FRP32

Replacing the Lower Fan Tray

CAUTION

Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

Procedure

1. Replace the screw for the cable carrier on the replacement fan tray.
2. Support the tray while you reconnect the power and sense plugs and install new cable ties, if needed.
3. Push the fan tray all the way back in.
4. Replace the two securing screws.
5. Replace the filter.
6. Close the side panel using FRP6.
7. Power up the system using FRP1.

FRP33

Removing the Upper Fan Tray

The control panel status lights indicate when a fan is not operating and must be replaced.

CAUTION

Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

Procedure

1. Power down the system using FRP2.
2. To remove the right upper fan tray, remove the front panel and inner front-panel EMI shield using FRP3. To remove the left upper fan tray, remove the back panel and inner back-panel EMI shield using FRP7.

NOTE: If you have a multicabinet system, you may have to separate the system using FRP48 before you can access the front or back of the cabinet.

3. Remove the two countersunk screws that secure the top grill panel to the top of the chassis next to the side panels. Refer to Figure 7-35.
4. Slide the panel to the side on the guide pins that insert it into the bulk converter and then lift the panel out.
5. Remove the four screws from the top fan-tray perforated cover and lift the cover out. Be careful; the perforated cover may have sharp edges.
6. Remove the four Phillips screws and four standoff screws from the fan tray.

7. Disconnect the fan power plug and warning signal plug located under the fan tray next to the bulk converter.

8. Lift the fan tray clear of the chassis.

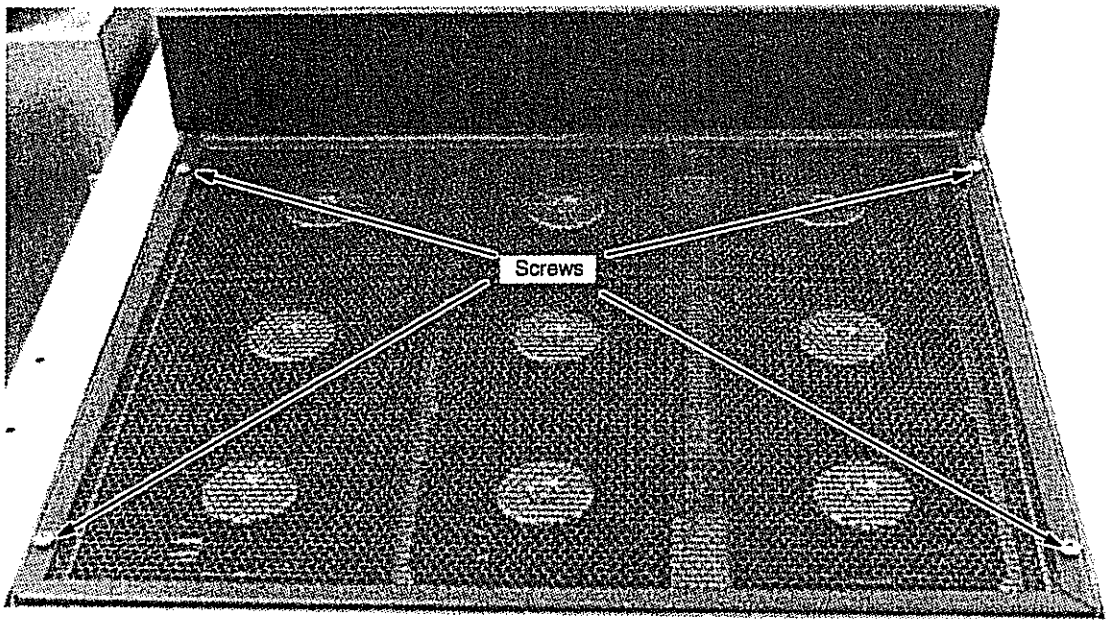

Figure 7-35. Top Fan-tray Perforated Cover

FRP34

Replacing the Upper Fan Tray

CAUTION

Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

Procedure

1. Insert the replacement fan tray into the chassis.
2. Reconnect the fan power plug and warning signal plug.
3. Replace the four Phillips screws and four hex standoff screws in the fan tray. The standoff screws are the screws nearest to the corners.
4. Replace the top fan-tray perforated cover and align the holes in the cover with the standoff screws.
5. Install the four screws that secure the top fan-tray perforated cover.
6. Slide the top grill-panel pins into the side of the bulk converter to the correct position and install the two countersunk screws.
7. Replace the front or back panel and inner back-panel EMI shield using FRP4 or FRP8 or reconnect the separated cabinets using FRP49.
8. Power up the system using FRP1.

FRP35

Removing the Maintenance SCSI Peripheral Devices

Three separate peripheral devices compose the SCSI. This FRP includes the three subprocedures needed to remove them. The three devices are:

- 8-mm helical scan cartridge drive (EX-2)
- Winchester-technology hard disk drive
- Quarter-inch cartridge (QIC) 1.3-Gbyte streaming cartridge (0.25-in) tape drive

CAUTION

Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

Procedure

The following steps guide you through the process of extending the VME IOS card cage; these steps are common to the removal of all three of the SCSI peripherals.

1. Power down the system using FRP2.
2. Open the right side panel using FRP5.
3. Remove the four screws that secure the IOS VME card cage. Refer to Figure 7-36.
4. Ensure that all of the cables connected to the front of the I/O interface boards are properly labeled.
5. Disconnect the cables connected to the front of the I/O interface boards; do not disconnect the cables connected to the back of the I/O interface boards.

CAUTION

Lay the cables flat so you will not damage them as you are pulling out the IOS VME card cage.

6. Pull the card cage out as far as it will extend (the drawer has locks as shown in Figure 7-36), and then remove the entire maintenance small computer system interface (SCSI) as directed in the following steps.

7. Remove the VME INHIBIT/ENABLE button cover on the VME card cage to access the inner screws, but leave the switch wires connected. Refer to Figure 7-37 while performing the next three subprocedures.

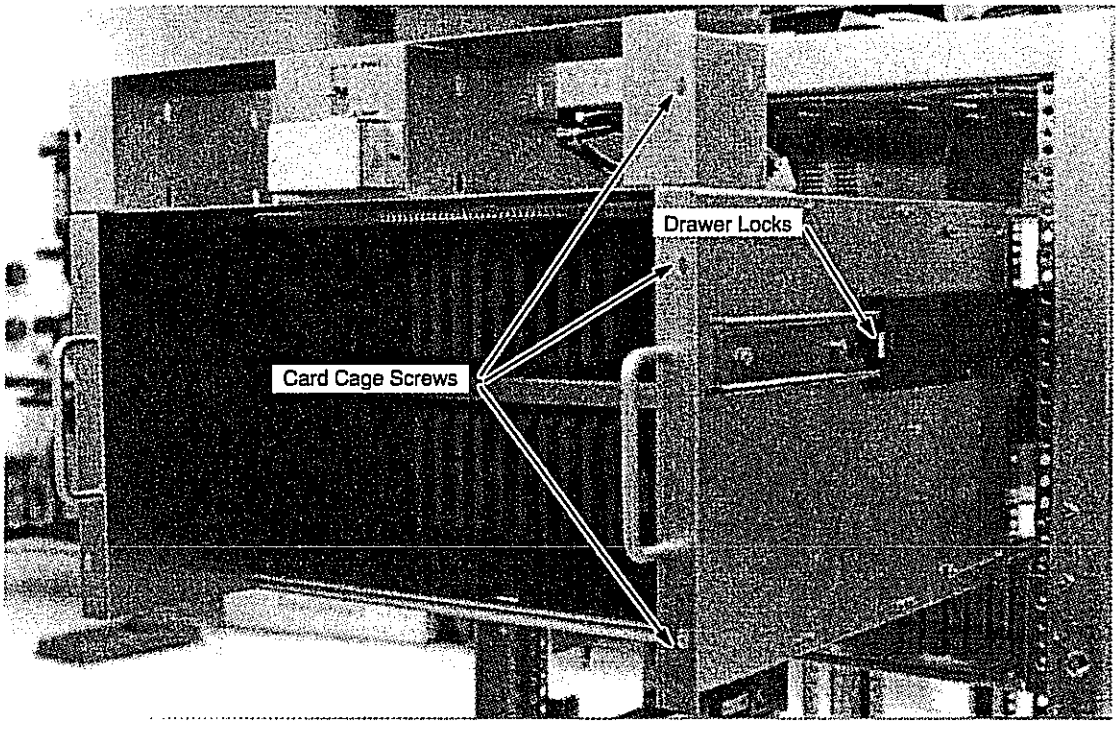

Figure 7-36. IOS VME Card Cage

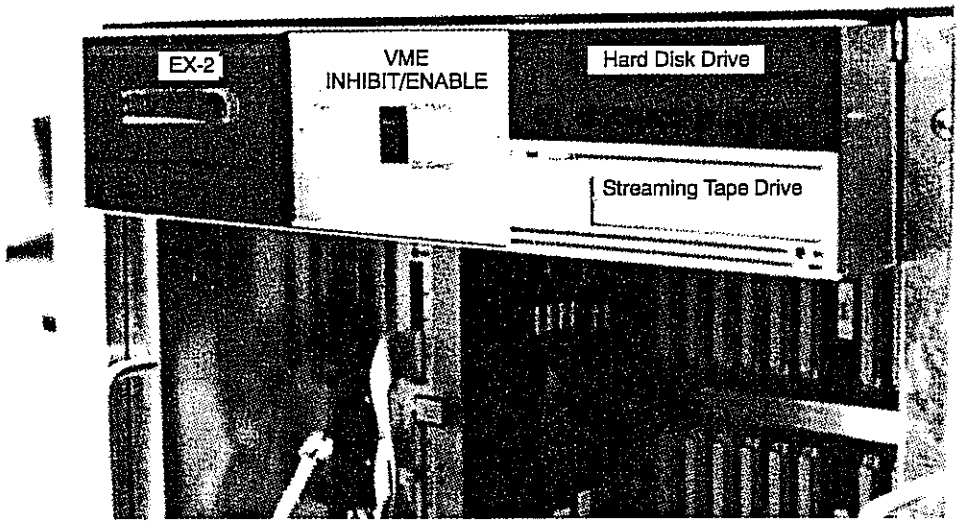

Figure 7-37. SCSI Subassembly

Removing the Helical Scan Cartridge Drive

1. Disconnect the SCSI cable and the power cable from the back of the drive.
2. Remove the two sliding screws from the left side of the EXABYTE-2 (EX-2) helical scan cartridge drive.
3. Remove the EX-2 retaining bracket from the SCSI.
   a. Remove the two top screws as shown in Figure 7-38.
   b. Remove the two bottom screws as shown in Figure 7-39.
4. Slide the EX-2 subassembly out of the SCSI it and place on an antistatic surface.
5. Remove the two screws that secure the EX-2 to its retaining bracket and remove the retaining bracket.

Removing the Hard Disk Drive

1. Disconnect the SCSI cable and the power cable from the back of the hard disk drive.

2. Remove the four screws that secure the hard disk drive and streaming tape drive subassembly to the card cage from the right side of the VME card cage as shown in Figure 7-40.

3. Remove the hard drive retaining bracket.

   a. Remove the two right most screws located on the top right side of the VME card cage.

   b. Remove the bottom two screws located under the streaming tape drive on the VME card cage.

   c. Remove this assembly from the SCSI and place it on an antistatic work surface.

   d. Remove the two screws that secure the hard disk drive to the bracket and slide the hard disk drive out.

