ARIX
Corporation

ARIX System90 Models 45/85
Hardware Installation Guide

ARIX Corporation 821 Fox Lane San Jose, CA 95131

Part No. MA-99386-00 Rev. B

Title:	ARIX System 90, Models 45/85 Hardware Installation Guide
Part Number:	MA-99386-00 Revision B
Date:	April 4, 1990
Written by:	H. K. Bronowicki
Revised by:	Alan R. Whitehorn
Illustrated by:	Robert Rogers and Alan R. Whitehorn
Production by:	Robert Rogers

FCC WARNING:

This equipment generates, uses, and can radiate RF (radio frequency) energy, and if not installed and used in accordance with the information provided by ARIX Corporation, may cause interference to radio communications. It 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, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

This digital apparatus 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 presènt appareil numerique n'èmet pas de bruits radioèlectriques dèpassant les limites applicables aux appareils numèriques de Classe A prescrites dans le règlement sur le brouillage radioèlectriques èdictè par le ministère des communications du Canada.

Table of Contents

Chapter 3 Card Cage Modules

List of Figures

Chapter 3

Chapter 4

Chapter 5

Chapter 6

Chapter 7

Chapter 8

Appendix A

List of Tables

Preface

This manual contains all the information necessary to perform an initial installation of an **ARIX System90 Model 45 and Model 85** computer. It also contains a general description of the system and procedures for removing and installing all field replaceable units (FRUs) of the system.

The intended users of the manual are field engineers, customer support personnel, and system administrators.

Definitions of WARNINGS, CAUTIONS, and NOTES

WARNINGS, CAUTIONS, and NOTES are defined as follows:

WARNING:

A WARNING box calls attention to a condition or action that can cause personal injury if allowed to exist or occur.

CAUTION:

A CAUTION box calls attention to a condition or action that can cause damage to the equipment or the software if allowed to exist or occur.

NOTE:

A NOTE box is used in place of a footnote. It calls attention to or contains amplifying information about or stresses the importance of associated text.

Type Conventions in This Document

- File and directory names are shown in **this typeface.**
- Commands, when they are referenced in the text, are shown in ***this typeface***
- Text that is displayed on the screen is shown in `this typeface`
- Text that you enter on your terminal is shown in **`this typeface`**
- Titles of things such as books, chapters, sections, and tapes are shown in *this typeface*
- Special keys or key combinations, such as Carriage Return or Control d, are surrounded by the characters « and ». These brackets must not be confused with the greater than > and less than < symbols.
  A Carriage Return looks like «CR».
  A Control d (holding down the Ctrl key while pressing d) looks like «Ctrl d».

1 Introduction

This manual contains all the information necessary to installing an ARIX **System90 Model 45 and Model 85** computer. It also contains procedures for removing and installing all field replaceable units (FRUs) of the system. More detailed descriptions of the FRUs appear in the chapters as noted below.

- Card Cage Modules (Chapter 3)
- Power and Status Modules (Chapter 4)
- Removable Media Modules (RMM) (Chapter 5)
- Cooling and Ventilation (Chapter 6)
- DC Power Supply (Chapter 7)
- AC Module (Chapter 8).

WARNING:

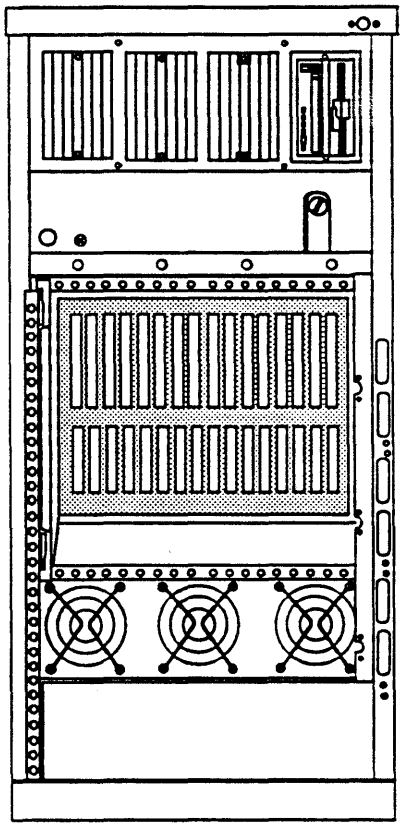
All procedures described in this manual must be carried out by trained, technical personnel ONLY!

System Description

All functional units and subassemblies of the System90 models with the exception of terminals, printers and certain other types of peripheral devices are housed in metal cabinets. These cabinets are referred to as *primary cabinets* (Figure 1-1), *I/O expansion cabinet* which are similar to the primary cabinet and *peripheral expansion cabinets* (Figure 1-2). Primary cabinets are configured with motherboards and associated card cages. I/O expansion cabinets are used to expand the system beyond the primary cabinets capacity. All computational and I/O elements and subsystems are housed in these two cabinets. Peripheral expansion cabinets do not have motherboards nor do they contain elements of the two major functional subsystems.

Primary Cabinet

A *primary cabinet* is the main cabinet in the system. It contains the Computational Subsystem (CSS). It also contains all of the major FRUs listed on the previous page.



Primary Cabinet with
16-Slot Card Cage

Figure 1-1. Cabinet

I/O Expansion Cabinet

The *I/O expansion cabinet* is nearly identical in appearance to a primary cabinet, but accommodates only components of the I/O Subsystem (IOS), the AC Module, the Cooling System and the DC Power Supply. It also contains the Removable Media Module (RMM).

Peripheral Expansion Cabinet

A *peripheral expansion cabinet* has the same exterior dimensions as the other two cabinets but is used exclusively to house optional peripheral devices for the system. The peripheral expansion cabinet can house the following peripheral devices:

- Five SCSI trays containing up to six 5 1/4-inch drives in each tray.
- Up to two SCSI 9-track tape drives with a single SCSI tray.

Each peripheral section is 7" high and accommodates a standard ARIX peripheral device. Each cabinet contains five peripheral sections.

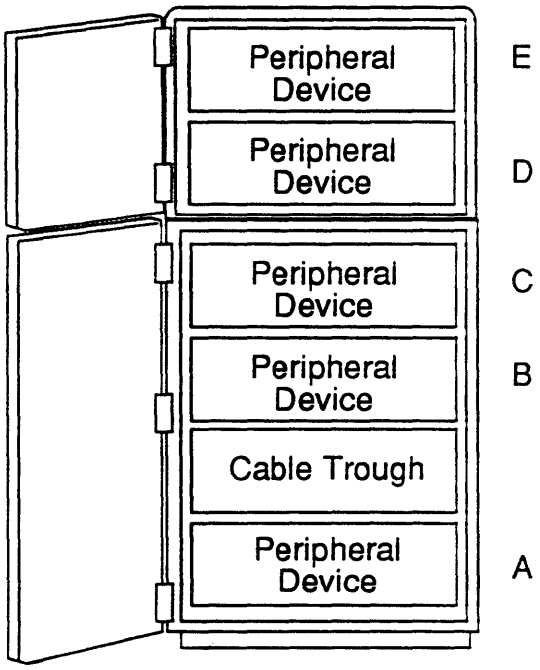


Figure 1-2. Peripheral Expansion Cabinet

System Configurations

Two models of the System90 are available: the *Model 45* and the *Model 85*. The configurations include two major functional subsystems, the Computational Subsystem (CSS) and the I/O Subsystem (IOS). The various configurations are housed in one or more cabinets. The maximum complement of cabinets for either system is seven.

Model 45

The *Model 45* (Figure 1-3) is primarily a standalone, single cabinet system. The single primary cabinet has a 16-slot motherboard. The Model 45 can be expanded through the use of I/O and peripheral expansion cabinets.

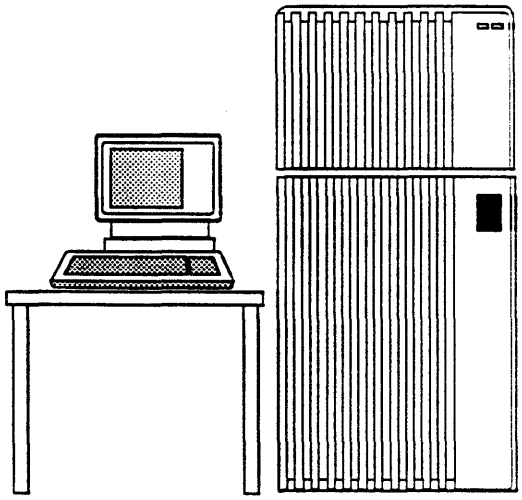


Figure 1-3. Minimum Model 45

Model 85

The minimum *Model 85* (Figure 1-4) is a two-cabinet system:

- A *primary cabinet* (CSS) having a 16-slot motherboard

  and

- An *I/O cabinet.* (IOS) with a 16-slot motherboard

The Model 85 can have up to four I/O cabinets and additional peripheral expansion cabinets. All compute subsystem (CSS) boards must reside in the Primary cabinet, IOS boards (Controllers) must reside in the cabinet. The I/O Processor Module (IOPM) can be installed in either the CSS or IOS cabinet depending on the system configuration requirements.

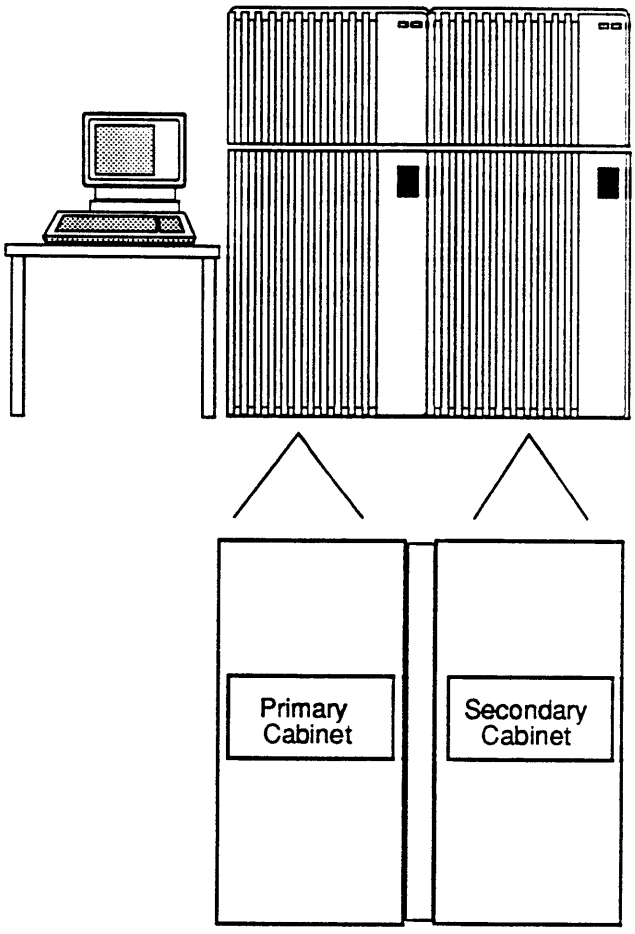


Figure 1-4. Minimum Model 85

System Control

The operator controls the system from an *operator control panel* located in the primary cabinet (Figure 1-5) and a system console terminal. The operator control panel, has a three-position keyswitch and two LED indicators in the upper right corner of the cabinet door, these functions are further shown in Table 1-1.

Table 1-1 Control Panel LED Indications

LEDs		Indication
Green	Yellow	
OFF	OFF	No AC power or main circuit breaker off.
OFF	ON	AC power on and SPM active, main system power off.
ON	OFF	Full System has power.
ON	Flashing	Abnormal condition, detailed information displayed on console terminal

The keyswitch is used to power the system up, down and to perform a manual reset. Two indicator LEDs (one yellow, one green) indicate power on and operational status.

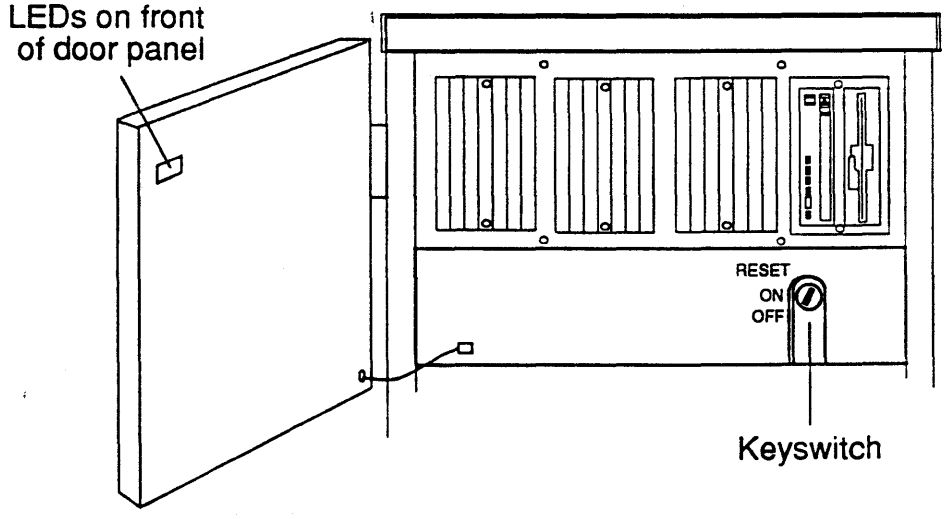


Figure 1-5. Operator Control Panel

The primary cabinet has four RS-232 serial ports (Figure 1-6) located on the Console Board at the left rear of the cabinet near the center.

Console

The console terminal connects to the Console port in the read of the system in the primary cabinet. All system diagnostics as well as operating system commands can be performed from the console terminal.

Remote Console

A remote console port is provided for remote system access and diagnostics. To act as a remote console port, a modem should be connected to this serial port .

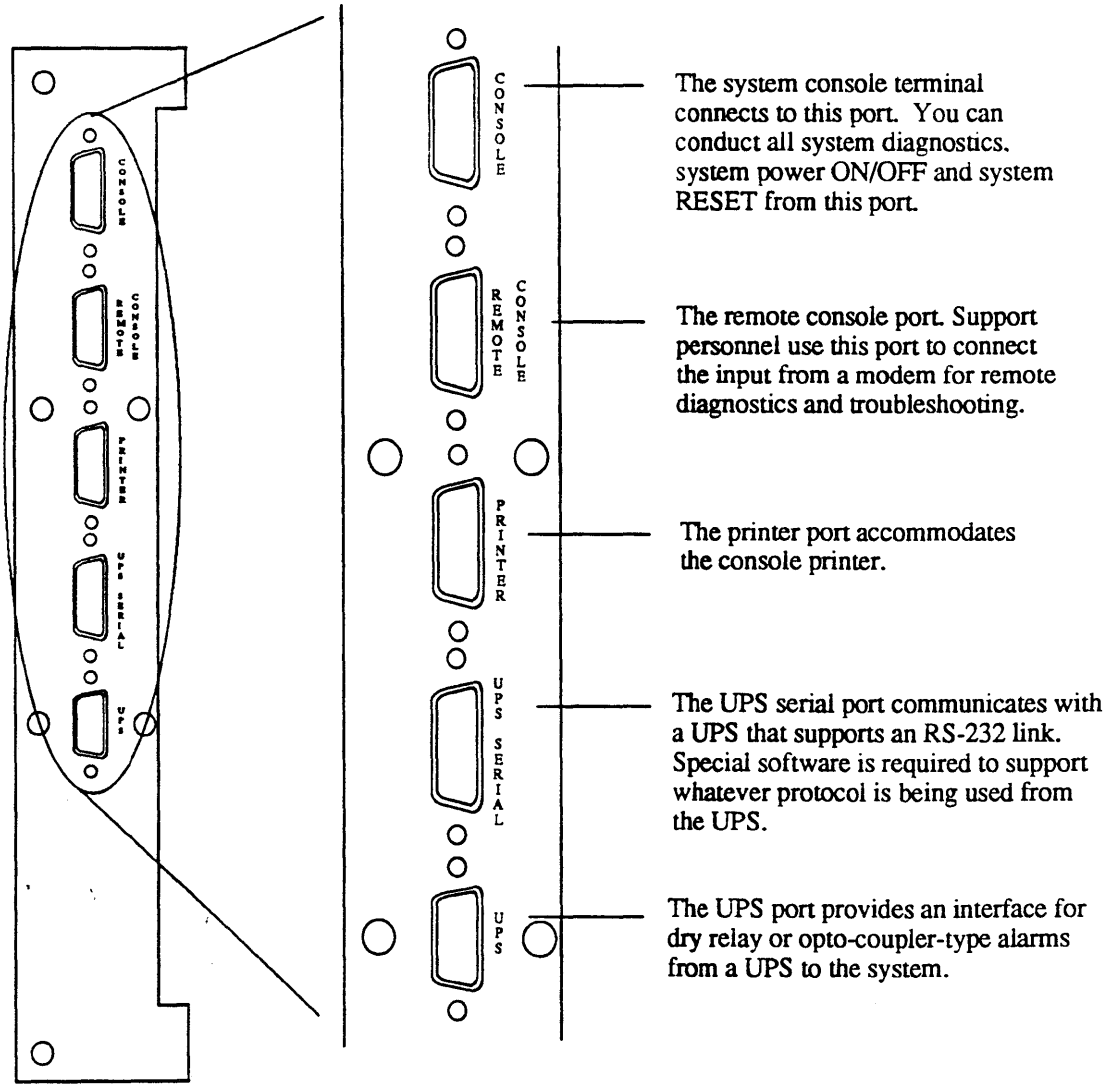


Figure 1-6. System Serial Ports

2 System Installation

Installing a full **ARIX System90 Model 45** or **Model 85** computer, single or multiple cabinet, at a new site normally consists of the following operations:

- Gathering the required materials and personnel
- Unpacking the hardware
- Placing the hardware units in their operating positions
- Installing spacers, disk drives and tape drives in the expansion cabinets (if any)
- Connecting peripheral hardware units, such as the system console
- Connecting the system power and logic cables
- Powering on the system and performing power-up checks
- Checking the system for correct operation.

Although a console terminal is a system requirement and is shown in figures as an integral unit of the system, installation of peripherals other than those shipped inside the ARIX cabinets are not covered in this manual. Please refer to the System90 Model 45 and Model 85 Site Preparation Guide along with the manufacturers documentation for detailed installation instructions.

Installation Requirements

Before beginning, make sure you have all of the material and personnel listed below.

CAUTION:

Substantial assembly of multicabinet systems and peripherals is required at the installation site by *trained personnel.*

Installation Team Personnel

A *minimum* installation team consists of three persons as follows:

1. An ARIX field engineer or -- someone with equivalent ARIX product line knowledge
2. At least one assistant
3. A software specialist -- someone familiar with the system supervisor level software

Tools and Test Equipment

You need the following tools and test equipment to install the System90 equipment cabinets:

1. A floating bubble level
2. Slot head and phillips head screwdrivers, sizes 1 and 2 and an additional short or stubby phillips head
3. A 9/16-inch open end wrench
4. A 1/2-inch open end wrench
5. A small flashlight.
6. An *electro-static discharge* (ESD) ground strap for the wrist

Documentation

To install the complete system, including peripheral devices, you need the following documentation:

1. This manual
2. ARIX *System90 Model 45 and Model 85 Site Preparation* manual
3. *Uninterruptible Power Supply Guidelines for the ARIX System90* if installing a UPS.
4. *ARIX OS/90 Software Release Notes* and Installation Procedure for the Software release being installed.
5. A floor plan (preferably the one generated during site preparation time) showing the position of each cabinet and other major units in the system
6. If cables to terminals, modems, printers, and other external peripheral devices pass from room to room, you may also need the architectural plans for the building in which the system is installed.

> NOTE:
>
> Before carrying out any of the procedures or operations described in this manual, read the entire procedure first.

Unpacking

System 90 cabinets are crated and packed individually. In multicabinet systems, some of the hardware items are shipped in separate packages as noted in the procedures below. The shipment may also have non-ARIX units (terminals, printers, modems, etc.) Unpacking procedures for these devices appear in the respective manufacturer's manuals.

Preliminary Procedures

1. Before unpacking each unit check it for any exterior signs of shipping damage. If you find any such signs or suspect any, report the facts to the carrier before accepting the shipment.
2. Check the tilt and shock watches on each unit for indications that the unit has been tilted excessively or subjected to excessive shock.
3. After unpacking each unit, again check for signs of damage.
4. Take inventory of the shipment and check it against the shipment manifest and your purchase order.
5. If you find any damage, items missing, or other irregularities with the shipment, report the facts to the carrier and to your ARIX Customer Support representative (Section 12).

Unpacking System Cabinets

Unpack system cabinets as follows:

1. Hold the cabinet loading ramp so that it cannot fall and cut the four plastic binding straps that hold the ramp and crated unit (Figure 2-1).
2. The AC power cord for the cabinet is shipped coiled in a compartment on the under side of the loading ramp (Figure 2-2). Remove the power cord from the compartment and push it to one side so that you can move the ramp.
3. Ease the ramp to the floor and lay it to one side temporarily.
4. Remove the four shipping edge boards from the edges of the hood.

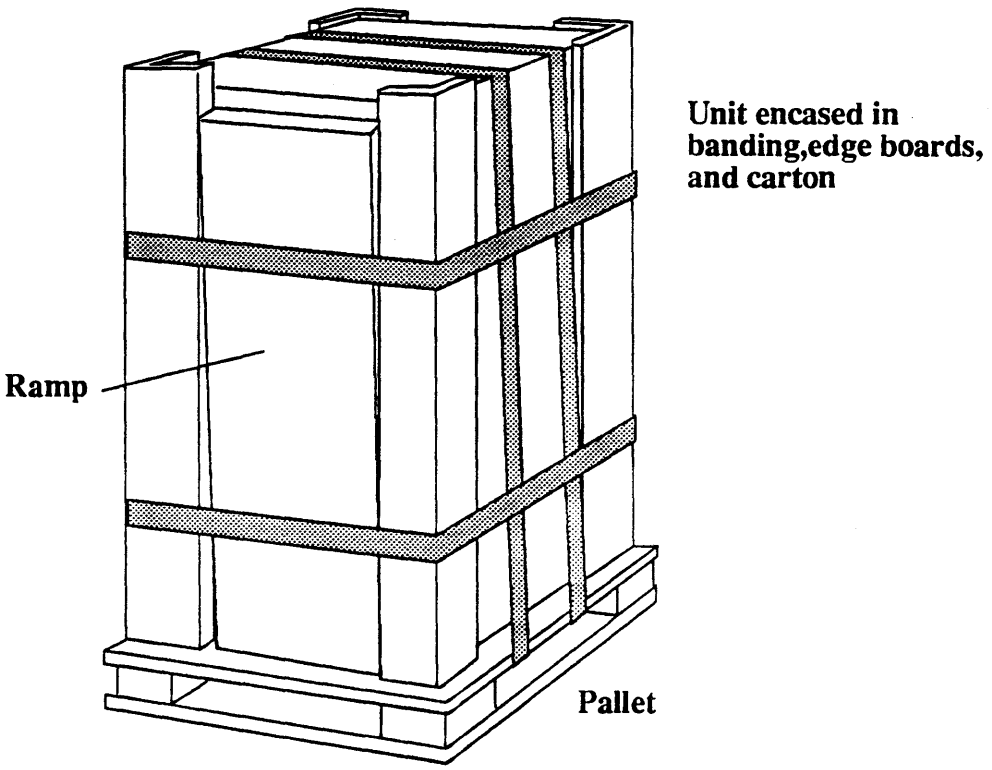


Figure 2-1 System90 Cabinet in Packing Crate

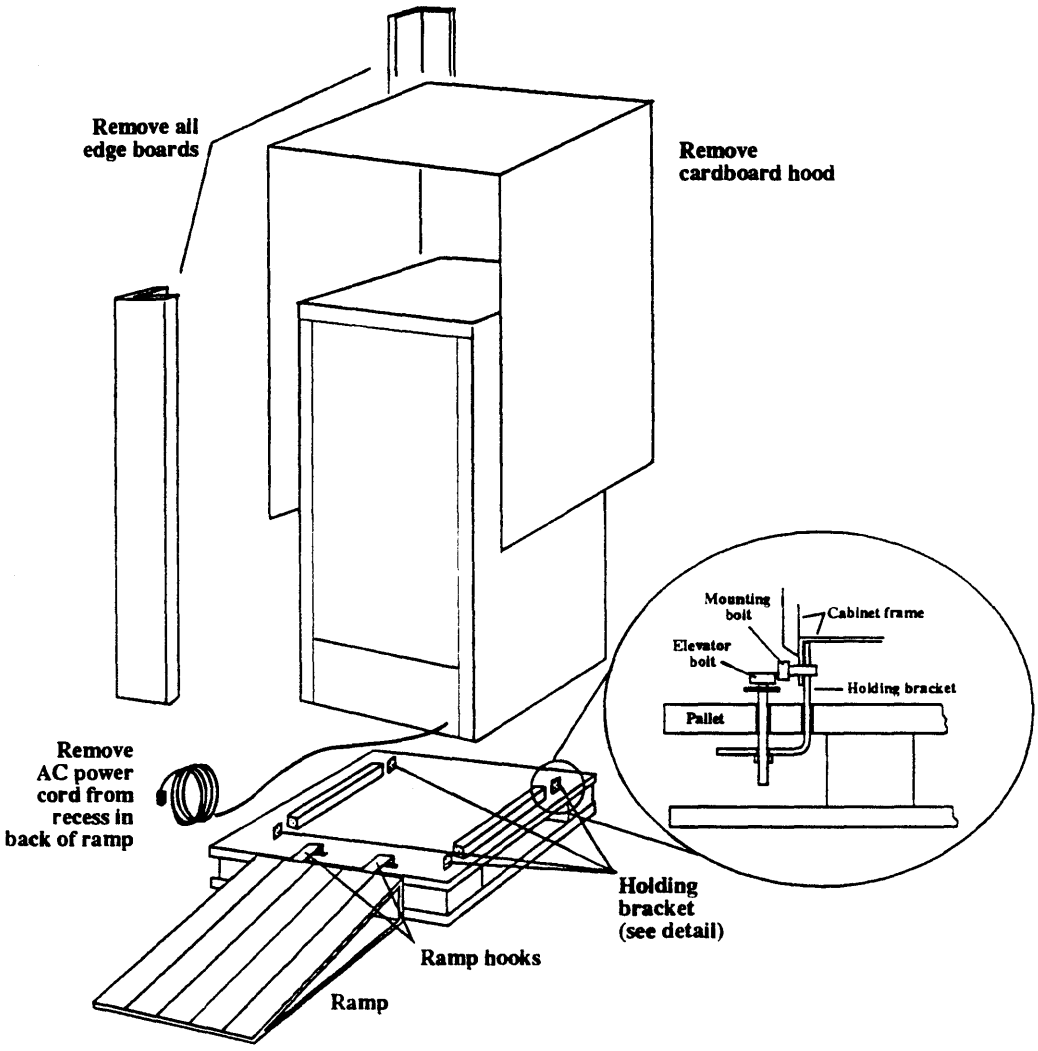


Figure 2-2 Cabinet Packing Crate, Exploded View

CAUTION:

At least two persons should carry out the next step, one on the ramp side to support and steady the cabinet as it rolls down the ramp and one on the opposite side to push on the cabinet.

1. Gently roll the cabinet off the pallet and down the loading ramp onto the floor.
2. Move the cabinet to its approximate final location.
3. Lift the cardboard hood off the cabinet (Figure 2-2) and set it aside.
4. Remove the plastic shipping bag by pulling it over the top of the cabinet.
5. Store all packing materials and containers in case you have to return a unit to the factory.
6. If you are installing a multiple cabinet system, the shipment includes some additional hardware items packed in banded, cardboard cartons. Cut the bands, open the cartons, and remove the items.

Unit Placement

To assist you in carrying out the procedures in this section, refer to the floor layout diagram produced for this installation at site preparation time as described in the *System90 Site Preparation* manual. As you will observe in that diagram, placing the System90 units in their operating positions includes placing the external peripheral units (system console terminal, printers, etc.). You can find procedures for preparing these peripheral units in the respective manufacturer's documentation.

Single Cabinet Systems

If you are installing a single cabinet system, unit placement consists of placing the primary cabinet in the position from which it will operate and stabilizing it. Proceed as follows:

1. Place the primary cabinet in the position it will occupy during operation.
2. Use a 1/2-inch wrench or suitable adjustable wrench and lower the leveling feet at each of the four corners of the cabinet until all the weight is off its casters (Figure 2-3).

3. Some system disk drives are shipped separately. Install the disk units as described in Section 5.
4. Check the level of the cabinet with the bubble level. If necessary, adjust each foot to bring the cabinet into a level condition.
5. Place the console terminal and all other external peripheral devices in their operating positions according to your floor layout diagram.

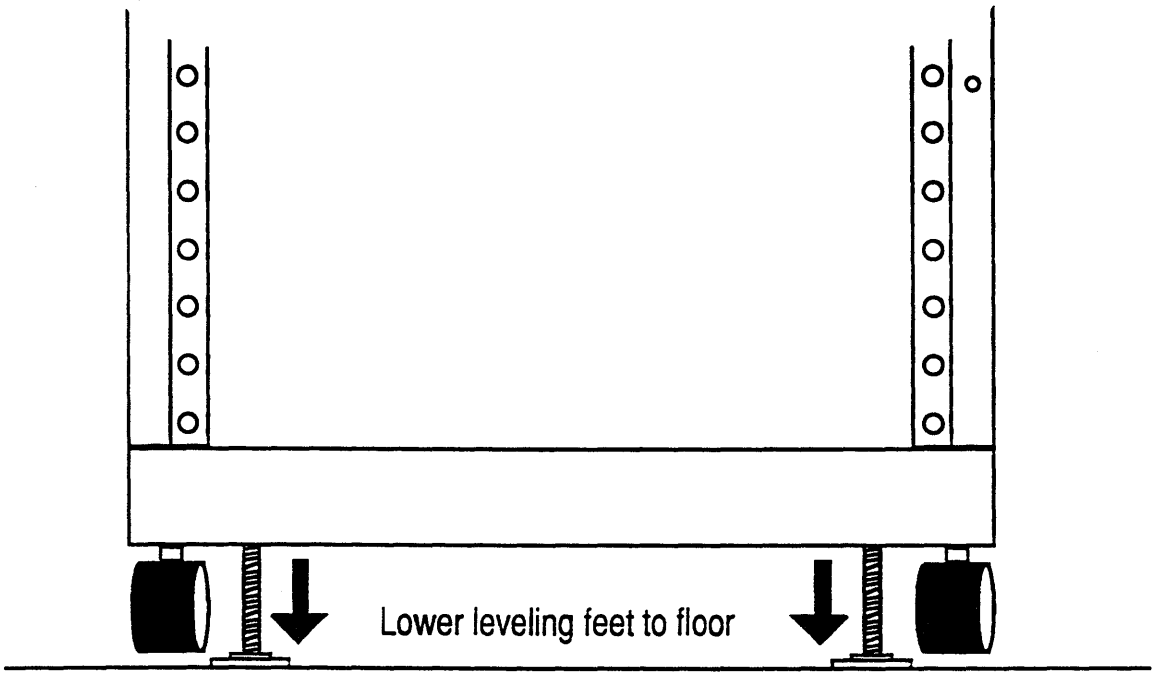


Figure 2-3. Cabinet Placement, Single Cabinet System

Multicabinet Systems

If you are installing a multicabinet system, unit placement involves bolting the cabinets together and installing EMI shields through which signal cables between cabinet card cages must pass.

The cabinet joining procedures in this section cover only the primary and one other cabinet. If your system has more than two cabinets, repeat the steps for joining cabinets three through seven as required.

1. Place the primary cabinet in the position it will occupy during operation.

   You must observe some restrictions with regard to the positions of the different types of cabinets relative to the main cabinet (Figure 2-4).

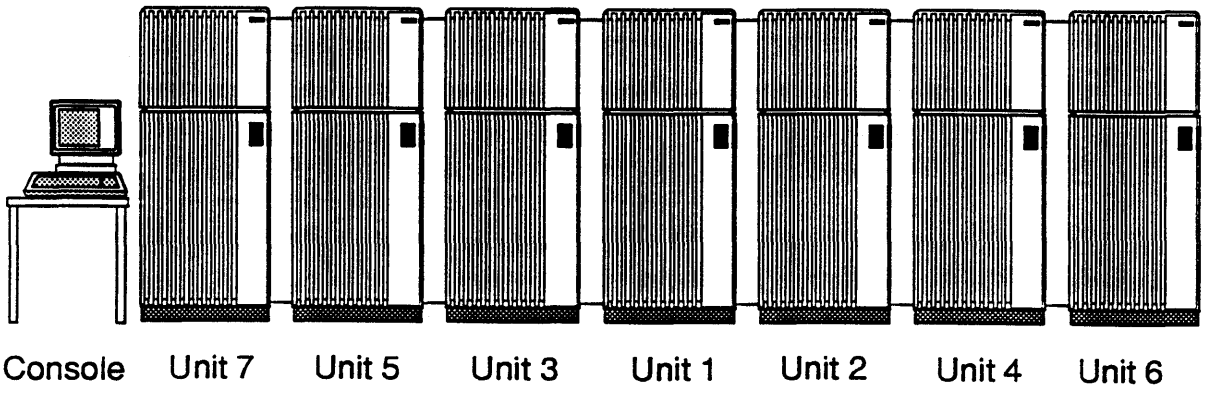


Figure 2-4. Suggested Cabinet Arrangement for Multicabinet Systems

Cabinet positioning starts with the primary cabinet. Cabinets which contain backplanes must be immediately adjacent to one another. Peripheral expansion cabinets may be not placed between cabinets with backplanes. The cabinet number sequence shown at the top of each cabinet above is just a suggested order for joining the cabinets and has no other significance.

2. Lift the doors off their hinges (Figure 2-5).

3. When you receive a multicabinet system for installation, the primary cabinet may have all its outer covers in place. The other cabinets are not shipped with side covers. The side covers of the primary cabinet become the side covers of the end units of the system.

   As applicable, remove the top covers, the outer side cover to which the expansion cabinet is to be attached, the EMI end cover plate on the same side of the expansion cabinet will be located,cable trough cover at rear and the bar at the top front of each cabinet.

   The outer covers are held in place by flat metal tabs welded to the covers on the inner sides and two screws. These tabs slide tightly over the frame plates and fit into cutouts in the inner panels of the machine (Figure 2-5). To remove an outer cover, proceed as follows:

   3a. Open the top front plastic door and disconnect the LED cable; then, gently lift the door off its hinges.

   3b. Loosen the captive slot screw which can be located through a hole underneath the filler panel, just under the top cover of the system. This holds the top cover; then slide the cover backwards and off.

   3c. Loosen the two screws which are located at the lower corners of each side panel; then, grip the panel in the center and lift it straight up and out .

   Set all the covers aside and clear of the immediate work area. You will not put them back in place until after you install the cables, as described in the next subsection.

4. Some peripherals are shipped separately. Install the units as described in the manufacturers documentation to ensure correct installation and to prevent any possible damage.

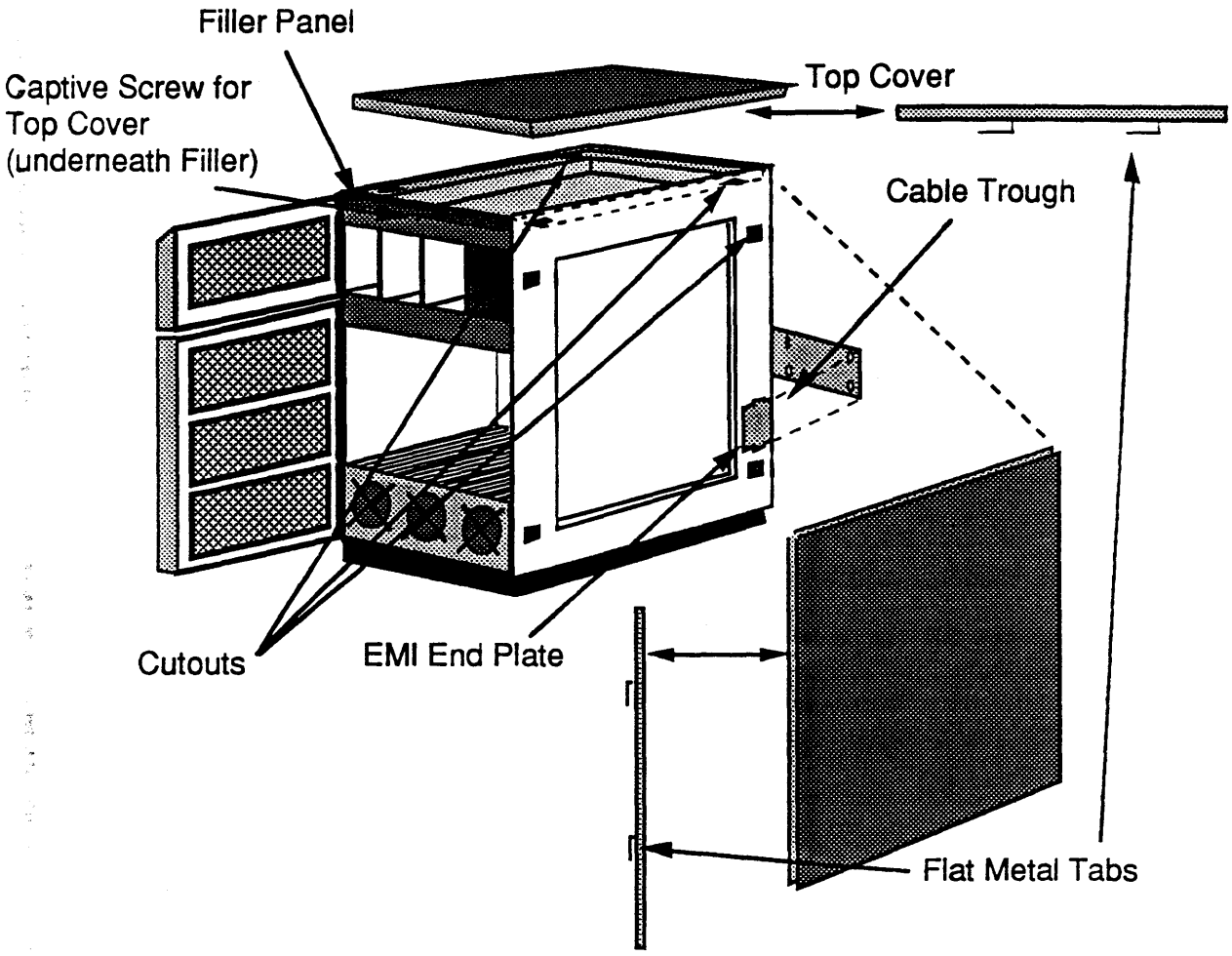


Figure 2-5. Cabinet Door and Cover Removal

5. Remove the end plates from the inner sides of the cable trough (Figure 2-6), if required.

6. Place the other cabinets in the approximate positions they will occupy during operation. Allow sufficient clearance between cabinets to work easily until you have mounted the joining brackets.

