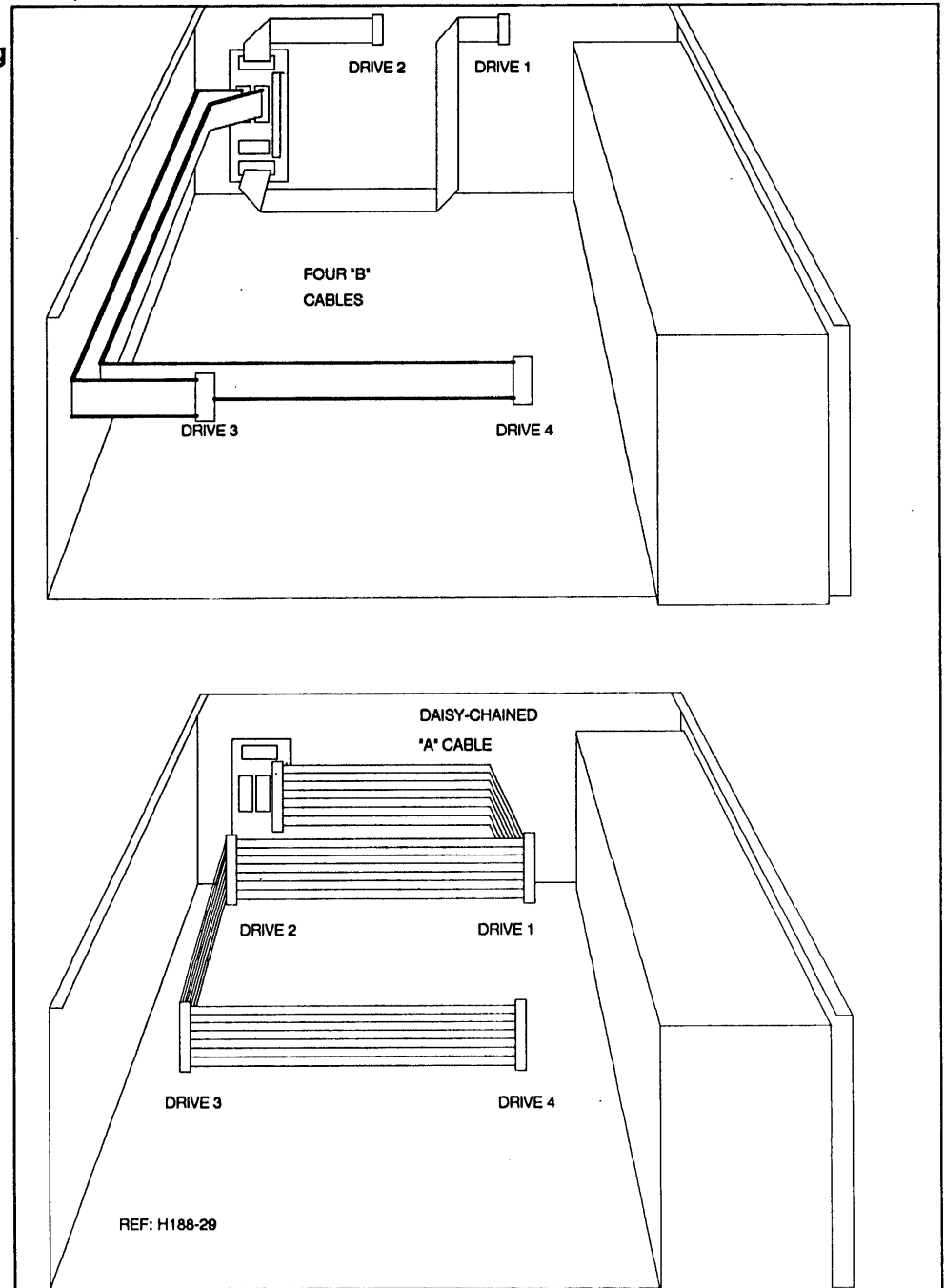


SCSI drive cable kits are available with the following 50-pin connectors:

D Sub Connectors for SUN Microsystem applications	P/N 502256
Din Connectors for stand ribbon cables	P/N 502257
Centronics type connectors for IEEE applications	P/N 502258.

Figure 2-8 shows cabling for the optional ESDI cable kit (P/N 502259). It can be used as a guide for cabling four ESDI drives. This figure is meant as a general guide for ESDI cabling. Refer to the drive manufacturer's instructions for detailed instructions for drive/controller cabling.