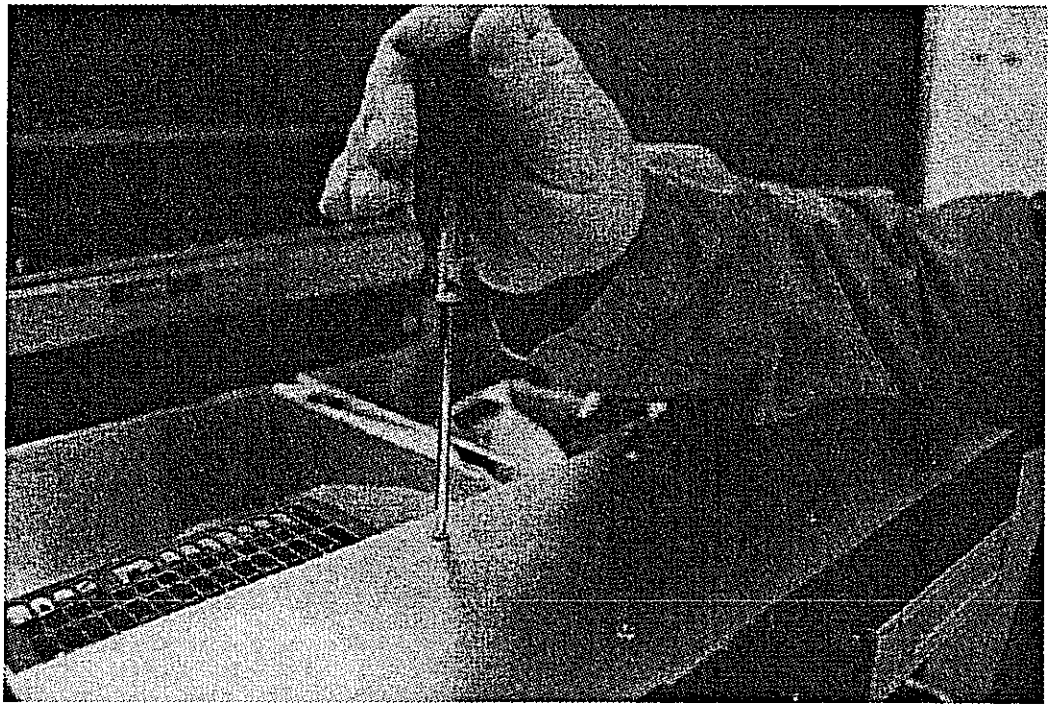

Figure 7-38. Removing EX-2 Bracket Upper Screws

Removing the Streaming Tape Drive

1. Disconnect the SCSI cable and the power cable from the back of the hard disk drive.

2. Remove the four screws that secure the hard disk drive and streaming tape drive subassembly to the card from the right side of the VME card cage as shown in Figure 7-40.

3. Remove the retaining bracket for the hard drive and streaming tape drive from the VME card cage.

   a. Remove the two screws located on the top right side of the VME card cage.

   b. Remove the bottom two screws located under the streaming tape drive.

   c. Remove this subassembly from the SCSI and place it on an antistatic work surface.

   d. Remove the two screws that secure the streaming tape drive to the bracket and slide the streaming tape drive out.

Figure 7-39. Removing EX-2 Bracket Lower Screws

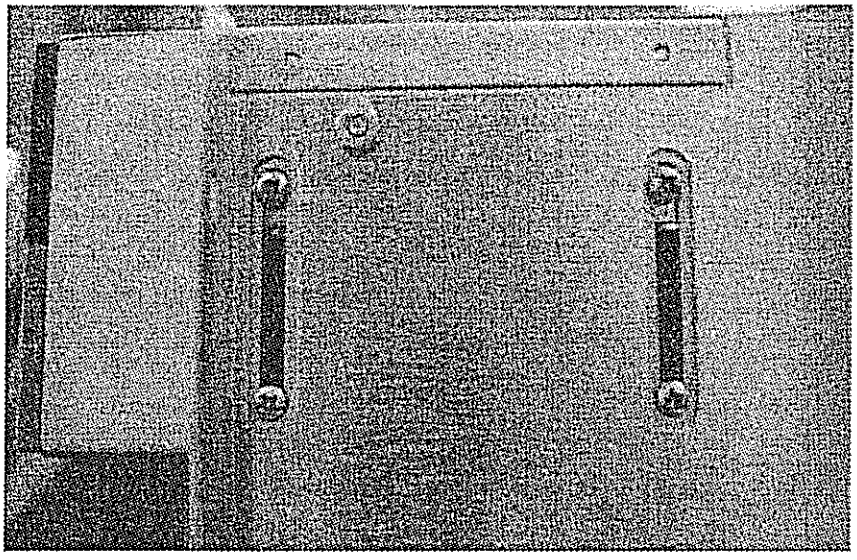

Figure 7-40. SCSI Hard Drive and Streaming Tape Drive Screws

FRP36

Replacing the Maintenance SCSI Peripheral Devices

CAUTION

Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

Replacing the Helical Scan Cartridge Drive (EX-2)

1. Replace the two screws to secure the helical scan cartridge drive (EX-2) to its retaining bracket.
2. Slide the new EX-2 subassembly into its designated location in the SCSI subassembly.
3. Replace the EX-2 retaining bracket in the SCSI.
   a. Replace the two bottom screws as shown in Figure 7-39.
   b. Replace the two top screws as shown in Figure 7-38.
4. Replace the two sliding screws on the left side of the EX-2.
5. Reconnect the SCSI cable and the power cable at the back of the drive.

Replacing the Hard Disk Drive

1. Replace the two screws that secure the hard disk drive to the retaining bracket.
2. Slide the new hard disk drive assembly into its designated location in the SCSI.
3. Replace the hard drive and streaming tape drive subassembly into the SCSI.

4. Replace the SCSI cable and power cable.
5. Replace the bottom two screws under the streaming tape drive in the VME card cage.
6. Replace the top two screws that secure the hard disk drive to the retaining bracket.
7. Replace the four screws on the right side of the retaining bracket that secure it to VME card cage.

Replacing the Streaming Tape Drive

1. Replace the two screws that secure the streaming tape drive to the retaining bracket.
2. Slide the new streaming tape drive subassembly into its designated location in the SCSI subassembly.
3. Replace the SCSI cable and the power cable.
4. Replace the bottom two screws located under the streaming tape drive in the VME card cage.
5. Replace the top two screws, securing the subassembly to the VME card cage.
6. Replace the four screws on the right side of the retaining bracket that secure it to VME card cage.

Replacing the SCSI Assembly

After you have replaced the faulty SCSI device, using the applicable section of this FRP, follow this procedure to complete the process of reinstalling the SCSI in the VME card cage.

1. Push the card cage back on the tracks until it latches; do not push the card cage into the frame after it latches. Leave the card cage extended.
2. If you have not moved each VME board from the faulty card cage to the replacement card cage, do so at this time.
3. Check the jumpers on the back of the replacement VME card cage to ensure that the jumper connections are the same as those on the replacement card cage. Move the jumpers from the faulty card cage to the replacement card cage.

4. Reconnect the power plug, sense cable, and cable carrier.
5. Replace the vertical wireway cover by reinstalling all screws.
6. Replace the I/O cables on the back of the VME card cage if applicable.
7. Push the card cage into the frame.
8. Replace the four screws that secure the VME card cage to the 19-inch rack.
9. Replace the I/O cables on the front of the card cage.
10. Replace the VME INHIBIT/ENABLE button cover on the VME card cage.
11. Replace the back panel and inner back-panel EMI shield using FRP8.
12. Close the right side panel using FRP6.
13. Power up the system using FRP1.

FRP37

Removing the Disk Array Controller (DAC) Boards

CAUTION

Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

Procedure

1. Power down the system using FRP2.
2. Open the side panel using FRP5.
3. Remove the front panel from the DAC. This is a snap-fit panel. Refer to Figure 7-41.
4. Remove the eight screws that secure the front shield and pull off this shield. Refer to Figure 7-41.
5. Perform Steps 3 and 4 of FRP9 to remove the faulty DAC board. A layout of the DAC boards is shown in Figure 7-42.