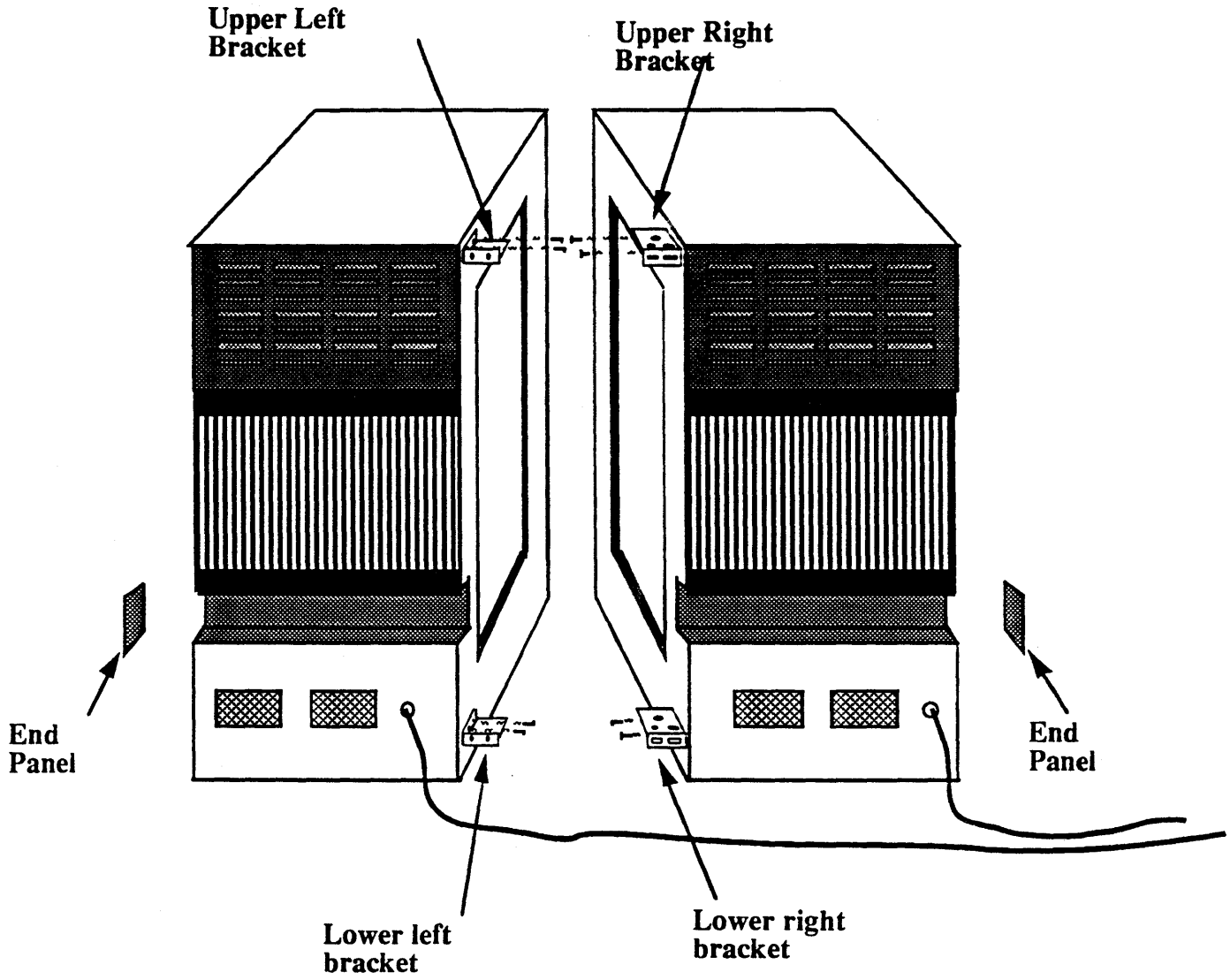


Figure 2-6. Mounting the Rear Joining Brackets

7. Using the phillips head screws for each bracket, mount the two pairs (upper and lower) of rear joining brackets to the frames of adjacent cabinets (Figure 2-6). The brackets are in the general shape of shallow boxes with two sides missing. A right bracket has a stud mounting hole on its under side. Mount the right brackets on the cabinet to your right as you face the rear of the cabinet with the open part of the box down. Mount the left brackets on the cabinet to your left with the open part of the box up. Tighten all rear bracket mounting screws firmly at this time.

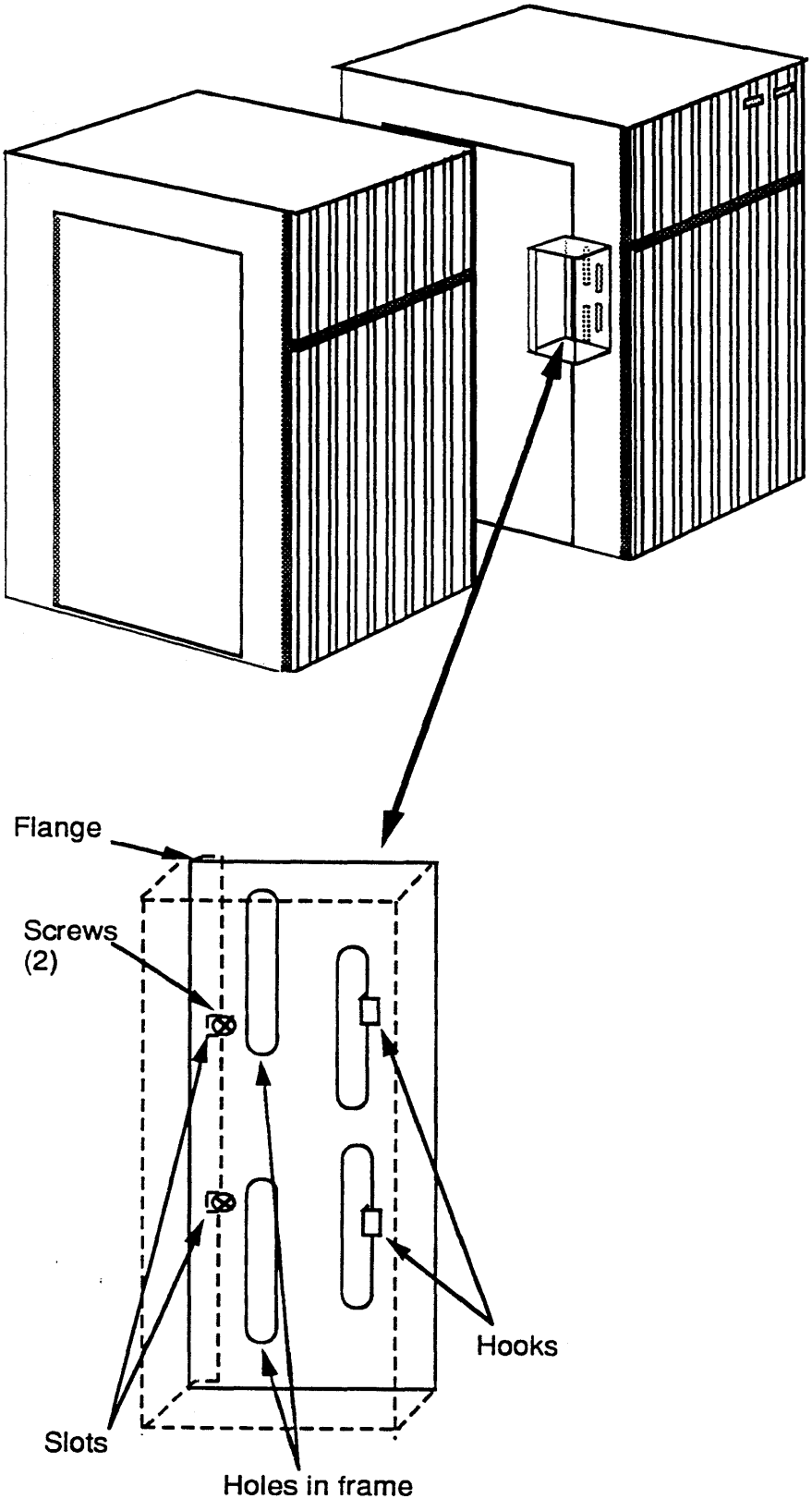


Figure 2-7a Mounting the IOM/IOSBA Cable Shield

8. Mount the EMI shield for the Input-Output Module/Input-Output System Bus Adapter (IOM/IOSBA) data cables (Figure 2-7a) to the frame of the right cabinet as follows:

   8a. Loosen the fourth and fifth screws on the side frame panel two or three turns.

   8b. Hold the shield against the side panel and slide the flange with two slots of the shield under the screws. On the same side of the flange are two hooks in front of the shield. Hook them in the front slots of the frame.

   8c. Hold and push forward against the side panel and tighten the screws.

9. Using two phillips head screws for each bracket, mount the three front joining brackets to the frame of the right cabinet in the positions shown (Figure 2-7b). Do not tighten the mounting screws at this time. You may have to move or readjust the position of the brackets when you join the cabinets.

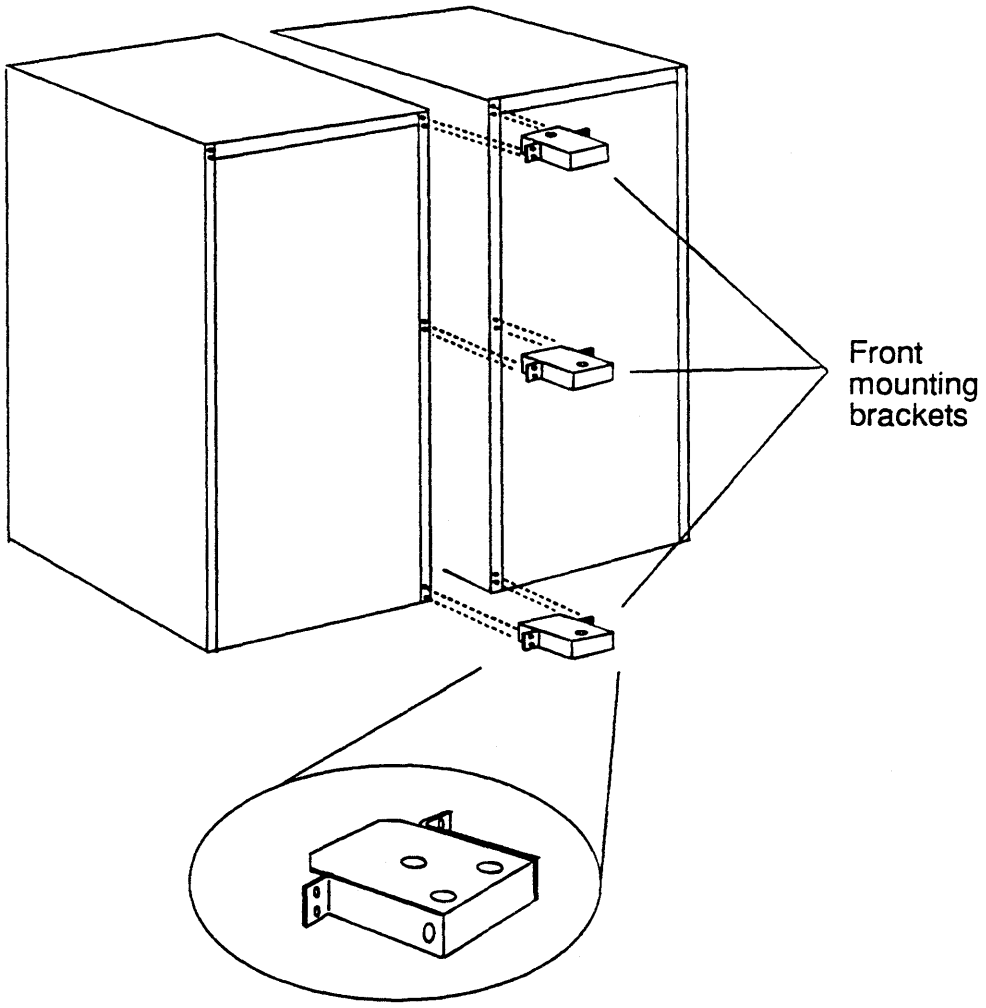


Figure 2-7b Mounting the Front Joining Brackets

10. Join the two cabinets as follows:

> NOTE:
>
> Make sure that the right brackets mate flush with the frame edges of both cabinets. If they are not flush, you will be unable to install the rear filler strips.

> NOTE:
>
> If possible, two to three people should perform the final steps in this procedure.

10a. Roll the second cabinet next to the primary cabinet.

10b. Push the cabinets together. As you do so, slide the rear joining brackets together so that the left brackets are underneath the right brackets. See that the right brackets touch against the frame members of the other cabinet; see also that the screw holes in the brackets are approximately aligned with the corresponding threaded holes in the second cabinet.

If the screw holes are not in alignment, adjust the leveling feet until they are.

10c. With the rear brackets correctly positioned, thread the phillips head screws through the elliptically shaped slots in the back sides of the *right* brackets and into the threaded holes in the back sides of the *left* brackets (Figure 2-8). You will have to hold the cabinets together, *perhaps with some force*, so you can thread the screws correctly. Do not fully tighten these screws at this time.

After threading the rear bracket screws and before connecting the front bracket screws into the left cabinet, tighten the rear screws completely (this will take out all of the minute slack in the alignment of the cabinets being connected) and check the screw hole alignment on the rear filler strip.

If the holes line up, install the filler strip. If they do not line up, remove the filler strip and adjust the cabinets to correct any alignment (for example, reinstall the rear filler strip to check the screw hole alignment.) When the alignment is corrected, tighten the rear bracket screws and install the filler panel.

NOTE:

It is much easier to complete the installation of the brackets and filler strips BEFORE connecting both sides of the front brackets.

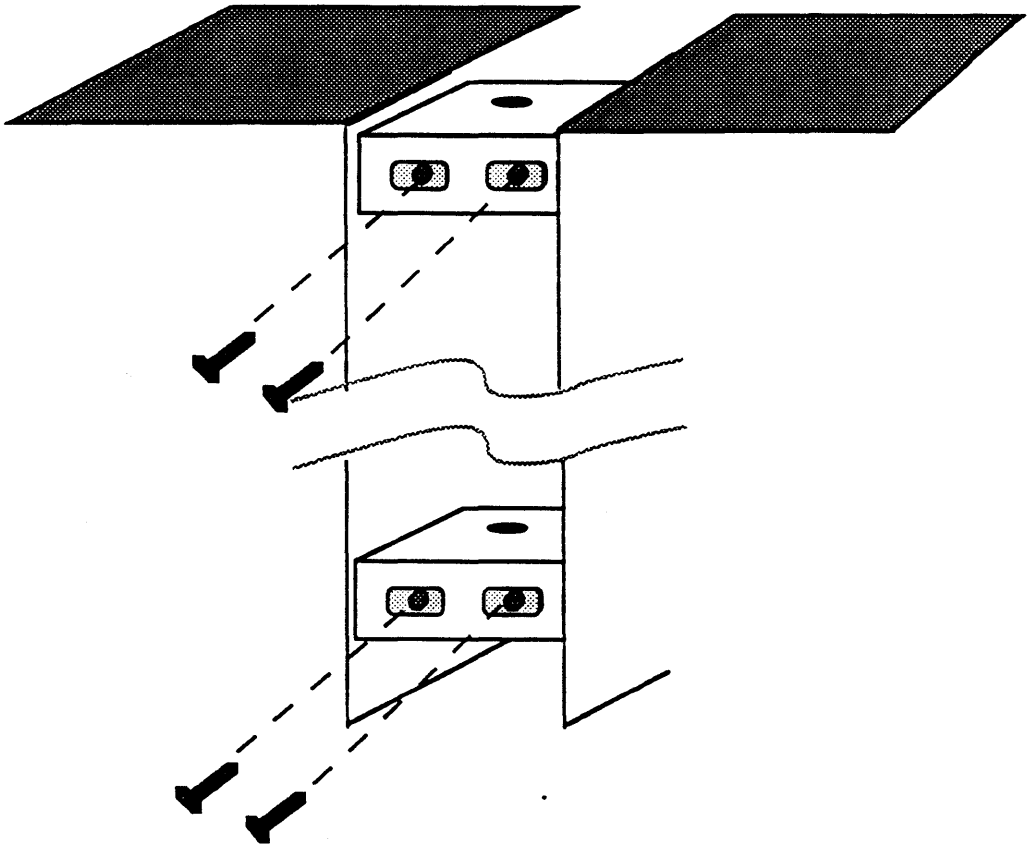


Figure 2-8. Connecting the Rear Joining Brackets

11. Use a 1/2-inch wrench or suitable adjustable wrench and lower the leveling feet at each of the four corners of the second cabinet until all the weight is off its casters (Figure 2-6) and the unit is level. Check the level with a bubble level.

12. Using two phillips head screws per bracket, connect the front joining brackets to the other cabinet (Figure 2-9). Tighten all of the front joining bracket screws prior to mounting the filler strips.

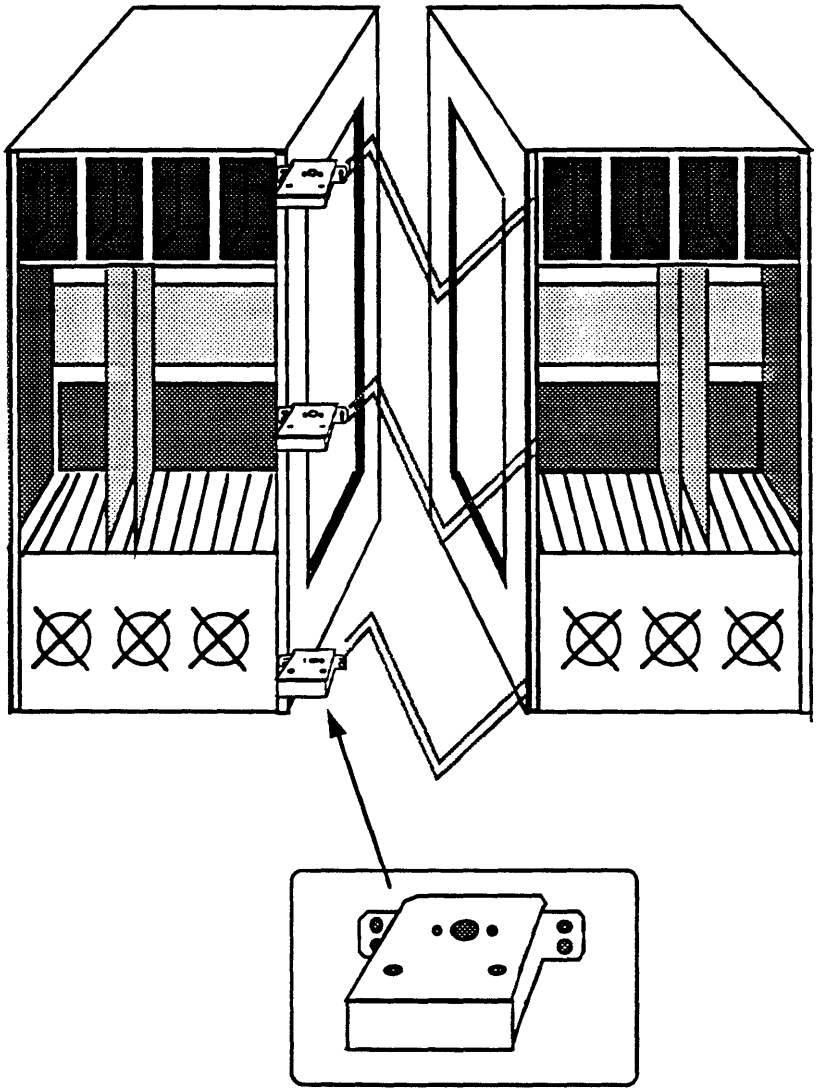


Figure 2-9. Connecting the Front Joining Brackets

13. Mount the other cabinet filler bezel (Figure 2-10), in the following order:

    13a. The front bezel is held in place by pairs of screws in each of the front joining brackets: two in the top of the top bracket and one in each side of the the middle and lower brackets as shown in the figure.

    13b. The top bezel has two press-in ball studs(which are initially screwed on the top strip) under side that fit into the holes in the tops of the front and rear joining brackets. Place the studs into these holes and press the bezel into place.

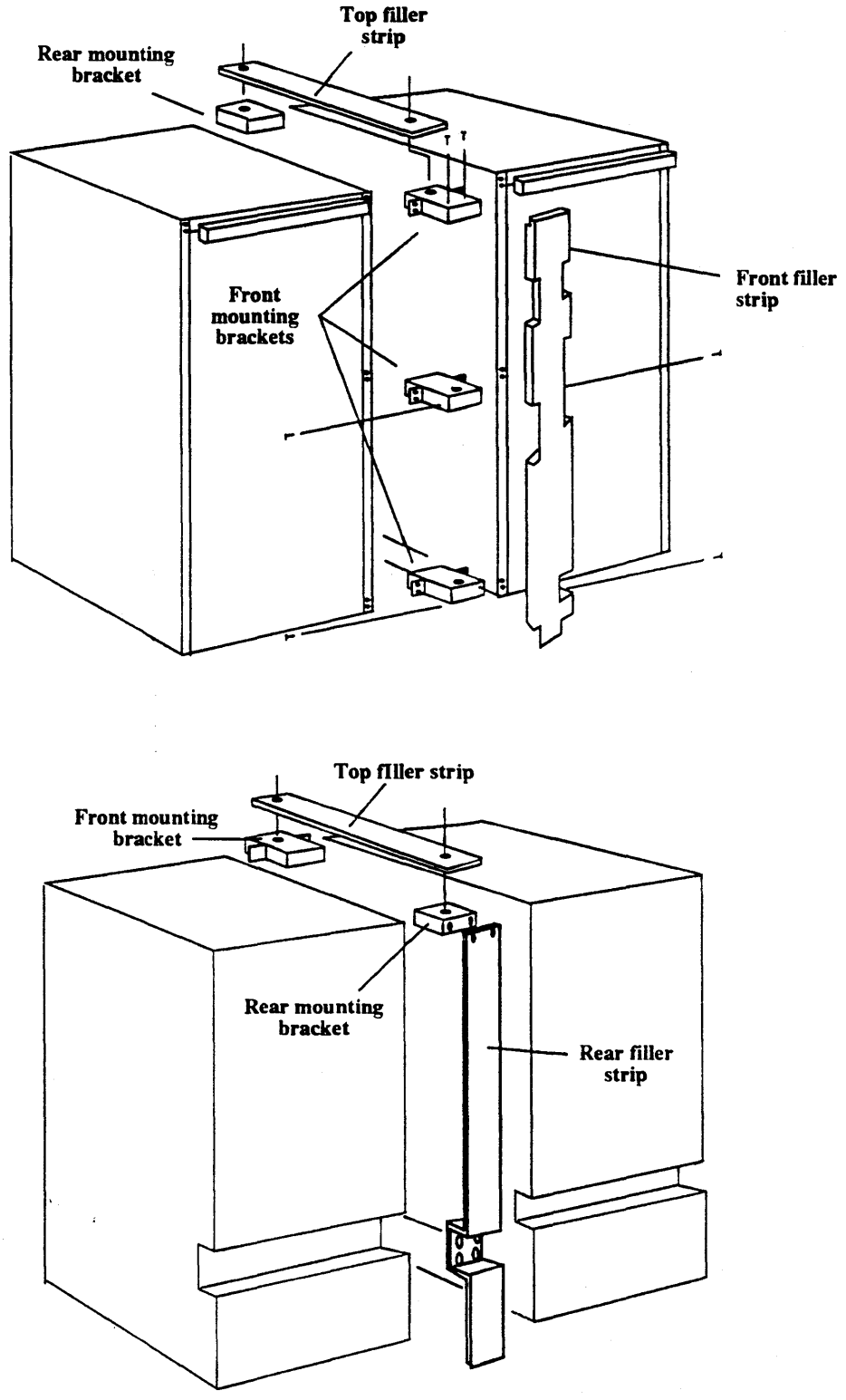


Figure 2-10. Intercabinet Filler Strips

14. Repeat this procedures as necessary for additional cabinets.
15. Use a 1/2-inch wrench or suitable adjustable wrench and lower the leveling feet at each of the four corners of the cabinet until all the weight is off its casters
16. Check the level of the cabinet with the bubble level. If necessary, adjust each foot to bring the cabinet level as shown in Figure 2-3 illustrated earlier in this section..

System Cable Connections

This subsection contains procedures for connecting the communication and control cables between units of the system and for connecting the main power cables between units of the system and the system AC power source.

Single Cabinet Systems

All internal cables in each cabinet are installed in the factory. Cable connections for single cabinet installations consist of connecting power and signal cables to the cabinet. Proceed as follows:

1. Place the system console terminal, printer(s), modems, and all other units of the system in the positions from which they will operate.
2. Connect the power cords to these peripheral units in the manner described in the respective unit manufacturer's documentation.

CAUTION:

Before connecting the system to the primary AC power source, verify that the voltage, polarity and grounding of the source are correct and in accordance with the power requirements specified in the ARIX *System90 Model 45 and Model 85 Site Preparation* manual. Verify also all system power switches are OFF.

3. Connect the primary cabinet power cord to its designated AC source.
4. Connect the RS-232C signal cable from the console terminal to the serial port marked CONSOLE (the uppermost port) on the serial panel.
5. If your system includes a diagnostic serial printer, connect the RS-232C signal cable from the system serial printer to the serial port marked PRINTER.

6. Identify and connect all system terminals to the appropriate jacks on the general communications boards (Figure 2-11). The Asynchronous Communications Device board (ACDB) and Asynchronous Communications Extender (ACE) board have RJ-45 type RS-232C connector jacks.

   Numbering of the connectors is from the bottom up, 0-15 on the first board, 16-31, 32-47 on the second and third ACDB/ACE boards combinations and so on as shown in the figure.

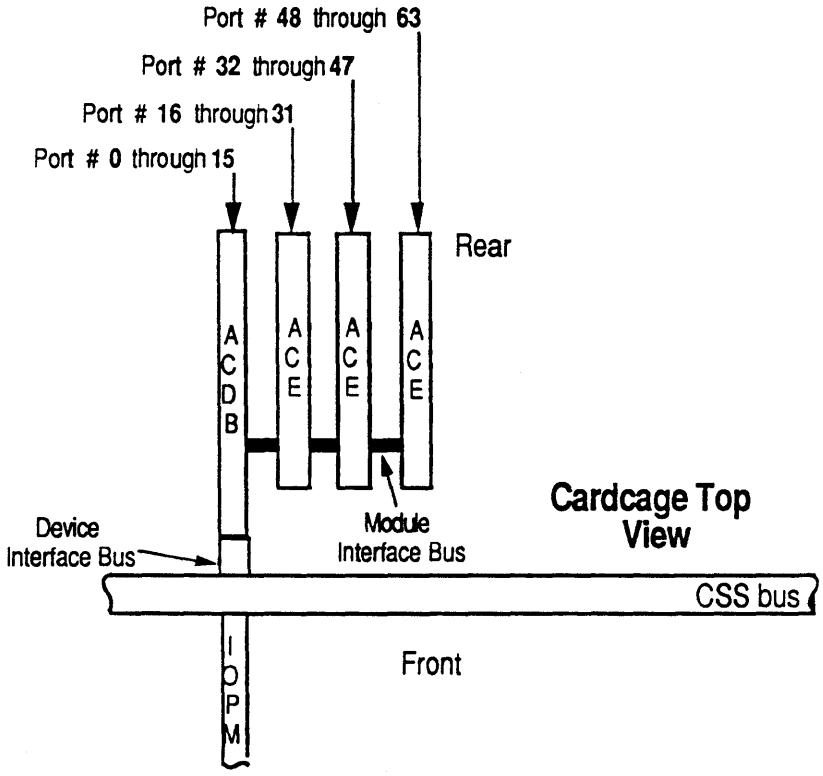


Figure 2-11. Communications Terminal Connection.

Multiple Cabinet Systems

Cable connections for multicabinet installations consist of those given above for single cabinet installation plus those between the several system cabinets.

Motherboard Ground and RWI Sensor Cables

All system motherboards must have a common ground. Heavy duty, stranded cables, included in the installation kit, provide this ground. Also, interface boards for device controllers in the I/O cabinets have control-monitor lines that connect to the Real World Interface (RWI) board in the primary cabinet. The control-monitor lines are 6-conductor and 8-conductor telephone type cables that connect to jacks on the back edge of the RWI board (Figure 2-13). When the system is shipped, these cables are already connected to the appropriate points inside the I/O cabinets and coiled in the cable trough. However, if they have come loose, you can reconnect them:

- The 6-conductor lines carry temperature sense and AC control information. They come from the AC Modules of the cabinets.
- The 8-conductor lines carry voltage sensing and status information. They come from the PSM boards of the cabinets.

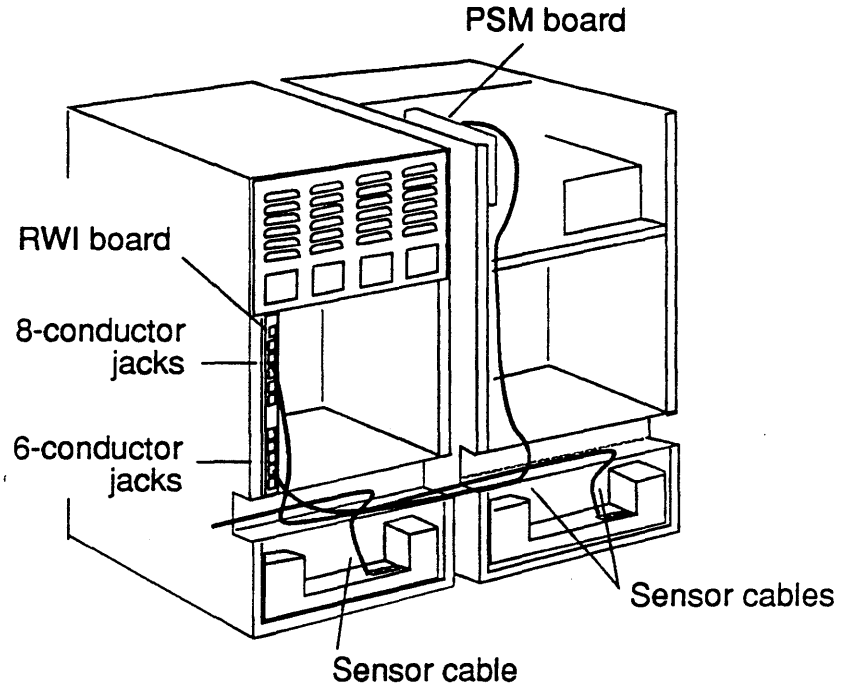


Figure 2-13. RWI Control and Monitor Cable Connections

The routing and connection of the motherboard ground strap(s) and RWI cables differ slightly depending upon the position of the I/O cabinet relative to the main cabinet. To illustrate both methods of routing and connection, Figure 2-14 shows three cabinets, one to the right of the primary cabinet and one to the left, as viewed from the rear. Note, however, that if the system has only two cabinets, the I/O cabinet can be either to the right or to the left of the primary cabinet. Proceed as follows:

1. Remove the cable trough cover.

2. Loosen the captive screws on the upper and lower EMI shield bezels and remove the bezels.

3. Remove the louvered cover from the power supply module on the rear of the primary cabinet.

4. Remove the nut from the ground lug on the main cabinet motherboard and disconnect the gray (or violet) wire (normally the outside wire).

CAUTION:

Make absolutely certain that you connect the ground cable to the ground lug. Connecting a grounded cable to +5 VDC will result in severe damage to the motherboard and other parts of the equipment.

5. Connect the ground strap from the I/O cabinet to the motherboard ground lug, reconnect the gray (or violet) wire, and replace the nut.

6. Connect the ground strap(s) and the RWI control-monitor lines between system cabinets.

For systems with cabinets to the left or left *and* right of the primary cabinet, continue as follows:

6a. Remove the slot covers from slots #2 and #3 at the rear of the primary cabinet card cage (Figure 2-14).

6b. Pass the ground strap through the hole and the RWI control-monitor lines from the I/O cabinet down through the card cage opening on the side of the cabinet as shown in Figure 14, Detail A, through the cable trough to the primary cabinet and up through the cable run at the left side rear of the cabinet.

For systems with cabinets to the right of the primary cabinet, continue as follows:

6c. Pass the ground strap and the RWI control-monitor lines from the I/O cabinet down the left side of the card cage slot and into the cable trough.

6d. Pass the ground strap up behind the card cage stop plate into the DSM

6e. Pass the ground strap down to the bus bar (as if it were a cable from the DC power supply) and connect it to the right side of the bus bar.

7. Connect the 6-conductor control-monitor cable to the lowest available 6-pin jack on the RWI board; connect the 8-conductor control-monitor cable to the lowest available 8-pin jack on the RWI (Figure 2-13).

The 6-pin and 8-pin RWI groups of connectors are numbered from the bottom up: #0, 1, 2, ..., etc. The cables from each numbered cabinet must be matched accordingly:

cabinet #0 -> 6-pin #0 and 8-pin #0

cabinet #1 -> 6-pin #1 and 8-pin #1

cabinet #2 -> 6-pin #2 and 8-pin #2,

and so on.

The connection pattern should be recorded in an equipment history log or similar document to assist in troubleshooting and interpretation of warning messages that refer to a cabinet number.

8. Replace the slot covers from slots #2 and #3 at the rear of the primary cabinet card cage.

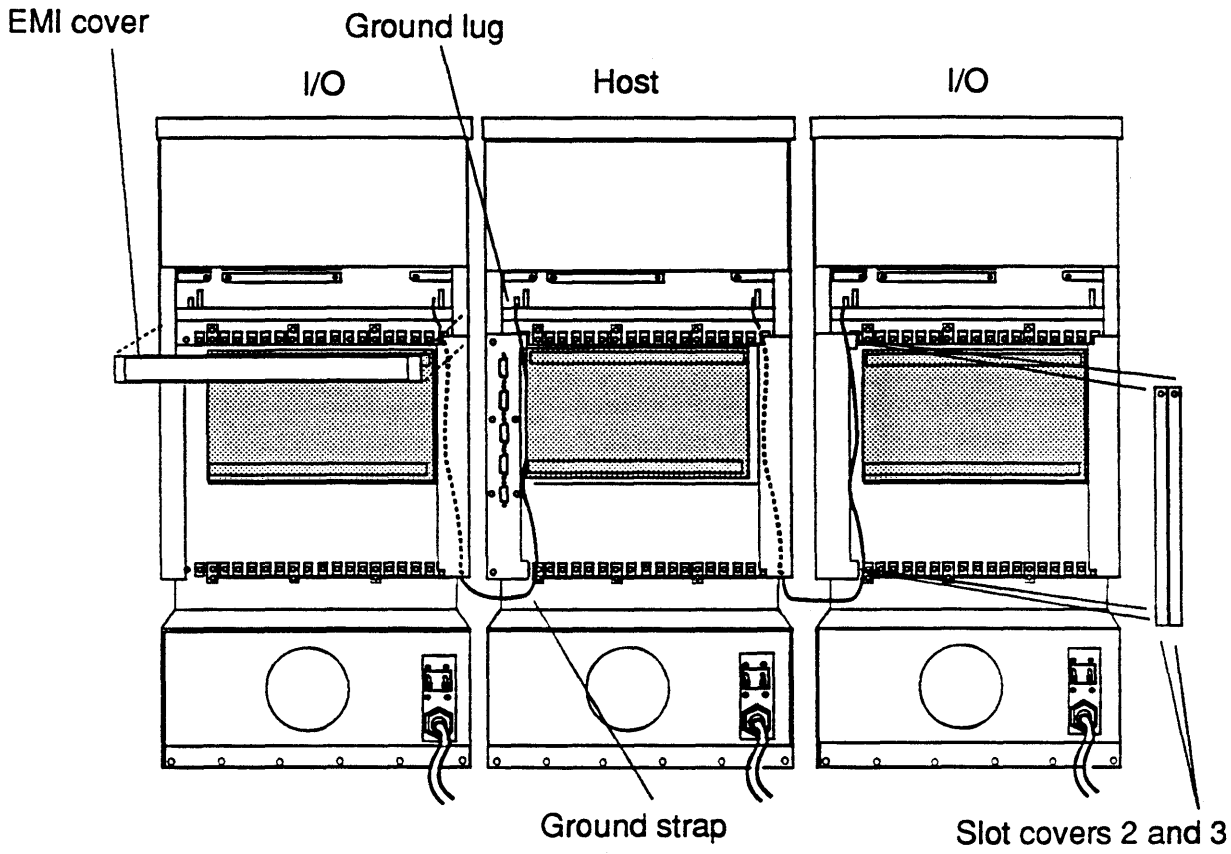


Figure 2-14. Motherboard Ground Strap and RWI Cable Routing

Intercabinet Signal Cables

All intercabinet signal cables are the flat ribbon type. The number and variety of the cables depend upon the specific configuration of the system, which is normally defined at the time the system is ordered. The system is shipped with the cables already connected in the primary cabinet to ports on the Computational Sub System (CSS) interface boards and IOM boards. The cables are rolled up and stowed inside the cable trough or inside the front panel of the card cage for shipping. Each cable has plastic information tags next to the connectors on each end that identify the controller port or IOSBA port to which the cable connects.

NOTE:
Cables can only be routed "outward" of the primary cabinet only.

1. Connect the I/O controller signal cables as follows (Figure 2-15):

   1a. Remove any shipping tape or binding material from the cables and unroll them.

   1b. Using the information on each cable tag, identify the port in the I/O cabinet to which it connects and mark the port.

   1c. If it has not already been done, route each cable from the primary cabinet into the cable trough by passing it through the lower opening of the card cage slot next to the interface board from which the cable extends, as shown in the figure.

   1d. Route each cable through the cable troughs of adjacent cabinets then up through the opening of the card cage slot next to the board containing the destination port.

   Before you can connect the cable, you may find it necessary to make a 90-degree fold in the cable near the connector. Observe the orientation of the connector pins so that you make the fold in the right direction.

   1e. Connect each cable to its port on the I/O interface board. Close the cover.

2. Replace the cable trough end plates and the rear cover plates and EMI shields.

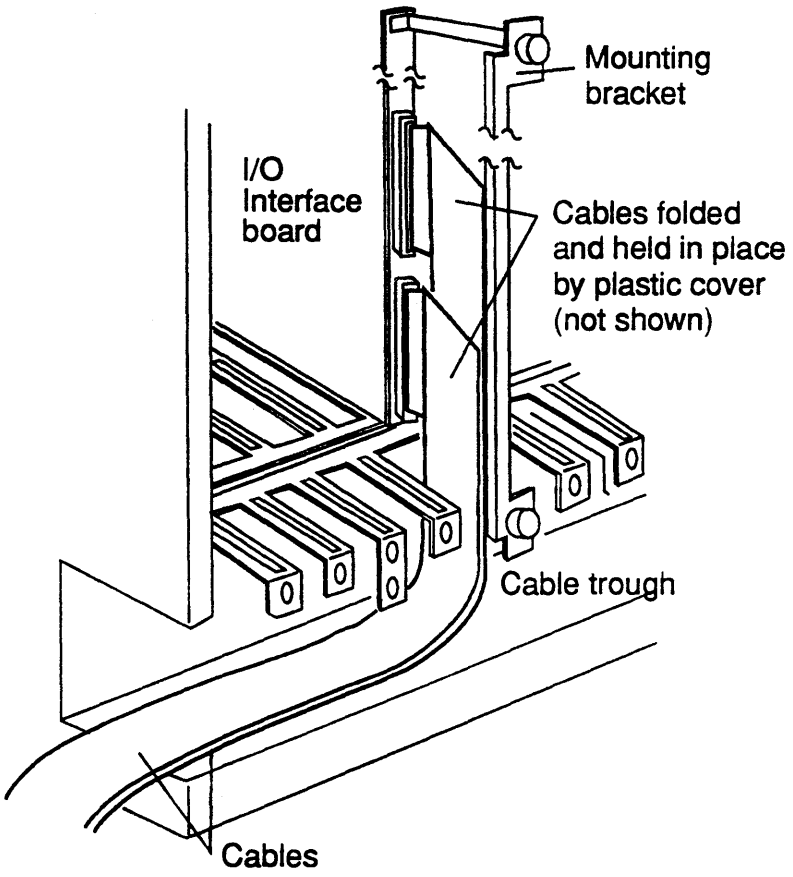


Figure 2-15. Intercabinet Signal Cables

For Multicabinet System Configurations Only

1. Connect the IOM to IOSBA cables as follows (Figure 2-16):

   1a. Using a phillips head screwdriver, loosen the front panel screws of the card cage modules of all cabinets involved; slide the panels up and off the card cages.

   1b. remove any shipping tape or binding material from the cables and unroll them.

   1c. Using the information on its tag, identify the IOSBA connector in the I/O cabinet (s) to which each cable connects and mark it.

   1d. Route the IOM to IOSBA cables from the IOM boards through the oblong cutouts in the sides of the cabinet frames, as shown in the figure. Pass the cables through the EMI shield and into the adjoining cabinet(s).

   1e. Connect each cable to its connector on the IOSBA board(s).

1f. Replace the front panels of the card cages.