**Figure 2-8:  
Example ESDI Cabling**

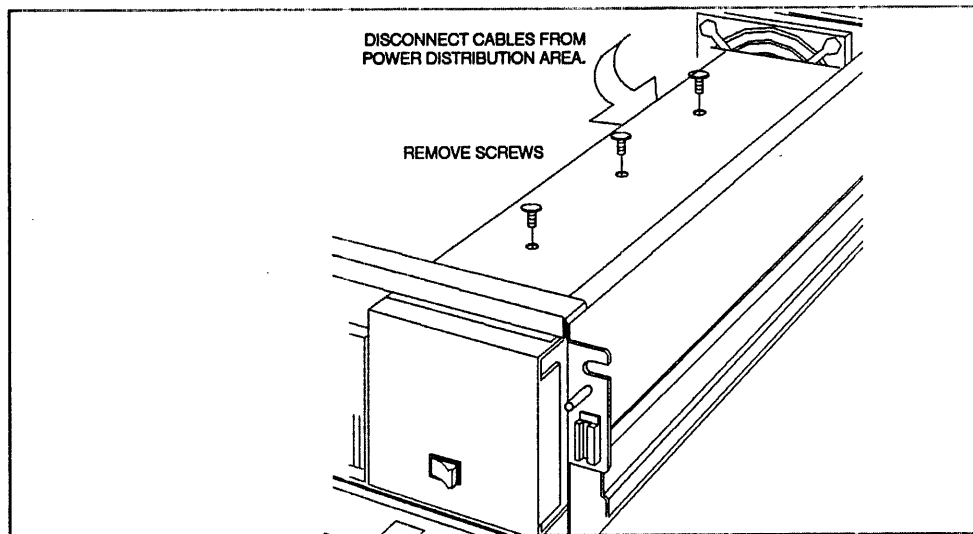


## 2.5 Optional SCSI Front Panel Installation

If the optional SCSI front panel with drive select switches and LEDs is specified at time of order, it is already installed. If it is ordered at a later date, use the following procedure to install the front panel.

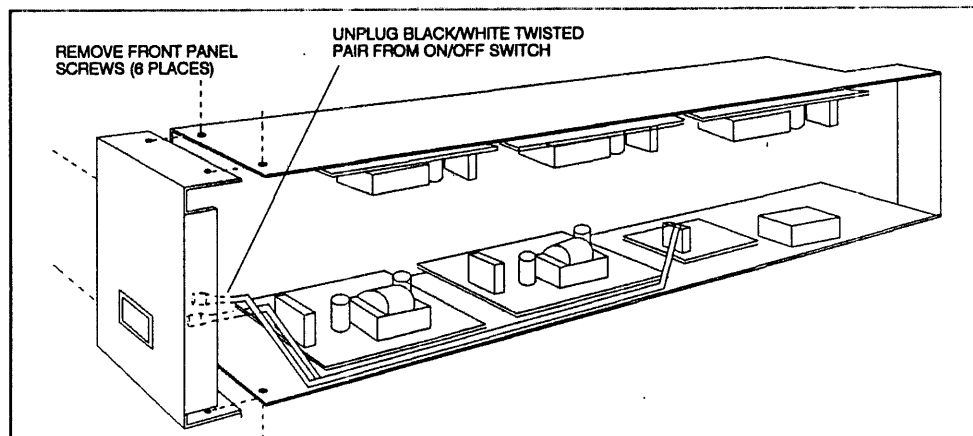
1. Disconnect cables from the power distribution area.
2. Remove the three screws over the power supply unit and pull the modular unit forward and out of the chassis.

**Figure 2-9:**  
Removing the Power Supply Unit from the Chassis



3. Remove the old front panel by unscrewing six screws (two at top, two at bottom, and two on left side) from the power supply unit.
4. Disconnect the black/white twisted pair cable from the ON/OFF switch.

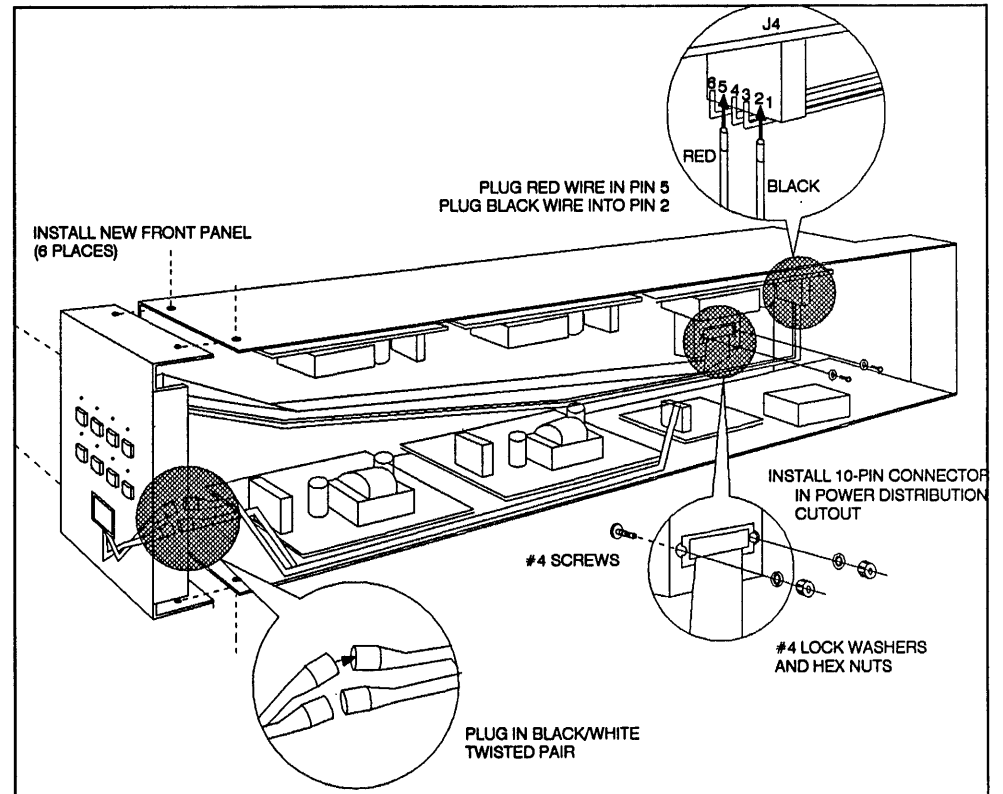
**Figure 2-10:**  
Removing the Old Front Panel



5. Place the new front panel over the power supply unit and replace the six screws.
6. Plug the black/white twisted cable onto the new front panel PWB ON/OFF switch.