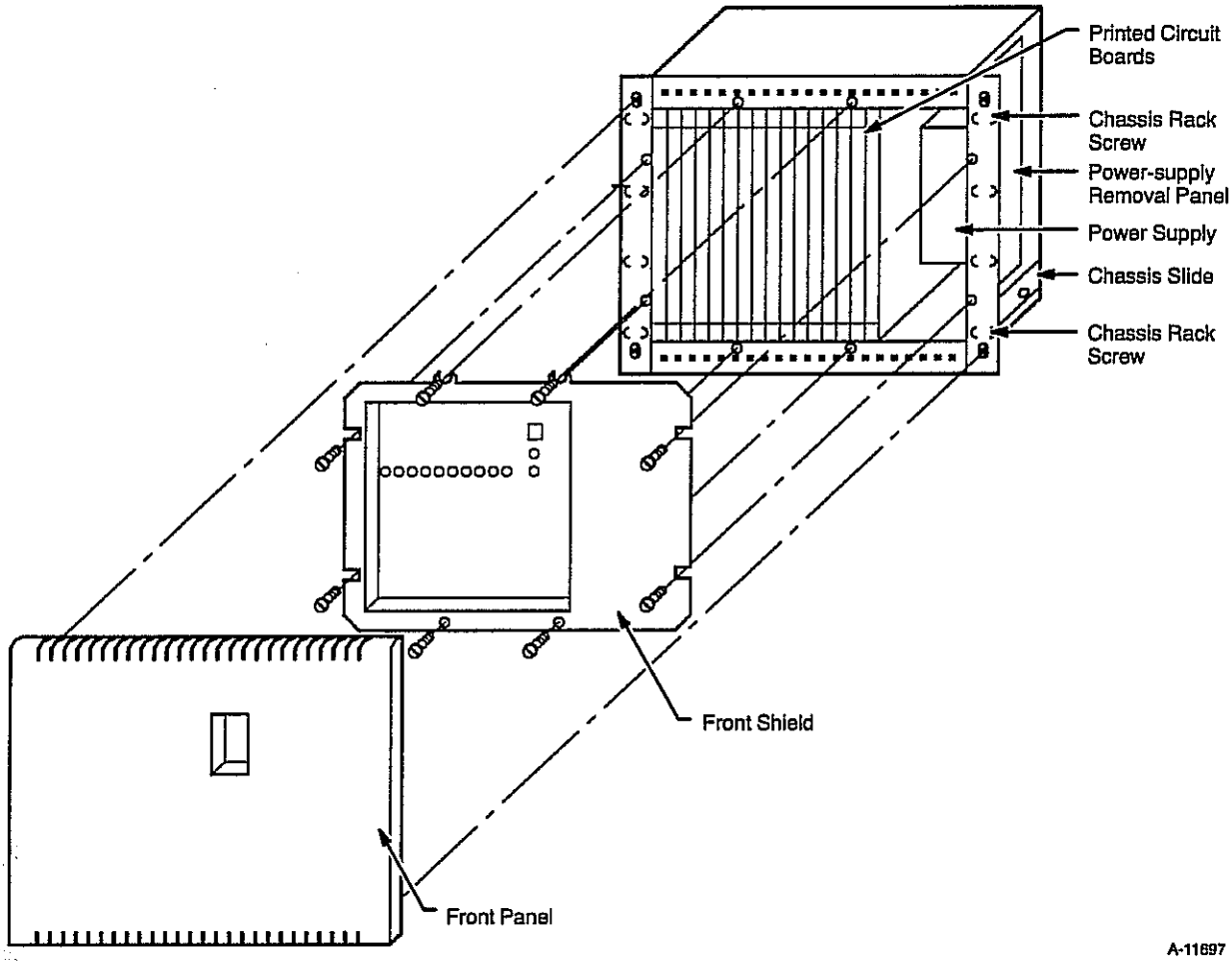

Figure 7-41. DAC Controller Assembly

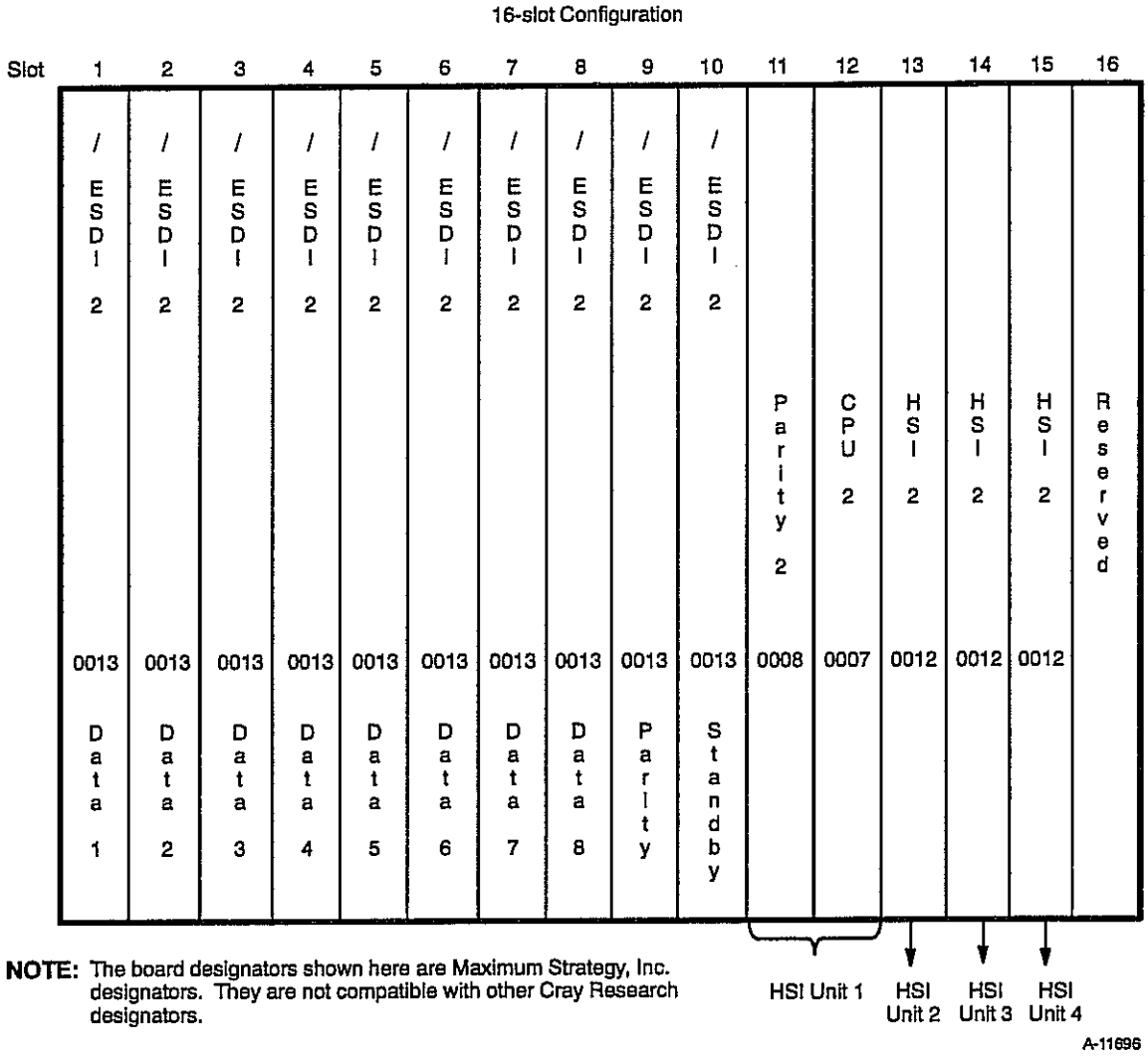

Figure 7-42. DAC Controller Board Configuration

FRP38

Replacing the Disk Array Controller (DAC) Boards

CAUTION

Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

Procedure

1. Replace the DAC board using FRP10, Steps 1 through 3.
2. Insert the front shield and replace the eight screws, securing it to the DAC assembly.
3. Snap the front panel back onto the DAC assembly.
4. Close the side panel using FRP6.
5. Power up the system using FRP1.

FRP39

Removing the PE-3 Tray Power Supply

This power supply is shared by all drives in the PE-3 tray. If none of the drives in the drawer work, this power supply is probably faulty.

CAUTION

Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

Procedure

DANGER

Wait for the system to completely power down before you touch any components associated with the high-voltage circuits. Verify power loss by performing a voltage check; failure to do so will result in death or serious injury.

1. Power down the system using FRP2.
2. Open the side panel using FRP5.
3. Attach the ESD wrist strap to an earth ground point.
4. Remove the four tray-retaining screws.
5. Remove the four power-supply retaining screws. Refer to Figure 7-43.
6. Extend the disk tray carefully, using the slide handles.

7. Remove the two retaining screws located on the side of the disk-tray top cover near the front. (Refer to Figure 7-44.) Remove the cover by lifting the front up and sliding it back to disengage the rear location tabs.