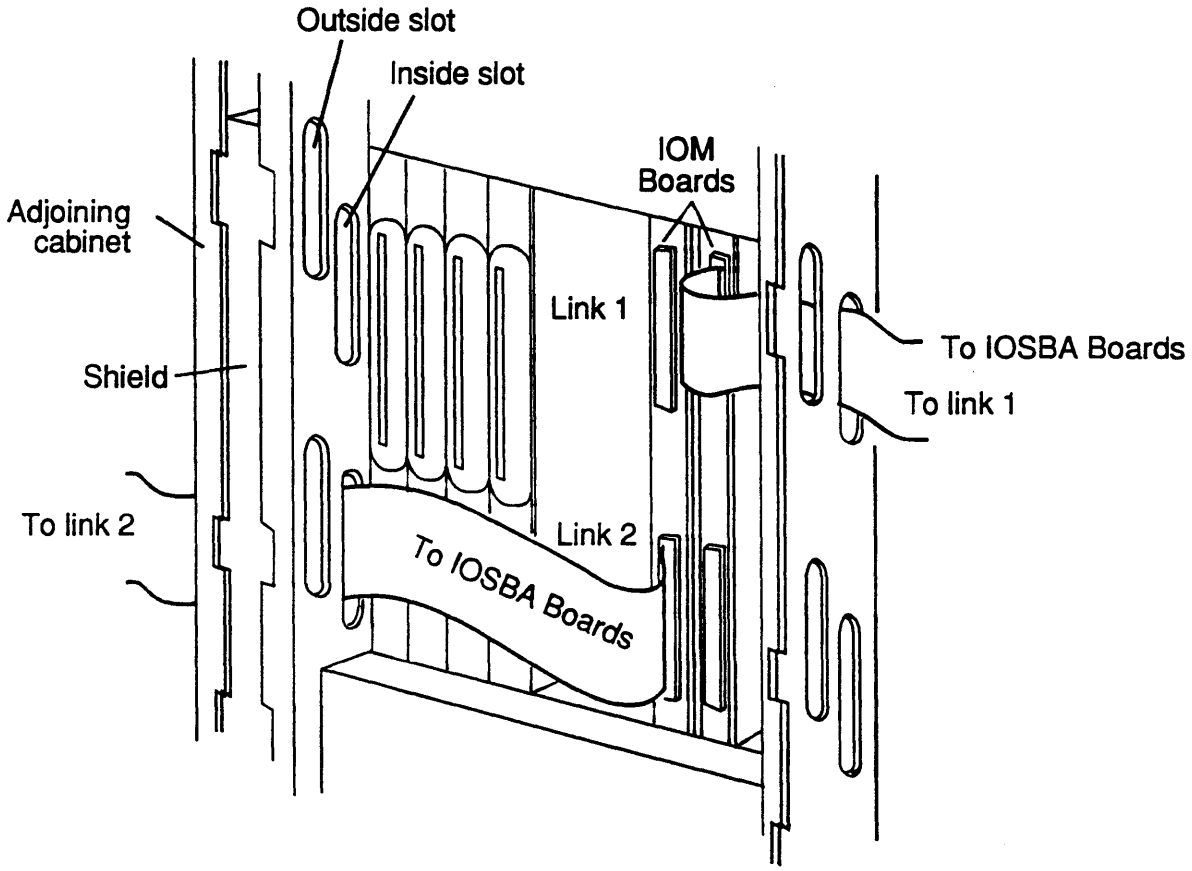


Figure 2-16. IOM to IOSBA Cables

2. Place the system console terminal, printer(s), modems, and all other units of the system in the positions from which they will operate.

3. Connect the power cords to these peripheral units in the manner described in the respective unit manufacturer's documentation.

CAUTION:

Before connecting the system to the primary AC power source, verify that the voltage, polarity and grounding of the source are correct and in accordance with the power requirements specified in the ARIX *System90 Model 45 and Model 85 Site Preparation* manual. Verify also all system power switches are OFF.

4. Connect the RS-232C signal cable from the console terminal to the serial port panel marked CONSOLE.

5. If your system includes a serial printer, connect the RS-232C signal cable from the system serial printer to the serial port marked PRINTER.
6. Identify the ACDB/ACE board for connecting system terminals. See also the note associated with step 6 in the subsection entitled *Single Cabinet Systems.*

The boards have RJ-45 type RS-232C connector jacks. Numbering of the connectors is from the bottom up, 0-15 on the first board, 16-31, 32-47 on the second and third boards, and so on as shown in the figure. Refer to *Appendix A* for pin designation and direction of the associated signals.

Connect all system terminals to the appropriate jacks on the communications boards.

System Cabinet Power Cable Connections

Each System90 cabinet requires a dedicated AC power line and circuit breaker as noted in the *ARIX System90 Model 45 and Model 85 Site Preparation* manual. Connect each system cabinet to its AC power source as shown in (Figure 2-17).

If you are installing an Uninterruptible Power Supply, (UPS) please refer to the *ARIX System90 Uninterruptible Power Supply Guidelines* manual for further installation instructions.

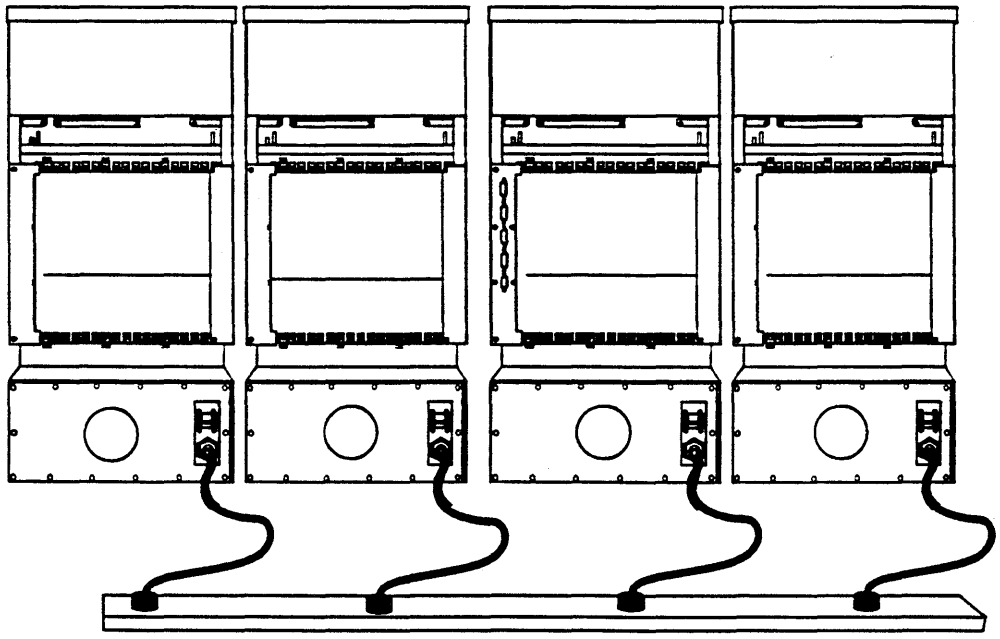


Figure 2-17. Power Cable Connection and Distribution

Initialization and System Checkout

Initializing the System90 consists of applying the system's AC source power to the units of the system and bringing it to the *single-user mode.* Proceed as follows:

> **CAUTION:**
> **Read this entire subsection CAREFULLY before you begin.**

Applying Power to the System

1. Turn the power switch of the console terminal to ON.
2. Turn the main circuit breakers at the rear and lower right of each cabinet to ON.
3. Turn the keyswitch on the operator panel on the front of the primary cabinet to ON.

   Observe the console terminal; as soon as autoboot begins, press any key on the keyboard.

Bringing the System to Single-User Mode

Install the system using the installation tapes supplied with the installation kit. For complete details, refer to ARIX OS/90 *Release Notes* and the ARIX OS/90 System *Administrator's Guide.*

> NOTE:
>
> Systems are shipped from ARIX with the disks formatted. It is possible that during shipment, the format may have been destroyed. If the disk is not formatted, refer to *"Disk/Tape Management"* in the *ARIX OS/90 System Administrator's Guide.* Read the entire procedure before loading the distribution tape.

ARIX-OS/90 operating system is distributed on 1/4 inch cartridge or 9-track tape. Please refer to the Software Release Notes and Installation Procedure for detailed instructions to load the system software.

Powering Down the System

Powering down a System90 that is operating in multiuser mode involves first bringing the system to the single user mode then closing or readying all system files and resources before actually interrupting the source power to the system. Proceed as follows:

1. Log onto the system as root.
2. Enter the command

cd /<<CR>>

(changes directory to ***root***).

3. Enter the command

shutdown [-g #] [-i] [-y]<<CR>>

The -g parameter specifies the number of seconds of grace (sleep) before the ***inittab*** file puts the system into single user mode. For explanations of the -i, and -y parameters, refer to *ARIX-OS /90 V.3 System Administrator's Reference Manual.*

A number of script files that issue warning messages to the ordinary users that the system is being brought down are normally integral with the ***shutdown*** script.

NOTE:
If you are not shutting down under emergency or urgent conditions, it is customary to allow the user ample time to completer their current operations to to bring them to a convenient stopping point. Thirty minutes is commonly granted for this purpose with warning messages issued every five minutes.

When the shutdown begins to run the following displays appear to which you must reply:

SHUTDOWN PROGRAM
Day of Week: Month: Day:hh:mm:ss:yy
Do you want to send your own message (y or n)?

To send a personalized message, type Y, and the message followed by a <<CTRL d>>

System maintenance about to begin
Please log off.

The system will now wait for the number of seconds specified or for the default of 60 seconds

SYSTEM BEING BROUGHT DOWN NOW!!!
Busy out (push down) the appropriate phone lines for this system.
Do you want to continue (y or n)?

To quit the shutdown program, enter n, and the multiuser prompt will appear. To continue the shutdown program, type y, and the system will prompt with the following:

Process accounting stopped
Error logging stopped
all currently running processes will now be killed

Date may appear here if processes are being killed

Wait for INIT: SINGLE USER MODE before halting
INIT: SINGLE-USER MODE

NOTE:

If any changes are made to files from single user state, the *sync;sync* command should be issued to ensure that the changes are flushed from main memory back to the disk (this occurs automatically in multiuser mode).

From single user state:

- the monitor mode can be entered by turning the keyswitch on the Operator Control panel to the RESET (right) position.
- multiuser state can be entered by typing **init 2**
- power can be removed from the system.

When the ***shutdown*** command completes execution, the normal prompt appears:

#

4. Turn the keyswitch on the Operator Control Panel to OFF (Standby)

5. At the rear of each cabinet turn the main circuit breaker to OFF.

3 Card Cage Modules

This chapter contains installation and removal procedures for all field replaceable units in the *card cage*. Card cage FRUs consist primarily of Interface, Logic or Miscellaneous printed circuit boards and the associated hardware, such as mounting devices as described below:

Interface Boards

- Asynchronous Communications Device Board (ACDB)
- Asynchronous Communications Extender (ACE)
- Dual SCSI Device Board (DSDB)
- LAN/WAN Device Board (LWDB)
- Real World Interface (RWI)

Logic Boards

- I/O Module (IOM)
- I/O Processor Module (IOPM)
- I/O System Bus Adapter (IOSBA)
- Memory Module (MM)
- Processor Module (PM)
- Service Processor Module (SPM)

Miscellaneous Boards

- Bus Arbiter Board
- Motherboards
- System Console Board (not an integral part of the card cage)

Most of these boards are mounted in ***slots*** in the main compartment of the card cage (Figure 3-1) and are fairly easy to remove and install.

Two types of PC boards occupy the slots in the card cage, *logic boards* and *interface boards* (also referred to as *device boards).*

Logic boards all have the same dimensions.

Interface and device boards work in conjunction with certain types of logic boards. They occupy slots in the *rear* section of the card cage directly behind their corresponding logic board. Interface boards all have the same general shape and height but in some cases differ in depth.

A CSS logic and I/O interface or device board have metal ejector tabs at the top and bottom of their front edges that serve to eject them from the backplane of the card cage. All logic boards are removed and installed the same way. Interface boards work in conjunction with certain types of logic boards. They occupy slots in the rear section of the card cage opposite the front section slots of their corresponding logic boards. Interface and device boards all have the same general shape and height but in some cases differ in depth. Except for differences in the output cable connections of specific boards, all interface boards are removed and installed in the same way.

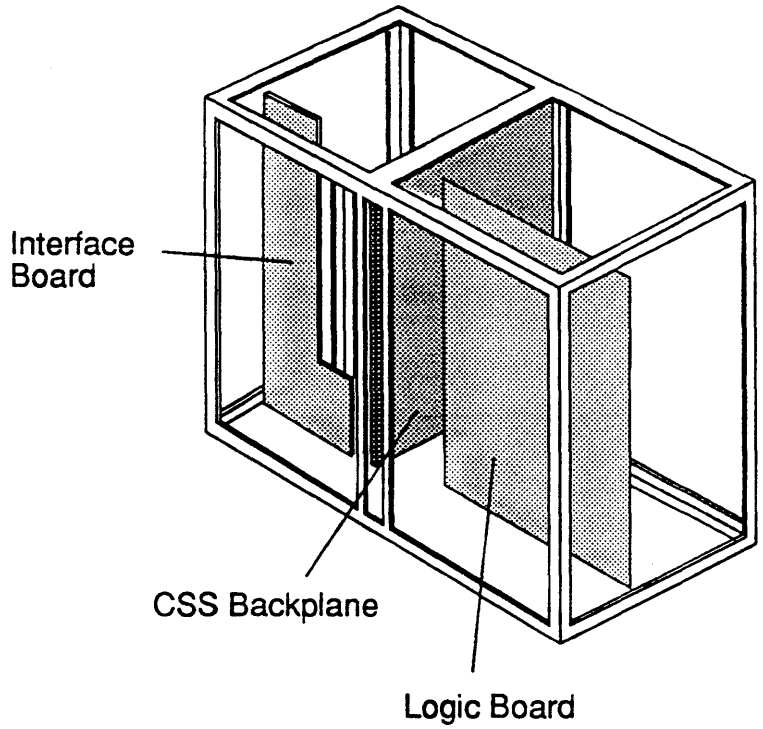


Figure 3-1. System 90 Card Cage

Logic Boards

Logic boards occupy the front chapter of the card cage. The procedures for removing and installing logic boards appear below. Any special requirements for a particular board appear in the subsection covering the specific board.

Logic Board Removal

To remove a logic board proceed as follows:

WARNING:

The Service Processor Module (SPM) and the Real World Interface (RWI) board have primary power on them any time the power cord is plugged in and the main circuit breaker is ON. This condition is true regardless of whether the system power switch on the front panel is on or off. Always turn the main circuit breaker to OFF when performing any operations with these boards.

1. Power down the system as described in Chapter 2. Turn off the circuit breaker.
2. Unlock, unlatch and open the front door of the main cabinet.
3. Loosen the phillips head screws that fasten the metal plate covering the card cage. Slide the plate up and lift it off the card cage.
4. Remove the phillips head screws from the top and bottom flanges on the front metal edge of the board. Save the screws for the installation procedure.
5. Label and remove any cables attached to the board.

CAUTION:

PC boards are susceptible to electrostatic damage. Use an Electro-Static Discharge (ESD) grounding strap when handling PCBs. Do not touch the ICs or components on the circuit boards, and do not handle the boards except by their edges.

6. Record the board type, its serial number, and the slot number from which it is being removed.
7. Eject the board from the backplane (Figure 3-2).

Remove the board from the backplane by pulling outward on the metal ejector tabs at the top and bottom of the board then pulling gently on the board, exerting pressure alternately on the top and bottom of the board as you pull on it. This action will unseat the board from the backplane and interface board connectors.

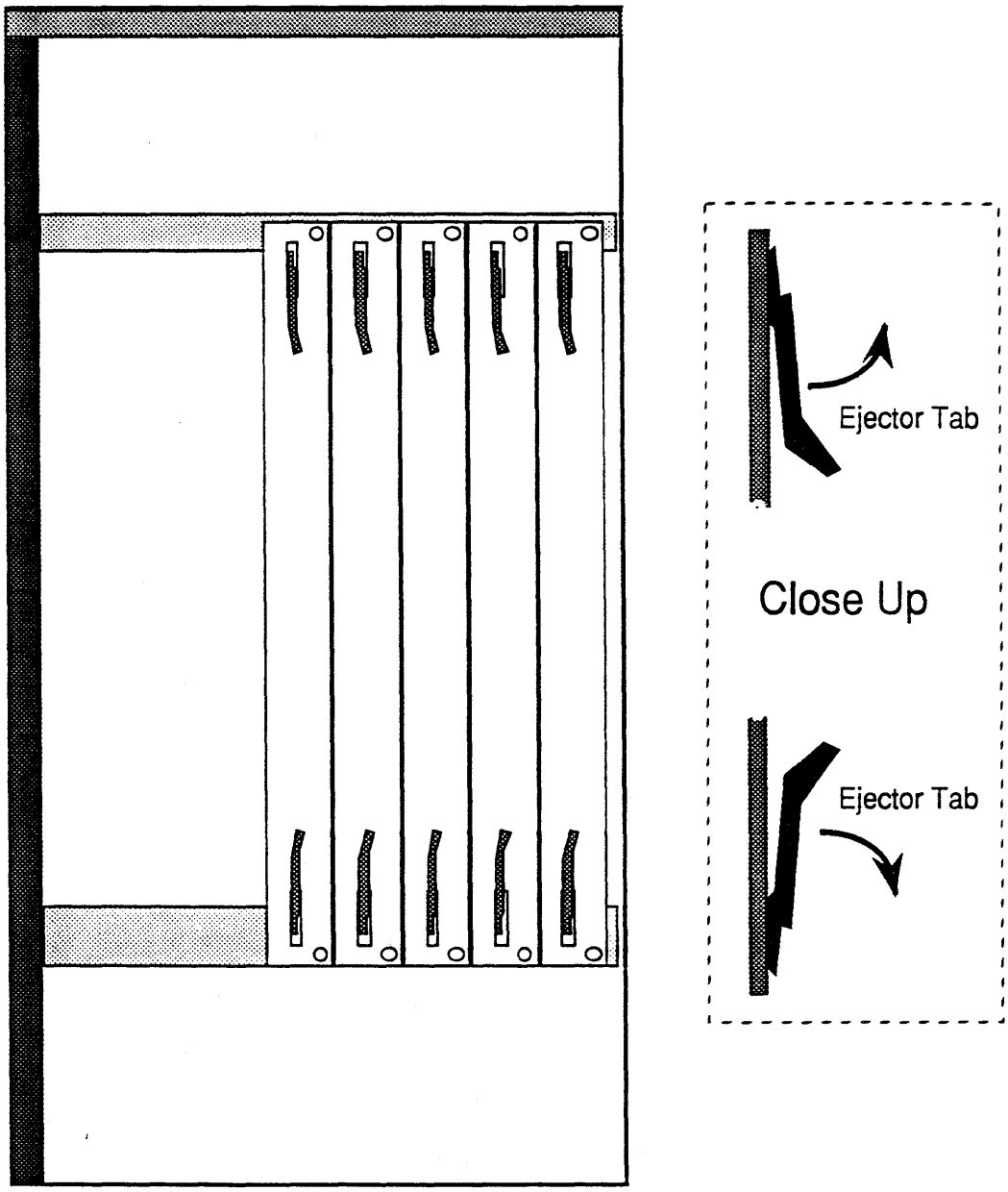


Figure 3-2. Logic Board and I/O Board Front Edges

8. When the board is free of the backplane connectors, hold it by its edges and gently slide it out of the card cage.

9. Put the board in an antistatic bag; store it in a cool, dry environment and in an upright position if possible.

CAUTION:

To maintain efficiency in system cooling all empty board slots must be covered with slot filler plates before powering up the system. If you are not going to replace the board just removed, install the filler plate in the now vacant slot. Call an ARIX representative if you need additional slot filler plates.

10. Replace the cover plate on the card cage; close and latch the front door of the cabinet.

Logic Board Installation

If you are also going to install a corresponding interface board, install that board first. Refer to Chapter 5, *Interface Boards* section *Interface Board Installation* for the correct procedure.

CAUTION:

Make certain that you are installing the correct combination of interface board and logic board. Connecting the wrong combination of these boards can result in permanent damage to the boards.

To install a logic board proceed as follows:

1. Power down the system as described in Chapter 2. Turn off the circuit breaker.

WARNING:

The Service Processor Module (SPM) and the Real World Interface (RWI) boards have primary power on them any time the power cord is plugged in and the main circuit breaker is ON. This condition is true regardless of whether the system power switch on the front panel is on or off. Always turn the main circuit breaker to OFF when performing any operations with these boards.

CAUTION:

Make certain that you are installing the correct combination of interface and logic board. Connection of the wrong combination of these boards may result in damage.

2. Unlock, unlatch and open the front door of the main cabinet.

3. Remove the metal plate that covers the card cage.

4. Remove the two phillips head screws from the slot cover plate: remove the plate and save it and the screws.

5. Grasp the PCB by its front metal edge and remove it from its antistatic bag.

6. Inspect all edge connectors and connection plugs for breaks, bends, foreign matter.

CAUTION:

When carrying out the following steps, do not force the board into the backplane. If you experience any abnormal resistance or interference withdraw the board and reinsert until the board seats in the backplane..

7. Hold the board by its edges with the component side of the board to your right and guide it into the upper and lower tracks of the card cage slot until it is resting against the backplane connectors.

8. Gently but firmly push the board into the backplane connectors until it is fully seated in the connectors.

   Secure the board in the card cage by moving the metal ejector tabs inward to their closed positions. Install the screws and cover plate removed in Step 4

9. Replace the card cage cover panel.

10. Close, latch and lock the front door of the main cabinet.

Interface Boards

Interface boards occupy the back of the card cage. The basic procedures for removing and installing interface boards appear below. Asynchronous Communication Device Boards and Asynchronous Communications Extender Boards must be removed as a whole stack and separated if required upon removal from the card cage. Any other special requirements peculiar to a specific board appear in the section dedicated to that module.

CAUTION:

PC boards are susceptible to electrostatic damage. Use an Electro-Static Discharge (ESD) grounding strap when handling PCBs. Do not touch the ICs or components on the circuit boards and do not handle the boards except by their edges.

Interface Board Removal

Interface boards are held to the back of the card cage by metal retaining brackets. The brackets differ slightly in construction depending upon which type of interface board they accommodate. The output cables from certain boards are held in place by special plastic retaining tabs(Figure 3-3).

1. Power down the system as described in Chapter 2. Turn off the circuit breaker.

2. Remove the upper and lower EMI shields on the rear of the cabinet

3. Record the board type, serial number, and slot number before removing the interface board.

4. If the board you are removing has its connectors extending from the back of the retaining bracket rather than extending down through the openings into the card cage, label and remove the cables from the connectors now.

5. Loosen the captive screws on top and bottom of the retaining bracket.

   If you are removing a Dual SCSI Device (DSDB) interface board that has its connectors and cables extending through the cable trough to other system cabinets, remove the cable trough cover, label and remove the connectors now. You have to withdraw the board far enough to open the small plastic cable holder on the bracket that holds the cables. This holder slips under the lip on the rear of the retaining bracket.

6. Grasp the captive holding screws of the retaining bracket and ***gently*** pull the board outward until it is free from the logic board connector.

   Make sure that the cables do not catch on the card cage slots or protruding edges of the slots as you move the board.

7. Pull the board out of the card cage.

8. Store the board in a cool, dry environment until its final disposition. Keep it in the antistatic bag and, if possible, in an upright position.

9. If you are not going to replace the board immediately, install a slot filler plate over the slot from which you removed the board.

10. Replace the upper and lower EMI shields on the rear of the cabinet and the cable trough cover if removed in Step 5 above..

Interface Board Installation

To install an interface board, proceed as follows:

CAUTION:

Install only one interface board at a time and make certain that you are installing the correct combination of interface board and logic board. Connection the wrong combination of boards may result in damage.

1. Power down the system as described in Chapter 2. Turn off the circuit breaker.

2. Remove the upper and lower EMI shields on the rear of the cabinet

3. Verify that the interface board you are installing is the one associated with the logic board in the installation slot and that any required setup (as in the DSDB and ACE boards) has been performed prior to the installation of the board in the card cage.

4. If necessary, loosen the screws that fasten the slot filler plate to the frame and remove the plate.

5. Remove the board from its shipping carton. The board is normally shipped inside a plastic, antistatic bag. Lay the board (still inside the bag) on a table or clean work surface. Store the carton temporarily; you may wish to use it for the board you are replacing.

6. Grasp the replacement board by its edges and remove it from its antistatic bag.

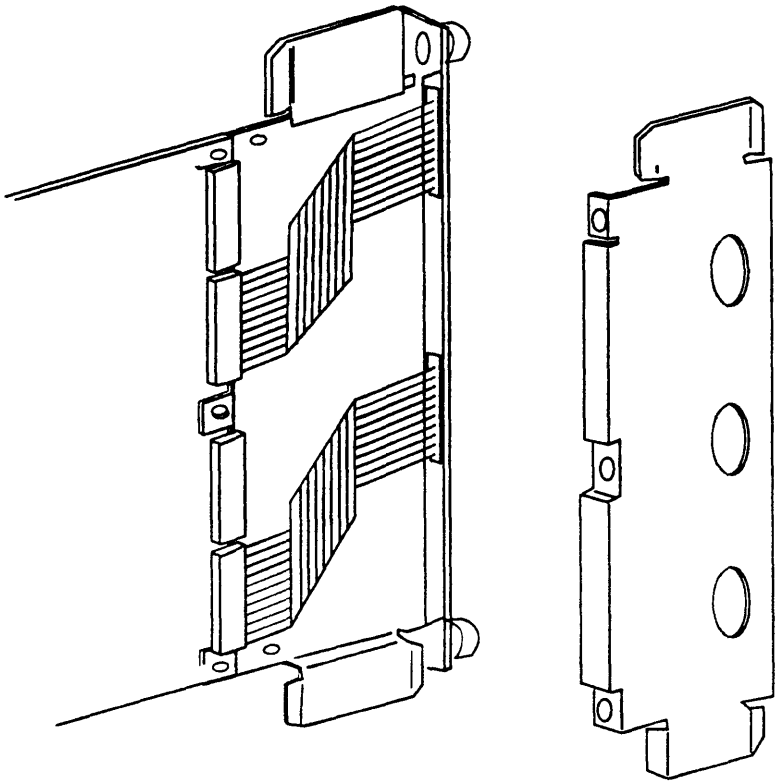


Figure 3-3. DSDB Bracket and Plastic Shield.

7. Grasp the captive holding screws of the retaining bracket and position it, component side to the left, in the upper and lower guide tracks of the installation slot.

8. Gently push the board into the card cage.

   If you are installing a board whose signal cable connectors are on the rear of the retaining bracket, push the board all the way into the slot and seat it firmly into the bus connector on the associated logic board; connect the tagged signal cables to the corresponding connectors on the board.

   If you are installing DSDB interface board, before you push the board all the way into the slot, open the plastic cable holder on the retaining bracket, connect the tagged signal cables to the corresponding connectors on the board, and close the plastic holder over the signal cables and slip its edge under the lip on the rear of the retaining bracket. The cable trough should have been removed to allow access to the cables.

   Push the board the rest of the way into the slot and seat it firmly into the bus connector on the associated logic board.

9. Replace the upper and lower EMI shields on the rear of the cabinet and the cable trough if it has been removed in a prior step.

Service Processor Module (SPM)

The Service Processor Module (SPM) provides the system console interface, interrupt dispatcher, CSS bus error registers, system environmental monitoring, time-of-day clock, nonvolatile RAM and the floppy disk interface. The SPM interfaces to the Real World Interface (RWI) board. The SPM is always installed in the far right-hand slot (when viewed from the front of the card cage).

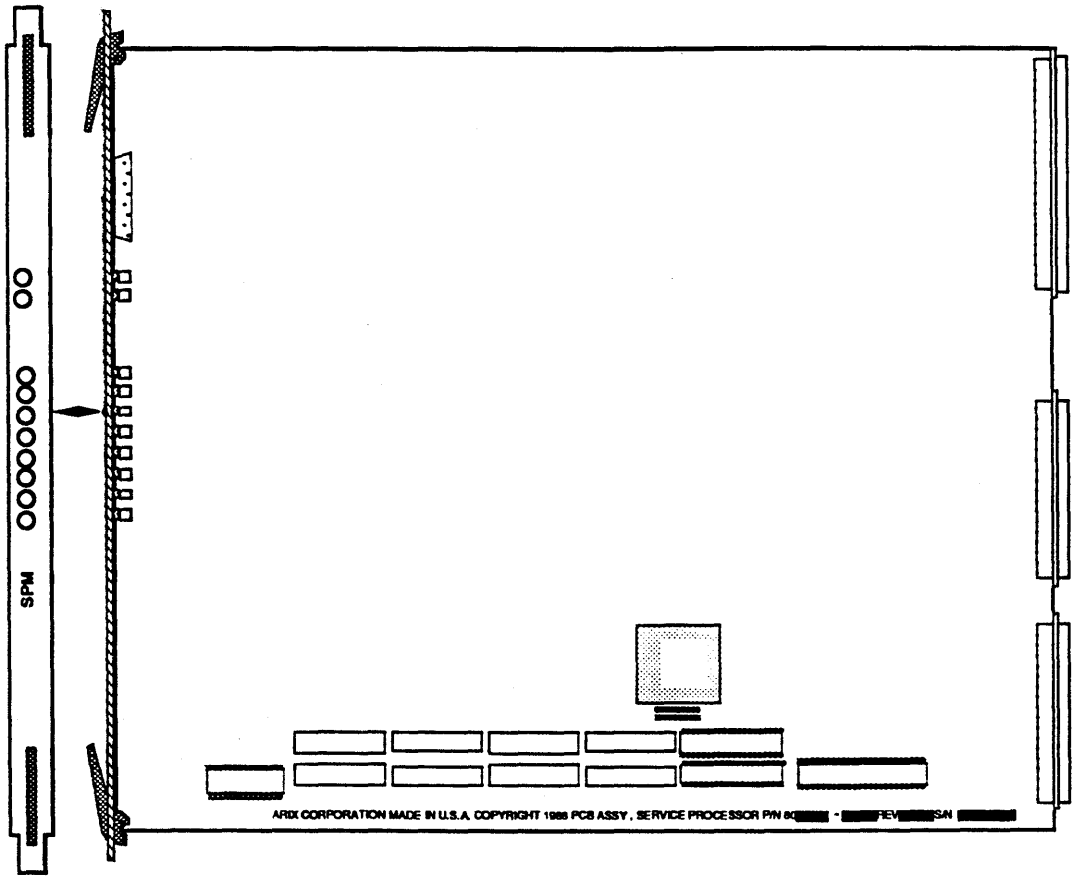


Figure 3-4. Service Processor Module

Real World Interface Board

The Real World Interface (RWI) board contains the system console port, the remote diagnostic port, the UPS serial and alarm interface port, serial printer port, the system DC power interfaces, the system AC power interfaces, the system environmental status monitors and the front panel interface(see Figure 1-6 for port location).

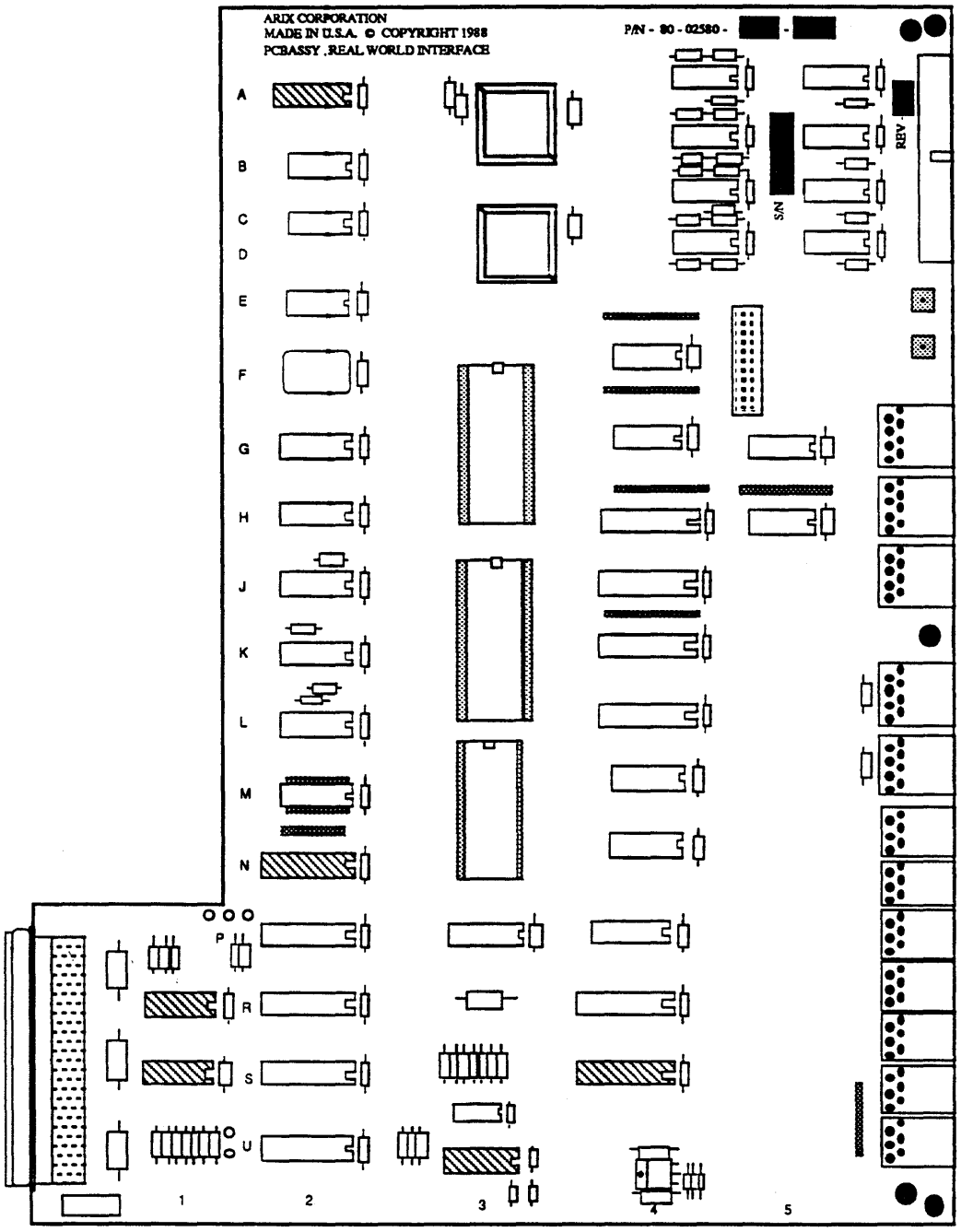


Figure 3-5. Real World Interface (RWI) Board

Memory Module

The Memory Module (MM) is the main system storage element of the CSS. MMs are available in several different capacities per board providing internal error detection and correction logic on each module.

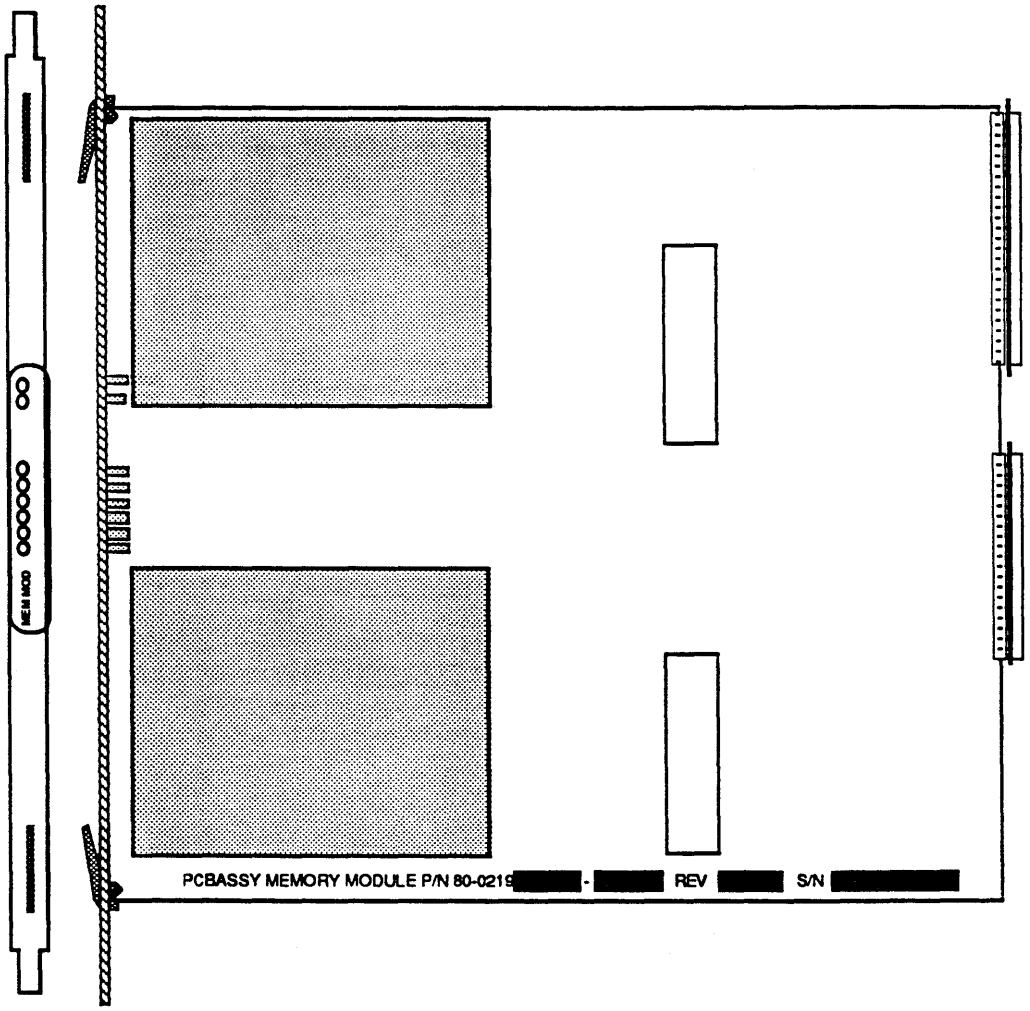


Figure 3-6. Memory Module

Processor Module

The Processor Module (PM) is the main computational element in the CSS. Instruction processing is handled by a 25 MHz 68020, 32-bit microprocessor together with a 12.5 MHz 68881 floating point unit (FPU). The PM also contains a 64 kilobyte virtual cache memory.

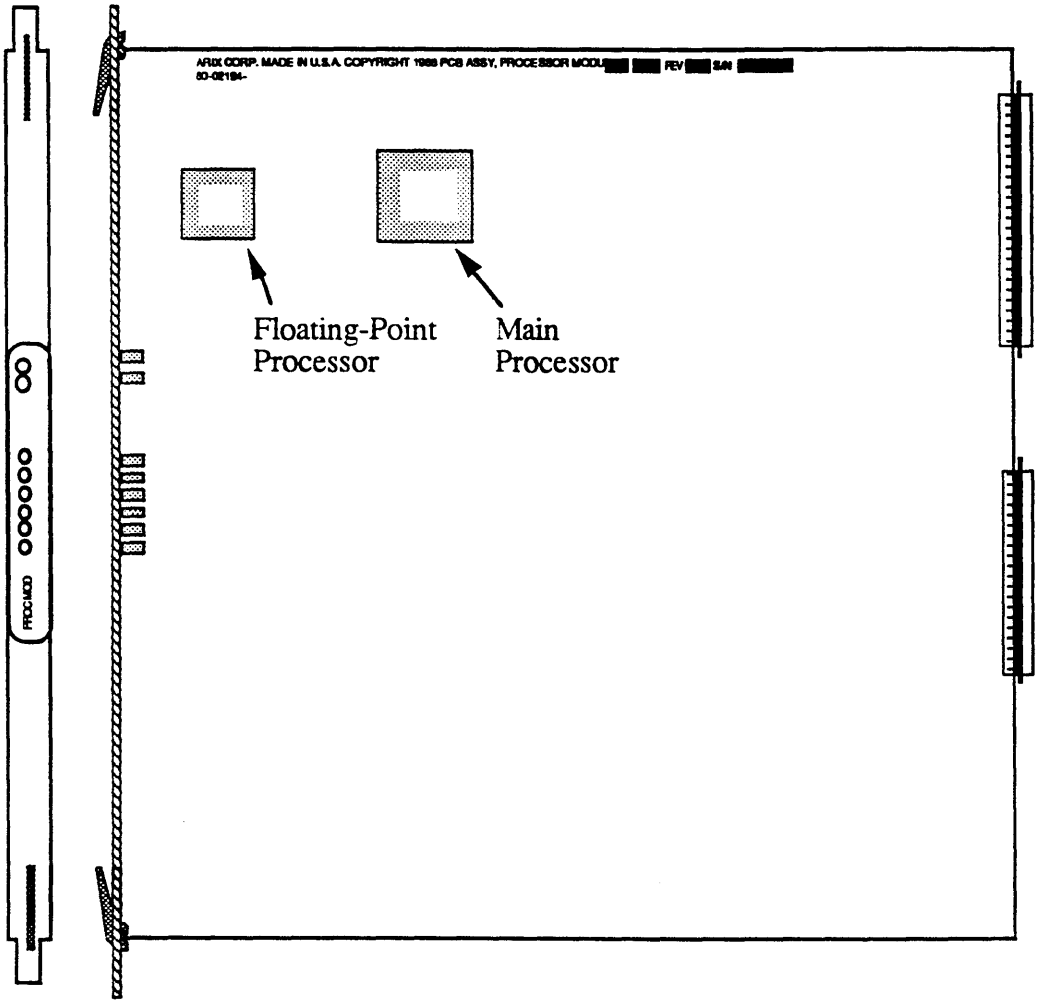


Figure 3-7. Processor Module

I/O Module

The I/O Module (IOM) is an adaptor between the CSS bus and an I/O bus. It provides DMA routing from the I/O Link to the CSS bus.