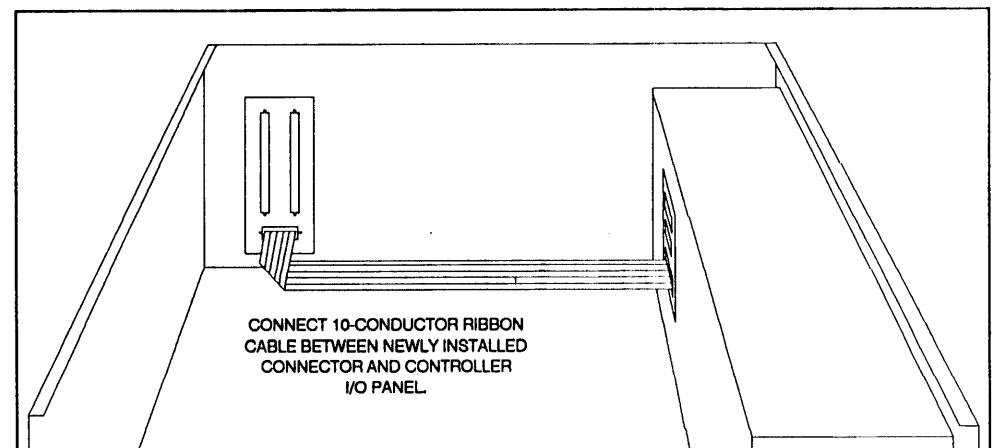
7. Route the 10-conductor ribbon cable between the power supply modules and secure the connector to the power distribution panel using two #4 screws and associated lock washers and hex nuts.
8. Route the red/black cable between the power supply modules and connect them to J4 on power supply module #1 (top-rear of the unit). Insert the black wire into pin 2 and insert the red wire into pin 5.

**Figure 2-11:**  
Installing the New  
SCSI Front Panel



9. Reinstall the power supply unit and reconnect the power cables to the power distribution area.
10. Attach the 10-conductor ribbon cable between the controller I/O panel and the newly installed 10-pin connector on the power distribution panel.

**Figure 2-12:**  
Connecting the Front  
Panel Cable to the  
SCSI Controller I/O  
Panel



**Notes**

## 3. The Power Supply Unit

### 3.1 Introduction

---

The modular power supply assembly consists of five power modules and the standard front console with the ON/OFF switch. (The optional SCSI front console is described in Chapter 2.5.) This chapter describes the functions of the power supply modules.

The 260 watt power supply assembly includes five 52 watt power supply modules. Each power module provides +5VDC at 2 amps (3 amps peak) and +12V at 2.5 amps (5 amps peak). The DC outputs are regulated and are not adjustable.

The power supply assembly also contains an AC power distribution printed wiring board (PWB 400825), power distribution connectors that supply DC power to the drives and exhaust fans, and an AC input area.

The fused AC input can be converted between 115VAC and 230VAC via a slide switch located at the rear of the unit (Figure 1-4).

Appendix A contains a detailed wiring diagram of the SA-H188 chassis.