8. Remove the two front plugs and one rear plug from the top of the power supply assembly. Refer to Figure 7-45.

9. Pull the assembly out from the front of the tray. Refer to Figure 7-46.

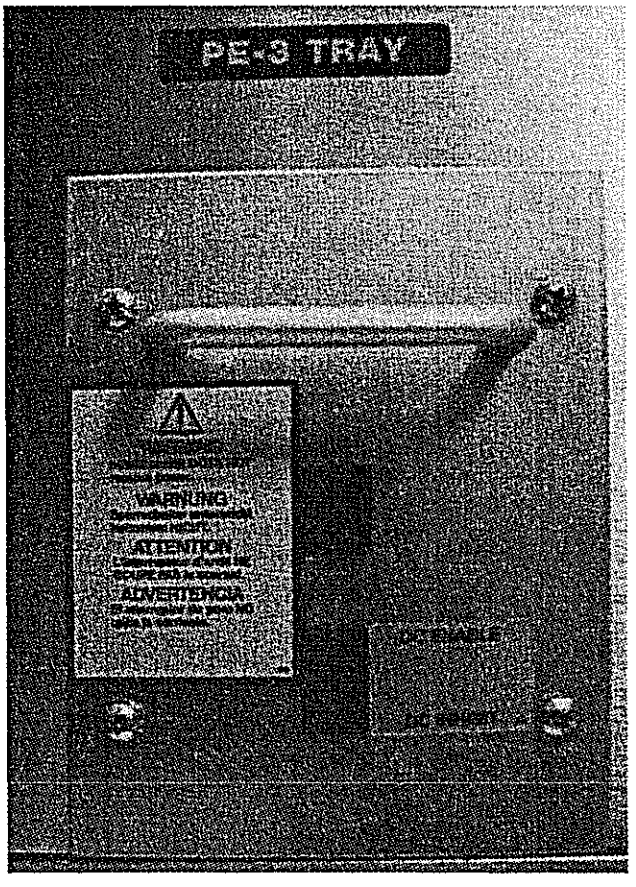

Figure 7-43. PE-3 Tray

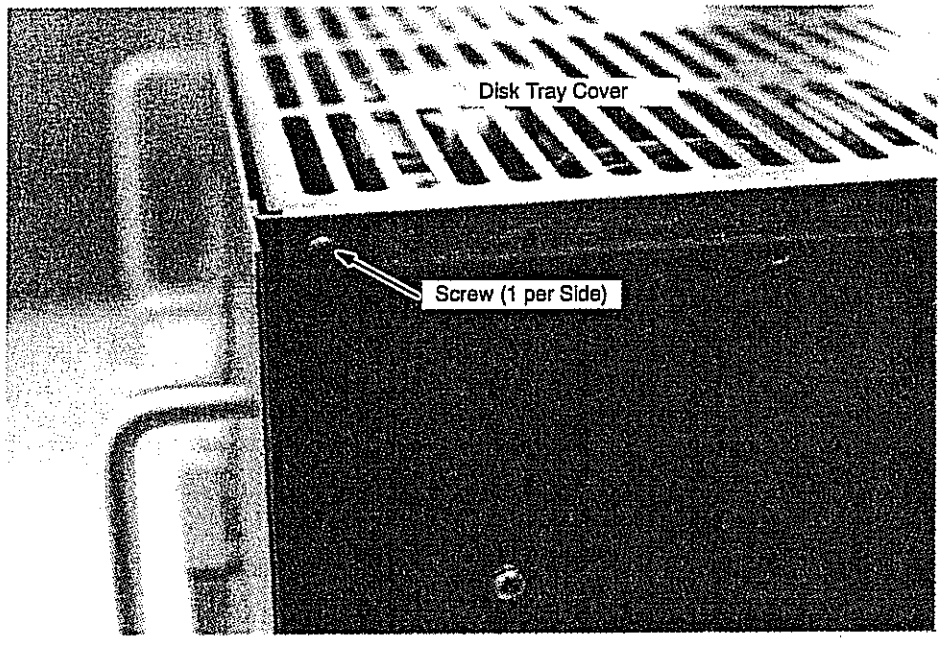

Figure 7-44. Disk Tray Cover

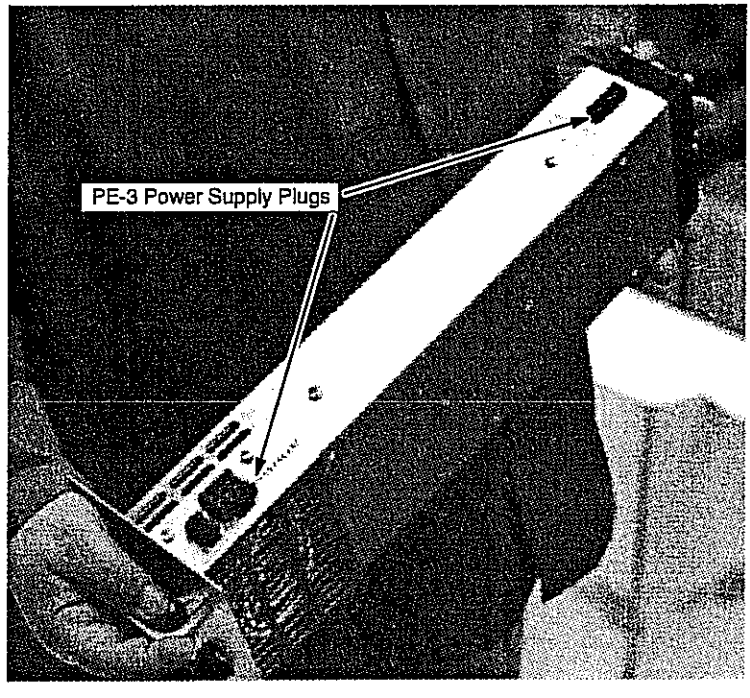

Figure 7-45. PE-3 Power Supply Front Plugs

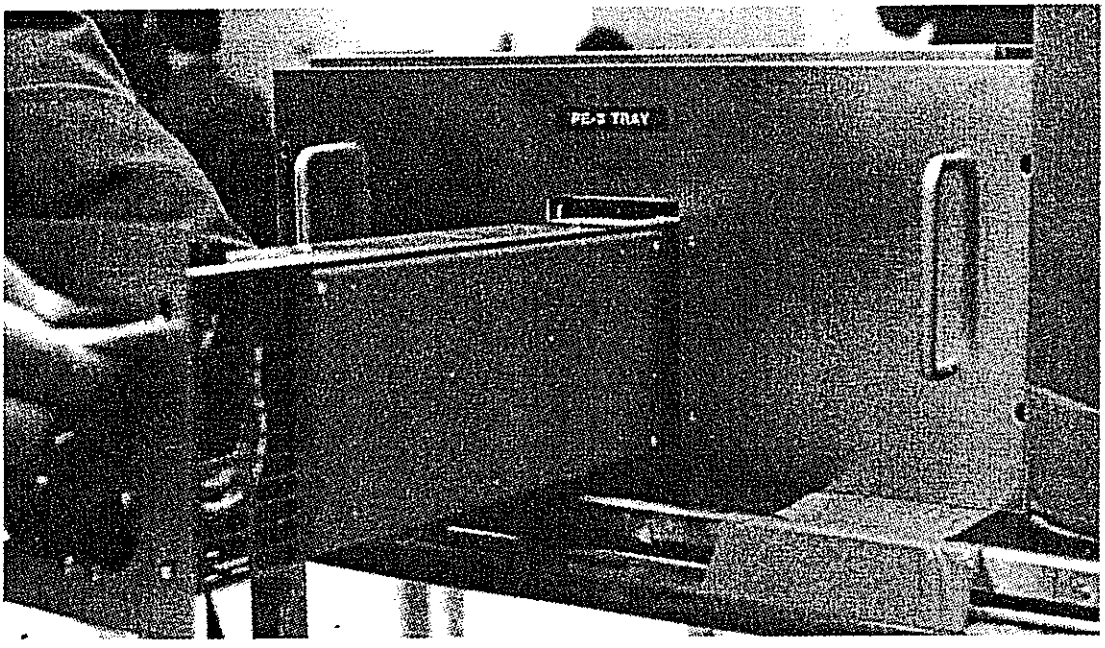

Figure 7-46. PE-3 Power Supply

FRP40

Replacing the PE-3 Tray Power Supply

CAUTION

Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

Procedure

1. Ensure that your ESD wrist strap is attached to an earth ground point.
2. Insert the replacement disk-tray power-supply assembly.
3. Reinstall the two front plugs and one rear plug in the top of the power supply assembly.
4. Replace the top cover by engaging the location tabs in the rear cutouts. Lower the front and secure the cover with the two retaining screws.
5. Slide in the tray.
6. Secure the power supply using the four power-supply retaining screws.
7. Secure the tray using the four tray-retaining screws.
8. Replace the side panel using FRP6.
9. Power up the system using FRP1.

FRP41

Removing the DD-3 Disk Drive

CAUTION

Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

Procedure

1. Open the side panel using FRP5.
2. Power down the PE-3 drawer by moving the 0/1 button to 0 to turn off the power supply.
3. Connect your ESD wrist strap to the nearest earth ground point.
4. Remove the four tray-retaining screws.
5. Extend the tray fully, until it locks, by carefully pulling on the two tray handles.
6. Remove the two screws, one from each side, that secure the top cover. Refer to Figure 7-47.
7. Lift the front of the cover and slide it back.
8. Remove all of the cables from the drive to be replaced and push them to the side to allow drive removal. You may have to remove one or more power plugs from other drives in order to have sufficient space to clear the drive. Refer to Figure 7-48.
9. Using the drive handle, pull the drive up and out of the tray. Refer to Figure 7-49. Avoid carrying the drive by the handle because it may fall. Support the drive with two hands when possible.
10. Transfer the drive-mounting hardware and handle to the replacement drive at an ESD-safe work area.

Figure 7-47. DD-3 Top Cover

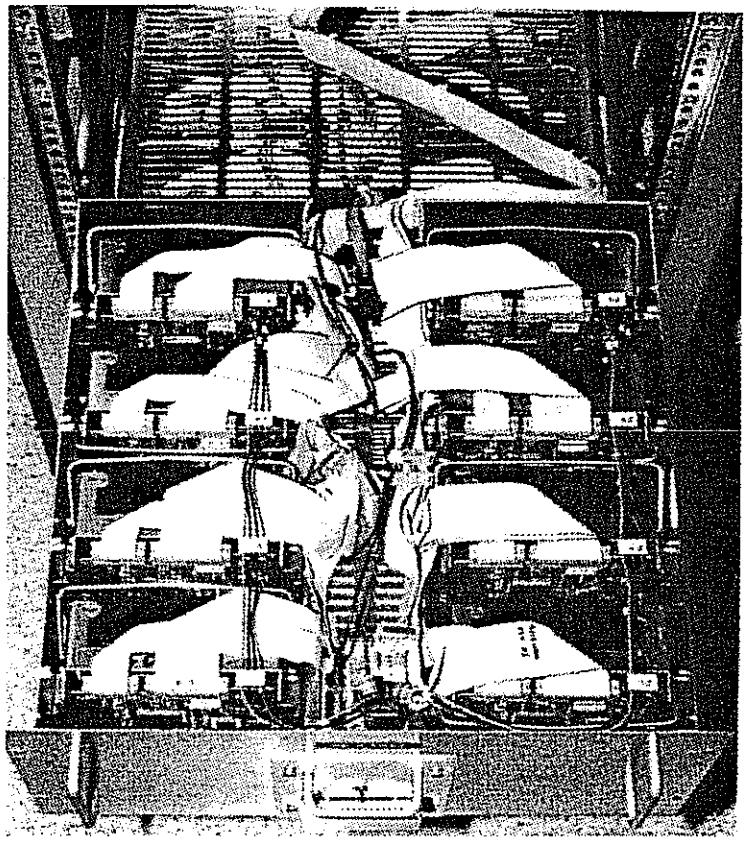

Figure 7-48. DD-3 Cables

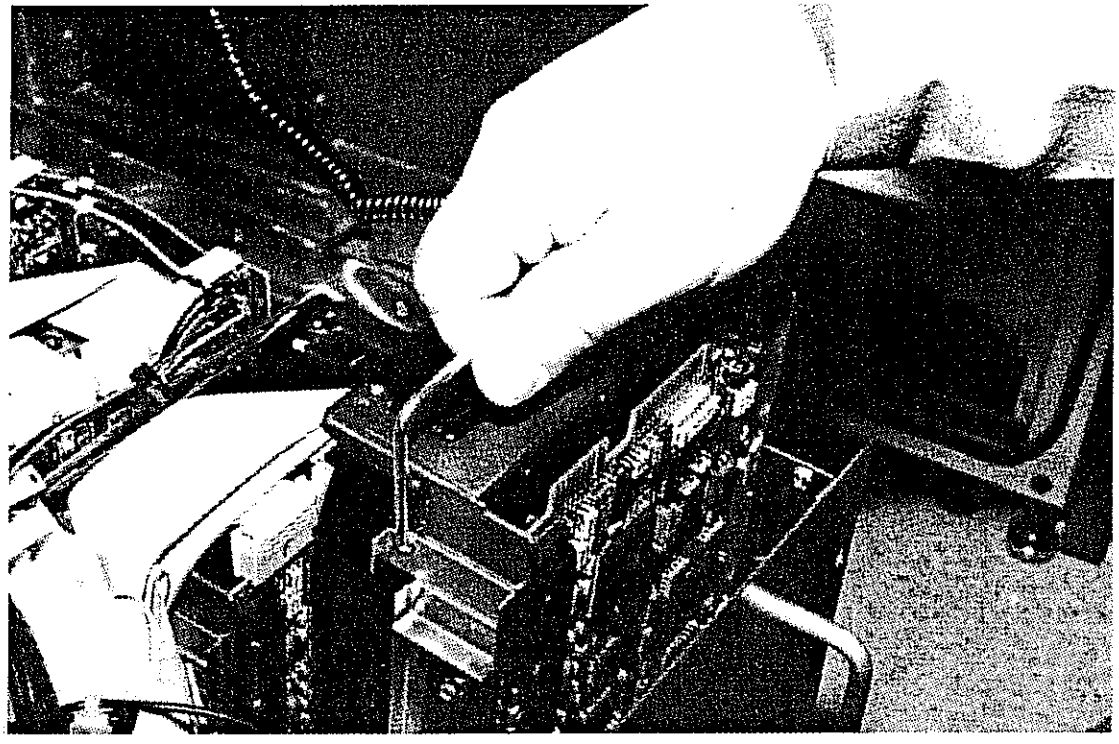

Figure 7-49. DD-3 Drive Handle

FRP42

Replacing the DD-3 Disk Drive

CAUTION

Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

Procedure

1. Ensure that your ESD wrist strap is connected to an earth ground point.
2. Avoid carrying the drive by the handle alone; slide the replacement drive into the mounting blocks in the tray.
3. Reconnect all cables. Ensure that the routing is correct and orderly.
4. Place the tray-cover locating tabs into the cutouts in the back of the tray. Lower the front of the tray cover and secure it with the two screws. Ensure that no cables are pinched under the cover.
5. Depress the slider locking latches on either side of the tray. Slide the tray back into the chassis.
6. Secure the tray to the chassis with the four tray-retaining screws.
7. Replace the side panel using FRP6.
8. Power up the PE-3 drawer by moving the power supply button to 1.

FRP43

Keying the DR-1 Replacement Drive

The removable drive (DR-1) for the system is keyed before the system is initially shipped, but the replacement drive is not keyed. The system is shipped with a keying kit. The keying scheme is recorded on the front of the DataShuttle and the DR-1. Record the keying position assigned to that drive on the tray. This procedure includes the DR-1 top panel removal and replacement.

CAUTION

Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

Procedure

1. Power down the system using FRP2.

NOTE: The following step requires two people.

2. Remove the DataShuttle cover by removing the top three screws on the rail and loosening the bottom three screws. A second person should support the drive while the first person loosens the bottom three screws. Refer to Figure 7-50.

3. Remove the top cover to gain access to the hex sleeve.

4. Remove the C-ring from the hex sleeve assembly.

5. Remove the hex sleeve from the panel assembly.

6. Look inside the drive. Position the hex sleeve (refer to Figure 7-51) according to the combination assigned to that drive. An example of keying is shown in Figure 7-52. The combination in the example is 1/1 (left set of keys) and 5/3 (right set of keys).

7. Insert the hex sleeve back into the panel assembly.

8. Snap the C-ring over the hex sleeve assembly.

NOTE: The following step requires two people.

9. Replace the DataShuttle cover.

   a. Insert the panel cover over the assembly.

   b. Replace the three screws on the rail.

   c. Tighten the bottom three screws.