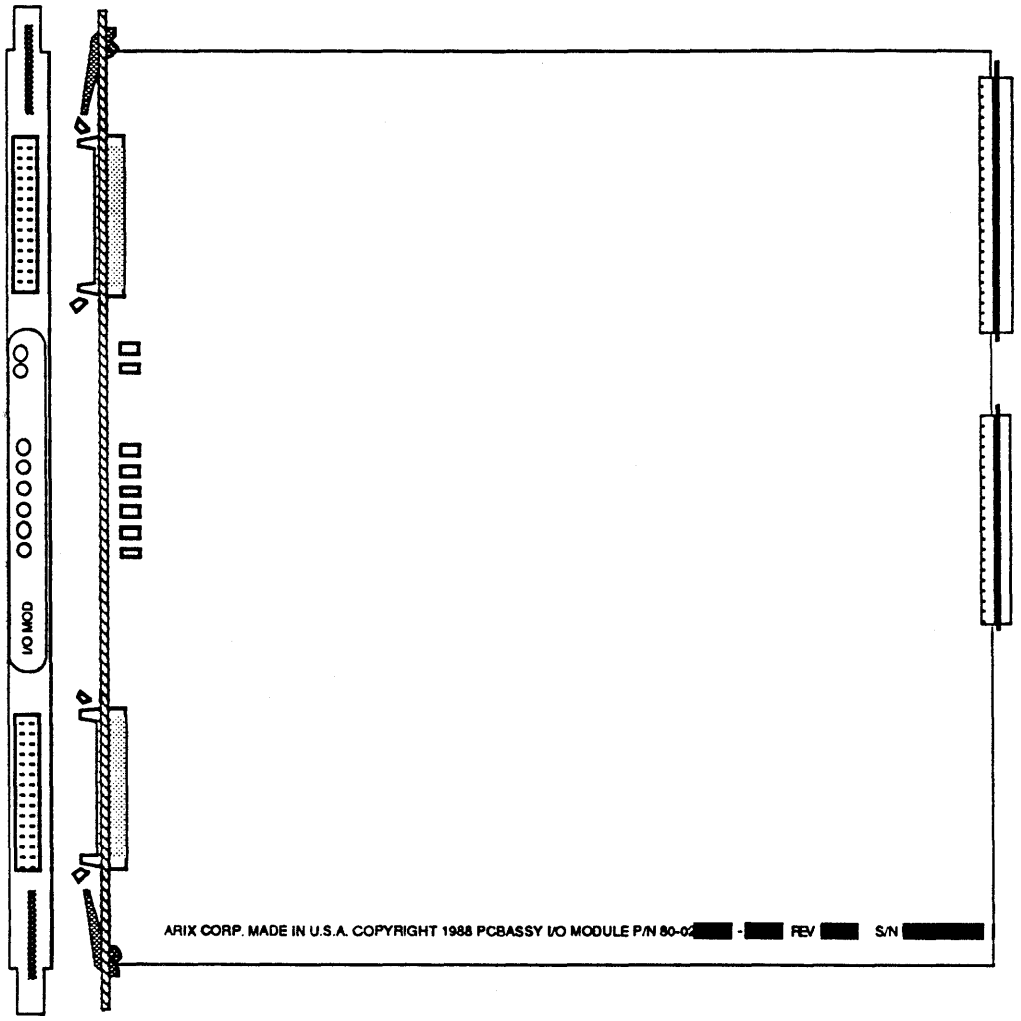


Figure 3-8. I/O Module

I/O Processor Module

The I/O Processor Module (IOPM) is a high performance general purpose controller which supports three different interface (device) boards which include the Asynchronous Communications Device Board/Asynchronous Communications Extender board, Dual SCSI Device Board and Local Area Network/Wide Area Network board configurations.

The IOPM interfaces to the CSS bus and can be installed in either the primary cabinet or the IOS cabinet.

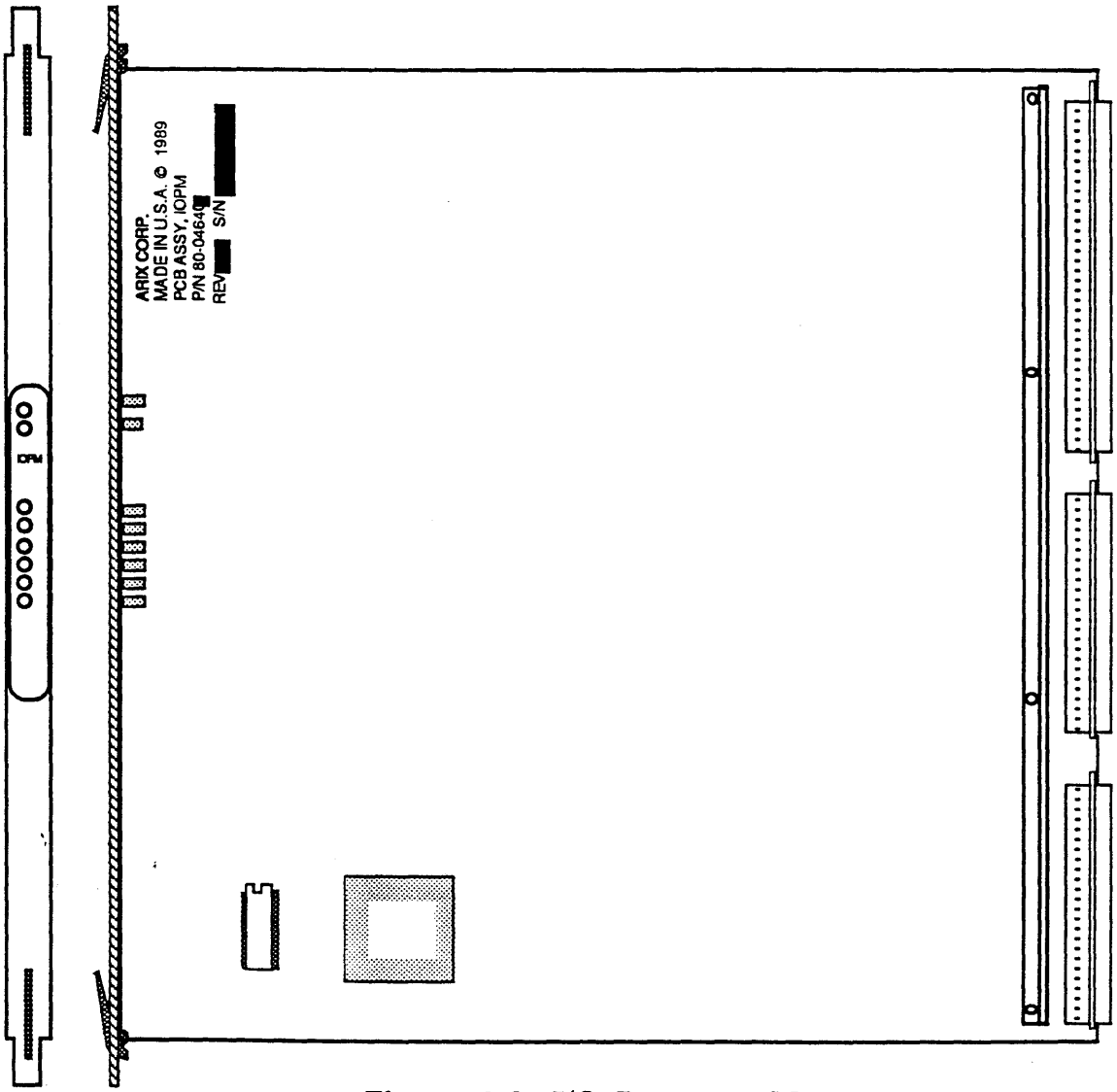


Figure 3-9. I/O Processor Module

I/O System Adapter Board (IOSBA)

The I/O System Bus Adapter (IOSBA) in conjunction with the I/O Module (IOM) connects an I/O bus to the CSS bus. The IOSBA is located in the highest priority slot of the CSS bus.

Commands originating on an I/O bus that are addressed to a slot located on the CSS bus or another I/O bus must be sent to the CSS bus for delivery. Commands originating on an I/O bus that are addressed to a slot on that same I/O bus must also be sent to the CSS bus for delivery.

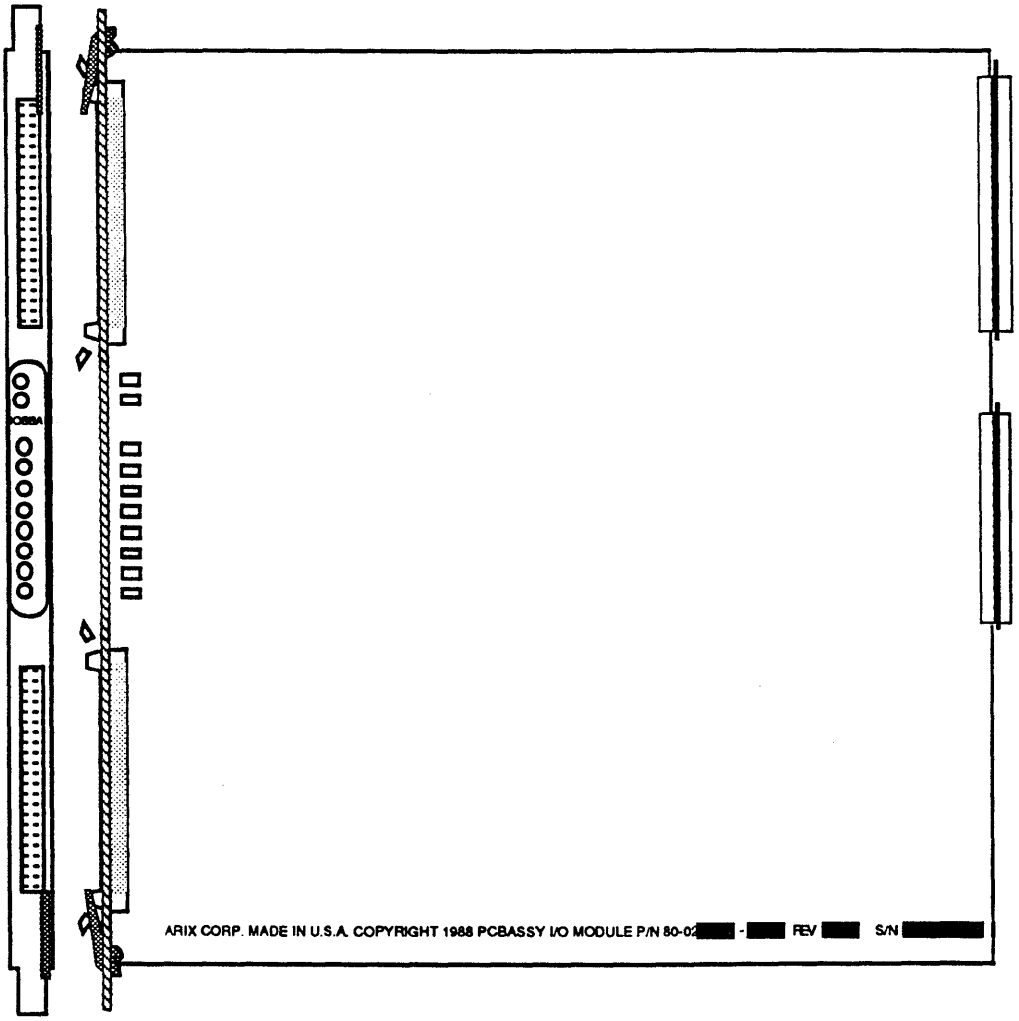


Figure 3-10. I/O System Bus Adapter

Asynchronous Communications Device Board

The Asynchronous Communications Device Board (ACDB) provides the asynchronous communications interface for the IOPM. The basic configuration of the ACDB is 16 asynchronous ports(8-pin RJ-45 connectors) and one Centronics compatible parallel port.(25-pin DB-25 connector).

The ACDB supports up to three Asynchronous Communications Extender (ACE) boards. The ACE board rides "piggy-back" on the ACDB providing an extra 16 Asynchronous ports per attached ACE board. The maximum port expansion capability from one IOPM/ACDB/ACE combination is 64 Asynchronous ports.

Each of the possible 64 channels are full duplex and the the baud rate can be individually set per channel. Selectable baud rate range from 50 to 19.2 K.

Figure 3-11. Asynchronous Communications Device Board (ACDB).

Asynchronous Communications Extender

The Asynchronous Communications Extender (ACE) is not installed into the CSS backplane or into the 96-pin IOPM device connector. The ACE connects directly to the ACDB through a stacking, DIN , 96-pin connector "piggy-backing" onto the ACDB board. The ACE board does require an interface board slot, so an ACE assembly should be mounted to the right (when viewed from the front of the card cage) of a group of logic boards (logic boards, with the exception of the IOPM do not use the space provided in the rear of the card cage for interface boards). Figure 3-12 shows an example of this configuration.

NOTE: Board ID jumpers are to be installed in 1st, 2nd, and 3rd positions to coincide with 1st, 2nd, and 3rd PCBs as shown.

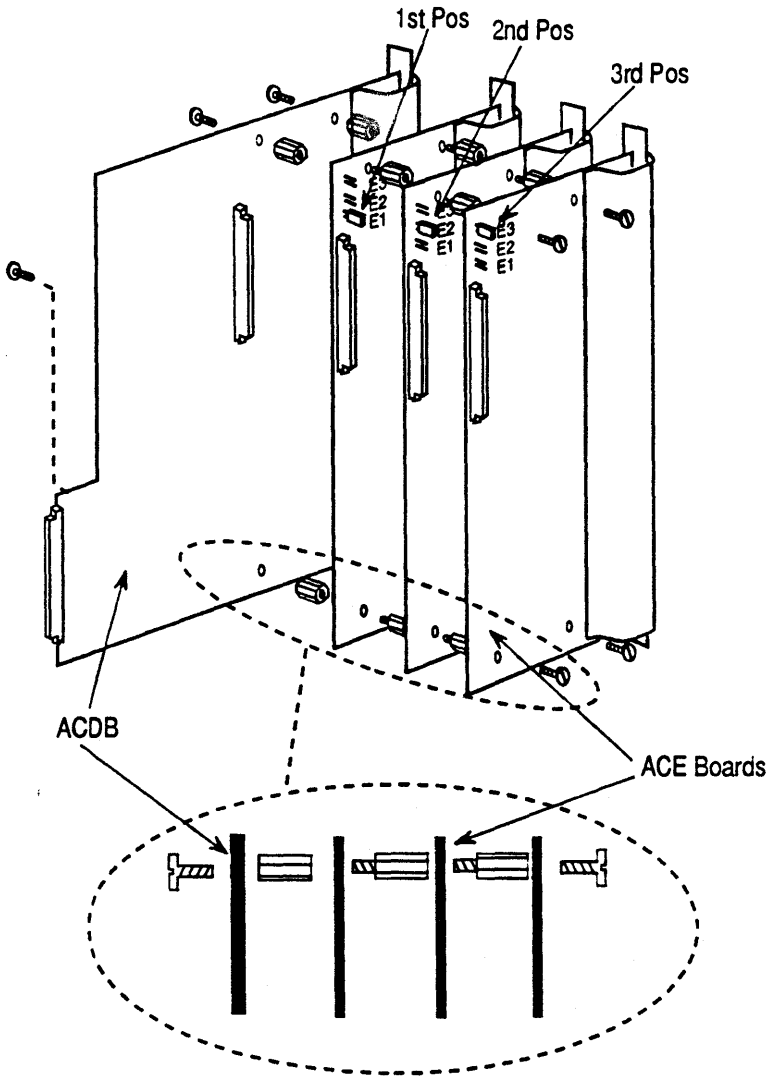


Figure 3-12. Asynchronous Communications Extender

ACE Board Removal

ACE boards are fastened to the back of the card cage by metal retaining brackets just like a normal interface board. However, *unlike* a normal interface board, ACE boards are also fastened to a parent ACDB. Therefore, to remove an ACE board you must also remove its parent asynchronous device board and any other ACE boards physically connected to the ACE board you wish to replace.

This assembly, consisting of the ACE board and ACDB, and any other ACE boards physically connected to the ACE board to be replaced, is described in the following paragraphs as the *ACE assembly*.

PC boards are susceptible to electrostatic damage. Use an Electro-Static Discharge (ESD) grounding strap when handling PCBs. Do not touch the ICs or components on the circuit boards, and do not handle the boards except by their edges.

Proceed as follows.

1. Power down the system as described in Chapter 2.
2. Record the board types, serial numbers, and slot numbers before removing the ACE assembly. Also record the ACE board IDs (1, 2, or 3) displayed by the LEDs at the bottom of the ACE board retaining brackets.
3. Label and remove the connectors extending from the back of the retaining brackets on the ACE assembly.
4. Loosen the captive screws on the top and bottom of the retaining brackets for the ACE assembly.
5. Grasp the captive screws of the parent asynchronous device board retaining bracket. ***Gently*** pull alternately on the top and bottom of the board until it is free from the logic board connector.
6. Carefully pull the entire ACDB/ACE assembly out of the card cage. As you remove the assembly, ensure that no cables catch on the card cage slots or the protruding edges of the board.
7. Referring to Figure 3-12, lay the stack on a table or clean work surface.and unfasten the screws and standoffs necessary to gain access to the ACE board you wish to remove. When separating an ACE board from the Module Interface Bus connector, be especially careful to lift the ACE board *straight* off.
8. Place the interface board in a plastic antistatic bag to protect the components from electrical damage.

9. Store the board in a cool, dry environment until its final disposition. Keep it in the antistatic bag and, if possible, in an upright position.

10. If you are not going to replace the ACE board immediately, reassemble the ACE assembly and install a slot filler panel in the unused slot.

ACE Board Installation

ACE boards are fastened to the back of the card cage by metal retaining brackets just like a normal interface board. However, *unlike* a normal interface board, ACE boards are also fastened to a parent ACDB. Therefore, to install an ACE board you must first remove its parent asynchronous device board and any other ACE boards physically connected to the ACE board you wish to replace.

This assembly, consisting of the ACE board and ACDB, and any other ACE boards physically connected to the ACE board to be replaced, is described in the following paragraphs as the *ACE assembly*.

To install an ACE board, proceed as follows:

CAUTION:

PC boards are susceptible to electrostatic damage. Use an Electro-Static Discharge (ESD) grounding strap when handling PCBs. Do not touch the ICs or components on the circuit boards, and do not handle the boards except by their edges.

1. Power down the system as described in Chapter 2.

2. If necessary, loosen the screws that fasten the slot filler plate to the frame and remove the plate.

3. Remove the ACE board from its shipping carton. The board is normally shipped inside a plastic, antistatic bag. Lay the board (still inside the bag) on a table or clean work surface.

4. Grasp the replacement board by its edges and remove it from its antistatic bag. Store the carton and antistatic bag temporarily; you may wish to use them for the board you are replacing.

5. Refer to the previous section, *ACE Board Removal* and remove the ACE assembly from the card cage.

6. Set the Board ID jumper to the correct position (see Figure 3-12). It is very **important** that no two Board IDs on the same Module Interface Bus be the same. The ID will be displayed on the LEDs on the board tetainer when powered up.

7. Referring to Figure 3-12, install the ACE board onto the Module Interface Bus connector and secure it using the standoffs and screws provided.

8. Grasp the captive screws of the parent asynchronous device board retaining bracket and position the ACE assembly, component side to the left, in the upper and lower guide tracks of the installation slots.

9. Gently push the boards all the way into the card cage slot and seat the parent asynchronous device board firmly into the bus connector on the associated logic board.

10. Reconnect the tagged signal cables to the corresponding connectors on the boards.

ACDB /ACE Physical Interface

The ACDB interface board provides sixteen (16) asynchronous communications ports. All 16 ports function as a Data Terminal Equipment (DTE). A pin/signal description of a cable for the RJ-45 connectors when used as a Data Terminal Equipment (DTE) interface is shown in Table 3-1. A DB-25 connector is assumed for the Terminal side. The second type of port is provided on the ACDB to accomodate a female DB-25 connector used for a parallel printer port.

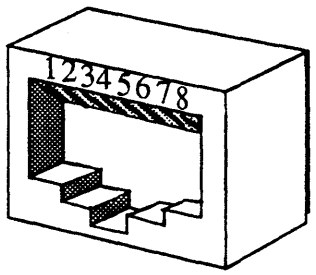


Figure 3-13. Female RJ-45 Port

Table 3-1. RJ-45 to DB-25 Connector Pin/Signal Description for DTE Use

RJ-45 ARIX (DTE)		Direction	DB-25 Terminal (DTE)	
Pin #	Signal Name		Pin #	Signal Name
1	No Connection			
2	DSR	←	20	DTR
3	TX	→	3	RX
4	RX	←	2	TX
5	GND	– – –	7	GND
6	DTR	→	8 6	DCD DSR
7	DCD	←	20	DTR
8	No Connection			

NOTE: Pin 20 on the DB-25 connector is connected to two pins on the RJ-45 connector. Pin 6 on the RJ-45 connector is connected to two pins on the DB-25 connector.

A pin/signal description of a cable for the RJ-45 connectors when used as an interface to Data Communication Equipment (DCE) or a MODEM is shown in Table 3-2. A DB-25 connector is assumed for the Terminal side.

Table 3-2. RJ-45 to DB-25 Connector Pin/Signal Description for DCE or MODEM Use

RJ-45 ARIX (DTE)		Direction	DB-25 MODEM (DCE)	
Pin #	Signal Name		Pin #	Signal Name
1	No Connection			
2	DSR	←	6	DSR
3	TX	→	2	TX
4	RX	←	3	RX
5	GND	– – –	7	GND
6	DTR	→	20	DTR
7	DCD	←	8	CAR
8	No Connection			

Table 3-3. ACDB Female DB-25 Parallel Printer Port Connector Pinout

Pin Numbers	*Descriptions*
1	Data Strobe
2-9	Data Lines 1 through 8
10	Acknowledge
11	Busy
12	Paper Empty
13	Select
14-25	Signal Ground

LAN/WAN Device Board

The Local Area Network/Wide Area Network (LAN/WAN) Device Board (LWDB) provides the IOPM with a single LAN and four WAN ports.

The Communications interfaces available for the WAN ports are:

EIA RS-232-C

EIA RS-449

CCITT V.35

The single LAN port is standard with each board and complies with the IEEE 802.3 CSMA/CD standard (Ethernet compatible). The WAN ports can only be configured by the factory.

Data transfer rate for the LAN interface is

Up to 10-Mbits/second

Data transfer rates for the WAN interface is as follows:

Up to 252 Kbits/second in full duplex on one port

Up to 128 Kbits/second full duplex on two ports

Up to 64 Kbits/second full duplex on four ports.

Physical Interface

The LAN/WAN has five connectors on its rear edge as shown in Figure 3-14. Ports 0 through 3 are designated WAN ports. The fifth and uppermost port is the LAN port.

The LAN interface complies withe IEEE 802.3 CSMA/CD standard at the Attachment Unit Interface (AUI); however, an external Media Attachment Unit (MAU), referred to as a transceiver, that complies withe the IEEE 802.3 standard is required to interface to one of several LAN mediums. With the appropriate transceiver, the LAN interface supports the following LAN mediums:

10 Base 5	10-Mbits/sec, baseband, thick coaxial cable
10 Base 2	10-Mbits/sec, baseband, thin coaxial cable
10 Base T	10-Mbits/sec, twisted pair wiring
10 Base 36	10-Mbits/sec, broadband, CATV-type cable
Fiber Optic	10-Mbits/sec, IEEE 802.3 compatible, fiber optic

The only field serviceable component on the LAN/WAN board is the fuse. The replacement fuse should be rated at 125 VAC, 2-Amps (Slow Blow) or 1-Amp (Fast Blow) Littlefuse - part number 273002 or equivalent.

The LAN/WAN provides power to the MAU and the fuse protects the LAN/WAN should the MAU develop a short circuit.

1. To replace the fuse, disconnect the MAU from the AUI

2. Then gently pull the clear section of the fuse assembly towards the outside edge of the board. The clear section of the fuse has two pins that fit into the socket of the fuse assembly.

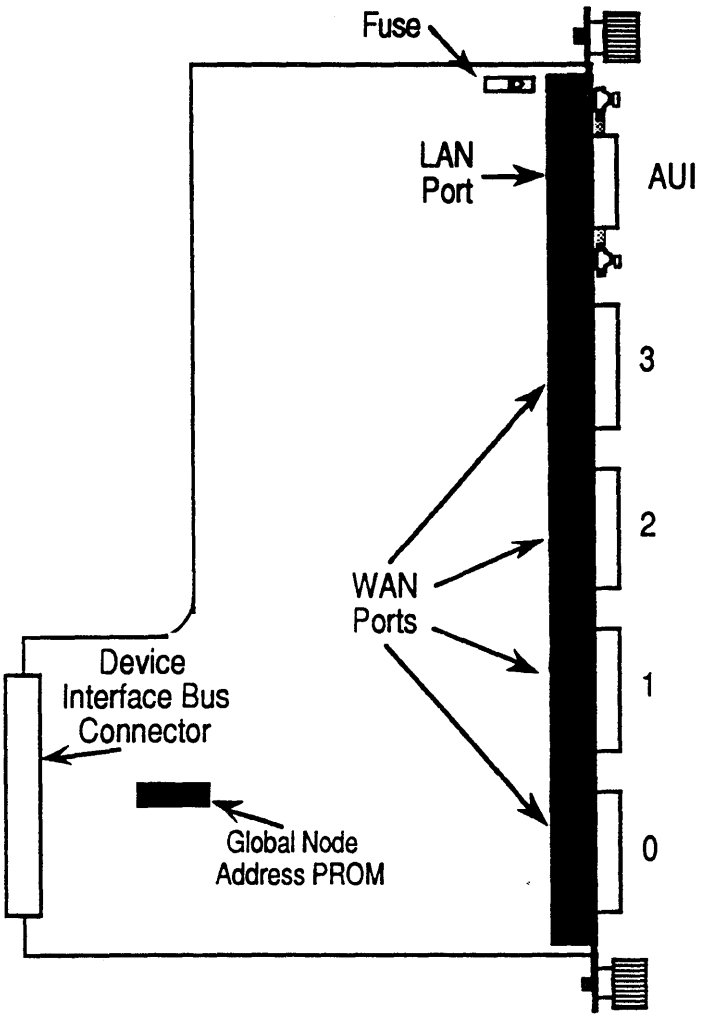


Figure 3-14. LAN/WAN Device Board

The AUI external cable and transceiver(s) must comply withe IEEE 802.3 standard.

The LAN AUI is a 15-pin D-style female connector. A strain relief bracket is included and must be used to ensure the strength of the connection. The bracket is installed using the following procedure:

1. Unscrew the two captive screws holding the strain relief bracket to the AUI.

2. Slide the strain relief bracket onto the cable connector as show in Figure 3-15.

3. While holding the strain relief bracket in place, thread and tighten the strain relief bracket's two captive screws into the two holes on each side of the AUI connector.

4. The AUI interface cable is now secured to the LAN port.

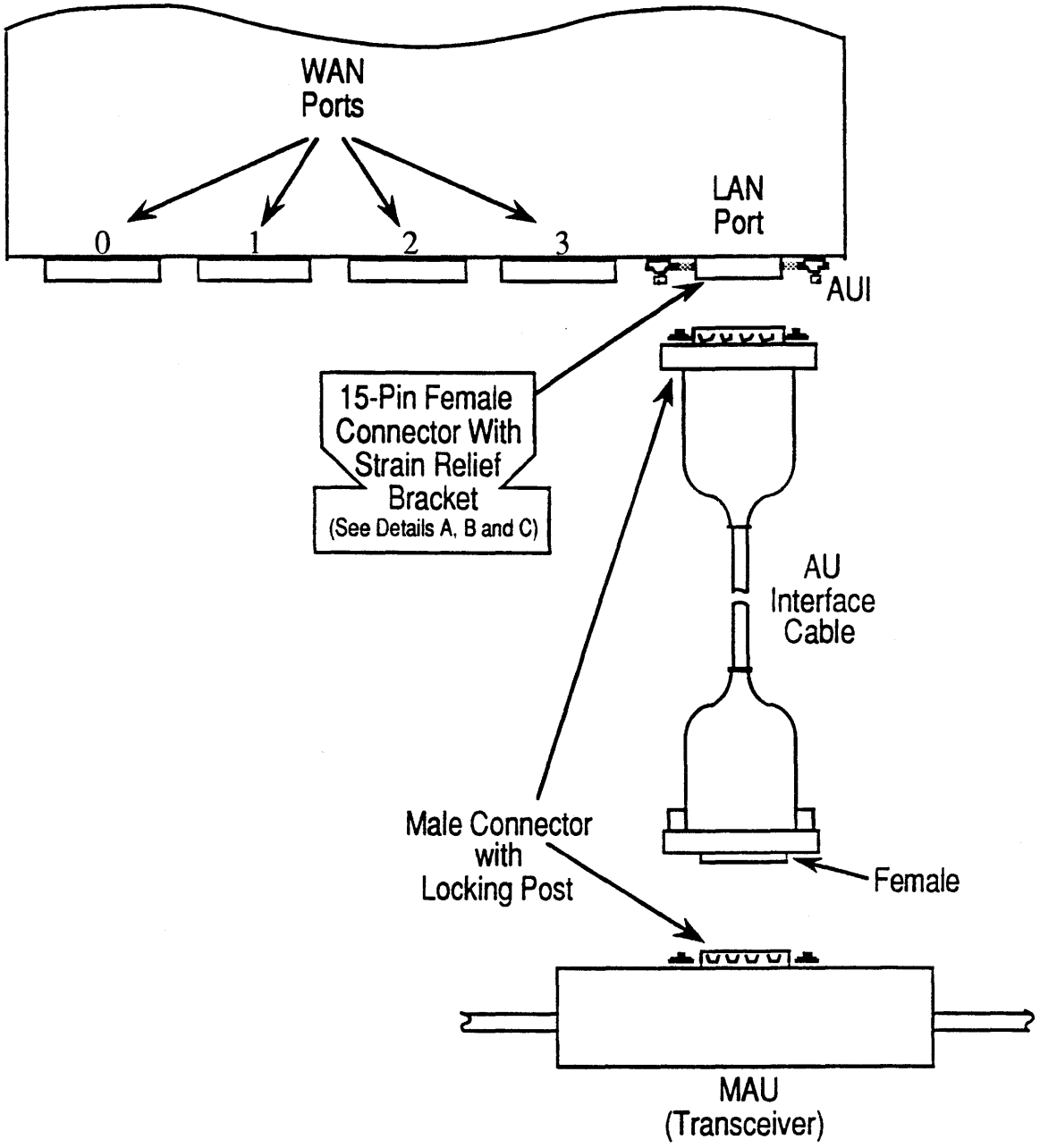


Figure 3-15. LAN/WAN Device Board Connection.

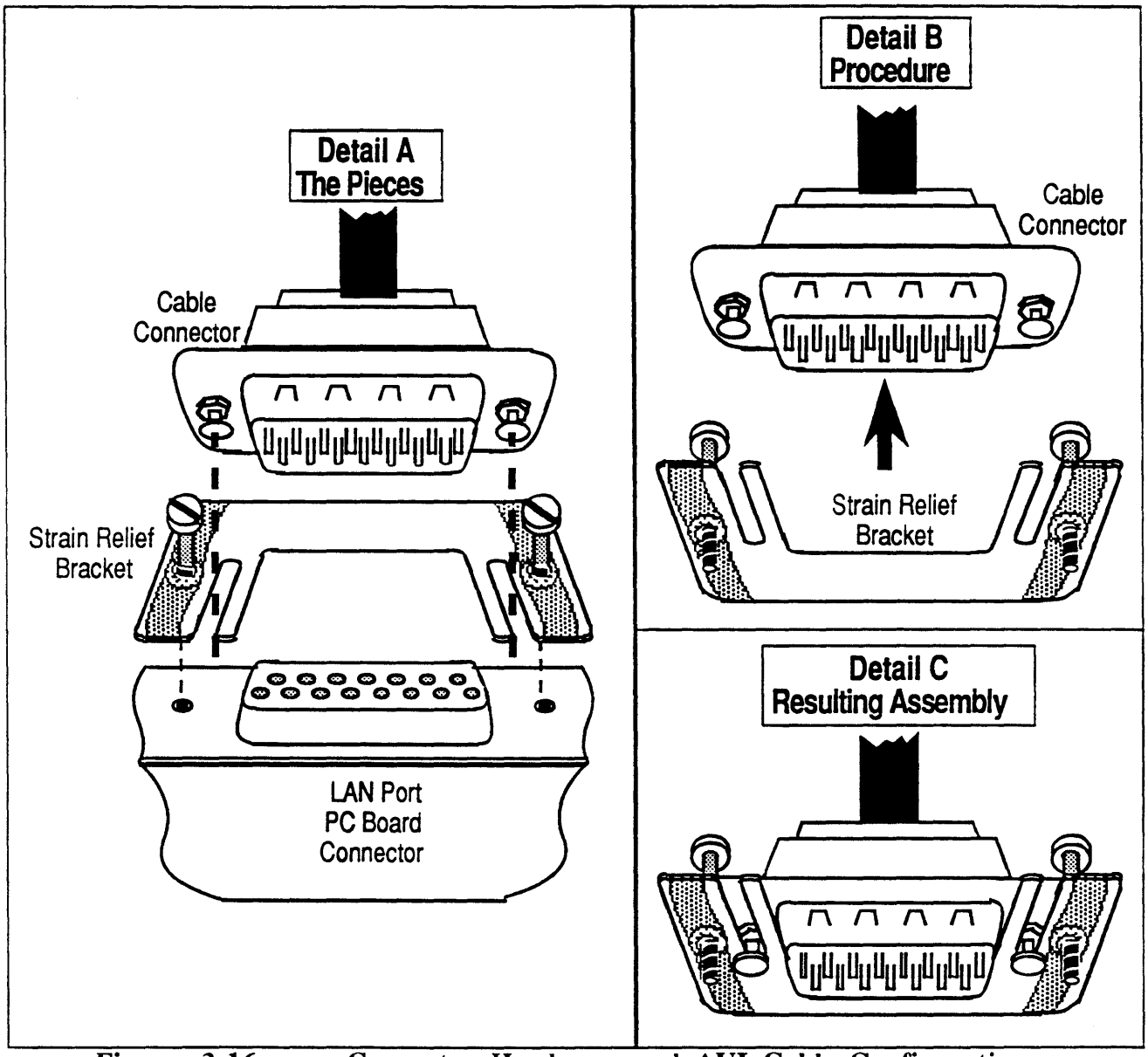


Figure 3-16. Connector Hardware and AUI Cable Configuration.

CAUTION:

If the strain relief bracket is not installed as shown (the *open* portion of the bracket should be on the left-hand side of the board when the board is in a vertical position), the bracket will scrape against any device boards to the left of the LWDB causing damage to the bracket and to the board.

Dual SCSI Device Board

The Dual SCSI Device Board (DSDB) is a high performance peripheral controller supporting the Small Computer System Interface (SCSI) for the IOPM. The DSDB supports two SCSI channel, each of which can accommodate up to seven peripheral devices for a total of 14 SCSI devices per DSDB. Each channel can be configured for single-ended or differential operation. Take note that the channel signalling convention is dedicated to that channel and that a mixture of single-ended and differential devices on the same channel is *not allowed.*

Figure 3-17 shows SCSI Channel 1 with the terminator resistor pack installed and set for single-ended to control SCSI devices in the primary cabinet, and SCSI Channel 2 with the terminator resistor packs removed is set for differential operation to control SCSI devices in an expansion cabinet.

Setting SCSI Channels for Single-Ended or Differential Operation

Note that in the figure SCSI Channel 1 has its Terminator Resistor Packs (RP-29, RP-32, and RP-35) present, and that SCSI Channel 2 has its Terminator Resistor Packs (RP-12, RP-13, and RP-15) removed.

This is very important.

- **Single-Ended** operation of a SCSI Channel is determined by:
  The **terminator resistor packs** for that channel are **present**
  The SCSI device cable must is connected to the Single-Ended port
  The **jumperblock** for that channel must is shorted between pins **2** and **3.**

- **Differential** operation of a SCSI Channel is determined by:
  The **terminator resistor packs** for that channel are **removed**
  The SCSI device cable must is connected to the Differential port
  The **jumperblock** for that channel must is shorted between pins **1** and **2.**

SCSI Channel Terminator Fuses

The only field serviceable parts of the DSDB are the fuses. Each SCSI Channel has a fuse for Terminator Power. The replacement fuse should have a 125 Volt rating at 1 Amps (Fast Blow) Littlefuse - part number 273002 or equivalent.

The DSDB provides Terminator Power for the SCSI devices, and the fuses protect the DSDB in the event of a short circuit. If the fuse blows, this indicates a higher than normal current draw from a SCSI device on that channel. The locations of the fuses are shown in Figure 3-17.

To replace the fuse:

1. Power-down the system as described in Chapter 2.

2. Disconnect the SCSI cables from the DSDB.

3. Gently pull the clear section of the fuse assembly towards the outside edge of the board.

4. Install a new fuse of the correct type and rating into the socket of the fuse assembly. The clear section of the fuse has two pins that fit into the socket portion of the fuse assembly.