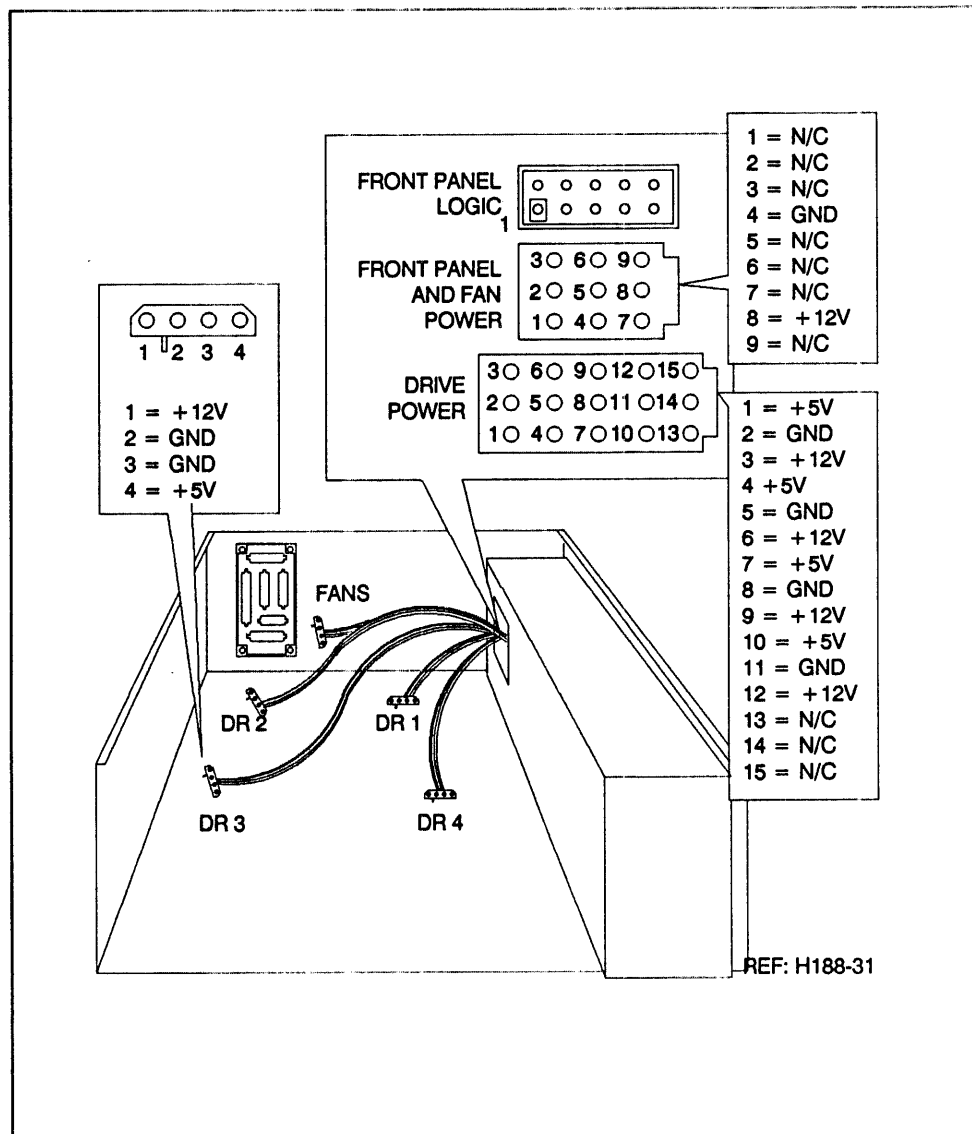


## 3.2 DC Output Cables

The DC outputs are cabled to the drives via a 15-cable power harness from the power supply unit. The fan output are cabled via a 9-pin harness.

Figure 3-1 shows the power cabling from the power supply unit.

**Figure 3-1:  
Power Cables**



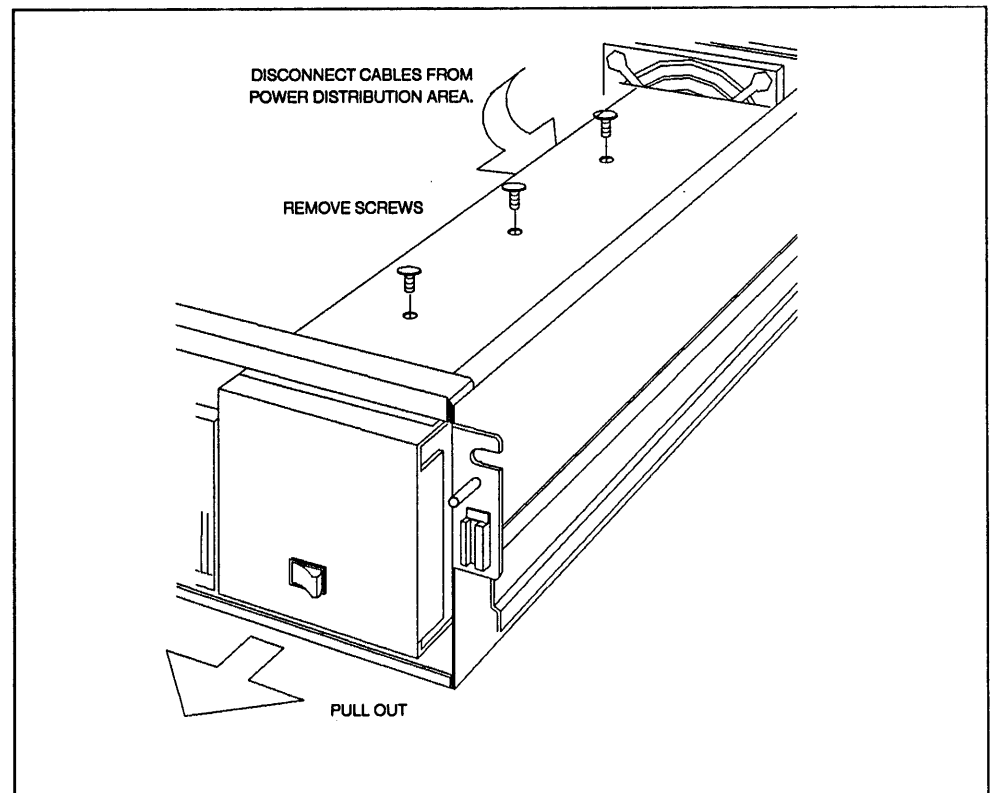
## 3.3 Power Supply Removal

Power cabling is independent so that any power supply module can be replaced without affecting operation of the other drives in the chassis.

If a power supply module must be replaced, use the following figures and procedure to remove the mounting bracket.

1. Unplug the drive and fan/front panel cables from the 15-cable and 9-cable power supply harnesses (Figure 3-1). If a controller 10-pin front panel cable is connected to the controller I/O panel, unplug it at the power supply connector.
2. Remove the three screws over the power supply assembly (Figure 3-2) and pull the power supply assembly forward.