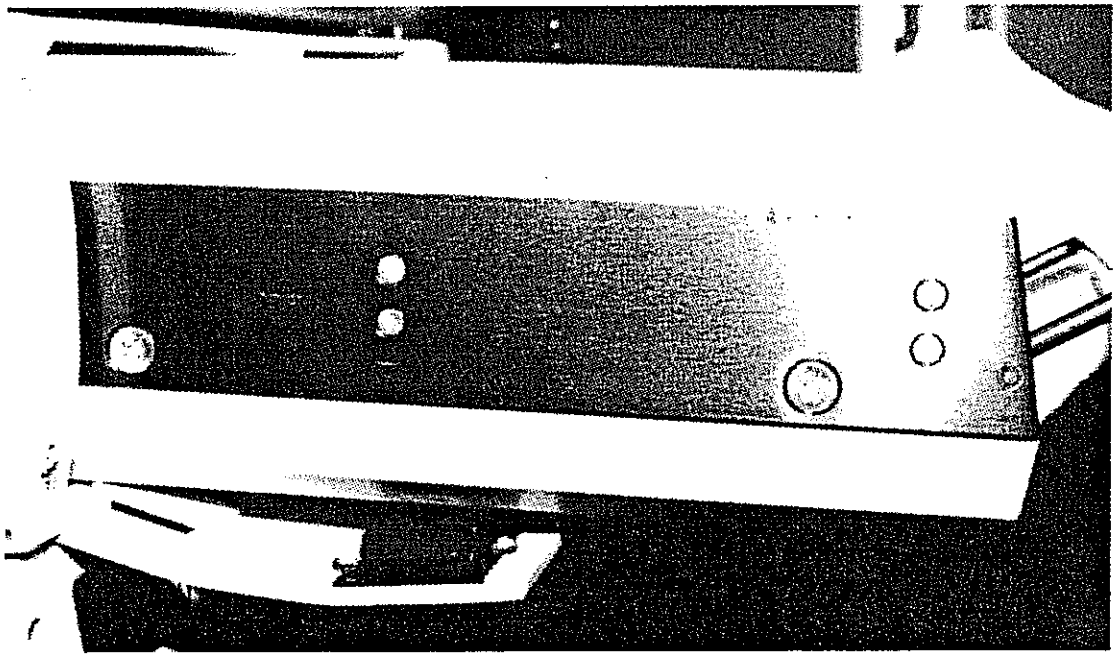

Figure 7-50. DR-1 DataShuttle Screws

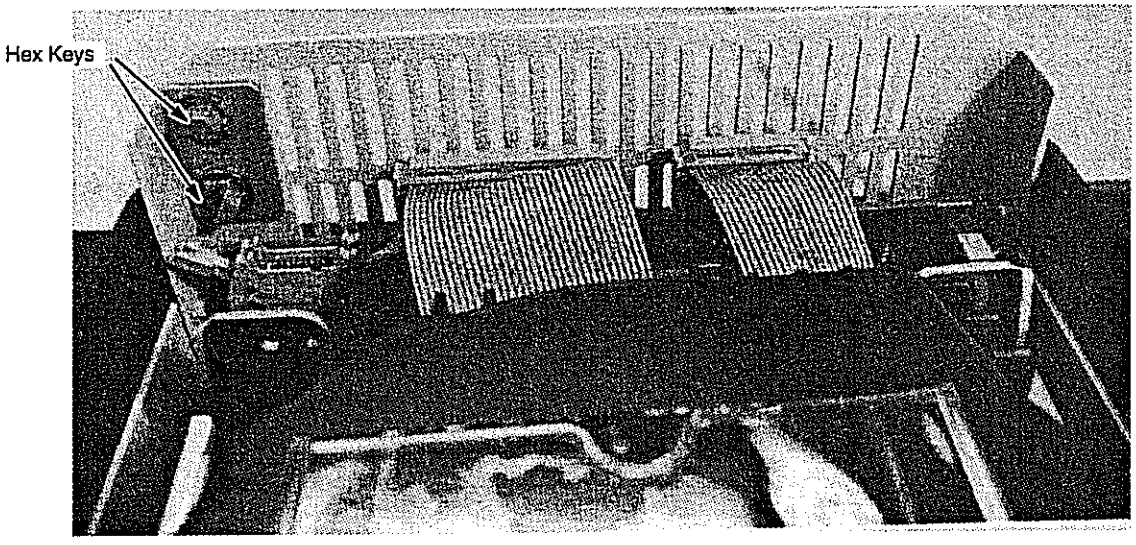

Figure 7-51. DR-1 DataShuttle (Inside Back View)

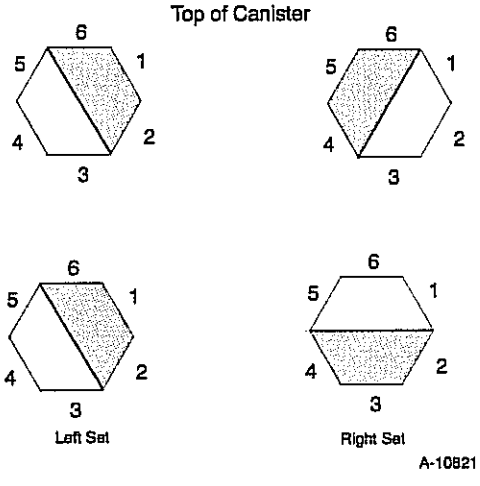

Figure 7-52. DR-1 Keying Example

FRP44

Removing the DD-4 Disk Drive

The intelligent peripheral interfaces (IPIs) are the disk drives used in the disk drive-4 (DD-4) subsystem, which is housed in the peripheral equipment-4 (PE-4) drawer. Use error logs and run the IPItest to determine whether the IPI drive is defective.

Procedure

CAUTION

Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

1. Shut off the power to the PE-4 drawer by moving each of the 0/1 buttons to the 0 position. Refer to Figure 7-53.

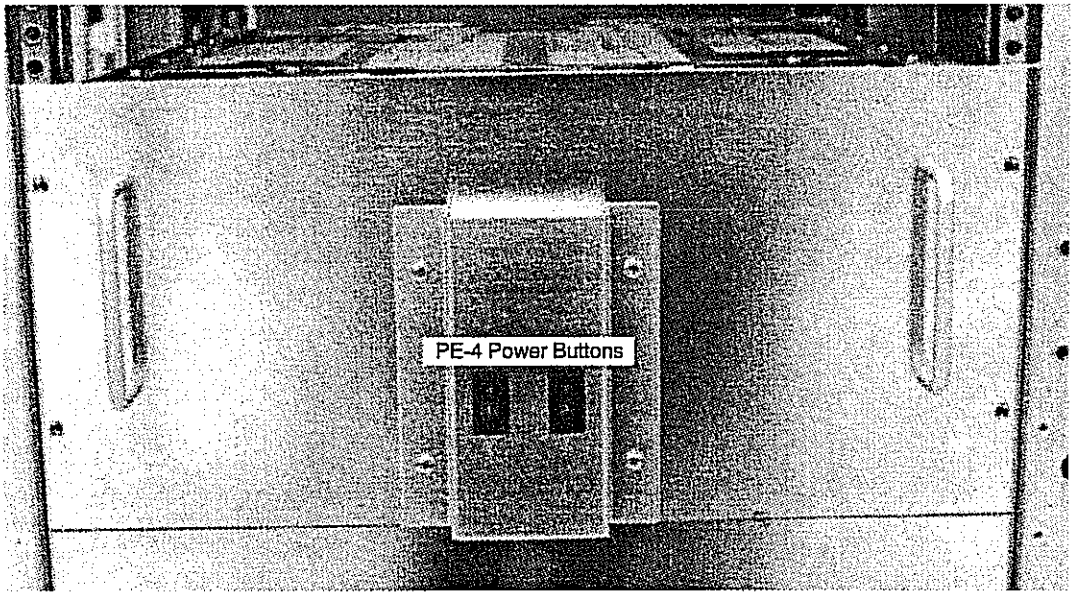

Figure 7-53. PE-4 Drawer

2. Remove the four PE-4 drawer-retaining screws that are located in each corner of the drawer. Refer to Figure 7-53.

3. Extend the drawer.

4. Remove the five screws along each edge of the top cover. (Refer to Figure 7-54.)

5. Remove the two screws attached to each drive.

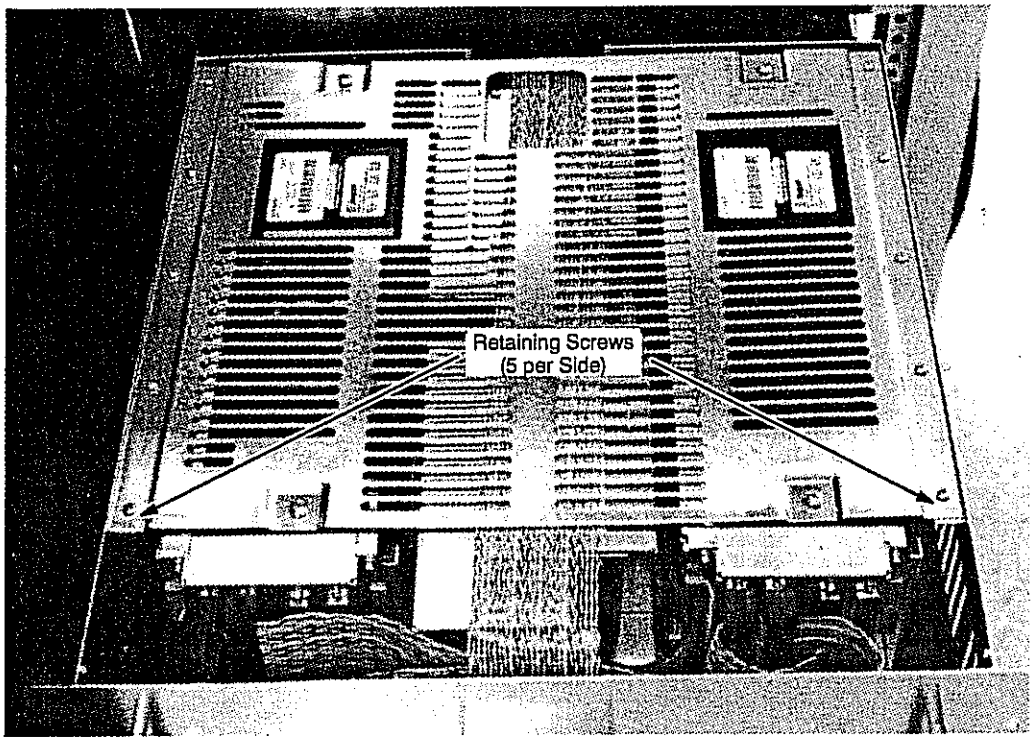

Figure 7-54. PE-4 Drawer Trim

6. Lift off the top cover.

7. Disconnect the ribbon cables from the front of the drive being replaced. Refer to Figure 7-55.

8. Remove the two screws from the bottom of the drive to be replaced.

9. First, disconnect the power cable from the power supply, move it out of the way, and lift the drive partially out of the drawer.