5. Determine the cause of the high current draw before placing the DSDB back into operation.

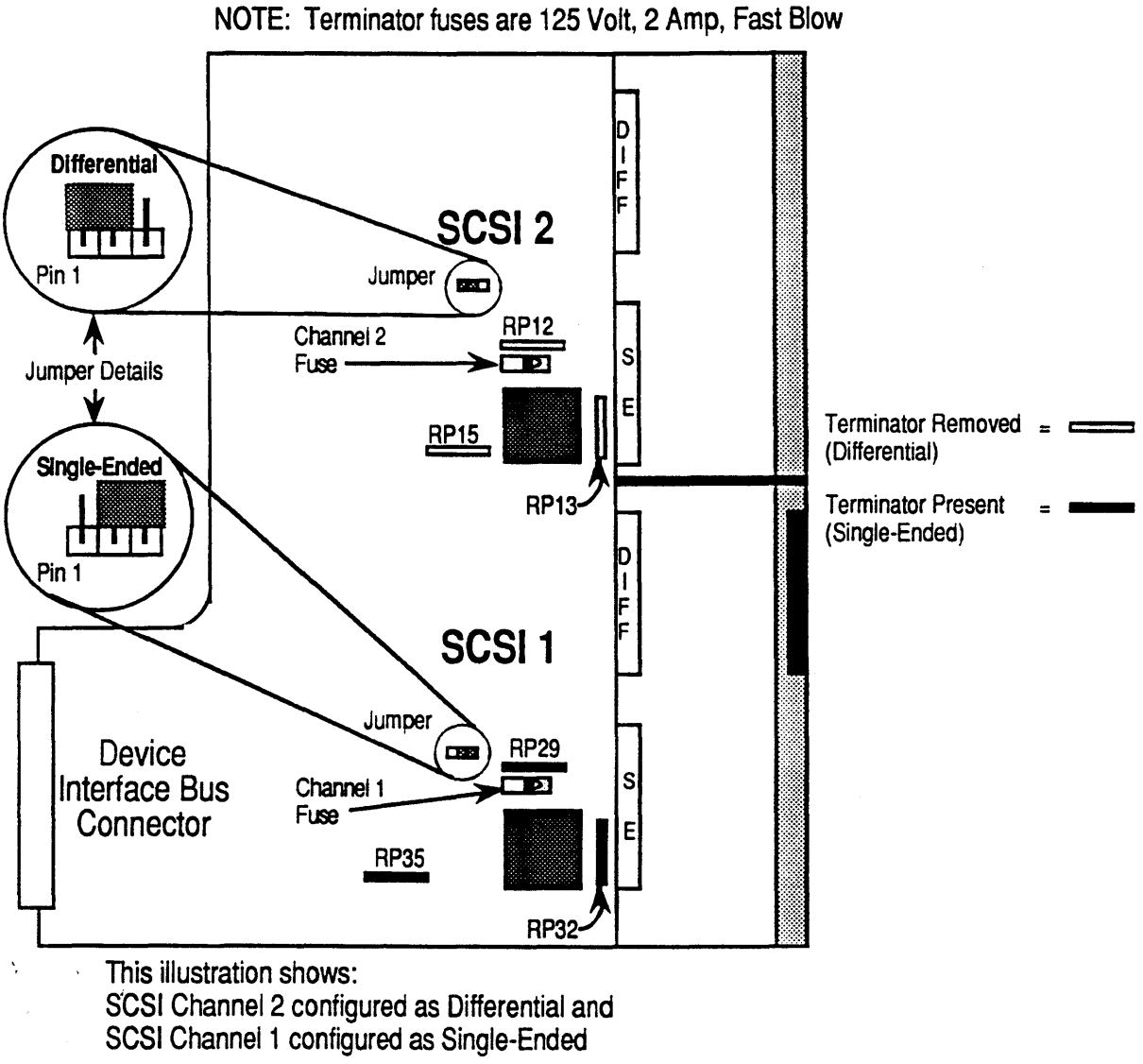


Figure 3-17. Dual SCSI Device Board (DSDB)

System Console Board

The System Console board is mounted on a metal panel on the rear of the primary cabinet behind the main card cage. It contains the system serial ports described in Chapter 1. Internally it connects to the Real World Interface board.

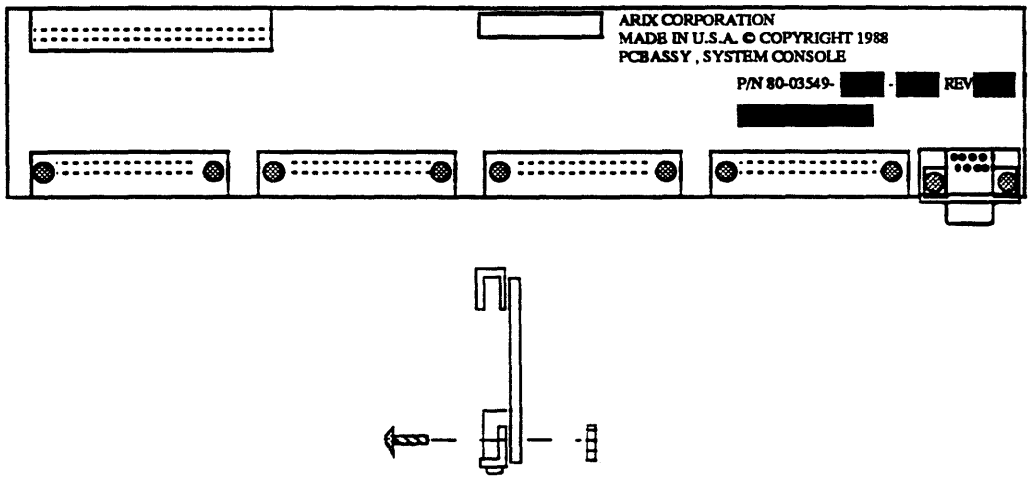


Figure 3-18. System Console Board

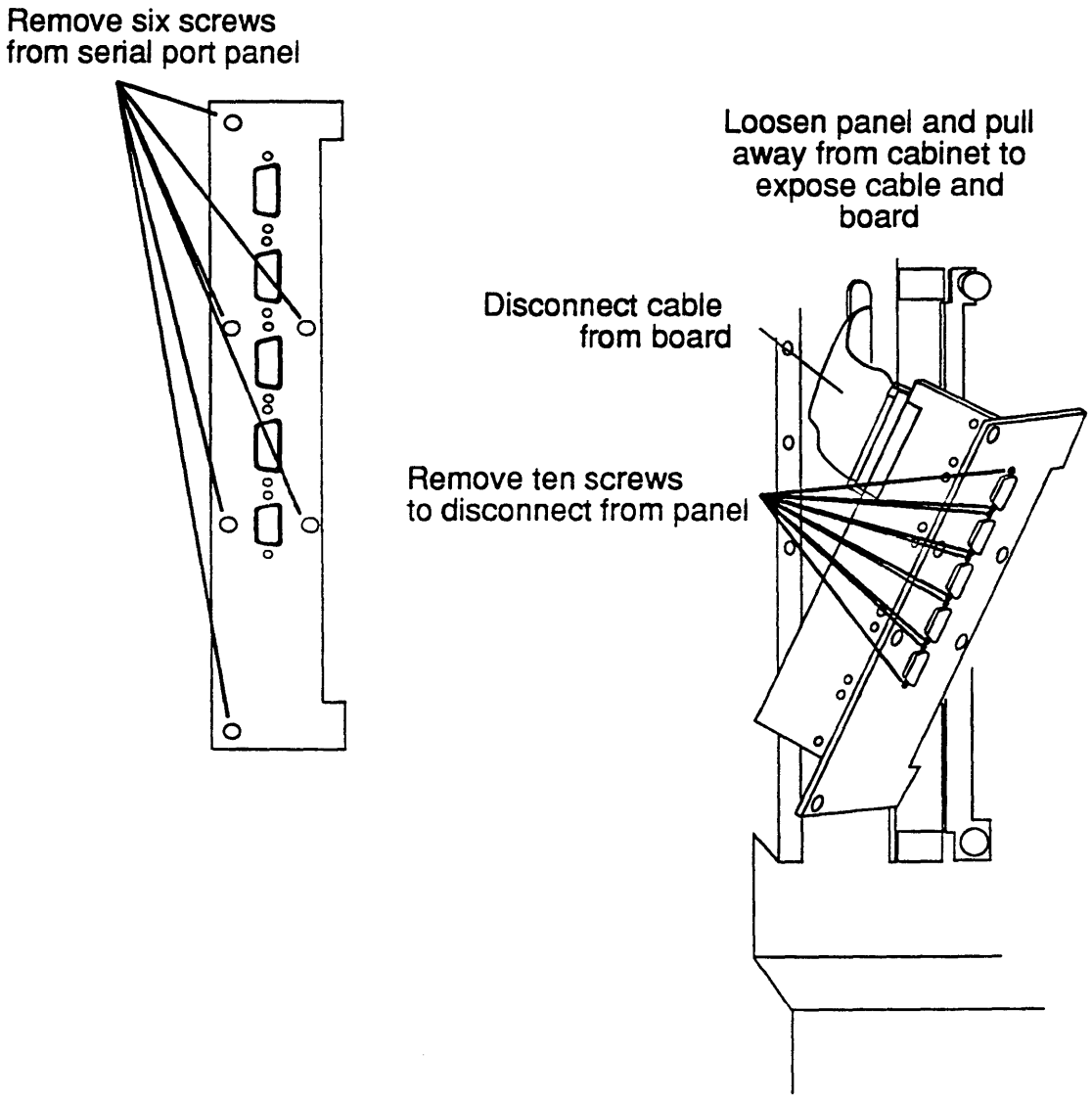


Figure 3-19. System Console Board Access

System Console Board Removal

Remove the system console board as follows:

1. Power down the system as described in Chapter 2. Turn off the circuit breaker.

2. Remove the six phillips head screws from the console board mounting plate (Figure 3-20).

3. Pull the mounting rack and board assembly away from the cabinet an inch or so until you have access to the signal cable connected to the top of the board.

4. Disconnect the signal cable from the board. You can now remove the rack and board assembly from the cabinet.

5. Remove the ten phillips head screws from the sides of the connectors on the board and separate the PCB from the mounting plate.

6. Lay the screws and mounting plate to one side until you are ready reinstall the assembly.

System Console Board Installation

Install the system console board as follows:

1. Unpack the replacement board and set the shipping container aside in case you need them to return the board.

2. Grasp the board by its edges and remove it from its plastic, antistatic shipping bag.

3. Attach the new board to the mounting plate with the ten screws removed in Step 5 above. Make sure that the connectors are well centered in the mounting plate cutouts before you fully tighten the screws.

4. Hold the mounting plate and board assembly close to the cabinet and connect the signal cable to the board.

5. Hold the mounting plate and board assembly against the cabinet, align the screw holes, and thread the six mounting screws removed in Step 2 above into the cabinet frame. Do not fully tighten the screws until you have threaded all six and have the mounting plate aligned squarely with the cabinet.

Bus Arbiter Board

The CSS Bus Arbiter attaches to the CSS motherboard. The bus arbiter board is mounted on the back of the motherboard as shown in Figure 3-21.

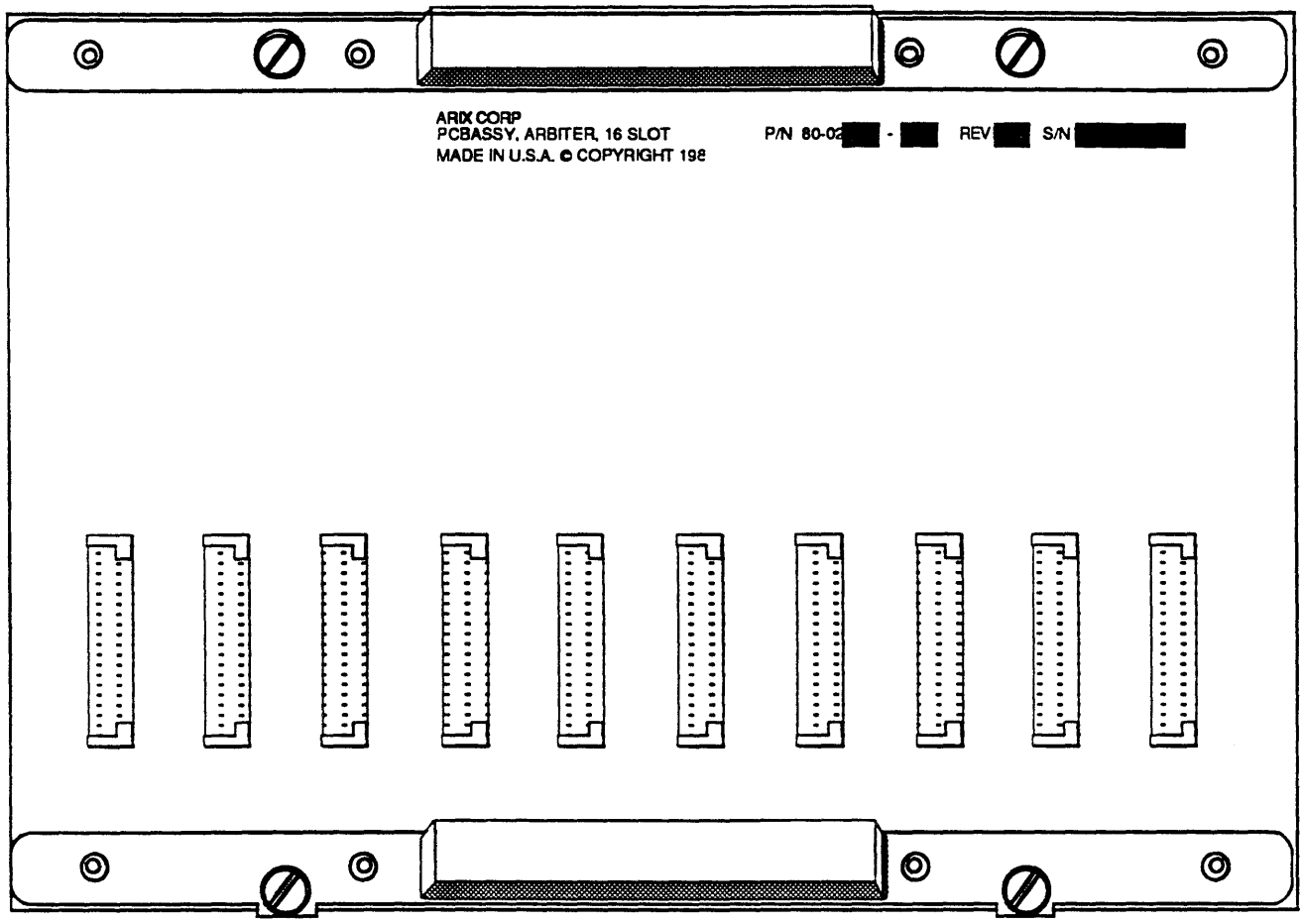


Figure 3-20. Bus Arbiter Board

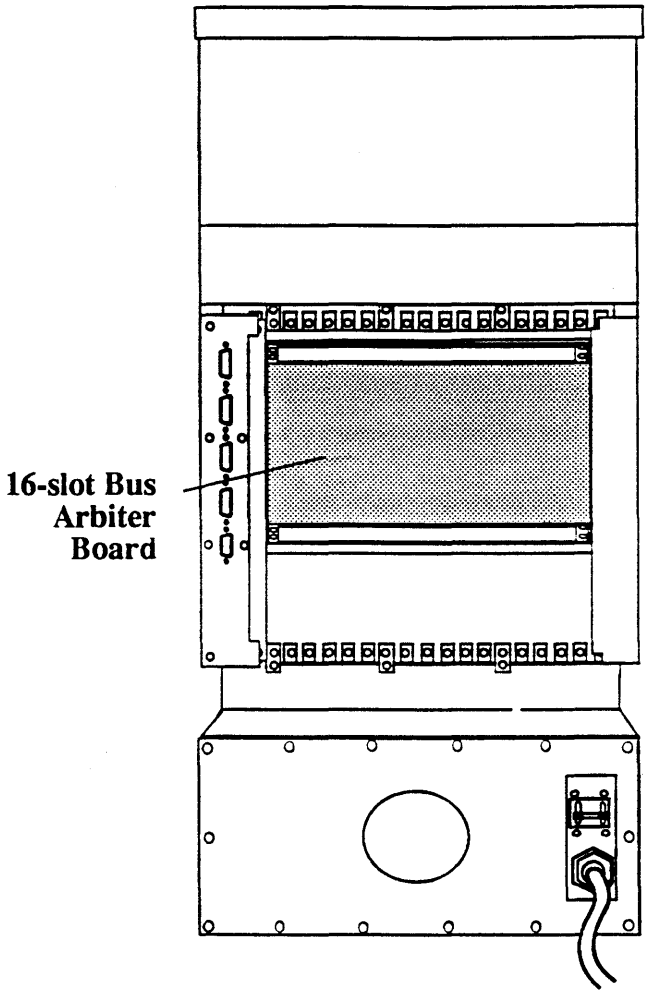


Figure 3-21. Bus Arbiter Board Access

Bus Arbiter Board Removal

Remove the bus arbiter board as follows:

1. Power down the system as described in Chapter 2.

2. Using a slot-head screwdriver remove the two horizontal EMI shields from the rear of the cabinet.

CAUTION:

You will have to remove all of the interface boards to gain sufficient clearance to remove the Arbiter Board. Proceed with the next few steps with caution.

3. Record the board type, serial number and slot number before removing the board.

CAUTION:

PC boards are susceptible to electrostatic damage. Use a correctly grounded ESD wrist strap when handling PCBs, do not touch the chips and components on the circuit boards and do not handle the boards except by their edges.

4. Identify, tag, and disconnect the signal cables from each board. Keep the cables in the openings next to the board from which you remove them.

5. Loosen the captive screws on top and bottom of the retaining bracket.

6. Remove the tagged interface boards from the card cage and store them in a clean, well protected place until you reinstall them. The ideal storage place is a standard cardboard storage carton for PCBs.

7. Loosen the captive screws that hold the Bus Arbiter board in place.

8. Grasp the board by the metal handles at the top and bottom and gently pull it toward you until it is free of the connectors on the motherboard.

9. Place the board in an antistatic bag and store it for shipment to a repair site.

Bus Arbiter Board Installation

Install the Bus Arbiter board as follows:

1. Unpack the replacement board and set the shipping container aside in case you need them to return the board.

2. Grasp the board by its edges or handles and remove it from its antistatic shipping bag.

CAUTION:

When carrying out the following step, you will not be able to see the connectors as you push them into the motherboard. If you experience any abnormal resistance or interference, withdraw the board and recheck the connectors in both the Bus Arbiter Board and the Motherboard.

3. Hold the board by its handles and carefully line up the connectors on the board with those on the motherboard; then, gently but firmly push on the arbiter board until it is fully seated in the motherboard connectors. Tighten the retaining bracket captive screws removed in Step 5 in the removal procedure.

4. Reinstall the interface boards in the same slots from which you removed them.

5. Reconnect the signal cables to the appropriate connectors on the interface boards.

6. Thread and tighten the holding screws on the interface board extenders into the card cage.

7. Reinstall the horizontal EMI covers on the back of the cabinet.

Motherboards

System90 motherboards distribute bus signals between the installed PC modules. They also distribute DC power to the boards. See Figure 3-22 for further detail.

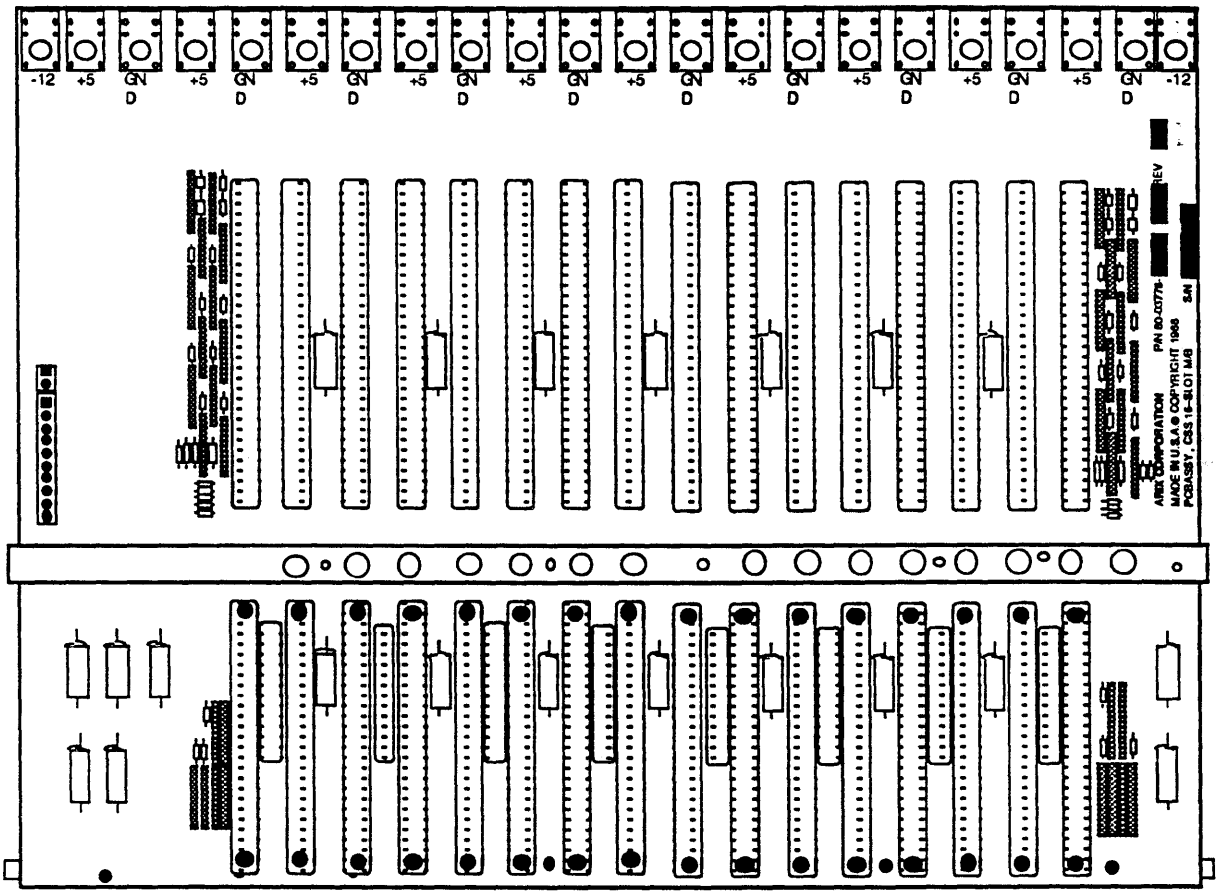


Figure 3-22. 16-Slot Motherboard

Motherboard Removal

Remove a motherboard as follows (Figures 3-23 and 3-24):

> NOTE:
>
> It is recommended that two people work together to perform many of the steps described in this procedure..

1. Power down the system as described in Chapter 2. Turn off the circuit breaker.

> NOTE:
>
> If you are removing a Motherboard from a cabinet that is part of a multicabinet system, you must separate the cabinet from the other cabinets in the installation as described in Chapter 2..

2. Open the front door, lift it off its hinges, and set it aside until you reinstall it.
3. Remove the side covers from the cabinet as described in Chapter 2. Turn off the circuit breaker.
4. Remove the phillips head screws from each side panel; remove the panels, and set them aside until you reinstall them.
5. Loosen the phillips head screws on the card cage cover; slide the cover up and off the frame. Set it aside until you reinstall it.
6. Using a slot-head screwdriver remove the two horizontal EMI shields from the rear of the cabinet.
7. Loosen the holding screws of all the interface boards until the threads are completely disengaged from the frame.
8. Identify the slot number of each interface board in the back chapter of the card cage and tag the board with the slot number.
9. Identify, tag, and disconnect the signal cables from each board. Keep the cables in the openings next to the board from which you remove them.

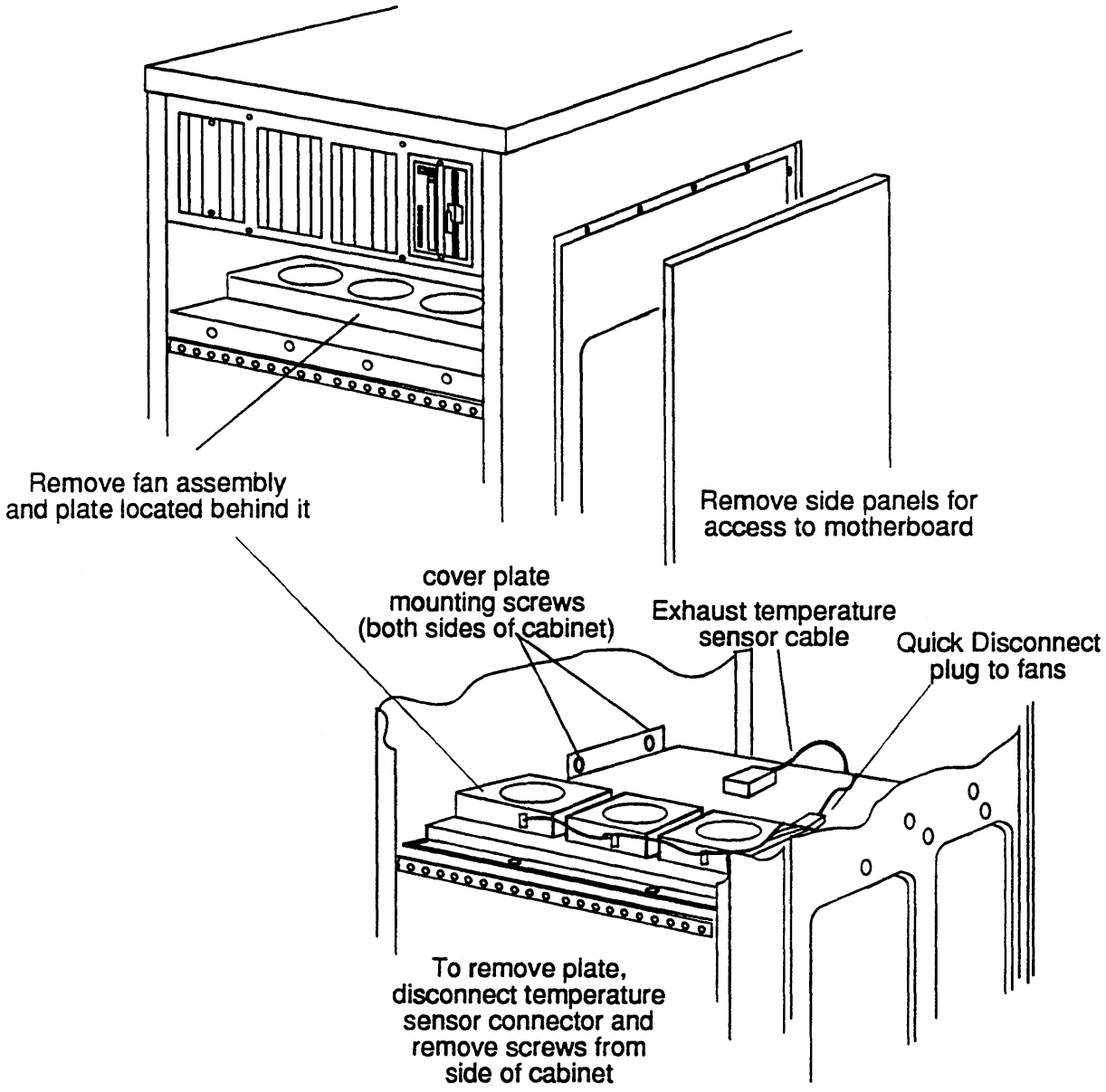


Figure 3-23. Motherboard Access and Removal, Part 1

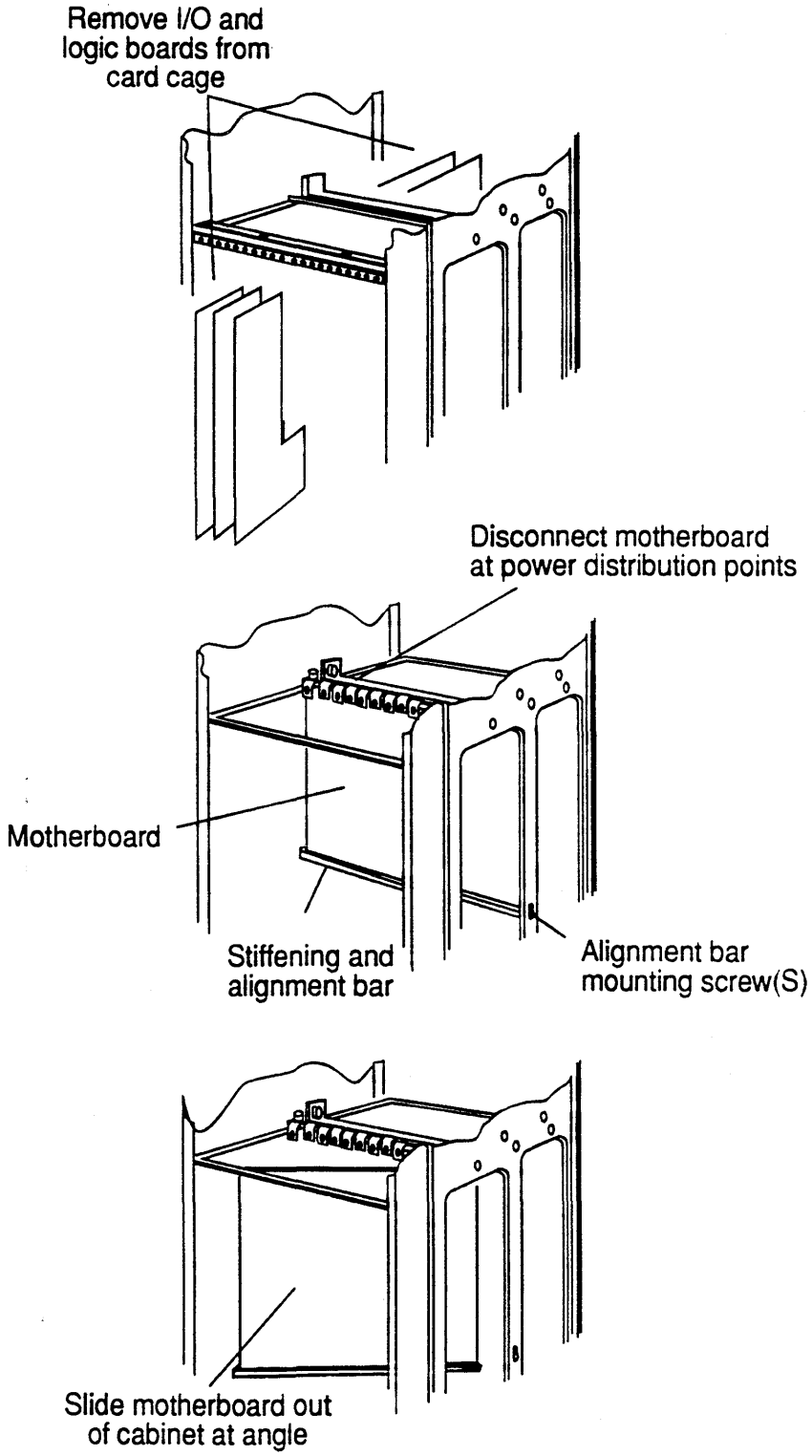


Figure 3-24. Motherboard Access and Removal, Part 2

PC boards are susceptible to electrostatic damage. Use a correctly grounded Electro Static Discharge (ESD) wrist strap when handling PCBs; do not touch the chips and components on the circuit boards and do not handle the boards except by their edge..

10. Remove the interface boards from the card cage and store them in a clean, well protected place until you reinstall them. The ideal storage place is a standard cardboard storage carton for PCBs.

11. Identify the slot number of each logic and controller board in the front chapter of the card cage and tag the board with the slot number.

12. Remove all logic and controller boards from the front of the card cage and store them in a clean, well protected place until you reinstall them.

13. Remove the Bus Arbiter board as described in the preceding subsection.

14. From the rear of the cabinet, remove P1 and auxiliary power harness in the CSS cabinet (the power sensor cable) from the motherboard.

15. To prevent screws or nuts from falling into the lower parts of the cabinet as you remove them from the motherboard, spread a cloth or antistatic mat in the bottom of the card cage so that it lies completely under the motherboard at both front and back.

16. Remove the *operator control panel* as described in Chapter 2.

17. Remove the *upper fan assembly* as described in Chapter 7.

18. Disconnect the signal cable from the *exhaust temperature sensor* board located in the upper cover plate of the card cage located just behind the upper fan assembly.

19. Disconnect the power cable for the fans located just behind the fan assembly in the upper air plenum.

20. Remove the phillips head screws that hold the upper cover plate in place. These screws enter from the outside.

21. Lift the cover plate off the frame and out of the cabinet.

    Removing this plate gives you access to the upper part of the motherboard and to the power distribution bus at the top of the motherboard.

NOTE:

As shown in Figures 3-22, 3-23 and 3-24, the Motherboard has GROUND and power distribution points of +5 VDC. The board also has +12 VDC and -12 VDC distribution points at the extreme ends. The +5 VDC and GROUND points on the board connect to flat extensions from the +5 VDC power bus. The +12 VDC and -12 VDC points connect to cables. Philip head screws provide a good electrical connection for these distribution points. The +/- 12 VDC return points are connected to the bus through screws and hex nuts..

22. Remove the phillips head screws from the +5 VDC and GND power distribution points along the top of the motherboard.

23. Remove the screws and nuts from the +12 VDC and -12 VDC distribution points at the extreme ends and top of the motherboard. After removing the screws and nuts, move the ±12 VDC cables up and out of the way.

    If possible, one person can hold the hex nuts on the back side of the board with a 1/4-inch nut driver or socket while a second person loosens and removes the screws from the front of the cabinet.

    If you are carrying out the the procedure alone, stand in front of the cabinet and reach into it through the upper air plenum and over the back of the board; hold the hex nuts with the 1/4-inch driver or socket held in this hand while you loosen and remove the screws from the front of the cabinet with the other hand.

24. Remove the phillips heads that hold the motherboard to the card cage (Figure 3-22).

25. Remove the phillips head screws (one from each side) that hold the stiffening and alignment bar to the card cage frame.

    When the second screw comes free, hold the motherboard.

26. Grasp the board by one side and remove it from the cabinet.

27 Put the board in an antistatic bag and store it in a cool, dry environment until its final disposition.

Motherboard Installation

1. Remove the replacement motherboard board from its shipping carton. Store the carton temporarily; you may wish to use it for the board you are replacing.

2. Fit the motherboard into the card cage, locating pins and corresponding holes are located on the motherboard and upper card guide.

3. Hold the motherboard in the approximate position it will occupy and thread the two external mounting screws into the ends of the bar. Tighten the two screws just enough to allow the motherboard to be moved vertically with a slight drag.

4. Take the system logic boards removed above out of their temporary storage and install them in their respective slots in the card cage. Install the boards as described earlier in this chapter.

5. Slide the boards into the slots to see if they seat firmly and completely into the motherboard connectors.

   If you experience any difficulty in getting the boards to seat correctly, or you observe that the connectors on the motherboard are not in alignment with those on the logic boards, slide the motherboard up or down until you are able to seat them.

6. After the logic boards are fully seated in the motherboard, tighten the two exterior screws; remove the logic boards from the card cage and again store them temporarily.

7. Install the ground wire located at the rear of the motherboard.

8. Install the screws and hex nuts in the +12 VDC and -12 VDC distribution points in the two end holes. Slip the screw through the associated cable, *then* through the board.

   If possible, one person can hold the hex nuts on the back side of the board with his fingers first and then after the screw is started with a 1/4-inch nut driver or socket while a second person threads the screws from the front of the cabinet.

   If you are carrying out the the procedure alone, stand in front of the cabinet and reach into it through the upper air plenum and over the back of the board; hold the hex nuts first with your fingers then with the 1/4-inch driver or socket held in this hand while you thread the screws from the front of the cabinet with the other hand.

8. Install the screws and hex nuts in the +5 VDC and GROUND distribution points in a similar manner. In this case, slip the screw into the board then through the power bus extender and into the hex nut.

9. Install the card cage cover plate removed in the step above. It is easies to start all phillips head screws a turn or so with your fingers and then tighten them all.

10. Connect the signal cable to the Exhaust Temperature Sensor board.

11. Install the *upper fan assembly* as described in Chapter 6.

12. Install the *operator control panel* as described in this Chapter 2.

13. From the rear of the cabinet, connect P1 (the power sensor cable) to the motherboard. If you are installing a motherboard in a Primary cabinet, also connect P2 (the Auxiliary Power Supply cable).

14. Install the Bus Arbiter board as described earlier in this chapter.

15. Install all logic boards in their respective slots.

16. Install all interface boards in their respective slots as described earlier in this chapter.

17. Replace all covers and close all doors at the front and rear of the cabinet.

18. Power up the system and bring it on line as described in Chapter 2.

4 Power and Status Boards

This chapter contains procedures for removing and installing all field replaceable PCBs other than those residing in the main card cage compartment. These PCBs are as follows:

- PSM distribution board
- Auxiliary power supply board
- AC module board
- Temperature sensor boards
- Keyswitch board
- Display board

PSM Distribution Board

The PSM Distribution board (Figure 4-1) is located inside the power supply compartment. It is mounted to a metal backing plate through four metal standoffs that fasten to the side of the module. The board is held in place by four phillips head screws.

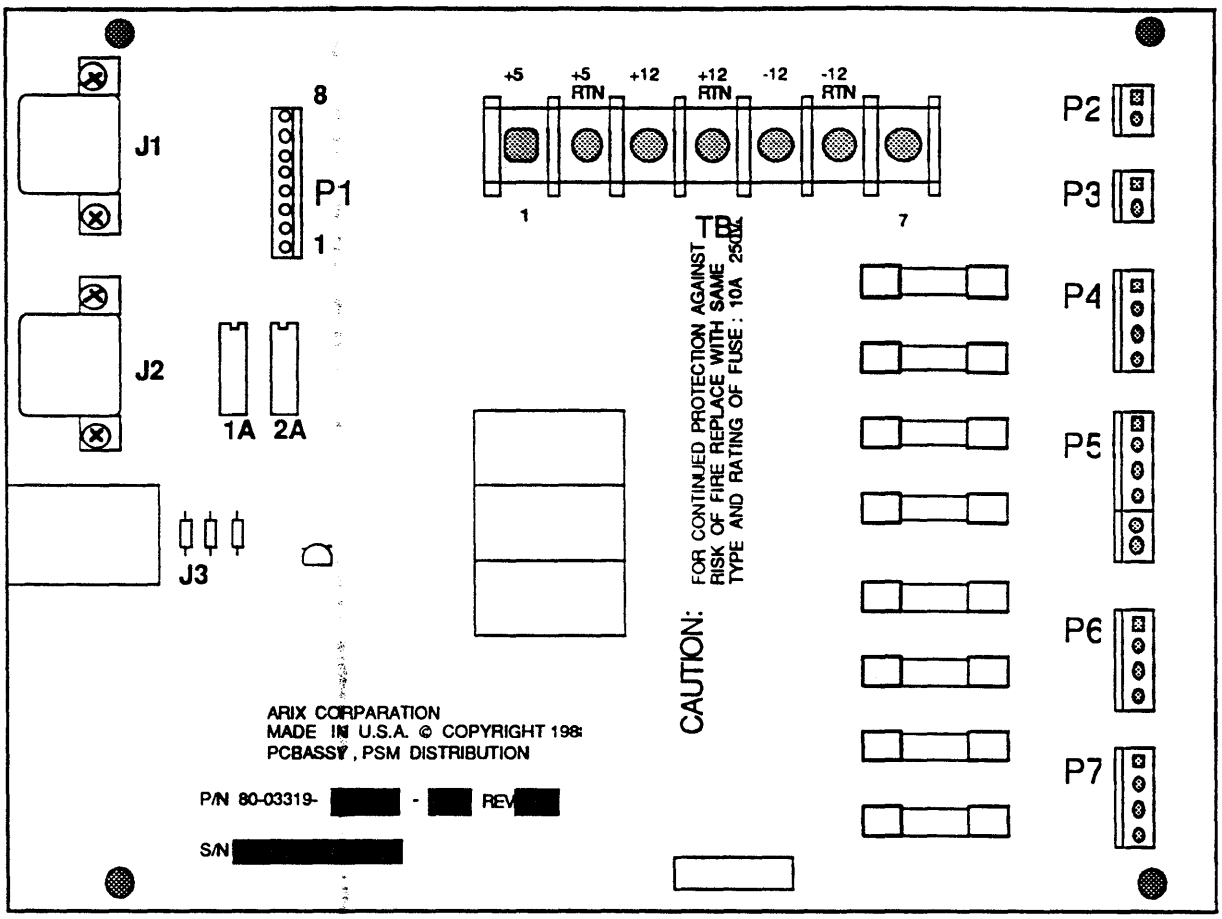


Figure 4-1. PSM Distribution Board

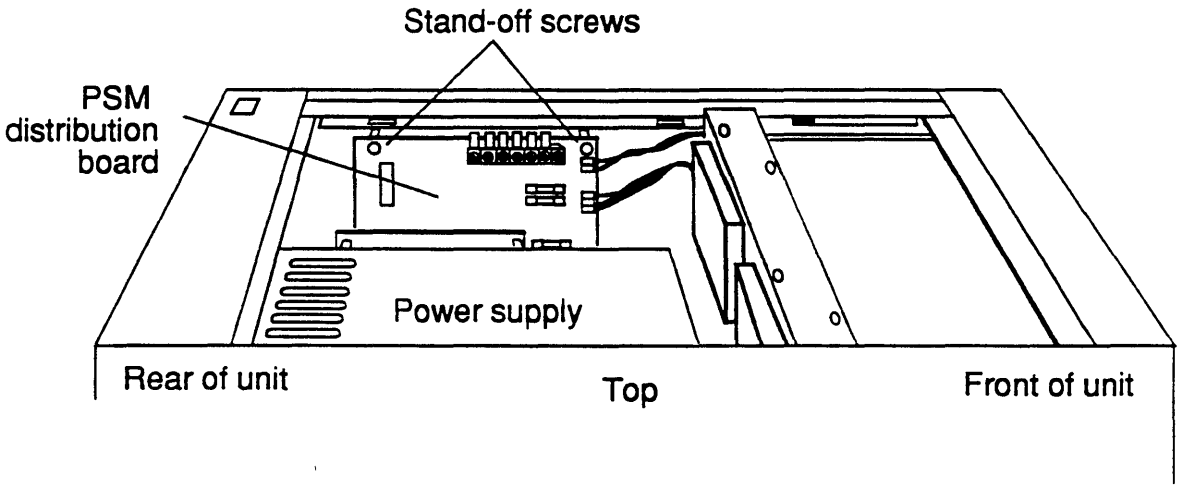


Figure 4-2. PSM Distribution Board Access

PSM Distribution Board Removal

Remove the PSM distribution board as follows:

1. Power down the system as described in Chapter 2. Turn off the circuit breaker.
2. Remove the top cover and top EMI shield of the cabinet.
3. Remove the three phillips head screws that hold the top panel of the power supply module in place. Slide the panel toward the rear of the cabinet and lift it off the module.