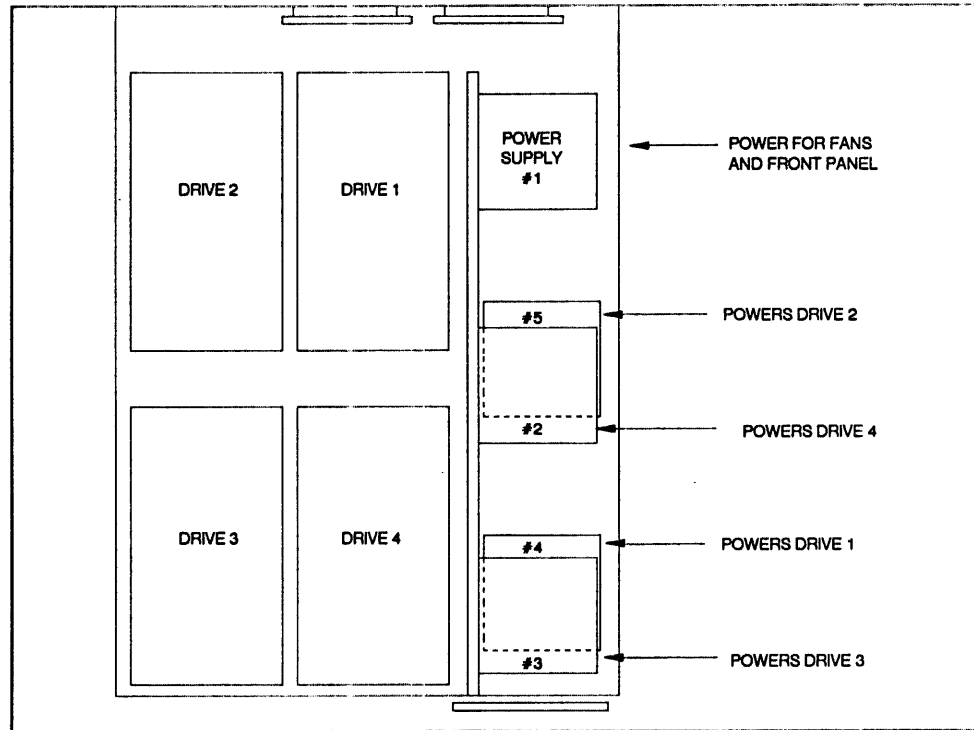
**Figure 3-2:**  
Power Supply  
Removal



### 3.4 Power Module Replacement

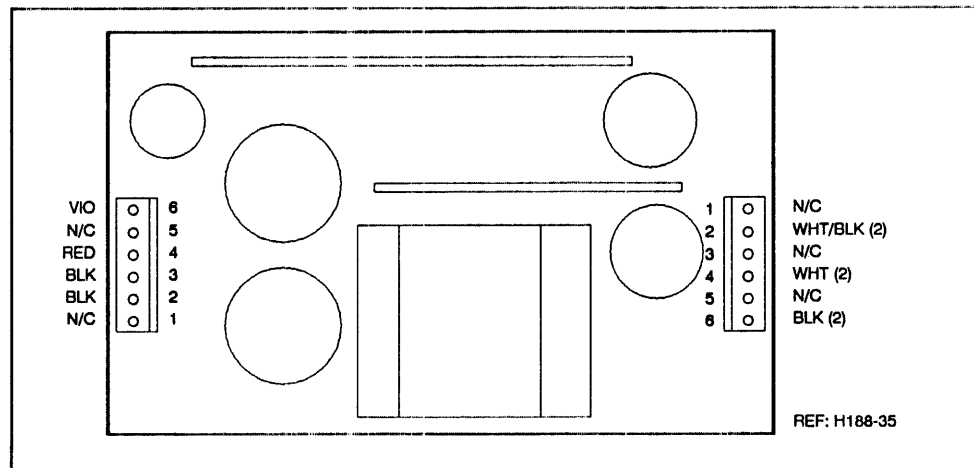
Each board powers one of the four drives. The fifth board powers the fans and front panel functions. Figure 3-3 shows the relationship between each power supply module and its associated drives or fan/front panel.