10. Disconnect the ground cable attached with a hex-head screw.

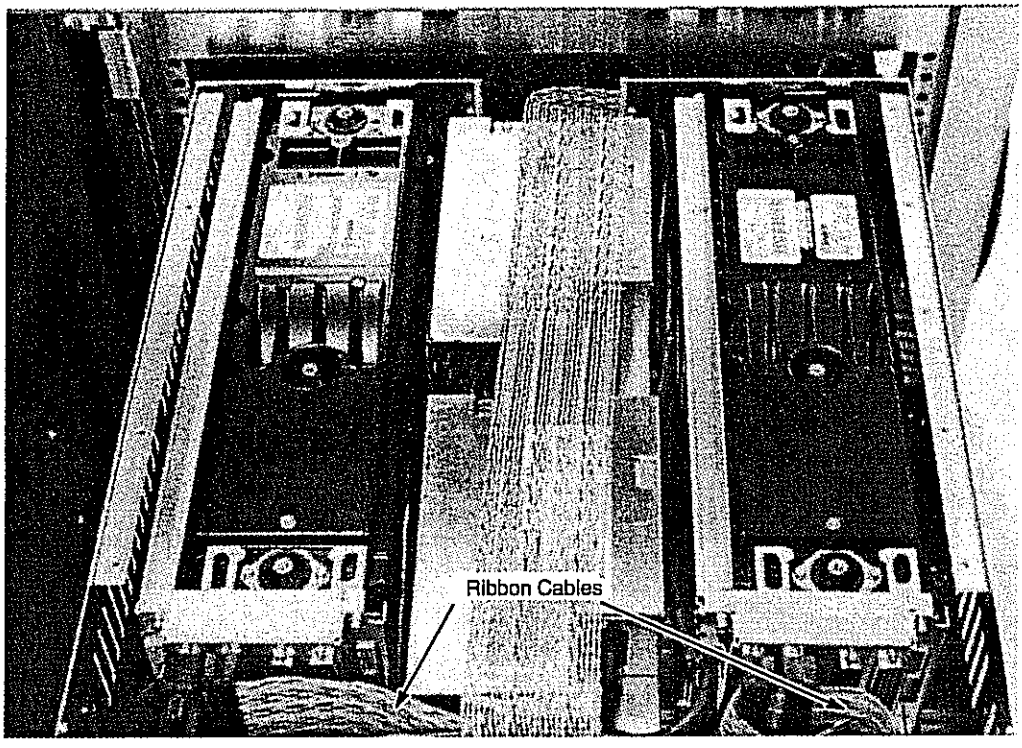

Figure 7-55. IPI Drives and Ribbon Cables

FRP45

Replacing the DD-4 Disk Drive

CAUTION

Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

Procedure

1. Reconnect the power and ground cables and insert the replacement drive. You may have to move the power and ground cables out of the way to ensure that they are not in the way when you insert the drive.
2. Replace the two screws on the bottom of the replacement drive.
3. Reconnect the ribbon cables to the replacement drive.
4. Replace the top cover.
5. Replace the two screws attached to each drive.
6. Replace the four screws at the corners of the top cover.
7. Push the drawer into the chassis.
8. Replace the four PE-4 drawer-retaining screws.
9. Turn on the power to the PE-4 drawer by moving the 0/1 button to the 1 position.

FRP46

Removing the DD-4 Disk Drive Power Supply

CAUTION

Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

Procedure

1. Power down the system using FRP2.
2. Open the side panel using FRP5.
3. Remove the four PE-4 drawer-retaining screws.
4. Extend the drawer.
5. Remove the five screws along each edge of the top cover.
6. Remove the two screws attached to each drive.
7. Lift off the top cover.
8. If you have two drives, remove the drive on the right. Use the following procedure to remove a drive.
   a. Disconnect the front ribbon cable from the drive being replaced.
   b. Remove the two bottom screws of the drive to be replaced.
   c. Lift the drive partially out of the drawer and disconnect the power cable from the power supply to move it out of the way.
9. Remove the retaining screw on the lower right side of the power supply needing replacement.
10. Lift the DD-4 power supply completely out of the drawer.

FRP47

Replacing the DD-4 Disk Drive Power Supply

CAUTION

Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

Procedure

1. Place the replacement DD-4 power supply in the drawer.
2. Replace the retaining screw on the lower right side of the power supply you are installing.
3. Replace the drive you removed using the following procedure.
   a. Place the drive partially in the drawer and reconnect the power cable to the power supply.
   b. Insert the two screws on the bottom of the drive.
   c. Reconnect the ribbon cable to the front of the drive.
4. Replace the top cover.
5. Replace the five screws along each edge of the top cover.
6. Replace the two screws attached to each individual drive.
7. Push in the drawer.
8. Replace the four PE-4 drawer-retaining screws.
9. Power up the system using FRP1.

FRP48

Separating a Multicabinet System

The following procedure lists the steps required to separate an expansion cabinet from the mainframe cabinet.

CAUTION

Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

Procedure

1. Power down the system using FRP2.
2. Lift off the top trim and remove all panels using FRP3, FRP5, and FRP7.
3. Remove the bolts that connect the cabinets together at the top of the system.
4. Remove the bolts (hose clamps) that connect the cabinets together at the bottom of the system.
5. Raise the leveling pads on all the expansion cabinets.
6. Pull the cabinets apart until the cable routing tray is fully extended.

FRP49

Reconnecting a Multicabinet System

Procedure

1. Push the expansion cabinet towards the mainframe.
2. Lower the leveling pads on the expansion cabinet.
3. Reconnect the hose clamps that connect the cabinets together at the bottom of the system.
4. Reconnect the bolts that connect the cabinets together at the top of the system.
5. Replace all trim.
6. Replace all panels using FRP4, FRP6, and FRP8.
7. Power up the system using FRP1.

FRP50

Performing a Safety Voltage Check

After you power down the system, you must perform a safety voltage check to ensure that there is no current in the system before you work with any component associated with the high-voltage circuits. You will need a digital voltmeter (DVM) to take this measurement.

Procedure

You must be familiar with the power distribution for your system before starting any work on the system. Remember to check each vertical wireway if you plan on working in that part of the system because each vertical wireway houses a separate circuit.

1. Power down the system using FRP2.
2. Remove the back-panel assembly using FRP7.

DANGER

Wait for the system to completely power down before you touch any components associated with the high-voltage circuits. Verify power loss by performing a voltage check; failure to do so will result in death or serious injury.

3. Remove the vertical wireway cover by removing its retaining screws.
4. Attach a DVM to an unused 4-prong plug. This is the 380 Vdc plug. There are exposed plugs located inside the vertical wireway.
5. Ensure that the reading on the DVM equals 0 volts. If it does not, wait 1 minute and take another reading.
6. When the DVM reading equals 0 V, proceed with the recommended maintenance procedure.

FRP51

Removing a TD-2 Tape Drive

This procedure requires two people because the drive is too heavy for one person to safely lift.

Procedure

1. Remove the cabinet side panel.
2. Power down the TD-2 tape drive by moving the 0/1 button located on the right side of the drive to 0.
3. Carefully start extending the TD-2 drive by pressing the release lever at the lower left corner of the drive and pulling on the handle.
4. Extend the drive until it is in the locking position.
5. Turn the power switch located on the back of the drive to the off position.
6. Loosen, but do not remove, the two Phillips screws holding the cover over the logic boards. Refer to Figure 7-56.
7. Set the cover to the side, but do not disconnect the ground wire.
8. After the cover over the logic boards has been removed, disconnect the ribbon cables from the I/O board. Refer to Figure 7-57.

NOTE: The ribbon cables on some TD-2 drives are secured to the back of the drive with a strap. For these drives, you must remove the three Phillips screws holding the strap before the ribbon cables can be disconnected from the drive.

9. Disconnect the power cord located on the left rear side of the TD-2 drive.
10. Replace the cover over the logic boards and fasten it securely with the two Phillips screws you loosened in Step 6.
11. Remove the two nuts attaching the drive to the cable carrier located on the right rear side of the drive. Refer to Figure 7-58.
12. Slide the cable carrier off the studs on the drive.

13. With one person on each side of the drive, press the lock button located on each of the rails and carefully slide the drive forward off the rail assembly.

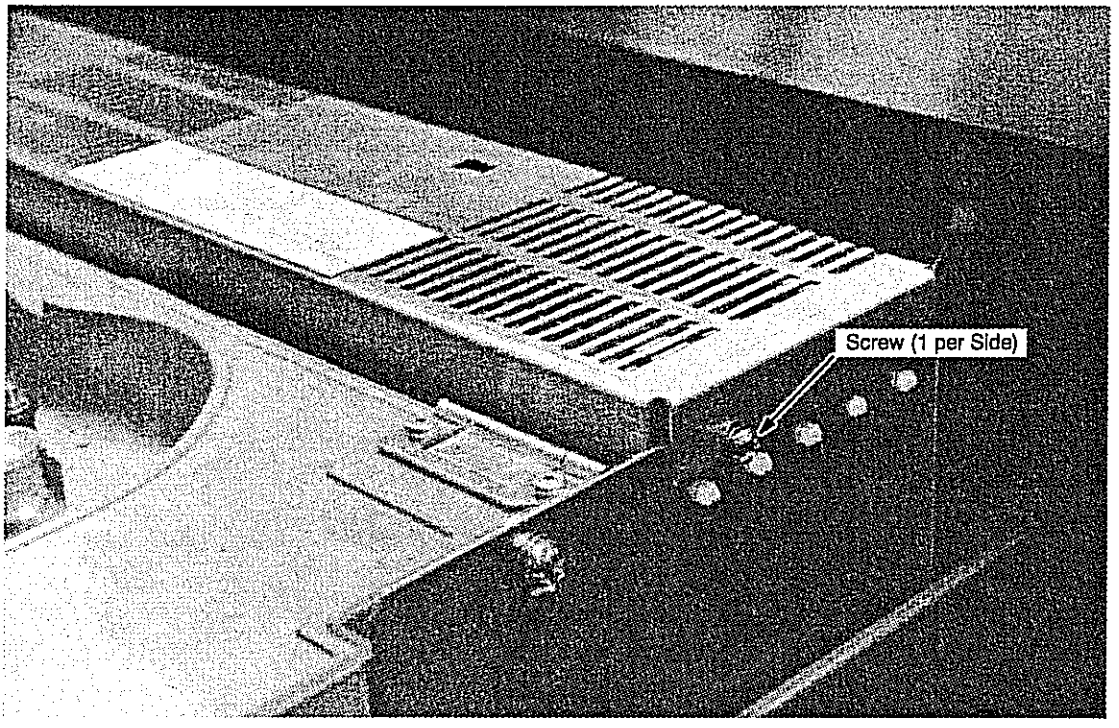

Figure 7-56. TD-2 Tape Drive Logic Board Cover

NOTE: You need to remove the rails from the side of the TD-2 drive to reuse them on the replacement drive.