NOTE:
To avoid mistakes in reconnecting the leads disconnected in the next two steps, make a sketch showing position, color and any other identifying information for each lead or plug being disconnected.

CAUTION:

PC boards are susceptible to electrostatic damage. Use a correctly grounded Electro Static Discharge (ESD) wrist strap when handling PCBs; do not touch the chips and components on the circuit boards and do not handle the boards except by their edges.

4. Tag and disconnect all plugs from P1 through P7 and from J1 through J3.

5. Tag and disconnect all terminal board TB1 leads.

6. Remove the phillips head screws from the corners of the PSM board. You will probably need a short handled screwdriver. Standoffs are permanently attached to the chassis. Then, holding the board by its edges, remove it from the screw.

   The metal backing plate will come away from the board. Lay it aside until you install the replacement board.

7. Put the board in an antistatic bag; store it in a cool, dry environment until its final disposition.

PSM Distribution Board Installation

Install the PSM distribution board as follows:

1. Power down the system as described in Chapter 2.

2. Remove the replacement board from its shipping carton. The board is normally shipped inside a plastic, antistatic bag. Lay the board (still inside the bag) on a table or clean work surface. Store the shipping carton temporarily; you may wish to use it for the board you are replacing.

3. Hold the replacement board by its edges and remove it from its antistatic bag.

4. Hold the board in one hand as you put one of the screws into a mounting hole on the board. Slide the metal backing plate over the screw. Hold this assembly together as you thread the screw into its corresponding hole in the side of the compartment. Do not tighten the screw more than a turn or so. Mount the remaining three screws in a similar way; then tighten all four of them.

5. Reconnect the power distribution leads to terminal board TB1 and reconnect the plugs to P1 through P7 and to J1 through J3.

6. Replace the top cover of the power supply compartment by placing the cover over the compartment and fitting the lugs in the cover into the holes in the compartment. Then engage the lugs by sliding the cover toward the front of the machine, and replace the three holding screws.

7. Replace the top cover of the cabinet.

Auxiliary Power Supply Board

The *auxiliary power supply* board (Figure 4-3) is located inside the power supply module of the primary system cabinet next to the main DC Power supply. It is used for the Service Processor module. The board is screwed to a mounting plate through four standoffs. The mounting plate is fastened to the base of the power supply compartment with two screws. This assembly is enclosed in a metal ventilated cover.

WARNING:

This PC board has primary power on it any time the power cord is plugged in and the main circuit breaker is ON regardless of whether the system power switch on the front panel is on or off. Always turn the main circuit breaker to OFF and disconnect the plug from the power source when performing any operations with this board exposed.

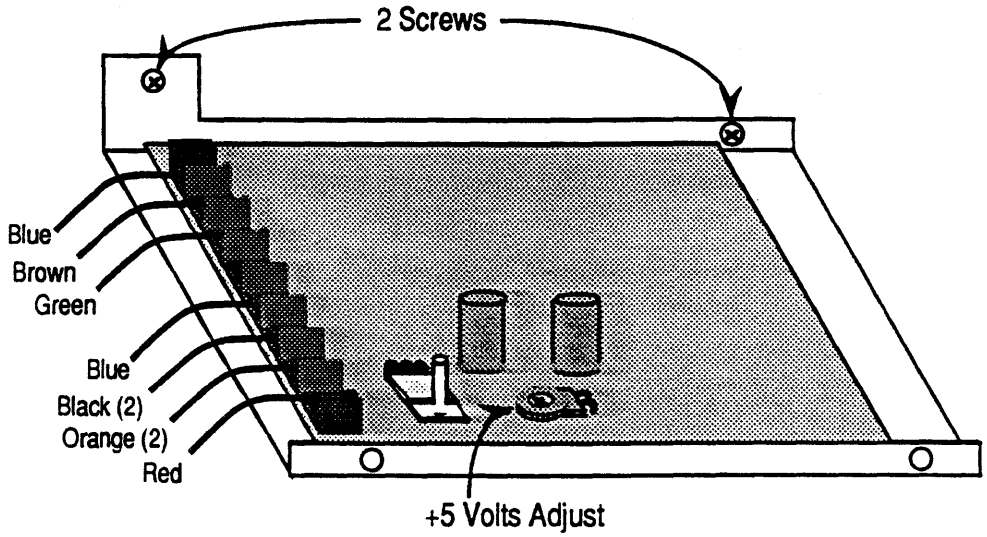


Figure 4-3. Auxiliary Power Supply Board

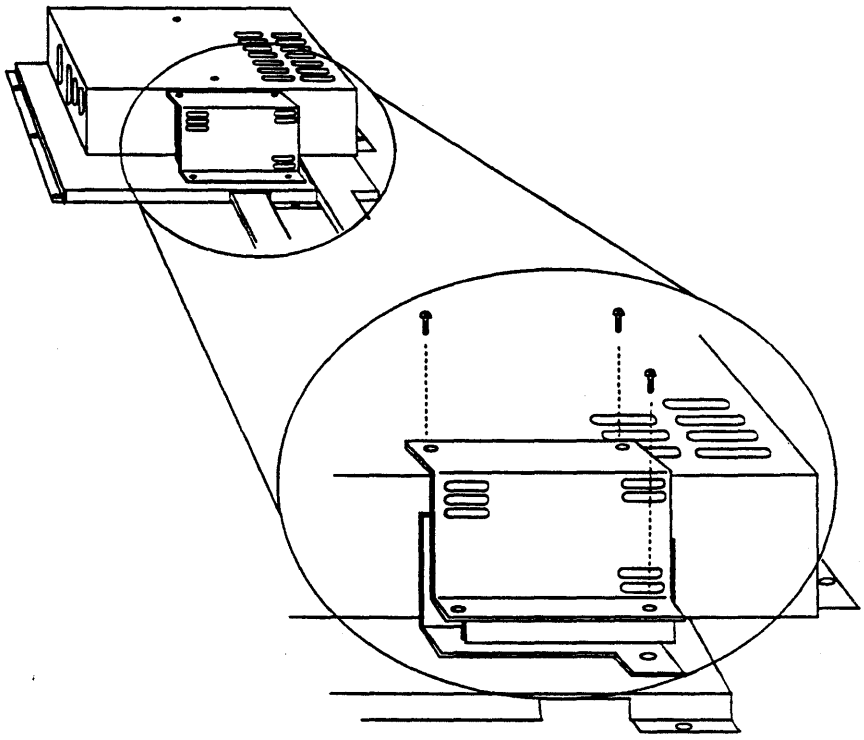


Figure 4-4. Auxiliary Power Supply Board Access

Auxiliary Power Supply Board Removal

Remove the *auxiliary power supply* board as follows:

1. Power down the system as described in Chapter 2. Turn off the circuit breaker.

2. Remove the top cover and the top EMI shield of the cabinet.

3. Remove the three phillips head screws that hold the top panel of the power supply module in place. Slide the panel toward the rear of the cabinet and lift it off the module.

4. Remove the two phillips head screws that fasten the *auxiliary power supply* cover; lift the cover off the APS and lay it aside temporarily.

> NOTE:
>
> To avoid mistakes in reconnecting the leads disconnected in the next step, make a sketch showing position, color and any other identifying information for each lead or plug being disconnected.

5. Tag and disconnect all leads from terminal board T1.

> **CAUTION:**
>
> **PC boards are susceptible to electrostatic damage. Use a correctly grounded Electro Static Discharge (ESD) wrist strap when handling PCBs; do not touch the chips and components on the circuit boards and do not handle the boards except by their edges.**

6. Remove the four phillips head screws from the corners of the *auxiliary power supply board.* You will probably need a short handled screwdriver.

7. Put the board in an antistatic bag; store it in a cool, dry environment until its final disposition is determined.

Auxiliary Power Supply Board Installation

Install the *auxiliary power supply* board as follows:

1. Power down the system as described in Chapter 2. Turn off the circuit breaker.

2. Remove the board from its shipping carton. The board is normally shipped inside an antistatic bag. Lay the board (still inside the bag) on a table or clean work surface. Store the shipping carton temporarily; you may wish to use it for the board you are replacing.

3. Hold the board by its edges and remove it from its antistatic bag.

4. Hold the board in one hand as you put one of the screws into a mounting hole on the board. Do not tighten the screw more than a turn or so. Mount the remaining three screws in a similar way; then tighten all four of them.

5. Reconnect the power distribution leads to terminal board TB1.

6. Replace the cover over the power supply and the top cover of the power supply compartment by placing the cover over the compartment and fitting the lugs in the cover into the holes in the compartment. Then engage the lugs by sliding the cover toward the front of the machine, and replace the three holding screws.

7. Replace the top covers of the cabinet.

Auxiliary Power Supply Board Adjustment

The Auxiliary Power Supply Board requires adjustment when replaced. The following procedure shows how to adjust the board.

1. Measure the +5 VDC on the test points located on the Real World Interface board (RWI) edge by connecting the voltmeter's positive lead to **TP1** (+5 V AUX) and the voltmeter's negative lead to **TP2** (GND).

2. Adjust the Auxiliary Supply potentiometer for +5 VDC at the RWI board. The voltage measured on the power supply terminal strip will read approximately 5.4 VDC.

3. The +12 and -12 VDC Auxiliary voltages are not adjustable. Verify that they are within 5% (+/- 0.6 VDC when measuring the voltages (+12 and -12 VDC) on the test points of the RWI board or power supply terminal strip.

AC Module Board

The AC module board is mounted inside the AC module. It receives control input from the Service Processor through the Real World Interface board. Its output controls the main power relay in the AC module.

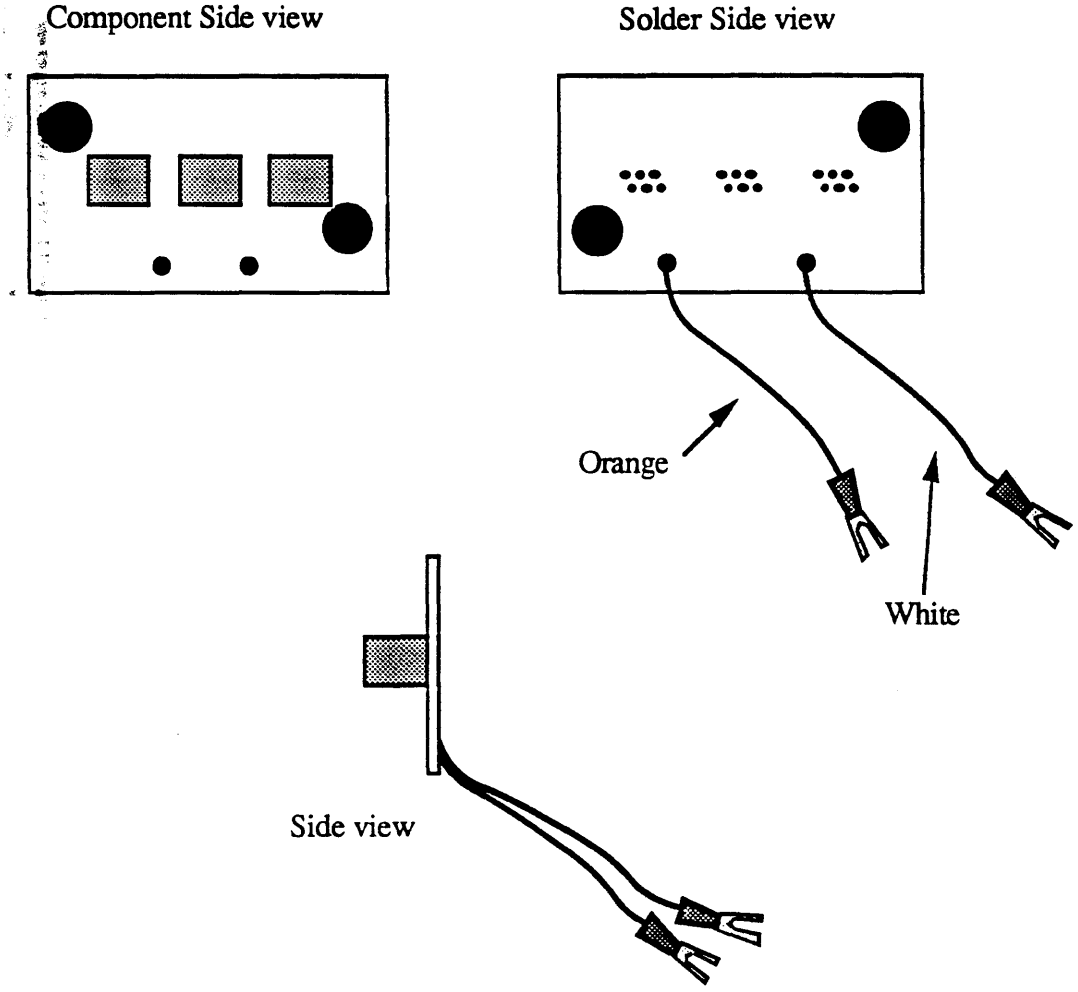


Figure 4-5 AC Module Board

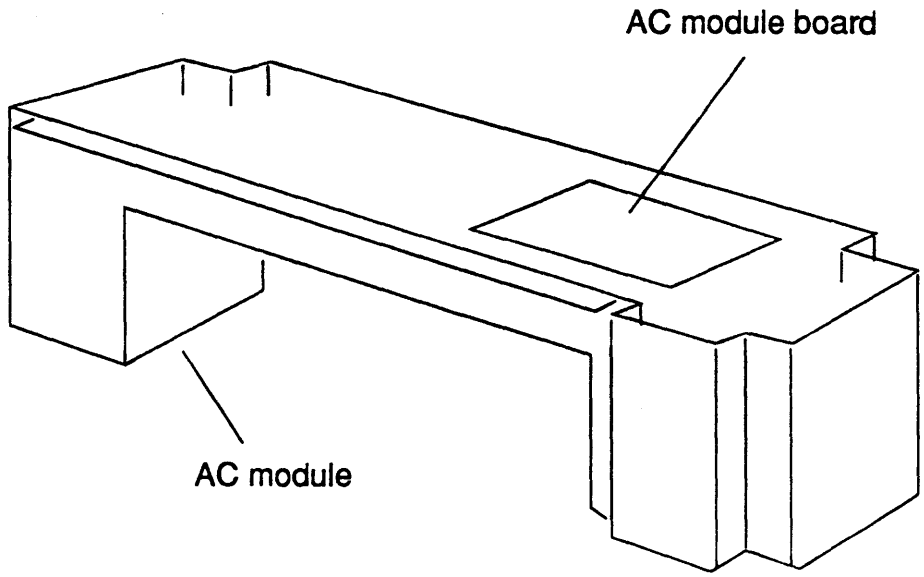


Figure 4-6 AC Module Board Access

AC Module Board Removal

Remove the AC module board as follows:

1. Power down the system as described in Chapter 2. Turn off the circuit breaker and unplug the power cord.
2. Remove the AC module as described in Chapter 10.
3. Place the AC module upside down on a table or clean work surface.

> **CAUTION:**
>
> **PC boards are susceptible to electrostatic damage. Use a correctly grounded Electro Static Discharge (ESD) wrist strap when handling PCBs; do not touch the chips and components on the circuit boards and do not handle the boards except by their edges.**

4. Tag and disconnect the two leads from the AC module board to the power distribution relay K1.
5. Remove the two phillips head screws that hold the board in place and lift the board out of the AC module.

6. Put the board in an antistatic bag; store it in a cool, dry environment until its final disposition.

AC Module Board Installation

Install the AC module board as follows:

1. Remove the replacement board from its shipping carton. The board is normally shipped inside an antistatic bag. Lay the board (still inside the bag) on a table or clean work surface. Store the shipping carton temporarily; you may wish to use it for the board you are replacing.

2. Hold the replacement board by its edges and remove it from its antistatic bag.

3. Hold the replacement board against its mounting panel and align the holes in the board with those in the mounting panel. Thread the two phillips head screws that hold the board in place into the mounting holes and tighten them.

4. Connect the two tagged leads from the AC module board to the power distribution relay K1.

5. Reinstall the AC module as described in Chapter 9.

Temperature Sensor Boards

System90 cabinets with motherboards have two temperature sensor boards, one for sensing the temperature of the inlet ventilation air, and one for the exhaust air. The two boards are identical. The locations of the boards are shown in Figures 7-3 and 7-6 Refer to Chapter 7 to see diagrams showing these locations and to find the procedures for gaining access to the boards.

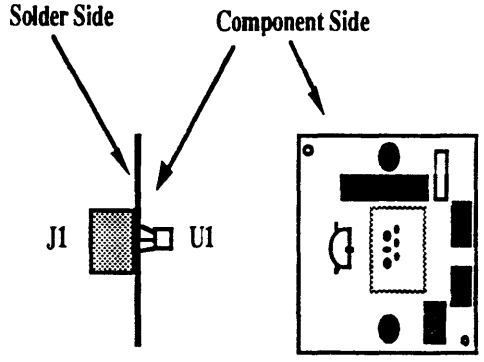


Figure 4-7 Temperature Sensor Board(s)

Temperature Sensor Boards Removal

Remove the temperature sensor board as follows:

1. Power down the system as described in Chapter 2. Turn off the Circuit breaker.

2. If you are replacing the inlet sensor board, gain access to it as described in *Removal of the Lower Fan Assembly* (Chapter 7).

   If you are replacing the exhaust temperature sensor board, gain access to it as described in *Removal of the Upper Fan Assembly* (Chapter 7).

CAUTION:

PC boards are susceptible to electrostatic damage. Use a correctly grounded Electro Static Discharge (ESD) wrist strap when handling PCBs; do not touch the chips and components on the circuit boards and do not handle the boards except by their edges.

3. Remove the two phillips head screws that hold the board in place and lift the board out of the module. You may need a short handled screwdriver to access the screw heads.

4. Put the board in an antistatic bag; store it in a cool, dry environment until its final disposition.

Temperature Sensor Board Installation

Install the temperature sensor board as follows:

1. Remove the replacement board from its shipping carton. The board is normally shipped inside an antistatic bag. Lay the board (still inside the bag) on a table or clean work surface. Store the shipping carton temporarily; you may wish to use it for the board you are replacing.

2. Hold the board by its edges and remove it from its antistatic bag.

3. Hold the board against its mounting panel and align the holes in the board with those in the mounting panel. Thread the two phillips head screws that hold the board in place into the mounting holes and tighten them.

4. Replace the sensor cable, fan assembly, and all panels and covers as described in Chapter 7.

Keyswitch Board

The *keyswitch board* monitors the position of the *operator panel key switch* and relays status signals to the Service Processor. The *keyswitch board* is mounted behind the *operator control panel* (Figure 4-9) with four phillips head screws through standoffs.

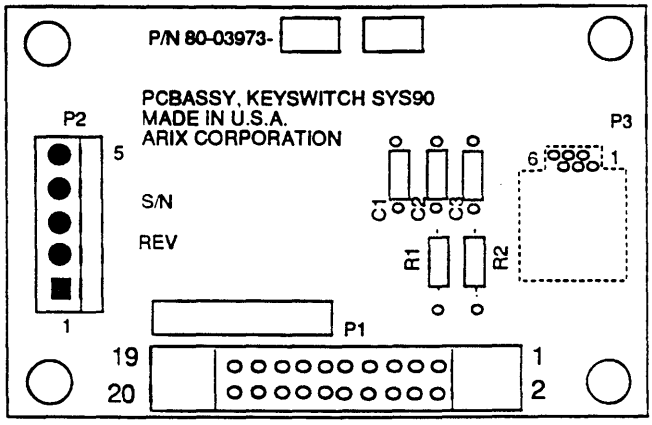


Figure 4-8 Keyswitch Board

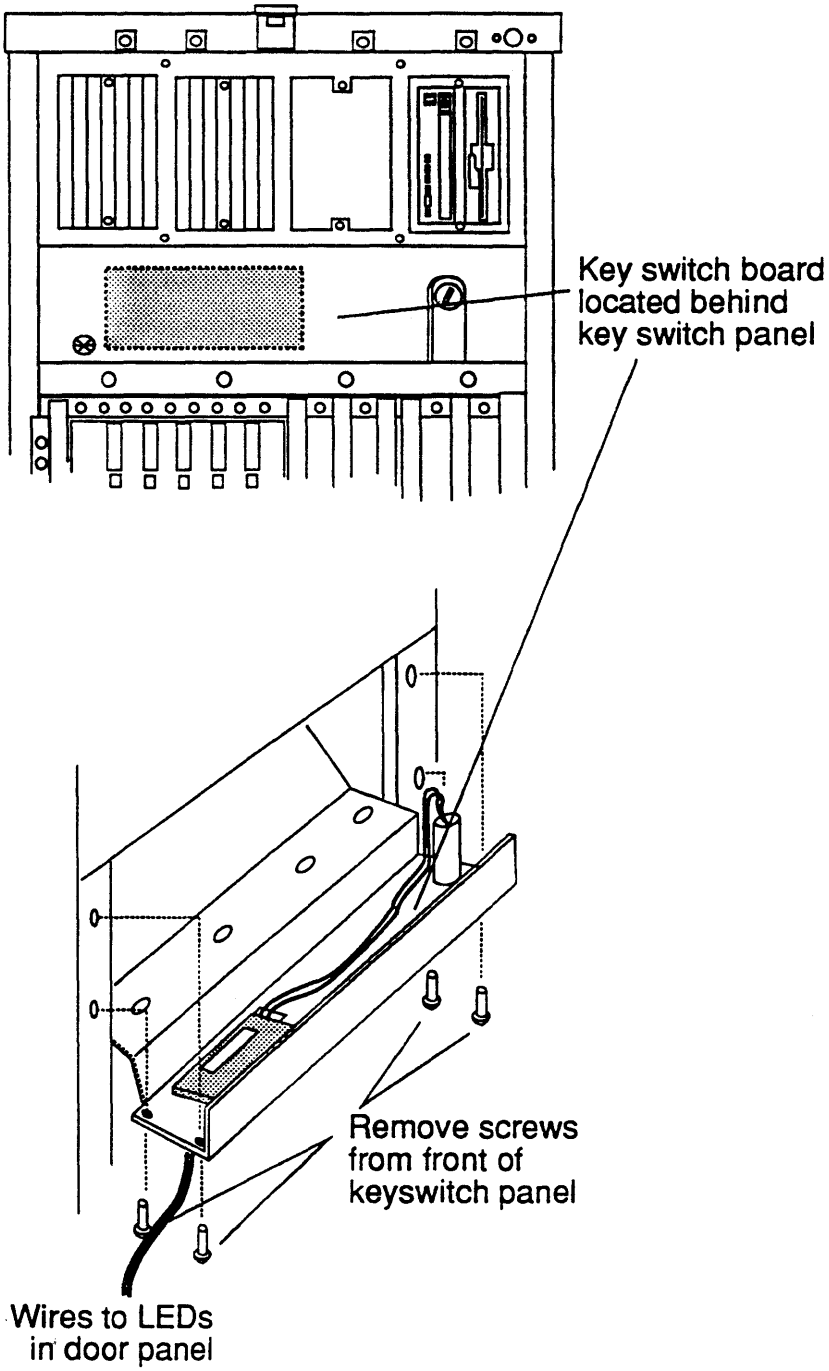


Figure 4-9 Keyswitch Board Access

Keyswitch Board Removal

Remove the *keyswitch board* as follows:

1. Power down the system as described in Chapter 2. Turn off the circuit breaker.

2. Open the front door of the cabinet and disconnect the telephone type connector in the *operator control panel* that goes to the LED Display board.

3. Remove the four phillips head screws from the *operator control panel* and lay them aside until you reinstall the panel (Figure 4-9).

4. Slide the panel away from the cabinet a few inches and turn it over to gain access to the inside of the panel.

CAUTION:

PC boards are susceptible to electrostatic damage. Use a correctly grounded Electro Static Discharge (ESD) wrist strap when handling PCBs; do not touch the chips and components on the circuit boards and do not handle the boards except by their edges.

5. Disconnect plug J1 from the keyswitch board.

6. Disconnect the harness between the keyswitch and the keyswitch board.

7. Remove the phillips head screws that hold the board in place on the standoffs; lift the board off its mounting and out of the panel. Save the screws until you install the replacement board.

8. Put the board in an antistatic bag; store it in a cool, dry environment until its final disposition.

Keyswitch Board Installation

Install the *keyswitch board* as follows:

1. Remove the replacement board from its shipping carton. The board is normally shipped inside a plastic, antistatic bag. Store the carton temporarily; you may wish to use it for the board you are replacing.

2. Hold the board by its edges and remove it from its antistatic bag.

3. Insert one of the mounting screws into the board. Hold the board, screw and thread the screw one or two turns into the mounting plate inside the operator panel. Do the same with the remaining screws; tighten all four screws.

4. Reconnect the cables to the board; reconnect J1 into its connector.

5. Slide the *operator control panel* into the cabinet and align the mounting holes in the panel with those in the frame of the cabinet.

6. Thread the four mounting screws into the cabinet and tighten them

7. Reconnect the telephone connector from the *display board* and shut the door.

Display Board

The *display board* controls the on/off status of the two status LEDs on the front door of the primary cabinet. The board receives its input from the Service Processor through the three wire cable assembly. The board is mounted just behind the front door of the cabinet using two phillips head screws that thread into holes in the front cover.

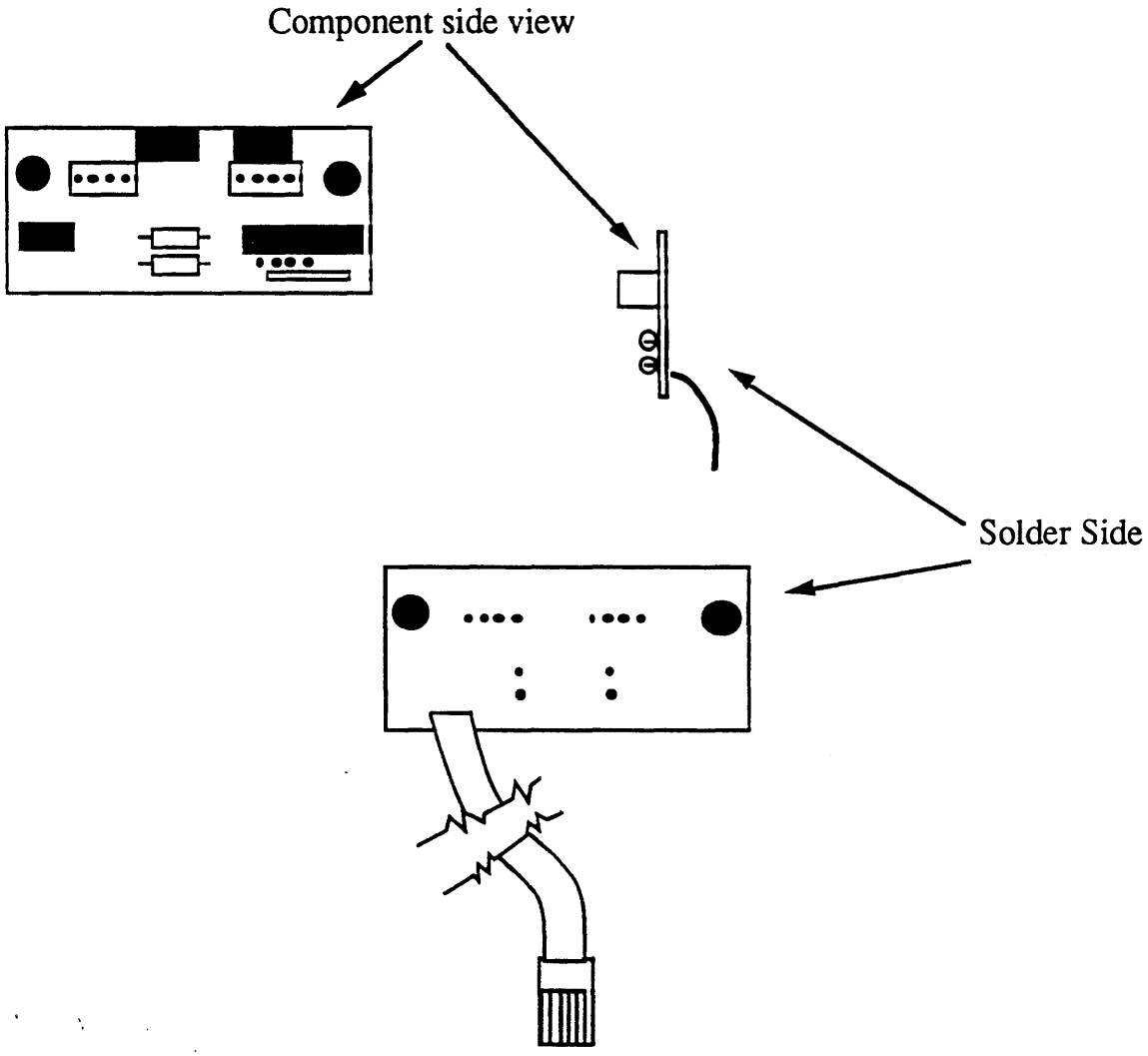


Figure 4-10. Display Board

Display Board Removal

Remove the *display board* as follows:

1. Power down the system as described in Chapter 2. Turn off the circuit breaker.

2. Open the front door of the cabinet.

CAUTION:

PC boards are susceptible to electrostatic damage. Use a correctly grounded Electro Static Discharge (ESD) wrist strap when handling PCBs; do not touch the chips and components on the circuit boards and do not handle the boards except by their edges.

3. Disconnect the telephone type connector from the *operator control panel*; lift the door off its hinges, and lay it on a clean table or other suitable work surface.

4. Remove the door liner.

5. Remove the two phillips head screws that hold the board to the cover.

6. Put the board in an antistatic bag; store it in a cool, dry environment until its final disposition.

Display Board Installation

Install the *display board* as follows:

1. Remove the replacement board from its shipping carton. The board is normally shipped inside an antistatic bag. Lay the board (still inside the bag) on a table or clean work surface. Store the shipping carton temporarily; you may wish to use it for the board you are replacing.

2. Hold the board by its edges and remove it from its antistatic bag.

3. Hold the board against its mounting panel and align the holes in the board with those in the mounting panel. Thread the two phillips head screws that hold the board in place into the mounting holes and tighten them. Do not overtighten screws as you may strip the holes.

4. Replace the door liner.
5. Install the door back on its hinges.
6. Reconnect the plug to the *operator control panel* jack.
7. Close the door.

5 Removable Media Module

The Removable Media Module (RMM) occupies the upper front section of the cabinet (Figure 5-1). It contains the following Field Replaceable Units (FRUs):

- A single cartridge tape-flexible disk (CT-FD) drive unit - a combination unit mounted in a single RMM slot(Primary cabinet only)
- Up to three SCSI devices (four when installed in an IOS Cabinet)

NOTE:
The RMM only supports single ended SCSI devices. No SCSI device may have terminators installed on the device. The SCSI bus is terminated within the chassis.

This chapter contains procedures for removing and installing these devices.

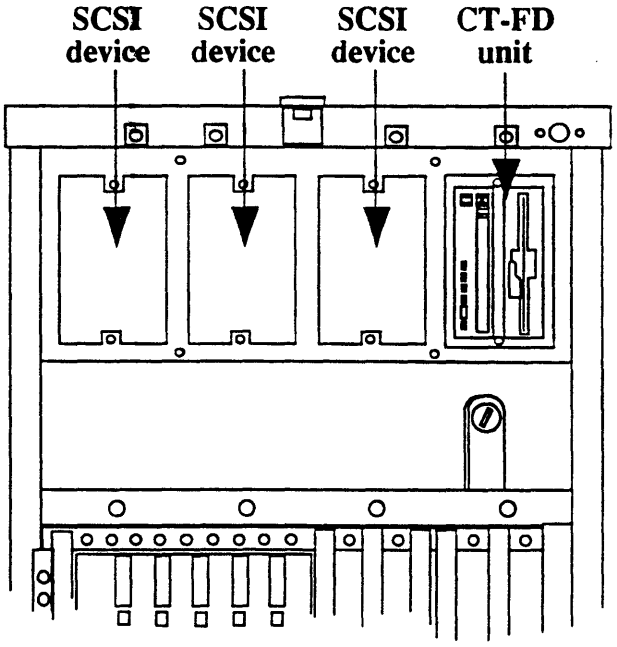


Figure 5-1. RMM with Access Panels Removed

SCSI Devices

You can remove and install SCSI devices from the front of the module without removing the top cover or the PSM access panel.

Removing a SCSI Device

Remove a SCSI device as follows:

1. Power down the system as described in Chapter 2.
2. Open the front door of the cabinet.
3. Remove the screw on the top, front of the SCSI device to be removed. Back out the jacking screw at the bottom of the device front panel.
4. Grasp the front of the device and pull firmly until the unit is free of the connectors in the rear of the compartment and out of the lug at the bottom of the rack.
5. Set the unit aside until final disposition is determined.

NOTE:
If you are not going to install a replacement drive immediately, refer to the ARIX *OS/90 V.3 System Administrator's Guide* for information relating to the behavior of the ARIX operating system with the missing (unmounted) device. If you are not replacing the drive immediately you must install a jumper cable in its place along with the appropriate filler panel.

Installing a SCSI Device

Install a SCSI device as follows:

1. Power down the system as described in Chapter 2.

2. Remove the replacement device from its shipping carton. The drive is shipped inside a plastic bag. Remove the drive from the plastic bag and lay it on a table or clean work surface. Save the shipping carton in case you have to return the old drive.

3 Select a vacant slot in the RMM; remove and discard the filler panel. Remove the jumper cable. Refer to the information label on the disk drive for ID selection.

4. Slide the drive assembly into the empty slot. Push gently but firmly on the drive to fully seat the connectors. Use the jacking screw to seat the drive assembly.

   Female connectors for both power and signal cables are mounted on posts at the back of the RMM module (Figure 5-2).

5. Secure drive assembly with the screw provided.

6. Power on the system and perform normal checks on the newly installed drive.

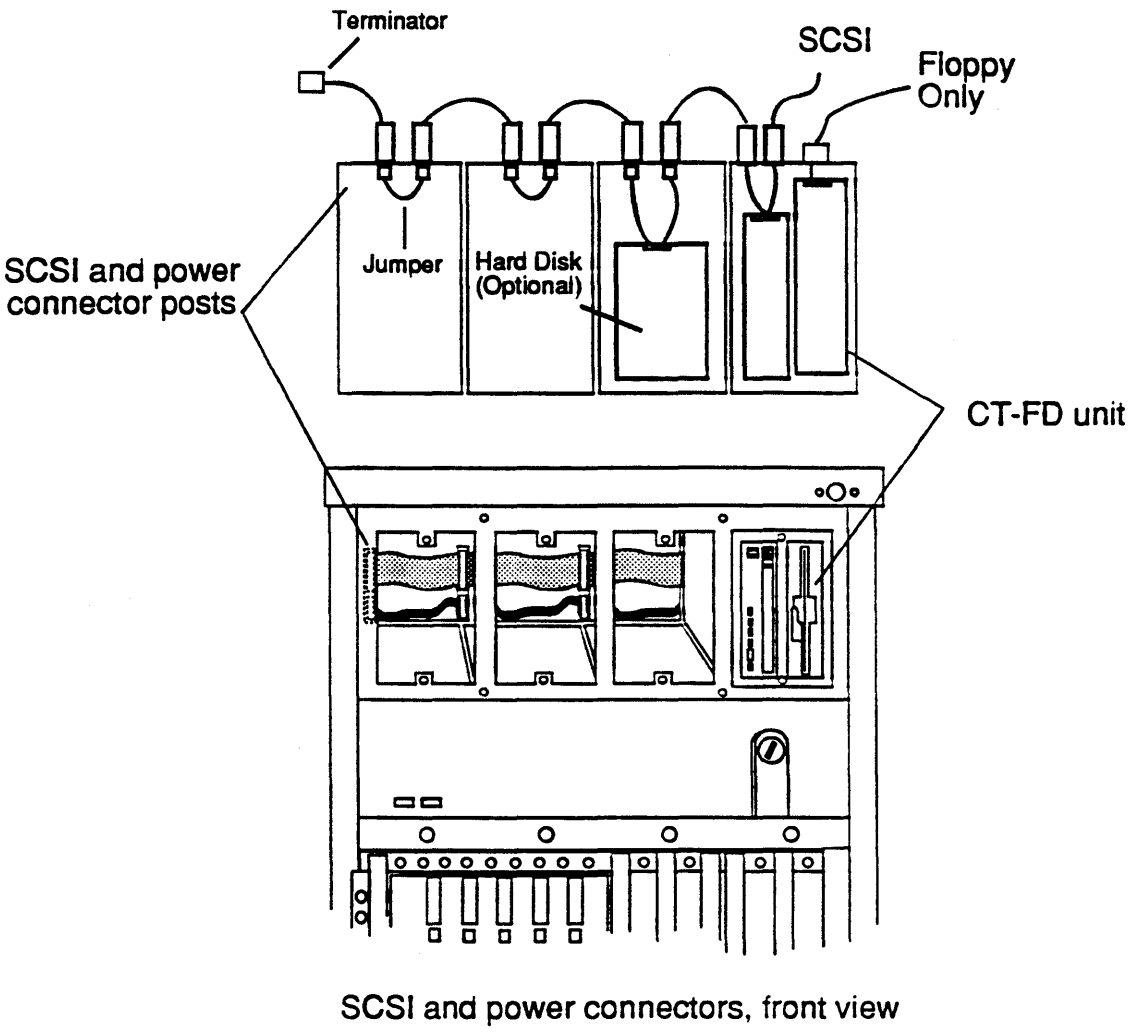


Figure 5-2. SCSI Device Connectors, RMM Module

Cartridge Tape-Flexible Disk Drive

The *cartridge tape-flexible disk* (CT-FD) unit occupies the first slot on the right side of the RMM (Figure 5-1) of the primary cabinet..

Removing a CT-FD Unit

Remove the CT-FD unit as follows:

1. Power down the system as described in Chapter 2. Turn off the Circuit breaker.

2. Refer to *Removing a SCSI Device* for CT-FD removal instructions.

> NOTE:
>
> If you are not going to install a replacement drive immediately, refer to the ARIX *OS/90 V.3 System Administrator's Guide* for information relating to the behavior of the ARIX operating system with the missing (unmounted) device.