**Figure 3-3:  
Drive/Power Supply  
Relationship**



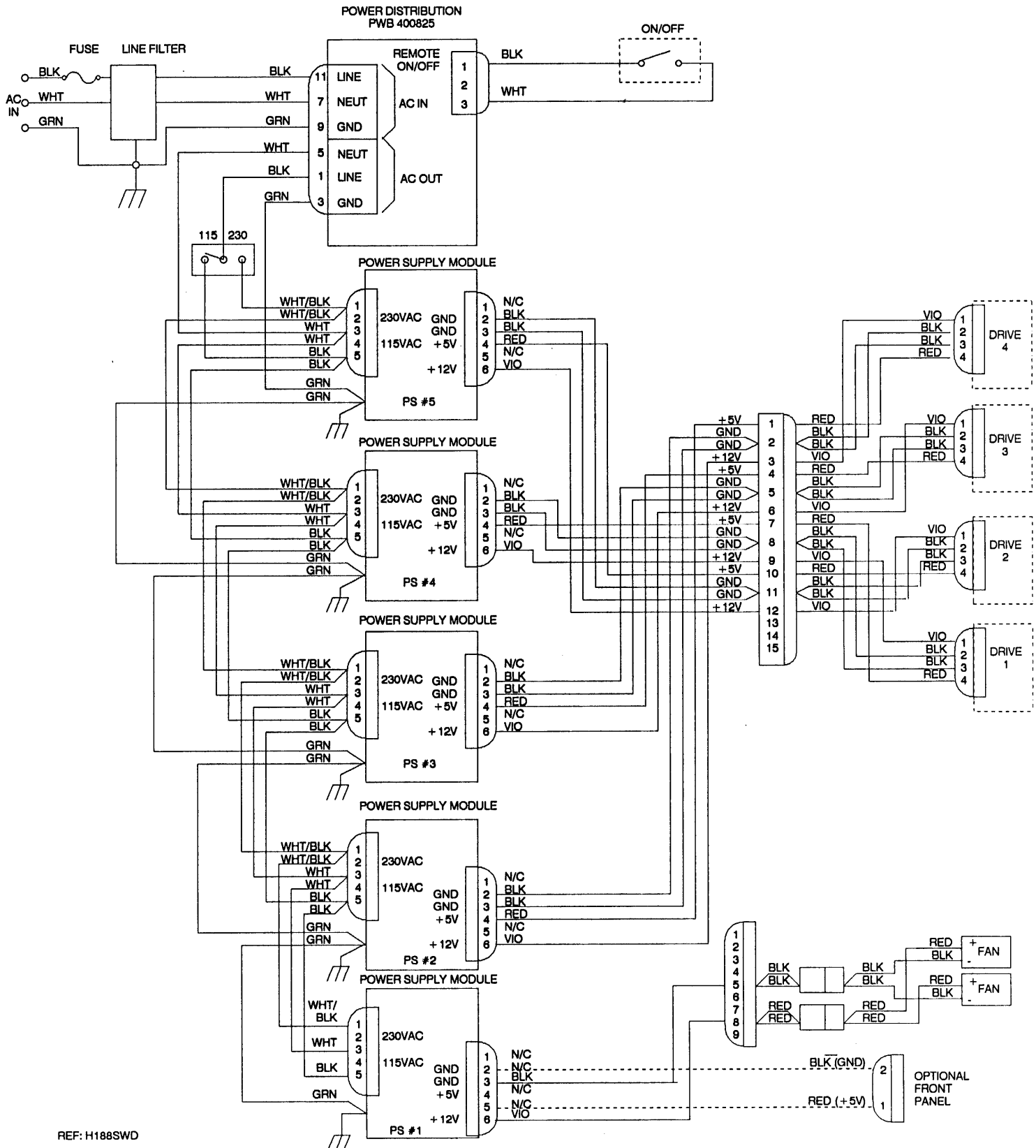
1. Unplug the 6-pin AC connector and the 6-pin DC output connector on the faulty power module. These connectors are shown in Figure 3-4.