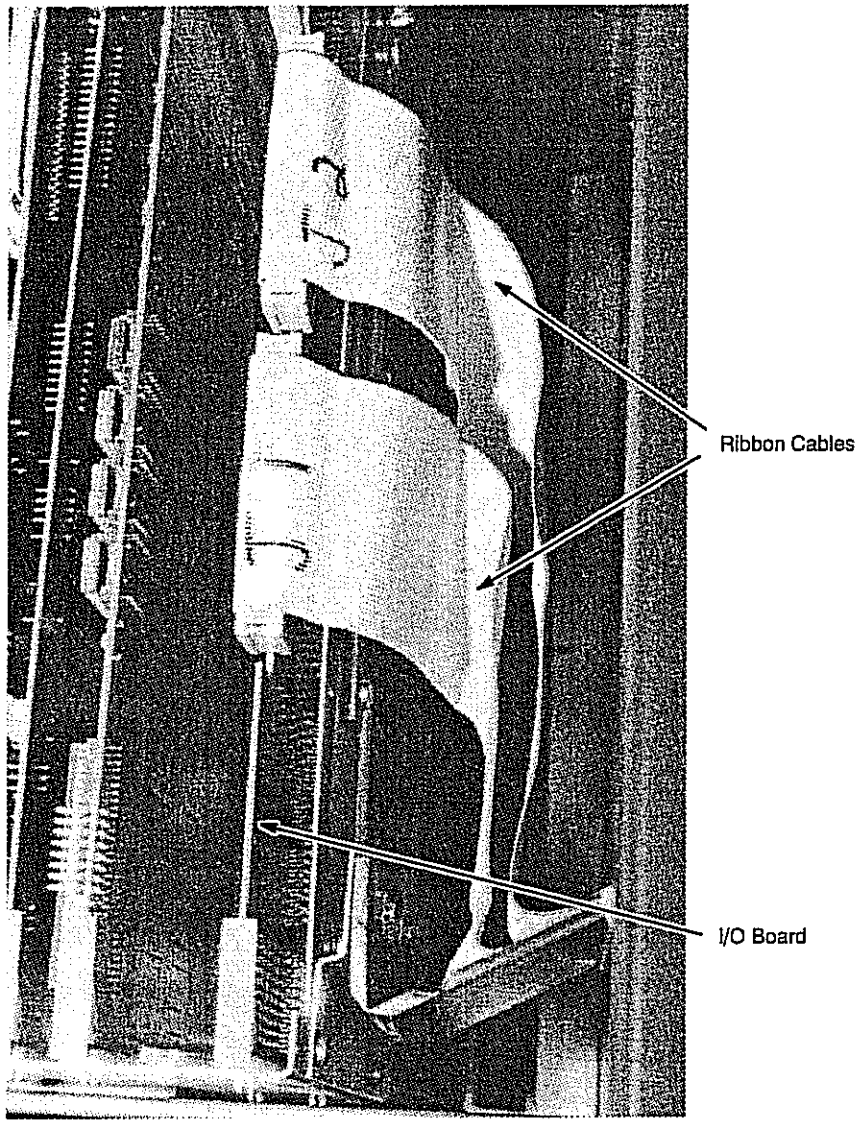

Figure 7-57. TD-2 Tape Drive Ribbon Cables

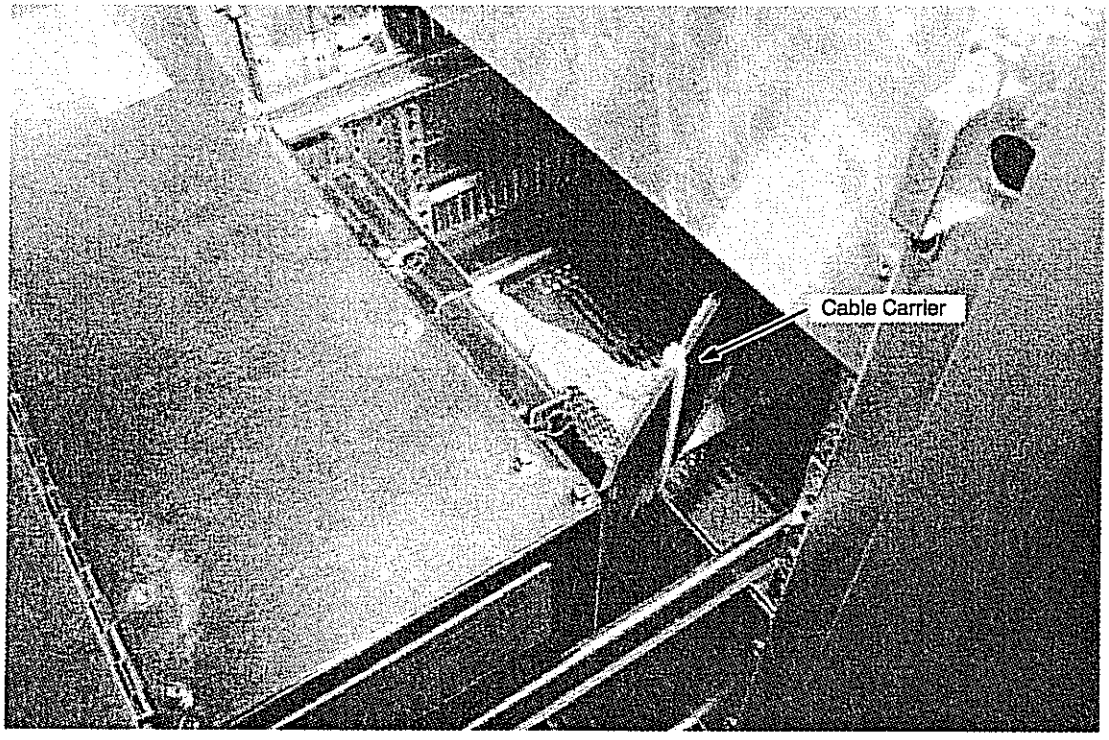

Figure 7-58. TD-2 Tape Drive Cable Carrier

FRP52

Replacing a TD-2 Tape Drive

This procedure requires two people because the drive is too heavy for one person to lift safely.

Procedure

1. Check the voltage switch to ensure that the drive is set to operate on 220-V power.

CAUTION

If the voltage switch is not in the 220-V position when the TD-2 drive is powered up, you will destroy the drive power supply.

2. Attach the side rails from the TD-2 drive you removed to the replacement TD-2 drive.
3. With one person on each side of the drive, carefully lift the drive and set the drive on the rail assembly.
4. Push the drive in until it locks into position on the rail assembly but leave the drive in the extended position.
5. Secure the drive to the cable carrier with the two nuts.
6. Loosen, but do not remove, the two Phillips screws holding the cover over the logic boards.
7. Set the cover to the side, but do not disconnect the ground wire.
8. Reconnect the two ribbon cables to the I/O logic board.
9. Replace the cover over the logic boards and secure the cover using the two Phillips screws you loosened in Step 6. Take care to not pinch the cables under the cover.

10. Connect the power cord to the drive at the right rear side of the drive.

11. Verify that the drive power switch located on the back of the drive is in the on position.

12. Carefully push the drive in until it locks into position.

13. Power up the TD-2 tape drive by moving the 0/1 button to the 1 position. This button is located on the front of the drive.

14. Replace the cabinet side panel using FRP6.

FRP53

Removing a TD-3 Tape Drive

This procedure requires two people because the drive is too heavy for one person to lift safely.

Procedure

1. Remove the cabinet side panel using FRP5.
2. Power down the TD-3 tape drive by moving the 0/1 button to the 0 position.
3. Use a small flat-bladed screwdriver to pry off the plastic trim on each side of the front of the tape drive. Pry both the top and bottom of the trim piece to loosen the part before removing it. Refer to Figure 7-59.
4. Remove the two Phillips screws (one from each side of the drive) that secure the drive to the cabinet location. Refer to Figure 7-60.

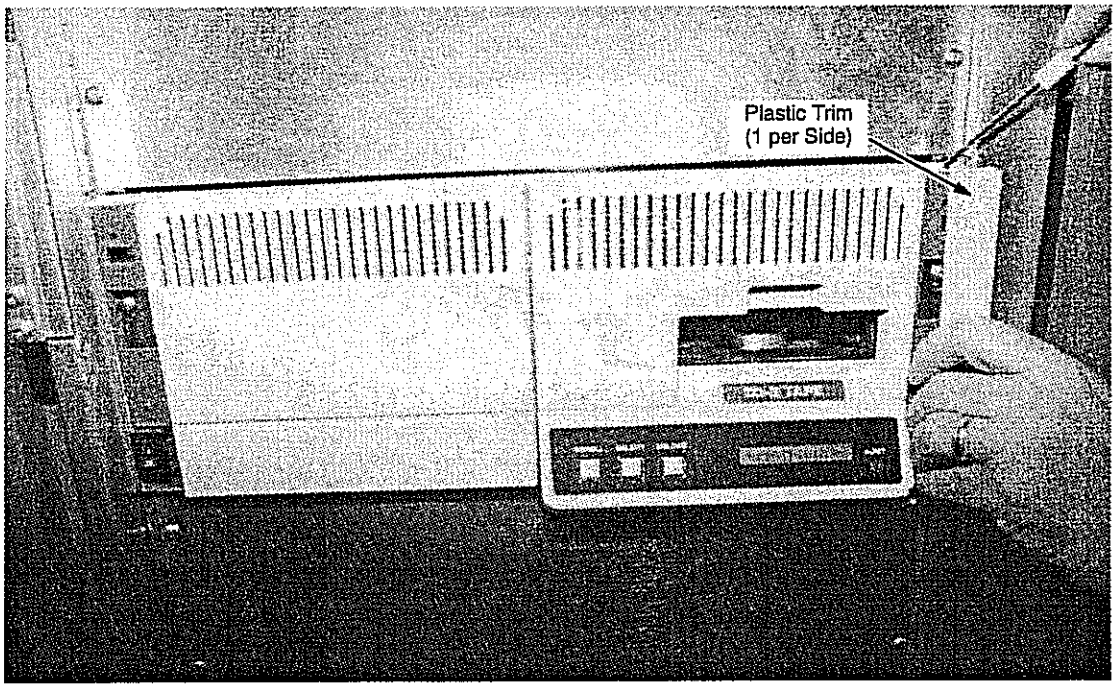

Figure 7-59. TD-3 Tape Drive Front View

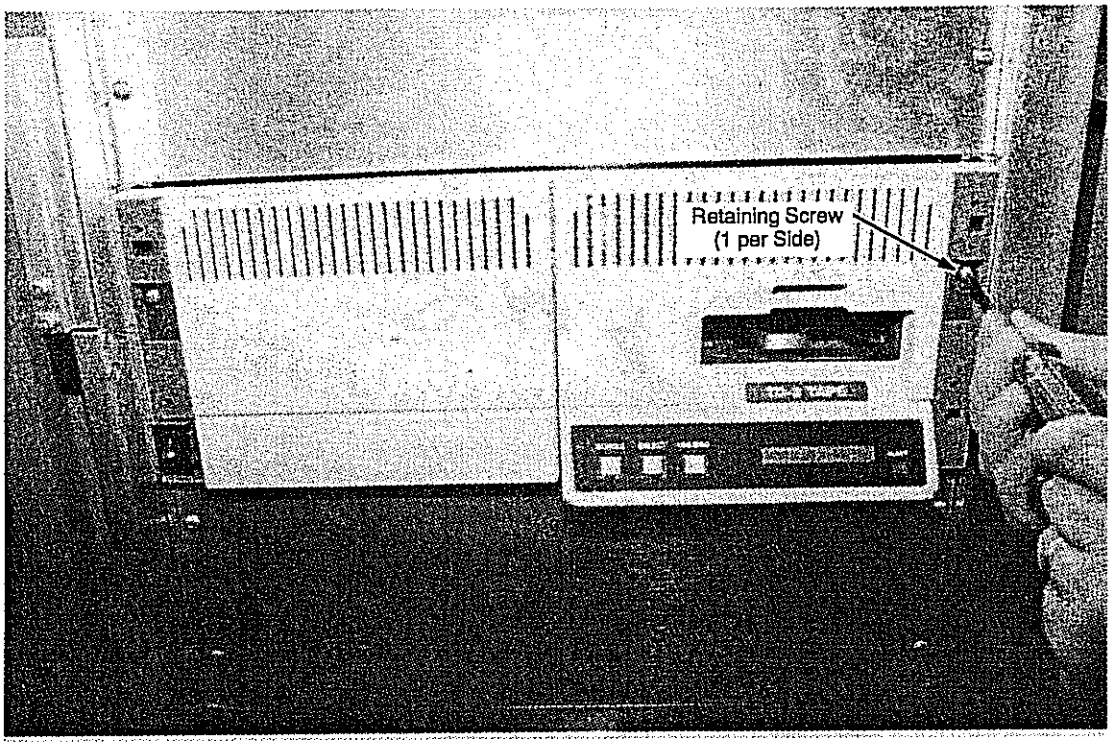

Figure 7-60. TD-3 Tape Drive Retaining Screws

5. Carefully extend the TD-3 drive until it locks into the rail-locking assembly.

6. Disconnect the ribbon cable located on the right rear side of the drive.

7. Place the drive power switch located on the rear of the drive in the off position.

8. Disconnect the power cord located on the left rear side of the drive.

9. Remove the two nuts securing the drive to the cable-carrier assembly located on the right rear side of the drive, and slide the drive off the cable carrier.