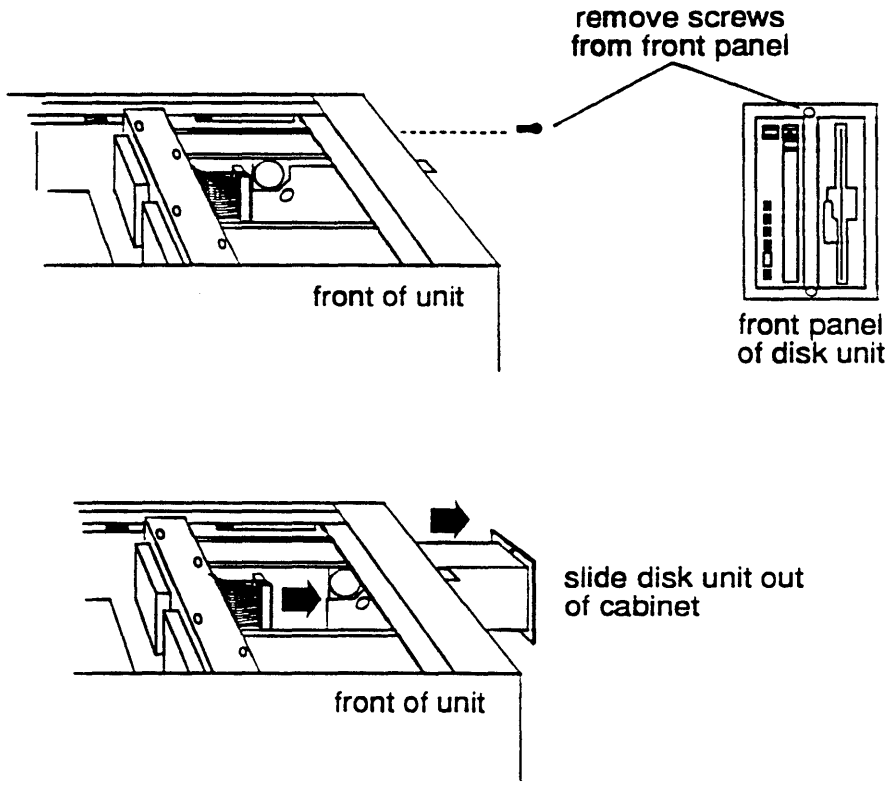


Figure 5-3. Power and Signal Cables, CT-FD Unit

Installing a CT-FD Unit

Install a CT-FD unit as follows:

1. Power down the system as described in Chapter 2. Turn off the circuit breaker.

2. Install the device in slot #1 and refer to the procedure in the previous section under ***Installing a SCSI Device***.

6 Cooling and Ventilation

System90 cooling is effected by a directed, forced air stream using high-volume fans. The system has three major fan assemblies: The *upper fan assembly*, The *lower fan assembly*, and the *PSM fan assembly*.

Figure 6-1 shows the major circulation paths and fan arrangements in a system cabinet containing a motherboard.

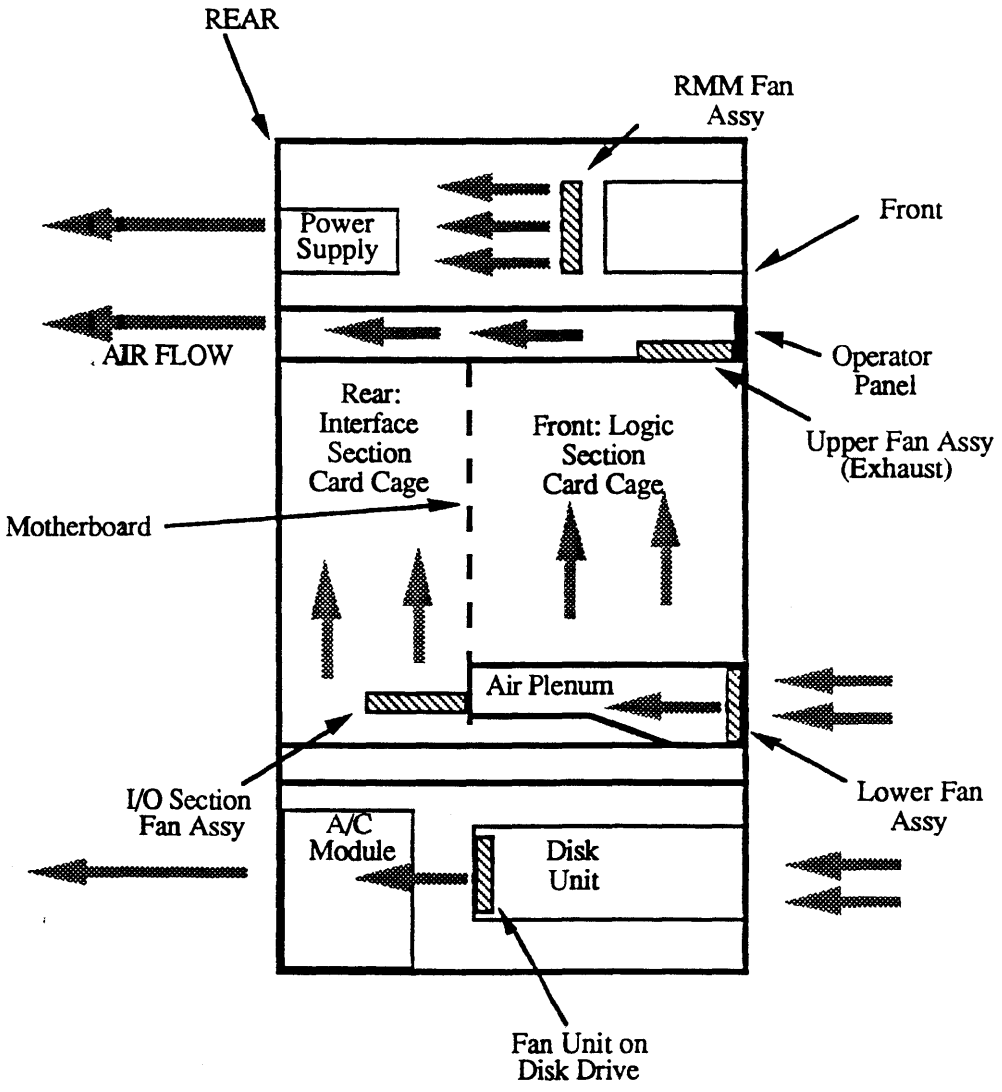


Figure 6-1. Primary Cabinet Cooling System, Air Flow

Fan Unit Removal and Installation

Individual fans differ in size, weight, capacity, and specifications, but they are mounted and dismounted from their assemblies or mounting panels in essentially the same way (Figure 6-2). Most system fans have a front and a back mounting hole at each of their four corners. In some assemblies the fan is attached by a screw and nut through the assembly or plate and a single hole at each corner of the fan. In others the mounting screw passes through both mounting holes into a tapped hole in the assembly or mounting plate. The mounting method for a specific fan is immediately apparent once you have removed the assembly.

Proceed as follows:

1. Lay the fan assembly or mounting plate on a table or other suitable work surface.

2. Disconnect the power cable from the fan

3. Remove the four screws at the corners of the fan you are replacing and lift the fan off the assembly or mounting plate.
   In some cases you may have to loosen or cut Tiewraps or clips to free the fans 12-volt power cable from its layout path. When you replace the defective unit and the power cable, you will have to replace or reconnect these elements.

4. Lay the defective fan aside until its final disposition.

5. Remove the replacement fan from its shipping carton and install it by reversing the removal procedure.

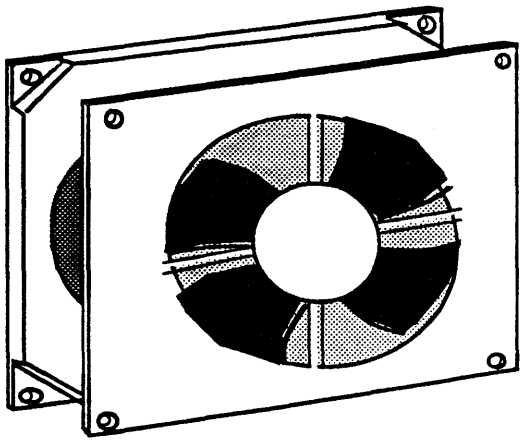


Figure 6-2. Fan

Lower Fan Assembly

The Lower Fan Assembly (Figure 6-3) consists of three vertically mounted front fans, an air plenum and three horizontally mounted rear fans. The three front fans draw in fresh outside air through filters in the door and force it through the plenum past the inlet temperature sensor. The three rear fans direct the incoming air up through the card cage into the discharge chamber where the three fans on the upper assembly force the exhaust out the rear of the cabinet. You can remove the lower assembly completely as a unit, or, if necessary, you can remove just the three front fans.

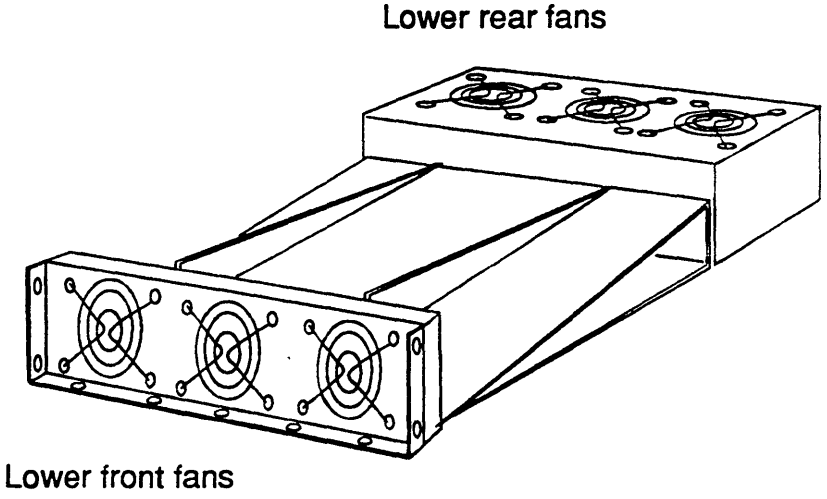


Figure 6-3. Lower Fan Assembly

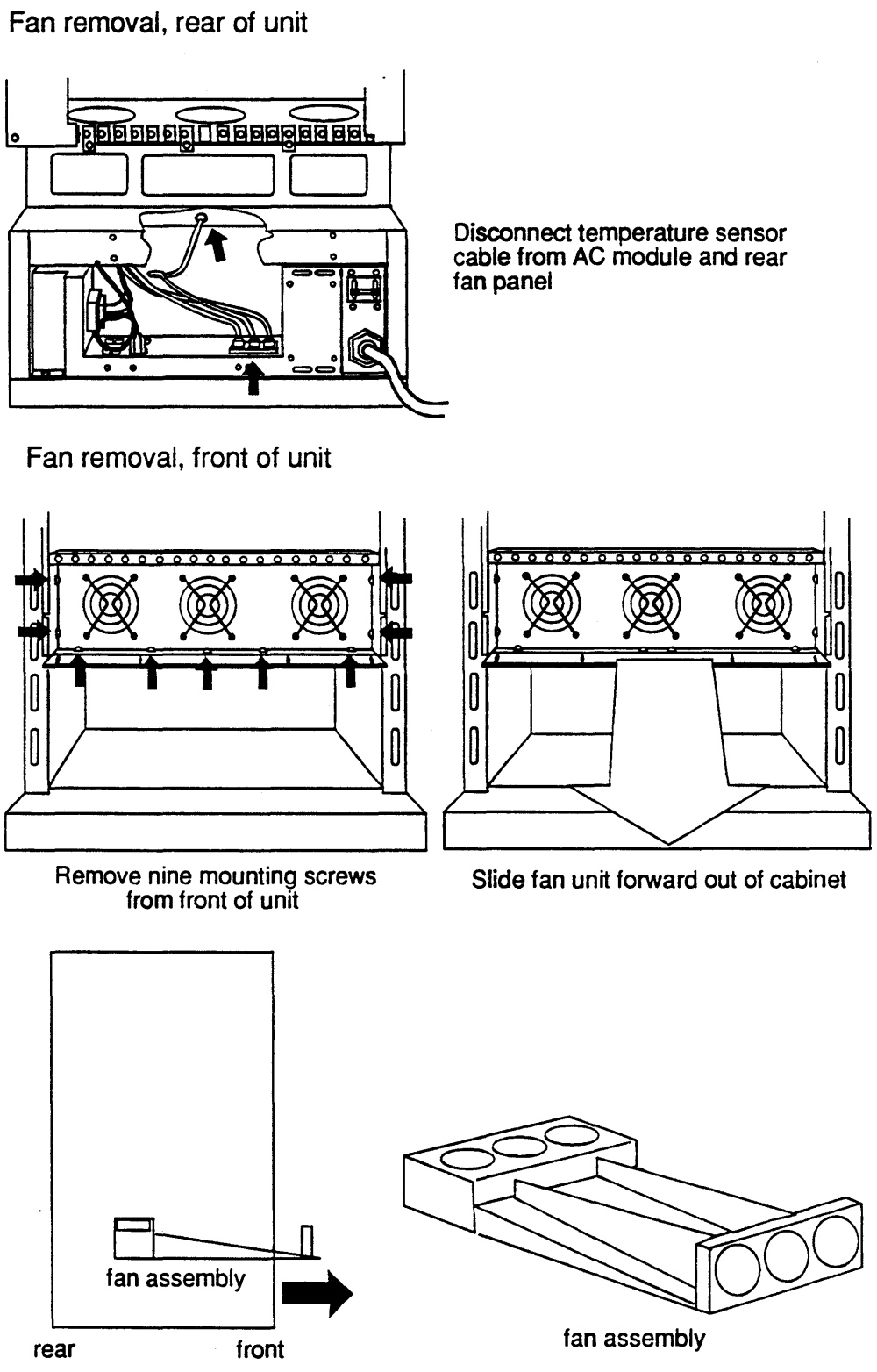


Figure 6-4. Lower Fan Assembly Access

Lower Fan Assembly Removal

Remove the Lower Fan Assembly as follows:

1. Power down the system as described in Chapter 2. Turn off the circuit breaker.

2. Open the front door of the cabinet.

> NOTE:
>
> If the defective fan is in the front section of the array (the vertically mounted fans), you can remove it from the assembly by disconnecting the mating connector to the front fan assembly and removing the mounting screws on the front edge of the rack (Figure 6-4)

3. Remove the lower cover on the rear of the cabinet (Figure 6-4).

4. Remove the inlet temperature sensor cable from J2 on the AC Module chassis (Figure 6-4).

5. Reach behind the cable trough and disconnect the power plug from the rear of the fan assembly (Figure 6-4).

6. At the front of the cabinet remove the phillips head screw from each side of the cabinet (Figure 6-4). These screws do not hold the fan assembly, but they obstruct its removal from the cabinet.

7. Remove the four phillips head screws from the sides of the assembly that hold it to the frame and the screws that hold the assembly to the bottom of the frame. Lay these screws aside until you reinstall the assembly.

8. Pull the assembly out of the cabinet. Make sure that the cable from the sensor board that your removed from J2 does not catch on the cabinet as you pull it through.

9. Lay the assembly on a table or suitable work surface and replace any defective fans in the array.

Lower Fan Assembly Installation

Install the Lower Fan Assembly as follows:

1. Place the assembly in front of the cabinet and lay the cable that goes to J2 on the AC Module on the top of the assembly so that it will not catch on anything as you slide the assembly into the cabinet.

2. Slide the assembly into the cabinet and reroute the cable through the cabinet to J2 on the AC Module.

3. When the assembly is flush against the cabinet frame, align the mounting holes in the assembly with those in the frame and reinstall the mounting screws removed in step 7 above.

   It is easier to install these screws if you get all of them started a few turns before tightening them completely.

4. Install the two obstructing screws removed in step 6 above into the side of the frame and close the front door.

5. Connect the power plug into the jack on the back of the fan assembly.

6. Connect the temperature sensor cable to J2 in the AC Module.

7. Mount the lower rear cover.

Upper Fan Assembly

The Upper Fan Assembly (Figure 6-5) is an array of three horizontally mounted fans located just behind the Operator Control Panel. The fans draw the air coming up through the card cage and direct it against a plate placed in the chamber at a 45 degree angle. The plate deflects the air toward the back of the cabinet and out.

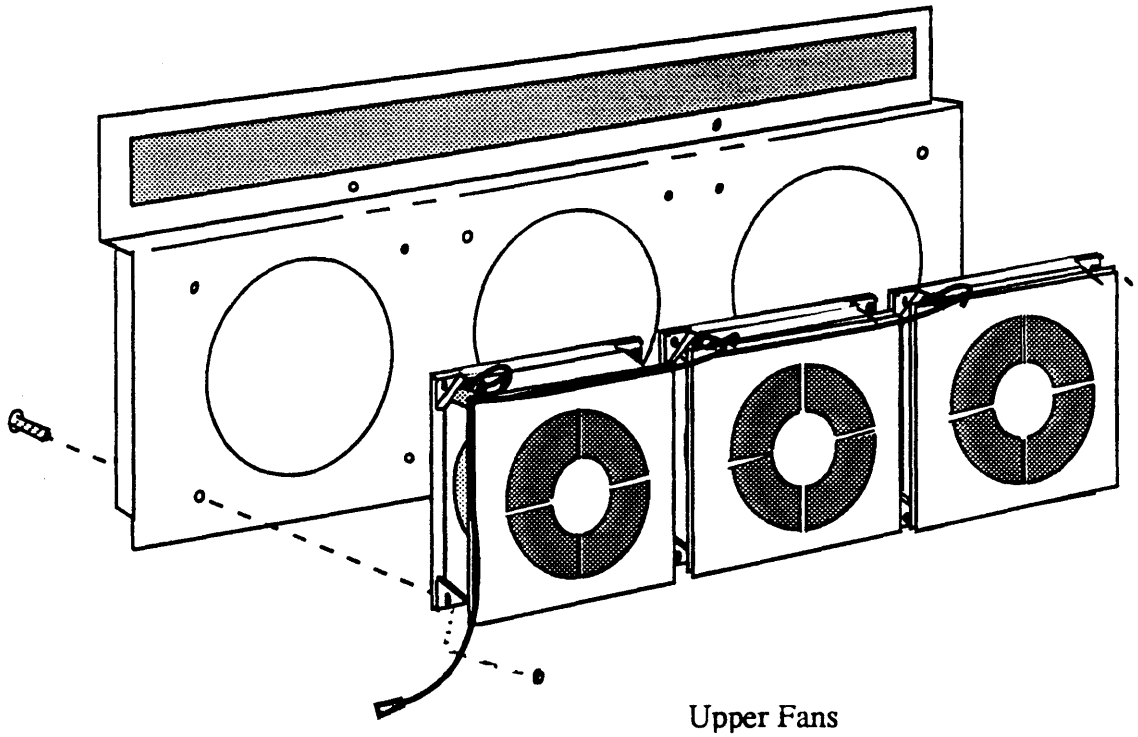


Figure 6-5. Upper Fan Assembly

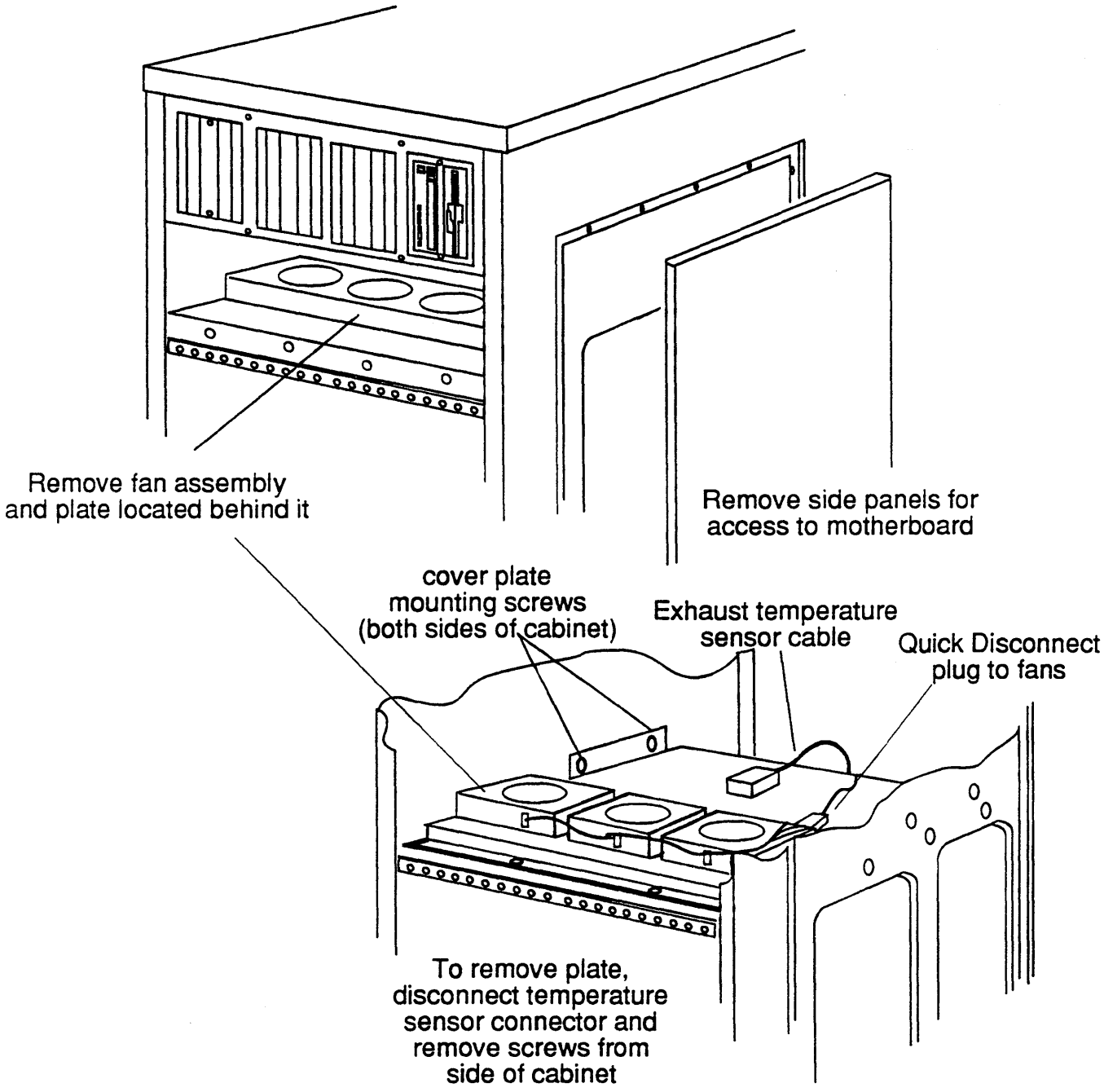


Figure 6-6. Upper Fan Assembly Access

Upper Fan Assembly Removal

Remove the Upper Fan Assembly as follows:

1. Power down the system as described in Chapter 2. Turn off the circuit breaker.

2. Open the front door of the cabinet and remove the Operator Control Panel as described in Chapter 4. Lay the panel to one side until you have removed the fan assembly (Figure 6-6).

3. Use a short handled phillips head screwdriver to loosen the four phillips head screws that hold the fan assembly to its mounting plate (Figure 6-6).

   When you have loosened the screws to the point where they are finger tight, remove them the rest of the way with your fingers.

4. Disconnect the power connector (a mating connector lying behind the fan array).

5. Pull the fan assembly out the front of the cabinet.

6. Lay the assembly on a table or suitable work surface and replace any defective fans in the array.

> NOTE:
>
> With this assembly removed, you have access to the Exhaust Air Temperature Sensor board. It is located on a plate immediately behind the Upper Fan Assembly. Refer to Chapter 4 (Power and Status Boards) for further information.

Upper Fan Assembly Installation

Install the Upper Fan Assembly as follows:

1. Slide the assembly a few inches into the cabinet and connect the power cable connector.

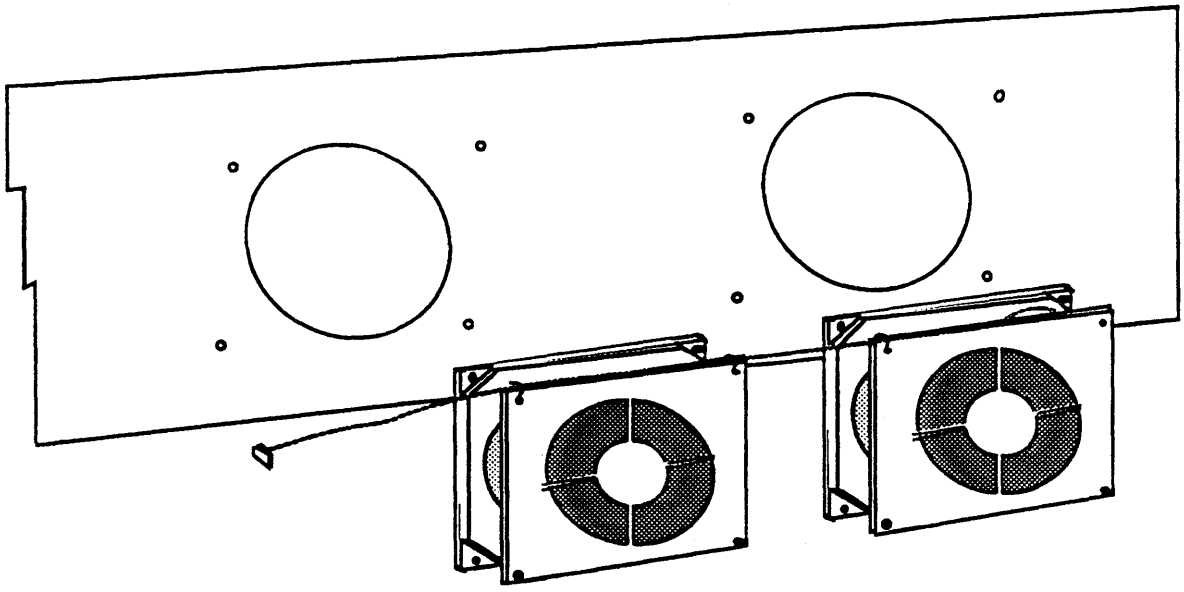
2. Install the four phillips head screws that hold the fan assembly to its mounting plate (Figure 6-6).

   It is easier to install these screws if you get all of them started a few turns before tightening them completely.

3. Install the Operator Control Panel as described in Chapter 4 and close the front door of the cabinet.

PSM Fan Assembly

The PSM Fan Assembly is located in the DC Power Supply chassis just behind the Removable Media Module (RMM). It provides air circulation for cooling the DC Power Supply, drawing it through the RMM units and forcing it across the power supply and out the rear of the cabinet.



PSM Fans

Figure 6-7. PSM Fan Assembly

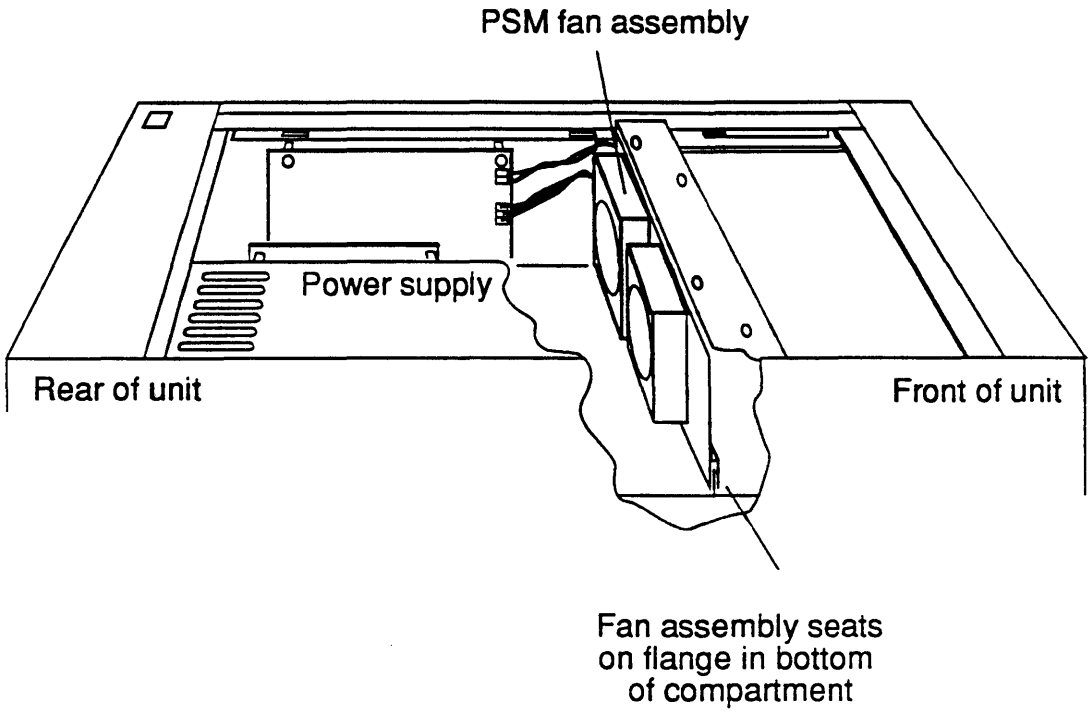


Figure 6-8. PSM Fan Assembly Access

PSM Fan Assembly Removal

Remove the PSM Fan Assembly as follows:

1. Power down the system as described in Chapter 2. Turn off the circuit breaker.

2. Gain access to the interior of the Power Supply Module as described in Chapter 8

3. Disconnect the fan array's 12-volt power plug from P2 on the PSM board (Figure 6-8).

4. Remove the phillips head screws in the top of the fan assembly that hold the assembly in place.

5. Lift the assembly up and out of the chassis.
The lower edge of the mounting plate has a welded strip lug on the front side of the plate that fits over a lip in the bottom of the RMM chassis. This lug causes the fan mounting plate to fit snugly. You may have to exert a little force to pull the plate out. To avoid having it come away suddenly when it comes free of the chassis, steady your hand or arm against the frame top as you pull the plate out of the module

6. Lay the assembly on a table or suitable work surface and replace any defective fans in the array.

PSM Fan Assembly Installation

Install the PSM Fan Assembly as follows:

1. Fit the lug on the lower edge of the assembly mounting plate into the lip on the bottom of the RMM chassis. Press the plate into the chassis snugly.

2. Align the holes in the mounting plate with the tapped holes in the RMM chassis and install the three phillips head screws.

   It is easier to install these screws if you get all of them started a few turns before tightening them completely.

3. Connect the 12-volt power plug from the fan assembly into P2 on the PSM board.

4. Close the Power Supply Module and the cabinet as described in Chapter 8.

The *DC power supply* is housed in the rear half of the RMM/PSM compartment (Figure 7-1) of *primary cabinets* and *I/O S cabinets*. The power supply provides all DC power for circuit boards mounted in the cabinet. The power supply compartment for primary cabinets (those containing a Compute Subsystem) also contains the *auxiliary power supply*, which supplies power to some circuits on the Service Processor and Real World Interface boards. The *auxiliary power supply* must be removed before removing the power supply. Procedures for removing and installing the *auxiliary power supply* appear in Chapter 4.

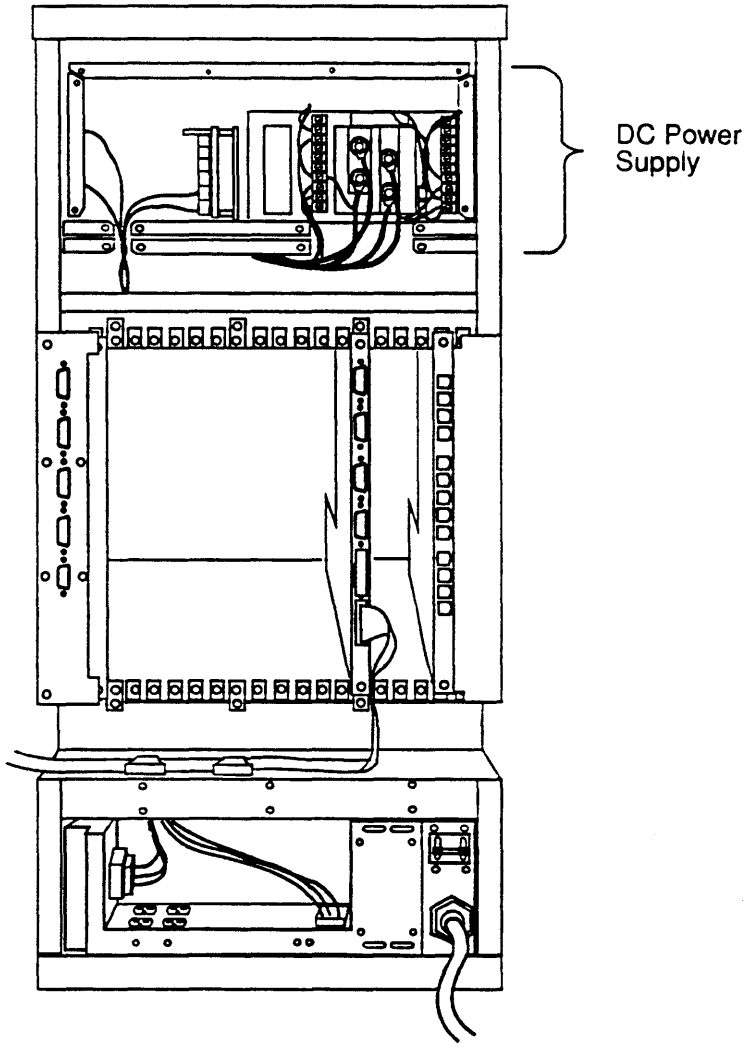


Figure 7-1. DC Power Supply Location in Cabinet

Power Supply Removal

Remove the Power Supply as follows :

1. Power down the system as described in Chapter 2. Turn off the Circuit breaker and unplug the power.

2. Remove the top cover and EMI shield of the cabinet.

3. Remove the phillips head screws from the top cover plate of the power supply chassis (Figure 7-2).

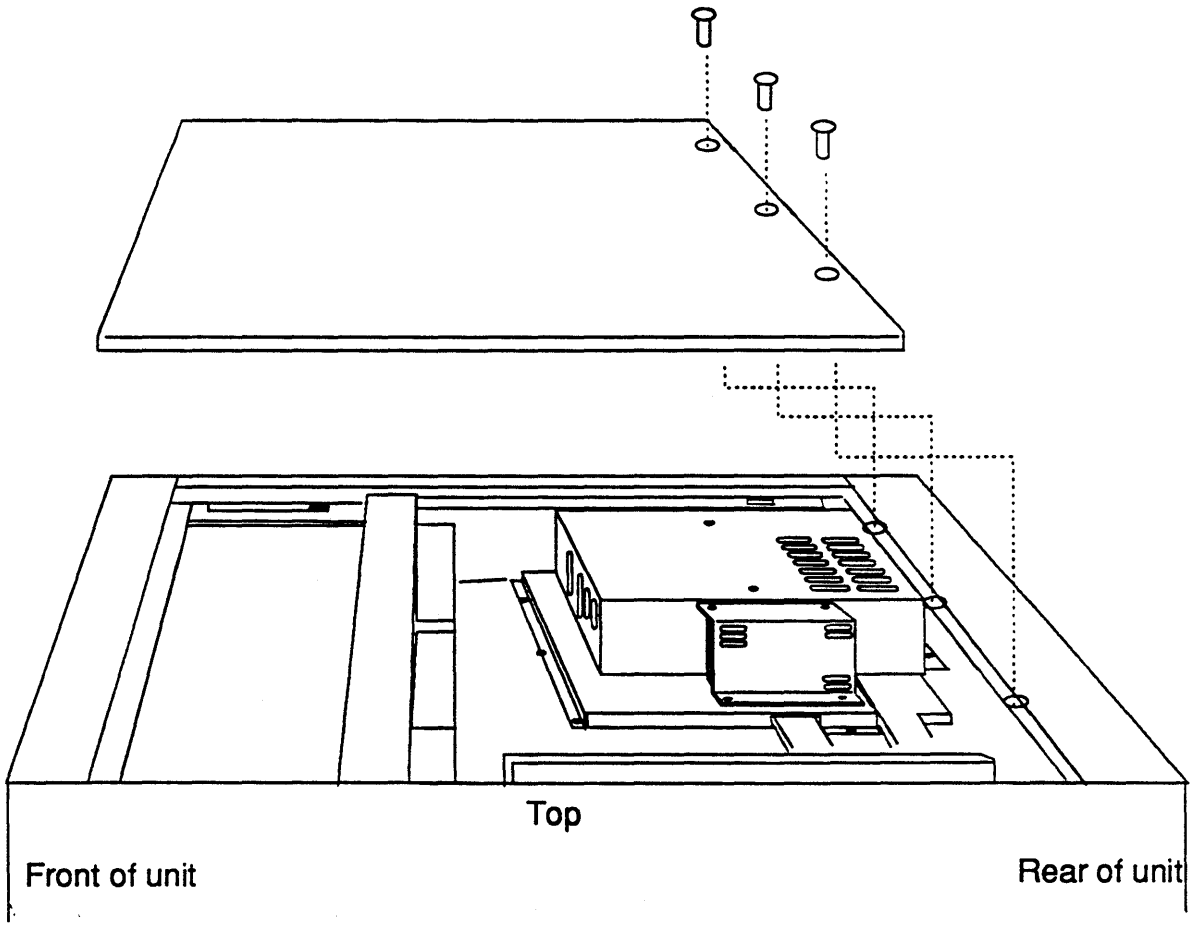


Figure 7-2 Power Supply Chassis-RMM Module, Top View

4. Slide the cover to the rear of the machine to disengage the lugs on the cover from the slots in the chassis.

5. Grasp the cover by its rear edge (front of the machine) and lift it up and off the chassis.

6. Remove the phillips head screws that fasten the upper rear cover. As you remove the last one or two screws, hold the cover to prevent it from falling.

7. Tag and disconnect all wires and leads going to the terminal boards and lugs on the back panel of the power supply. Move these wires and leads to one side and clear of the power supply (Figure 7-3).

CAUTION:

Take particular care to identify correctly each of the wires connected to these terminals. If you reconnect them incorrectly, severe damage to the machine will can result. To ensure correct tagging, make a sketch or map of the terminal boards and label each lead as you disconnect it. Include all identifying information you can, such as color, size, terminal board connection and so on.

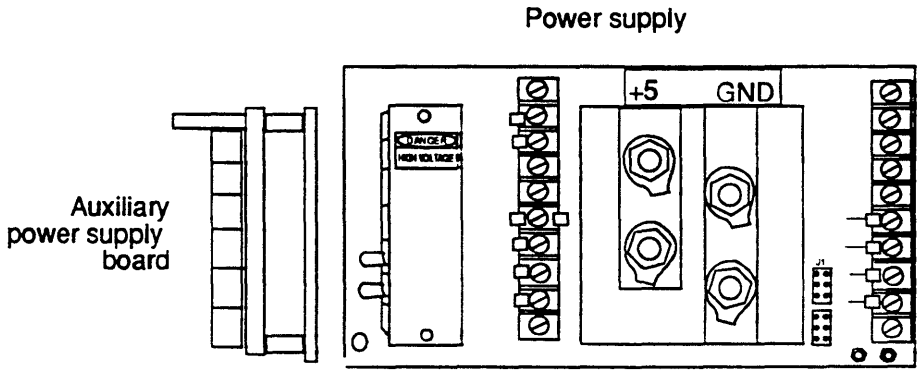


Figure 7-3. DC Power Supply, Terminal Connection Panel

8. Remove the *auxiliary power supply* (Chapter 4).

9. Remove the phillips head screws from the power supply mounting plate (Figure 7-4). The power supply is bolted to this plate from the underside.