**Figure 3-4:  
Power Module  
Connectors**

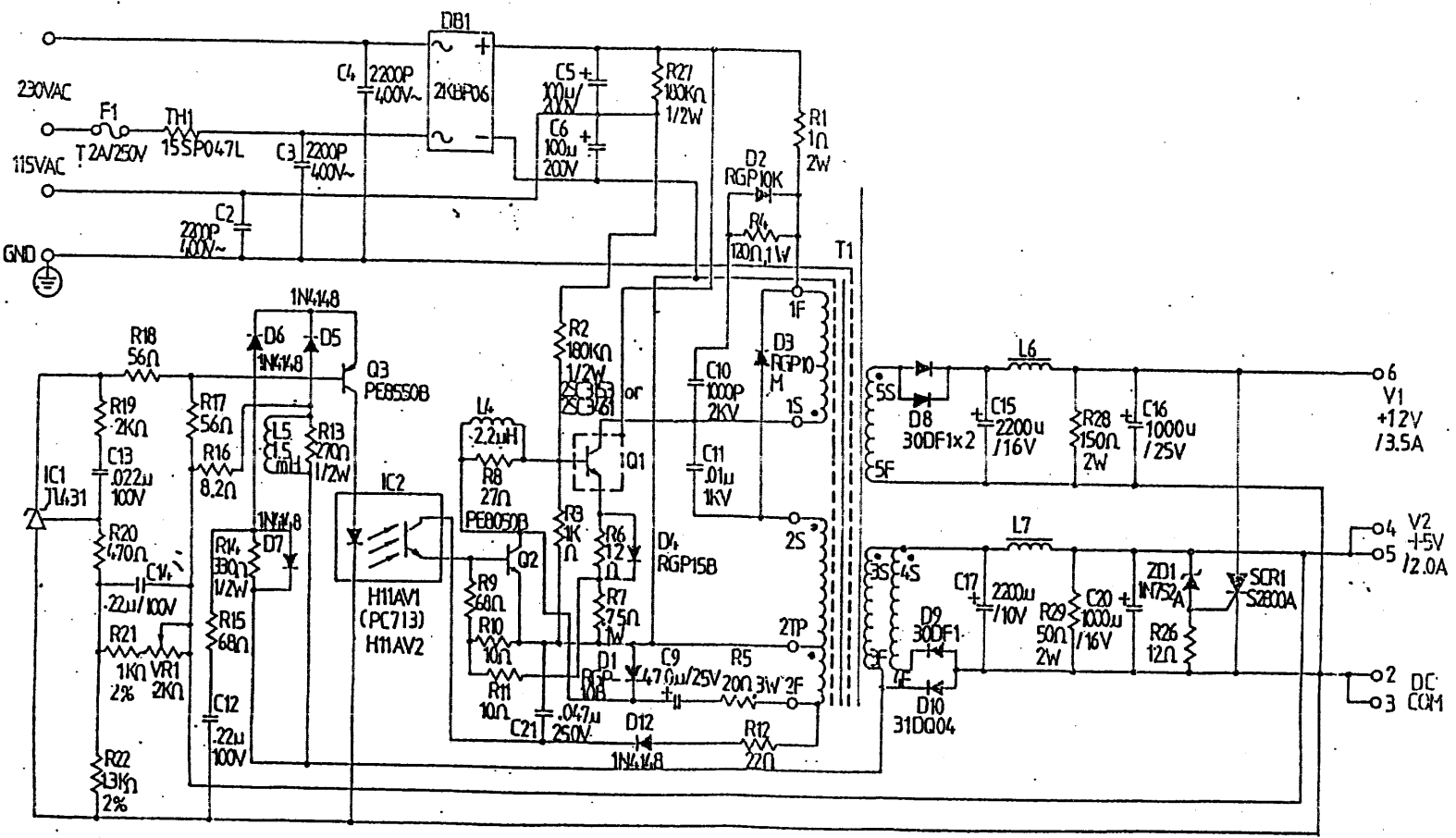


2. Replace the faulty power module and reconnect the AC and DC connectors.

# Appendix A - SA-H188 System Wiring Diagram

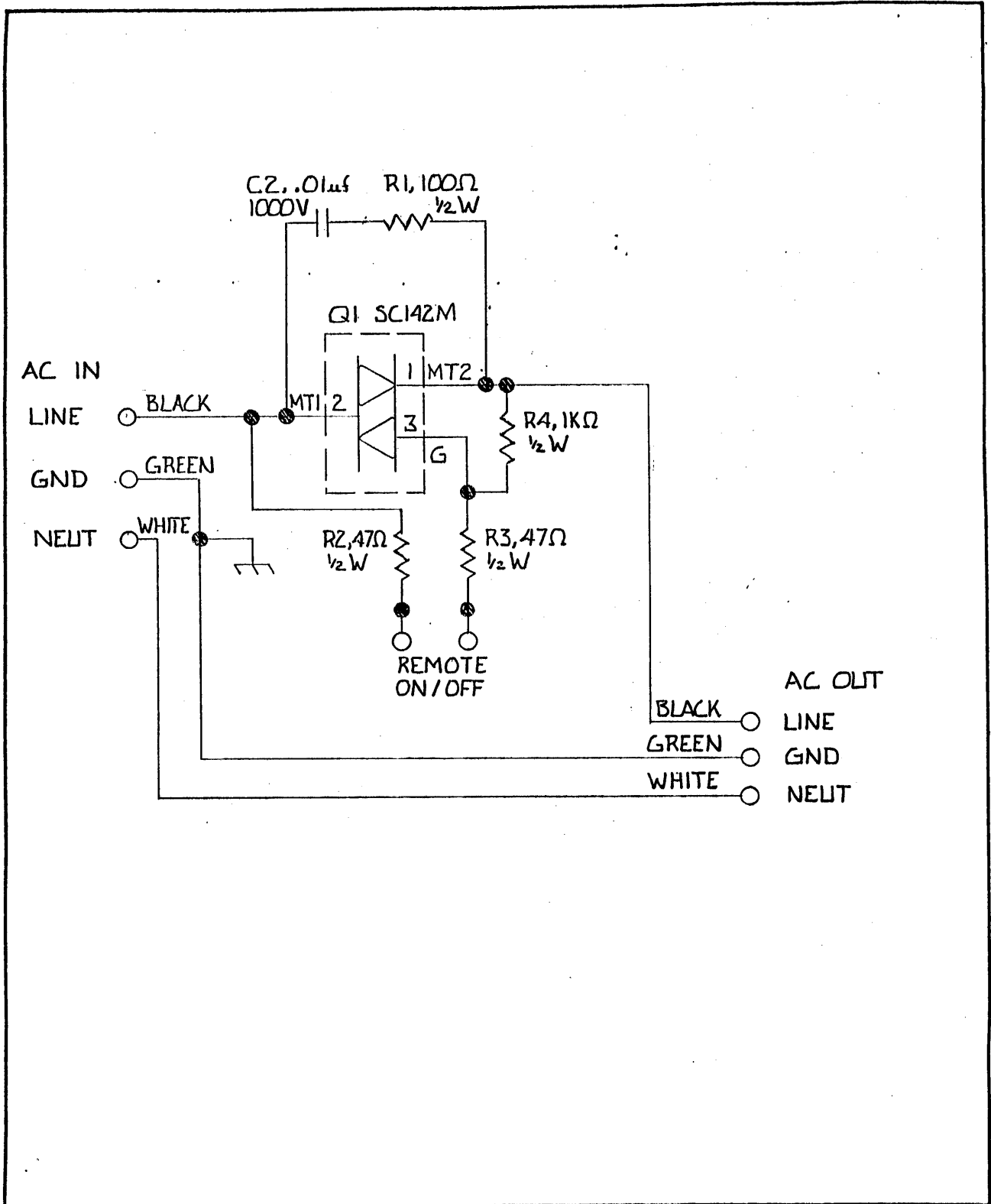


Appendix B - Power Supply Schematic



RESISTOR 1/4W UNLESS OTHERWISE SPECIFIED.  
 ACTIVE COMPONENTS SHOWN ARE TYPICAL. REFER TO "PARTS LIST" FOR DETAILED DESCRIPTIONS.