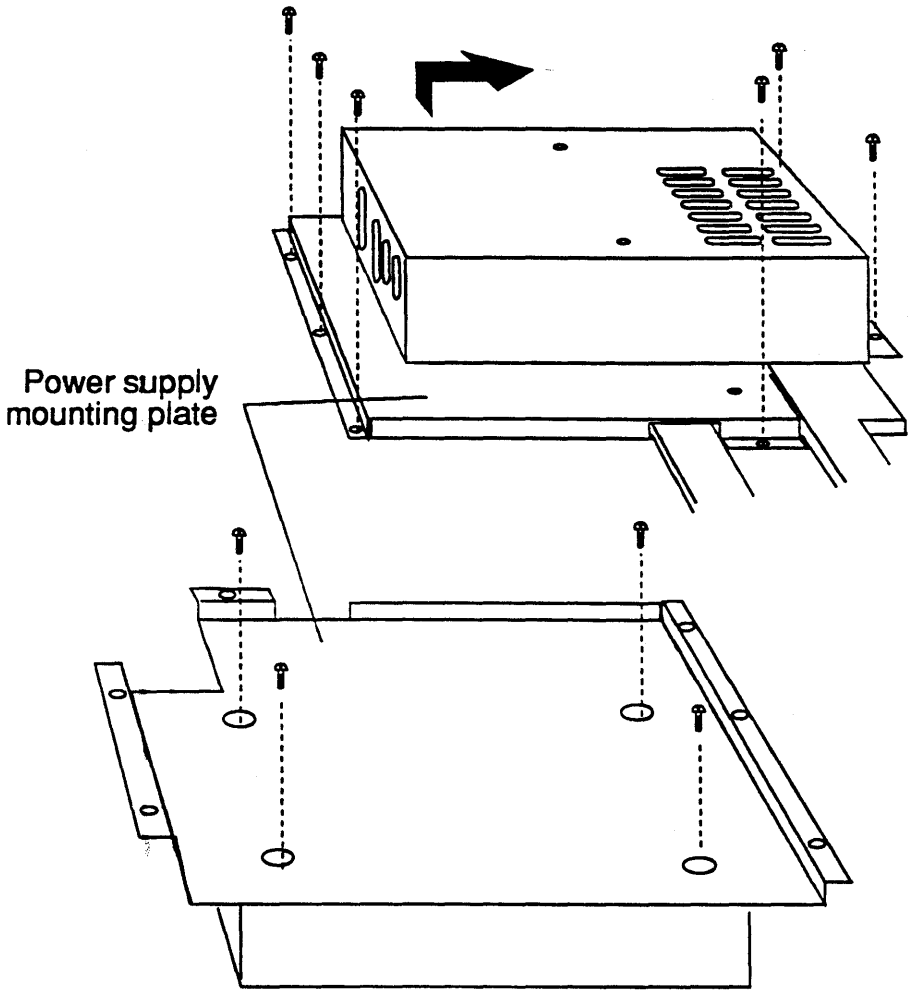


Figure 7-4. Removing the Mounting Plate Screws

10. Carefully lift the power supply and mounting plate assembly up slightly and out the back of the compartment

11. Place the assembly upside down on a bench or other suitable surface and remove the four screws that hold the power supply to the mounting plate. Remove the plate and set it aside until you are ready to mount the replacement power supply.

Power Supply Installation

Install the power supply as follows.

1. Check the outside of the shipping carton for signs of damage. Check the contents of the carton against the invoice or manifest. If you find any discrepancies or irregularities in either case, report the matter to the carrier and to your ARIX representative.

2. Open the shipping carton and remove the power supply unit. Save the packing materials until you are sure that the unit does not have to be returned.

3. Place the power supply upside down on a bench or other suitable surface.

4. Place the mounting plate removed above over the bottom of the power supply and align the screw holes in the plate with those in the power supply (Figure 7-5).

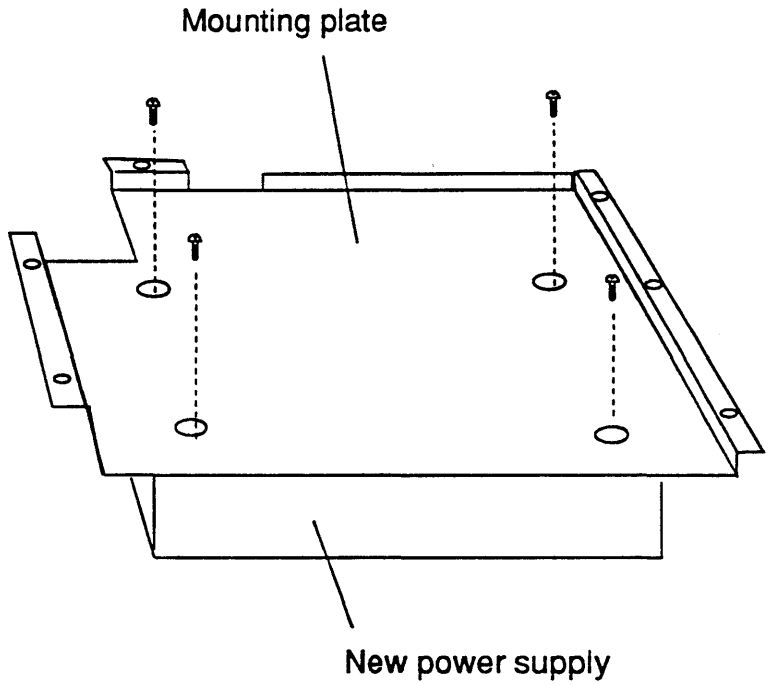


Figure 7-5. Attaching the Mounting Plate to the Power Supply Chassis

5. Using the four screws removed above, attach the mounting plate securely to the power supply.

6. Turn the assembly over. Holding the power panel end of the chassis toward the rear of the machine, slide the assembly into the power supply compartment.

7. Align the screw holes in mounting plate/power supply assembly over those in the compartment, and using the screws removed above attach the assembly securely to the compartment.

8. Install the Auxiliary Power Supply

9. Connect all wires and leads to the power panel. Refer to the sketch you made in the removal procedure to ensure correct connection of these wires. Check and adjust all of the three voltage outputs as required and detailed in the procedure below.

10. Replace the top cover of the power supply compartment by placing the cover over the compartment and fitting the lugs in the cover into the holes in the compartment. Then engage the lugs by sliding the cover toward the front of the machine, and install the three fastening screws.

11. Before remounting the back cover of the power supply compartment, check the connections to the power panel again.

12. Mount the back cover of the cabinet.

Main Power Supply Adjustment

The Main Power Supply can be checked and should be adjusted annually if required using the following procedure:

1. Measure the +5 VDC at the SENSE connector on the power supply (the Orange wire is positive, the Black wire is negative).

2. Adjust the V1 potentiometer for a +5.05 VDC reading.

3. Measure the +12 VDC on the PSM Distribution board at the terminal strip (the Red wire is positive, the Gray wire is negative).

4. Adjust the V2 potentiometer for a reading of +12.0 VDC.

5. Measure the -12 VDC on the PSM Distribution board at the terminal strip (the Violet wire is positive, the Blue wire is negative).

6. Adjust the V4 potentiometer for a reading of -12.0 VDC.

The *AC module* provides filtering, switching, and distribution of AC power in the system cabinets. It is located in the lower rear compartment of each cabinet (Figure 8-1). The main system circuit breaker (30 amps) is located in the AC module just above the line cord.

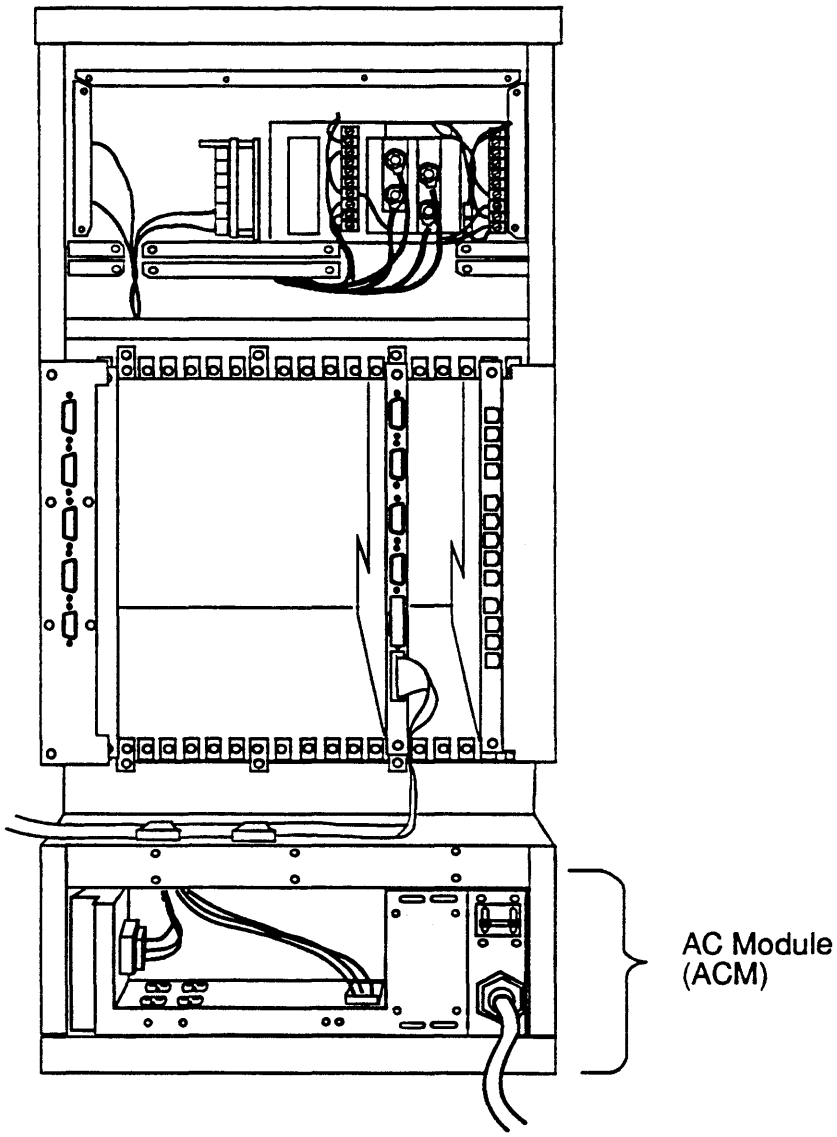


Figure 8-1 AC Module Location

AC Module Removal

Remove the AC module as follows:

1. Power down the system as described in Chapter 2. Turn off the Circuit breaker and unplug the power cord.

2. Remove the phillips head screws that fasten the lower rear cover and lift the cover off.

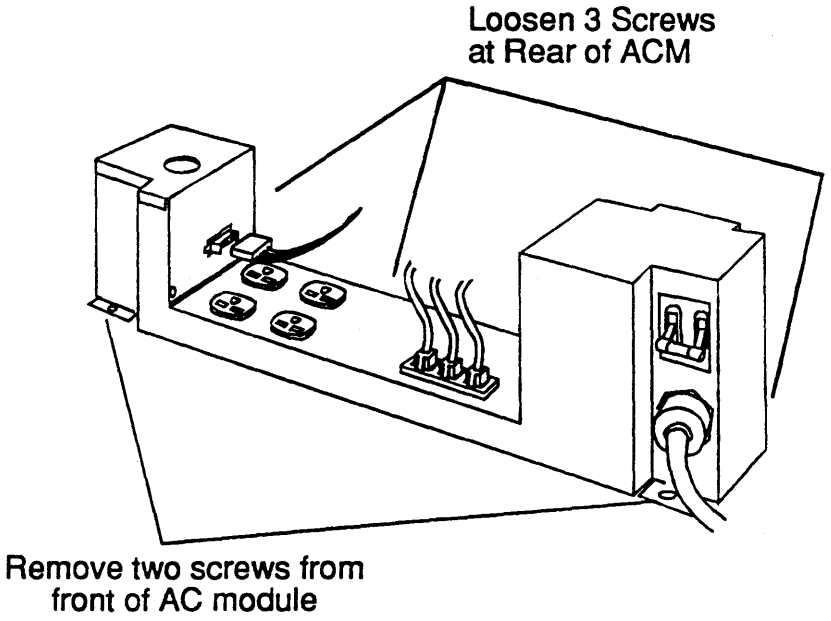


Figure 8-2 AC Module Access

3. Tag and disconnect the three sensor cable plugs from J1, J2, and J3 (Figure 8-2).

4. Tag and disconnect any AC distribution lines from the 220 VAC receptacles (outlets) in the center of the module (Figure 8-2).

   If you are removing the module from a *peripheral expansion cabinet*, a fifth outlet is mounted on the top left cover plate of the module.

5. Disconnect the leads from the DC Power Supply as follows:

   5a. If you are removing the module from a primary cabinet, disconnect the plug from J4 on the side of the module (Figure 8-2).

   - Remove the phillips head screws that fasten the top left cover plate of the module (Figure 8-3).

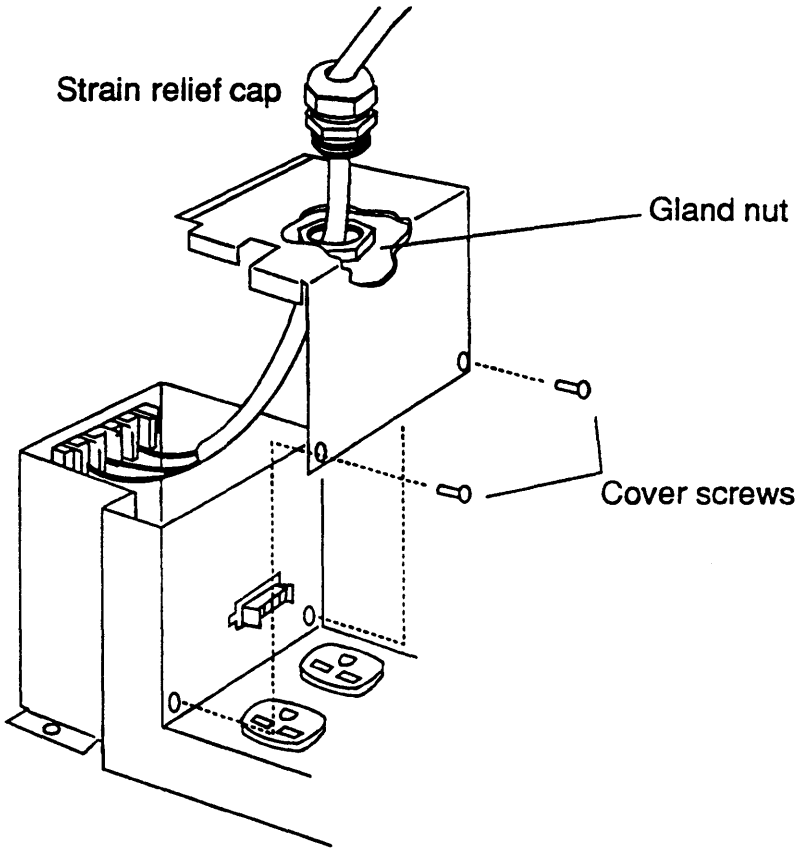


Figure 8-3 AC Module, Top Left Cover Removal

- Slide the cover away from the main chassis of the module until the lip of the cover is clear of the chassis.
- Unscrew the strain-relief cap a few turns until the cover will slide easily on the cable; slide the cover up the cable an inch or so until you have access to the gland nut on the under side of the cover and to terminal board TB3 inside the module.

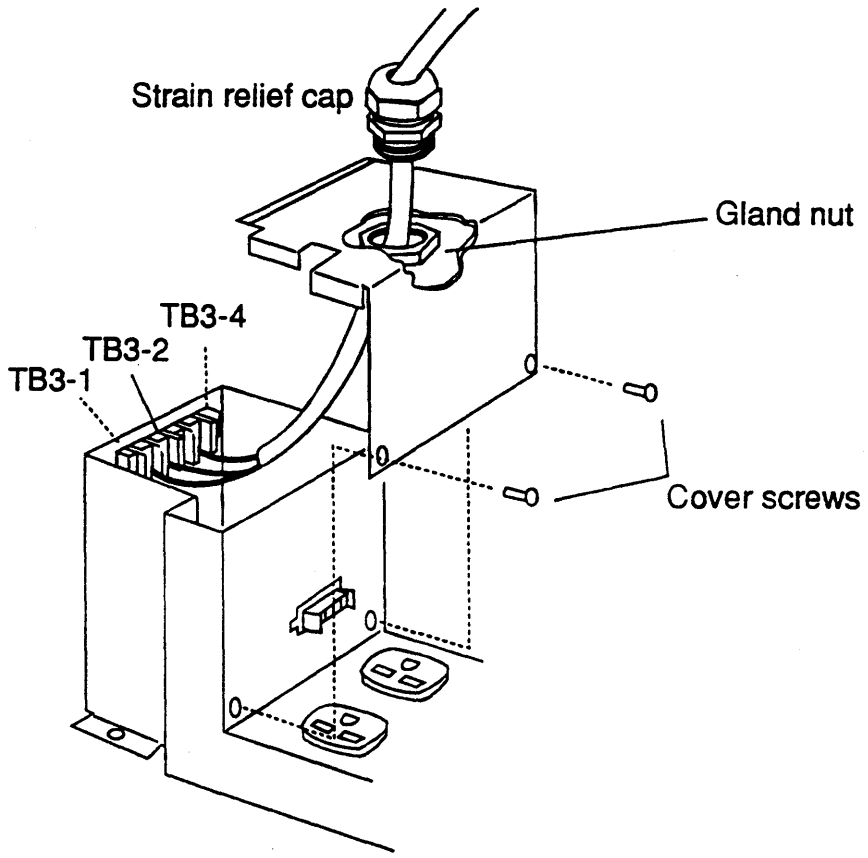


Figure 8-4 AC Module, TB3 Access

- Tag and disconnect the three cable leads from TB3-1, TB3-3, and TB3-4 (Figure 8-4) and pull the cable and cover away from the chassis.

6. Open the front door of the cabinet.
7. Remove the disk tray from the bottom of the cabinet if it is installed..

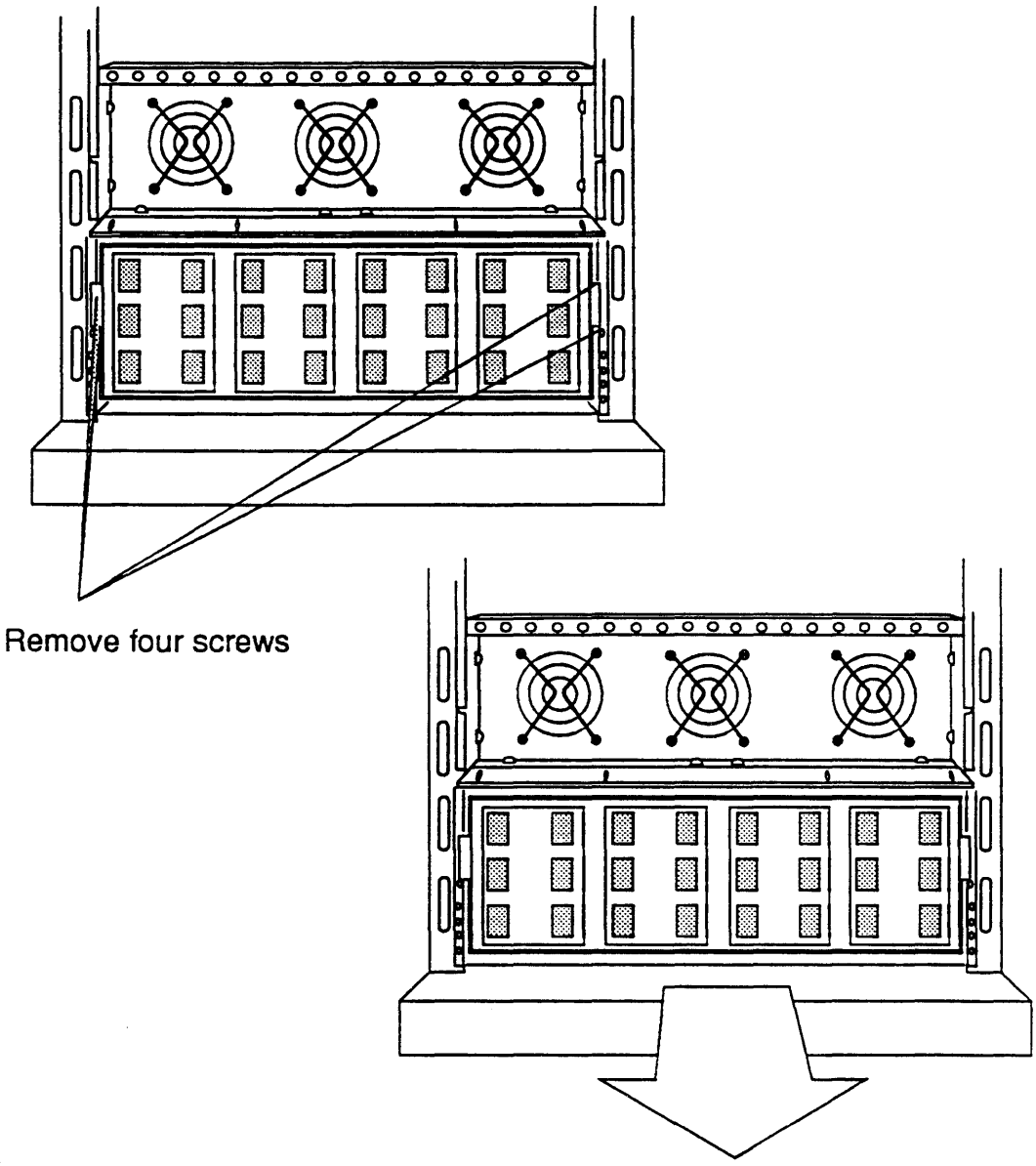


Figure 8-5 Releasing the Disk Storage Module

8. Remove the phillips head screws that fasten the rear of the AC module (Figure 8-6).

9. Using a short handled phillips head screwdriver, loosen the phillips head screws that fasten the front of the AC module (between the AC module and the back of the disk storage module tray). You need only unscrew these screws enough to slide the module out of the cabinet.

10. Slide the AC module toward the rear of the cabinet until it is clear of the rear mounting screws and lift it out of the cabinet.

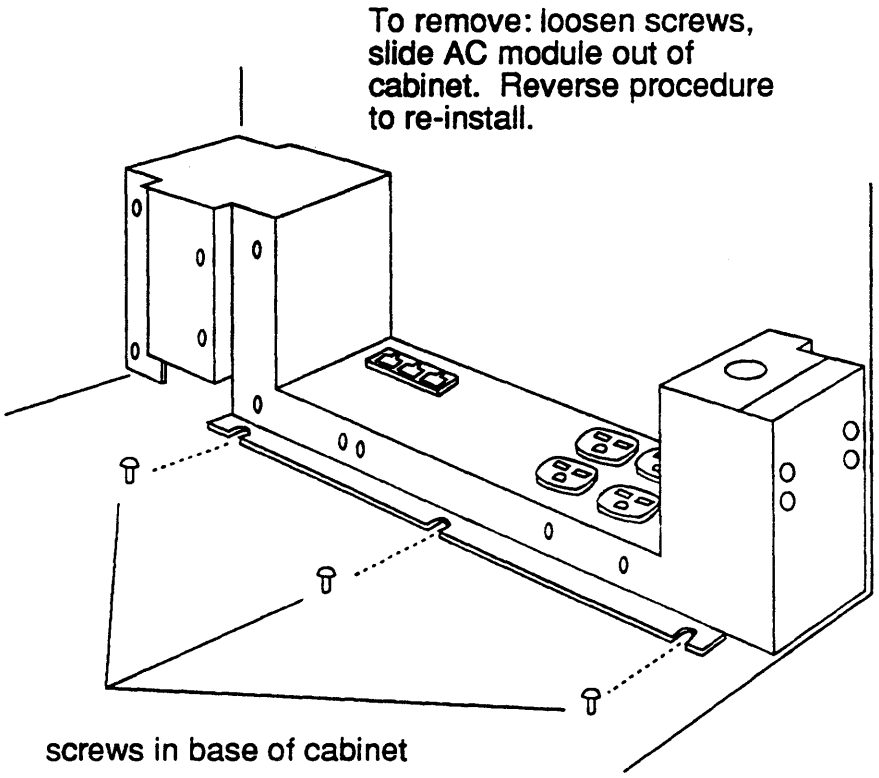


Figure 8-6 Removing the Front Mounting Screws

AC Module Installation

Install the AC module as follows:

1. Remove the replacement module from its shipping container.
2. Store the container and other shipping materials temporarily; you may wish to use them for the module you are replacing.
3. Remove the phillips head screws that fasten the lower rear cover and lift the cover off.
4. Open the front door of the cabinet.
5. Remove the phillips head screws that hold the disk storage module tray in place and pull the tray out of the cabinet about three or four inches (Figure 8-5).

6. If they are not already in place, install the phillips head screws that fasten the front of the AC module (between the AC module and the back of the disk storage module tray). Only thread these screws in a few turns. The module has cutout slots in the rear of the chassis that slide under the screw heads.

7. Make sure that all cables, leads, and connectors are clear of the AC module area in the cabinet and set the replacement module about three-quarters of the way into the rear of the cabinet where it is to be mounted.

8. Slide the module toward the front of the cabinet making sure that the cutout slots in the chassis slide under the three screw heads and rest snugly against the shafts of the three front mounting screws.

9. Install the phillips head screws into the two mounting holes in the rear of the chassis.

10. Tighten down all five mounting screws. You will need a short handled phillips head screwdriver for the three front screws.

11. Connect the leads from the DC Power Supply as follows:

    11a. If you are installing the module in a *primary cabinet*, connect the plug from the Auxiliary Power Supply into J4 on the side of the AC module (Figure 8-2).

    11b. If you are installing the module into a I/OS cabinet, proceed as follows:

- Slide the cover away from the main chassis of the module until the lip of the cover is clear of the chassis. Remove the cover and set it aside temporarily.
- Connect the three tagged cable leads from the main power supply to TB3-1, TB3-3, and TB3-4 (Figure 8-4).
- Slide the top cover plate down the cable and install it using the phillips head screws removed above.

12. Connect the three Sensor cable plugs to J1, J2, and J3 (Figure 8-2).

13. Connect any AC distribution lines to the 220 VAC receptacles (outlets) in the center of the module (Figure 8-2).

14. Using the phillips head screws install the cover plate on the rear of the cabinet.

Connector Pinouts

The ARIX System90 Model 45 and Model 85 provides interfaces to a wide variety of peripherals and communication devices. The following interface definitions are being supplied to ensure system compatibility. All models of the multiuser system provide the same interfaces except for the system console.

Asynchronous Communications Device Board (ACDB)

There are two types of external interfaces on the ACDB. The first is a female RJ-45 connector (of which there are 16) used for asynchronous communications (see Figure A- 1). The second is a female DB-25 connector used for a parallel printer port (see Figure A- 2). The pinouts for both of these connectors are described in Tables A-1 and A-2.

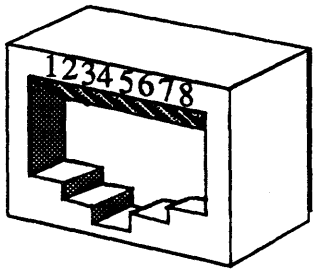


Figure A-1. Female RJ-45

Table A-1. ACDB Female RJ-45 Asynchronous Port Connector Pinout

RJ-45 ARIX (DTE)		Direction	DB-25 Terminal (DTE)	
Pin #	Signal Name		Pin #	Signal Name
1	No Connection			
2	DSR	←	20	DTR
3	TX	→	3	RX
4	RX	←	2	TX
5	GND	— — —	7	GND
6	DTR	→	8 6	DCD DSR
7	DCD	←	20	DTR
8	No Connection			

NOTE: Pin 20 on the DB-25 connector is connected to two pins on the RJ-45 connector. Pin 6 on the RJ-45 connector is connected to two pins on the DB-25 connector.

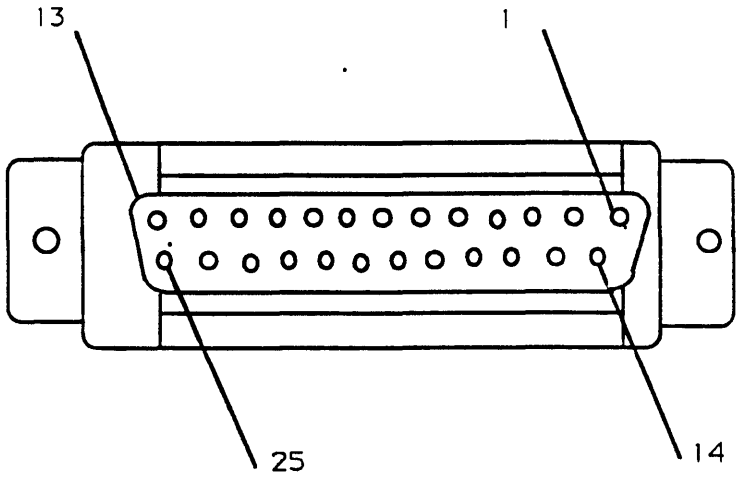


Figure A-2. 25-Pin D (Female)

Table A-2. ACDB Female DB-25 Parallel Printer Port Connector Pinout

Pin Numbers	*Descriptions*
1	Data Strobe
2-9	Data Lines 1 through 8
10	Acknowledge
11	Busy
12	Paper Empty
13	Select
14-25	Signal Ground

LAN/WAN Device Board (LWDB)

There are three types of external interfaces on the LWDB. The first is a female DB-15 connector (see Figure A- 3) to connect to an IEEE 802.3 network. The second is a female DB-25 connector (Figure A- 4) used for synchronous communications. The third is a female DB-37 connector (Figure A- 5) to provide V.35 connection to an X.25 network. The pinouts of these connectors are described in Tables A-3, A-4, and 5.

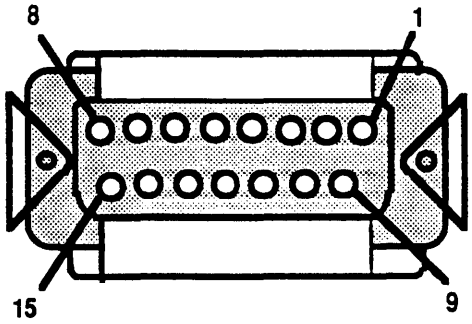


Figure A-3. 15-Pin D (Female)

Table A-3. LWDB Female DB-15 IEEE 802.3 Connector Pinout

Pin Numbers	*Descriptions*
1	Control IN Signals Shield
2	Collision Presence (+)
3	Transmit (+)
4	Data in Signals Shield
5	Receive (+)
6	Power Return (Ground)
7	Reserved
8	Control OUT Signals Shield
9	Collision Presence (-)
10	Transmit (-)
11	Data OUT Signals Shield
12	Receive (-)
13	Power (+12 VDC fused)
14	Power Shield
15	Reserved

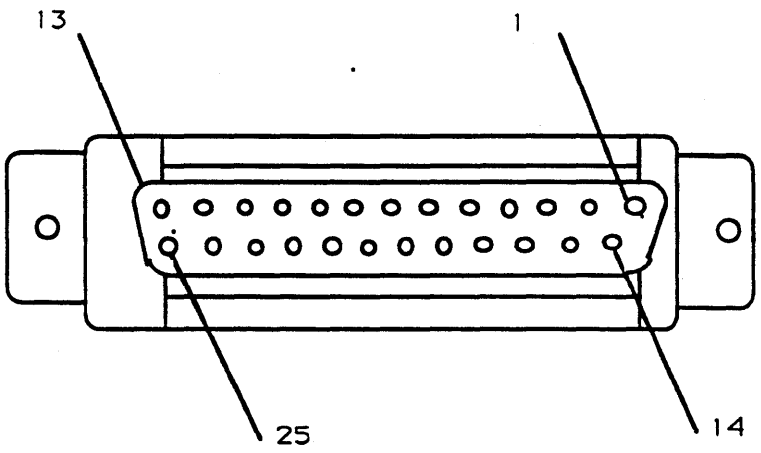


Figure A-4. 25-Pin D (Female)

Table A-4. LWDB DB-25 Synchronous Port Connector Pinout

Pin Number(s)	*Description*
1	Chassis Ground
2	Transmit Data
3	Receive Data
4	Request to Send
5	Clear to Send
6	Data Set Ready
7	Signal Ground
8	Data Carrier Detected
9-14	No Connection
15	Transmitter Clock
16	No Connection
17	Receiver Clock
18 19	No Connection
20	Data Terminal Ready
21	No Connection
22	Ring Detector
23	No Connection
24	Tx Sig Element Timing
25	No Connection

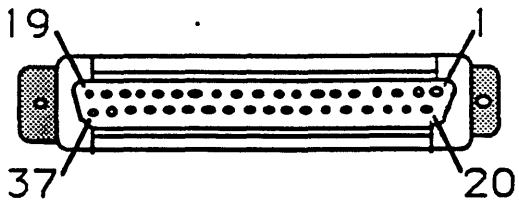


Figure A-5 37-Pin D (Female)

Table A-5. LWDB DB-37 V.35 Connector Pinout

Pin Number(s)	*Description*
1	Chassis Ground
2-3	No Connection
4	Transmit Data BA(A)
5	Transmit Clock DB(A)
6	Receive Data BB(A)
7	Request to Send
8	Receive Clock DD(A)
9	Clear to Send
10	Local Loopback
11	Data Set Ready
12	Terminal Ready
13	Remote Loopback
14	Data Carrier Detected
15-16	No Connection
17	External Transmit Clock
18	Test Mode
19	Signal Ground
20	Receive Common
21	No Connection
22	Transmit Data BA(B)
23	Transmit Clock DB(B)
24	Receive Data BB(B)
25	Request to Send
26	Receive Clock DD(B)
27	Clear to Send
28	No Connection
29	Data Mode
30	Terminal Ready
31	Receive Ready
32-34	No Connection
35	Terminal Timing
36	No Connection
37	Send Common

Dual SCSI Device Board (DSDB)

The DSDB provides two independent SCSI channels, referred to here as 1 and 2, in two different formats: single-ended and differential. Since these two formats require different pinouts, the DSDB was designed with four 50-pin male connectors (Figure A- 6). The first and third connectors from the top of the board, P1 and P3, are the single-ended SCSI channels A and B, respectively. The second and fourth connectors, P2 and P4, are the differential SCSI channels A and B, respectively. Since P1 and P2 are different pinouts for SCSI channel A, only one of these two connectors may be used at a time. The same is true for connectors P3 and P4. The pinouts for both types of SCSI connections are described in Tables A-6 and A-7.

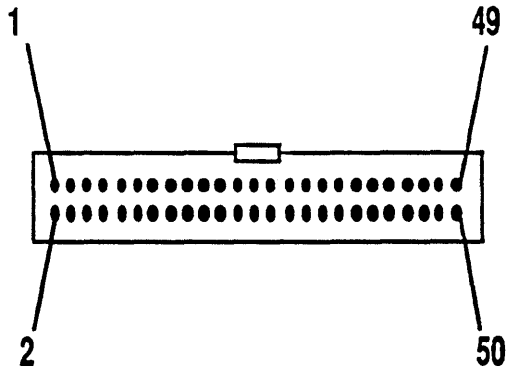


Figure A-6. 50-Pin Male Connector

Table A-6. DSDB SCSI Single-Ended 50-Pin Male Connector Pinout

Pin Number	Function	Pin Number	Function
1	Ground	26	TERM +5V DC
2	SD(0)	27	Ground
3	Ground	28	Ground
4	SD(1)	29	Ground
5	Ground	30	Ground
6	SD(2)	31	Ground
7	Ground	32	ATN
8	SD(3)	33	Ground
9	Ground	34	Ground
10	SD(4)	35	Ground
11	Ground	36	BSY
12	SD(5)	37	Ground
13	Ground	38	ACK
14	SD(6)	39	Ground
15	Ground	40	RST
16	SD(7)	41	Ground
17	Ground	42	MSG
18	SD(P)	43	Ground
19	Ground	44	SEL
20	Ground	45	Ground
21	Ground	46	C/D
22	Ground	47	Ground
23	Ground	48	REQ
24	Ground	49	Ground
25	Not Used	50	I/O

Table A-7. DSDB SCSI Differential 50-Pin Male Connector Pinout

Pin Number	Function	Pin Number	Function
1	Not Used	26	TERM +5V DC
2	Ground	27	Ground
3	SD(0)	28	Ground
4	SD*(0)	29	ATN
5	SD(1)	30	ATN*
6	SD*(1)	31	Ground
7	SD(2)	32	Ground
8	SD*(2)	33	BSY
9	SD(3)	34	BSY*
10	SD*(3)	35	ACK
11	SD(4)	36	ACK*
12	SD*(4)	37	RST
13	SD(5)	38	RST*
14	SD*(5)	39	MSG
15	SD(6)	40	MSG*
16	SD*(6)	41	SEL
17	SD(7)	42	SEL*
18	SD*(7)	43	C/D
19	SD(P)	44	C/D*
20	SD*(P)	45	REQ
21	DIFFSENSE	46	REQ*
22	Ground	47	I/O
23	Ground	48	I/O*
24	Ground	49	Ground
25	TERM +5V DC	50	Ground

Real World Interface

The Real World Interface (RWI) board provides two types of connectors: the female DB-25 connector and the male DB-9 UPS port connector. The DB-25 connectors (see Figure A- 7, Tables A-8 and A-9) are used to interface to the system console, printer, and remote diagnostics ports. The DB-9 connector (see Figure A- 8, Table 10) is used to connect to the Uninterruptible Power Supply (UPS) port (refer to the Uninterruptible Power Supply Guidelines for the ARIX System 90 Manual for further information).

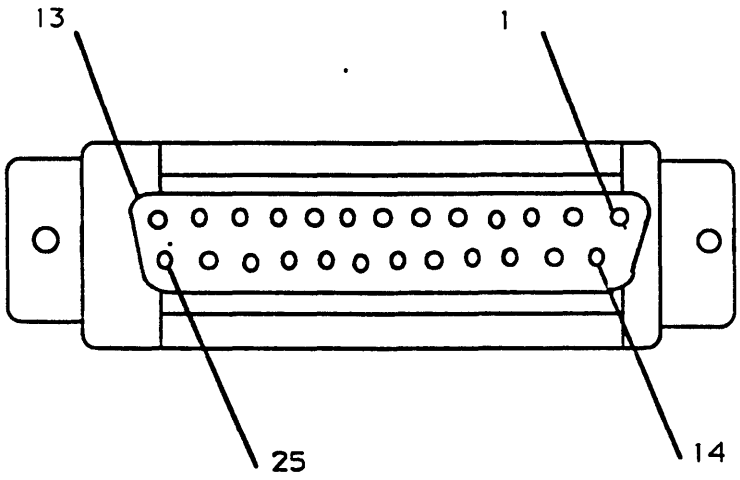


Figure A-7. 25-Pin D (Female)

Table A-8. DB-25 CONSOLE or Printer Ports to DB-25 Connector Pin/Signal Description for DTE Use

DB-25 CONSOLE (DCE)		Direction	DB-25 Terminal (DTE)	
Pin #	Signal Name		Pin #	Signal Name
1	Chassis Ground	— — —		
2	TX	←	2	TX
3	RX	→	3	RX
4	RTS	←	4	RTS
5	CTS	→	5	CTS
6	DSR	→	6	DSR
7	GND	— — —	7	GND
8	DCD	→	8	DCD
20	DTR	←	20	DTR

Table A-9. DB-25 REMOTE CONSOLE to DB-25 Connector Pin/Signal Description for DCE or MODEM Use

DB-25 REMOTE CONSOLE (DTE)		Direction	DB-25 MODEM (DCE)	
Pin #	Signal Name		Pin #	Signal Name
1	Chassis Ground	— — —		
2	TX	→	2	TX
3	RX	←	3	RX
4	RTS	→	4	RTS
5	CTS	←	5	CTS
6	DSR	←	6	DSR
7	GND	— — —	7	GND
8	DCD	←	8	DCD
20	DTR	→	20	DTR

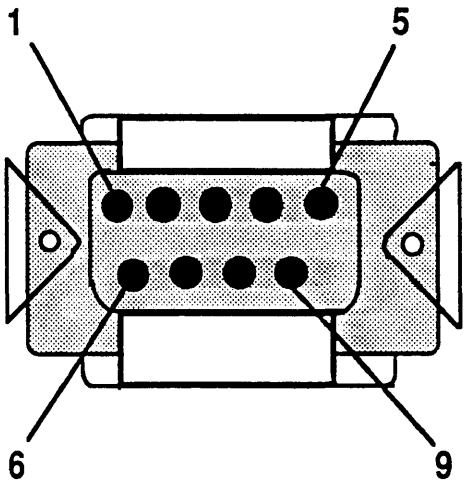


Figure A-8. 9-Pin D (Male)

Table A-10. RWI Male DB-9 UPS Port Connector Pinout

Pin Number	Description
1	AC Fail (active low)
2	No Connection
3	UPS Off (active low)
4	No Connection
5	Low Battery (active low)
6	No Connection
7	Signal Ground
8	No Connection
9	No Connection