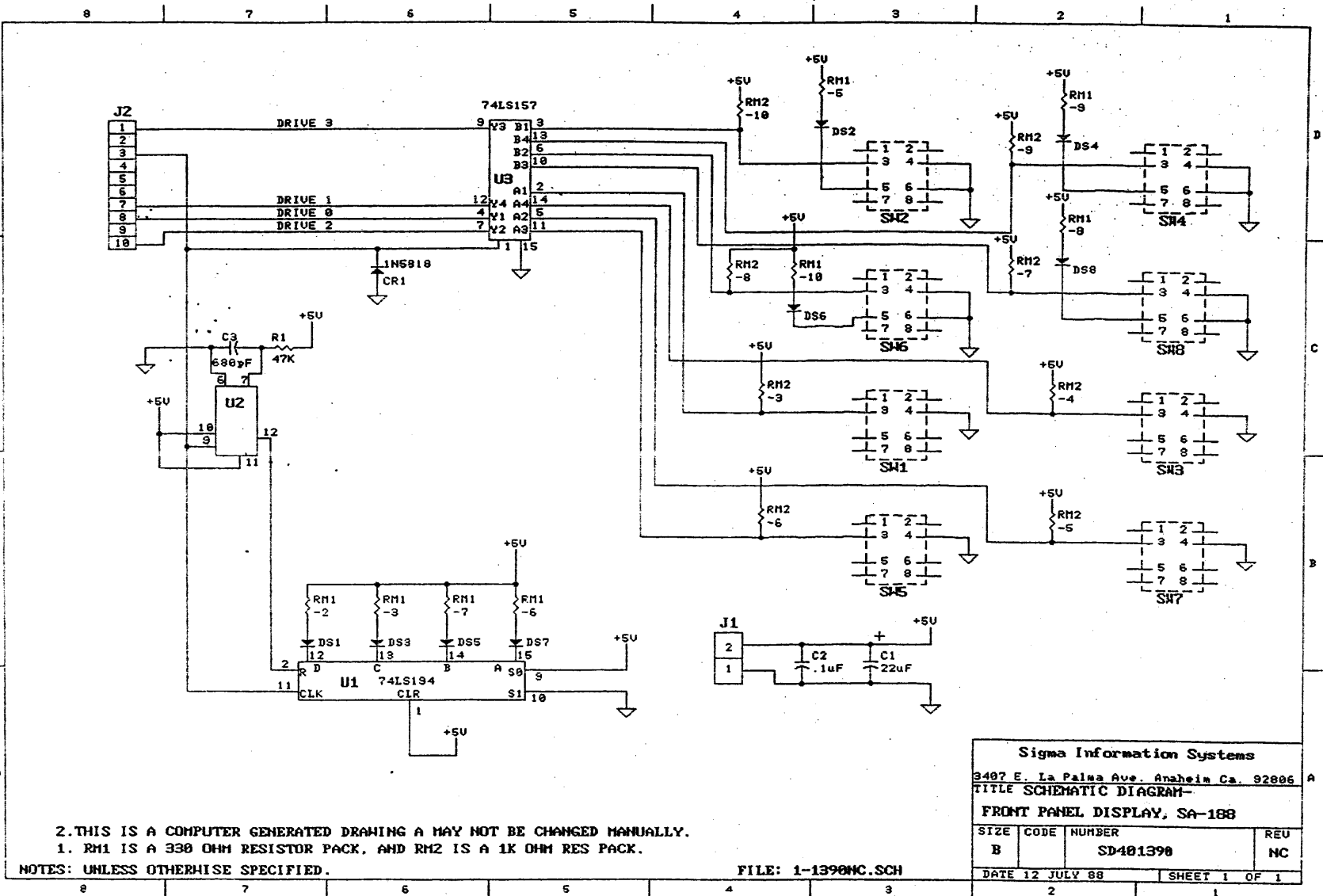
Appendix C - Power Distribution Schematic (P/N 400825)



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SIZE <b>A</b>	CODE IDENT. NO.	DRAWING NO. PL400825
SCALE NONE	REV. C	SHEET 3 OF 3

Appendix D - Front Console PCBA Schematic (401390)



2. THIS IS A COMPUTER GENERATED DRAWING A MAY NOT BE CHANGED MANUALLY.  
 1. RM1 IS A 330 OHM RESISTOR PACK, AND RM2 IS A 1K OHM RES PACK.

NOTES: UNLESS OTHERWISE SPECIFIED.

FILE: 1-1390NC.SCH

Sigma Information Systems			
3407 E. La Palma Ave. Anaheim Ca. 92806			
TITLE SCHEMATIC DIAGRAM-			
FRONT PANEL DISPLAY, SA-188			
SIZE	CODE	NUMBER	REV
B		SD481390	NC
DATE	12 JULY 88		SHEET 1 OF 1