10. With one person on each side of the drive, press the lock button located on each of the rails and carefully slide the drive forward off the rail assembly.

NOTE: You may need to remove the rails from the side of the TD-3 drive to reuse them on the replacement drive.

FRP54

Replacing a TD-3 Tape Drive

This procedure requires two people because the drive is too heavy for one person to lift safely.

Procedure

1. Check to ensure the drive voltage-selection switch is set on the 220-V setting.

CAUTION

If the voltage switch is not in the 220-V position when the TD-3 drive is powered up, you will destroy the drive power supply.

2. Attach the side rails from the faulty TD-3 drive to the replacement drive.
3. With one person on each side of the drive, carefully lift the drive and set it on the rail assembly.
4. Push the drive in until it locks into position on the rail assembly, but leave the drive in the extended position.
5. Secure the drive to the cable-carrier assembly.
6. Connect the ribbon cable to the right rear side of the drive.
7. Connect the drive power cord to the left rear side of the drive.
8. Verify that the drive power switch located on the rear of the drive is in the on position.
9. Carefully push the drive into the cabinet slot.
10. Secure the TD-3 drive to the cabinet frame with the two Phillips screws.

11. Press the two plastic trim pieces into place.

12. Power up the TD-3 tape drive by moving the 0/1 button to the 1 position.

13. Replace the cabinet side panel using FRP6.

FRP55

Removing the Power Cord Assembly

You must remove the incoming power module before you can remove the power cord assembly. The power cord assembly consists of a long cable that connects the incoming power module to the external power source and a short cable that connects the incoming power module to the capacitor bank or power ride-through box.

Procedure

CAUTION

Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

DANGER

Wait for the system to completely power down before you touch any components associated with the high-voltage circuits. Verify power loss by performing a voltage check; failure to do so will result in death or serious injury.

1. Power down the system using FRP2.
2. Unplug all AC cables from their power sources.
3. Remove the back panel and inner back-panel EMI shield using FRP7.
4. Remove the back capacitor-bank access plate from the upper right corner of the incoming power module by removing the four screws.

5. Unplug the J2, J3, and J4 connectors from the incoming data cable module. Refer to Figure 7-61. The J3 connector is attached with two screws.

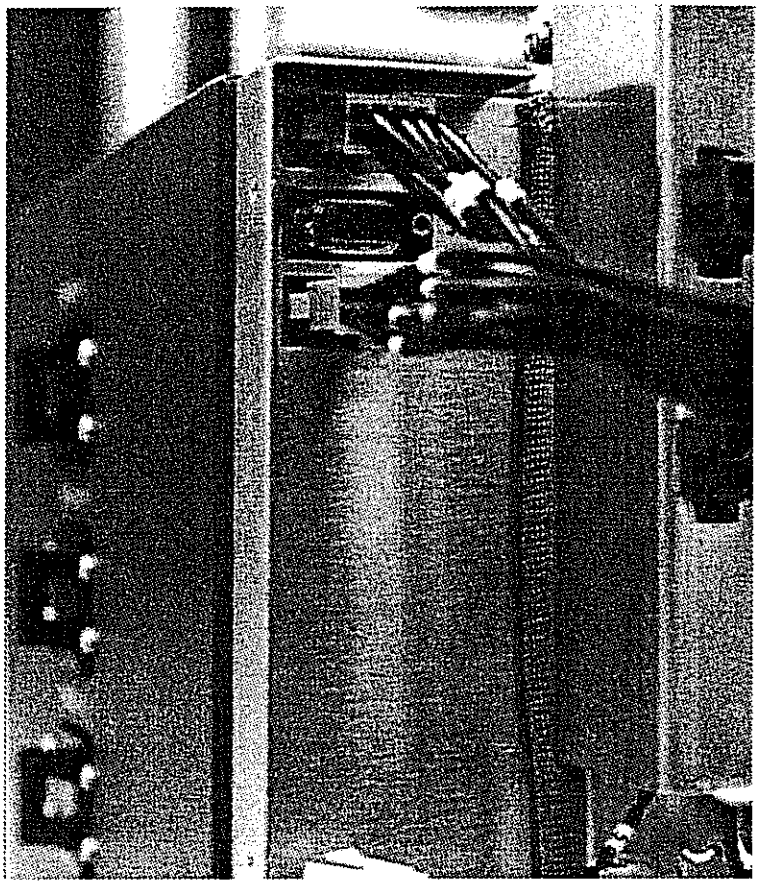

Figure 7-61. Incoming Power Module Connectors and Data Cable

6. Remove the two long and two short screws from the incoming power module.

7. Carefully lay the incoming power module beside the system with the breaker side down.

8. Disconnect the three outgoing AC cables from the capacitor box using an 11/32-inch socket.

9. Remove the back cover of the incoming power module by removing the ten Phillips screws from the cover. Refer to Figure 7-62.

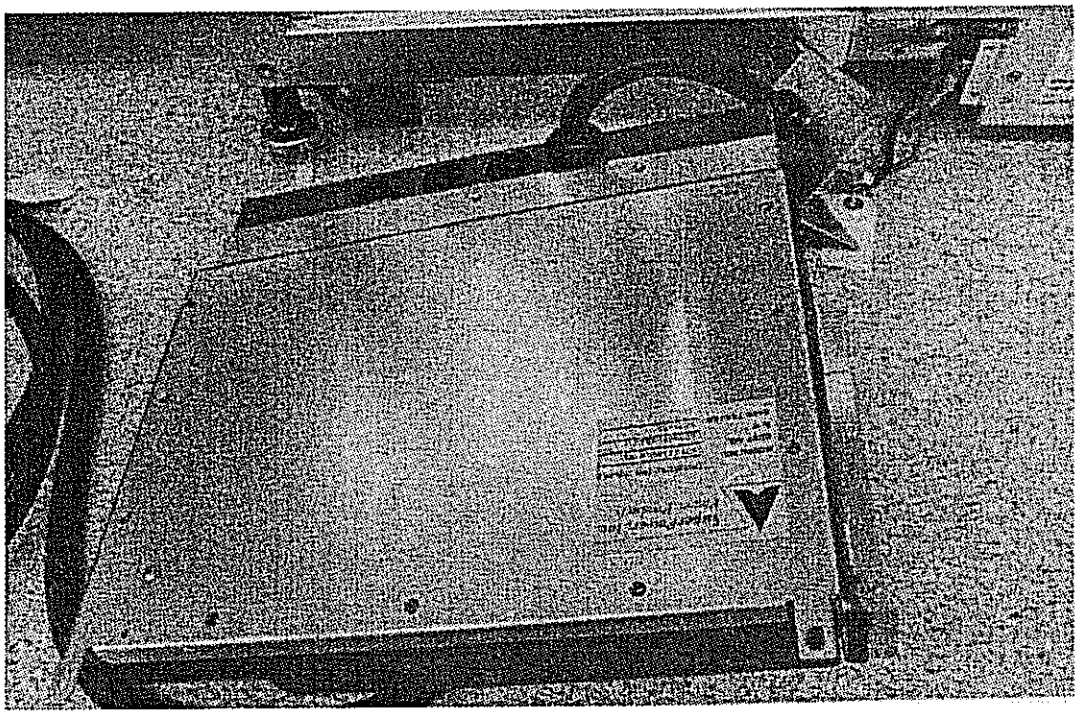

Figure 7-62. Incoming Power Module Back Cover

10. To disconnect the incoming power cable (part number 90086600), first press down firmly with a flat-bladed screwdriver and pull the line (black) and neutral (white) wires from the incoming power module terminal block. Refer to Figure 7-63.

11. After disconnecting the line and neutral wires, disconnect the incoming power cable ground (green) wire from the incoming power module using a 3/8-inch nut driver or a 3/8-inch socket. Refer to Figure 7-63.

12. Loosen the lock nut that retains the incoming power cable, using a hammer and flat-bladed screwdriver.

13. Remove the lock nut and slide the cable assembly out of the incoming power module.

14. To disconnect the outgoing power cable (part number 90086301), press down firmly with a flat-bladed screwdriver and pull the line (black), neutral (white) and ground (green) wires from the incoming power module terminal block. Refer to Figure 7-64.

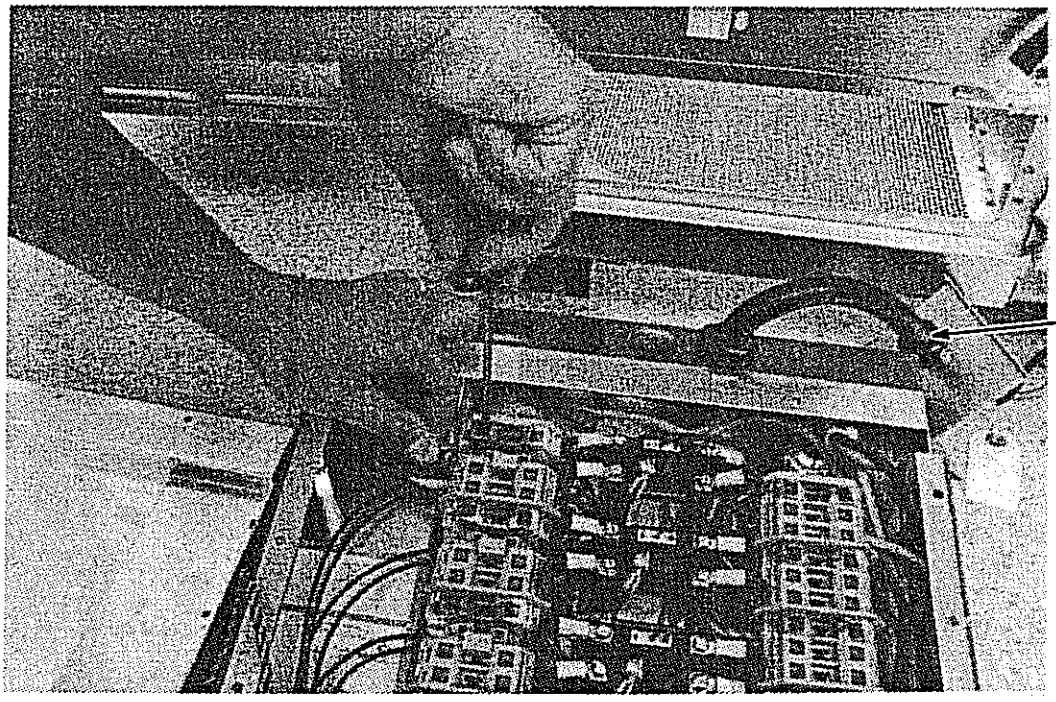

Figure 7-63. Incoming Power Module Terminal Block

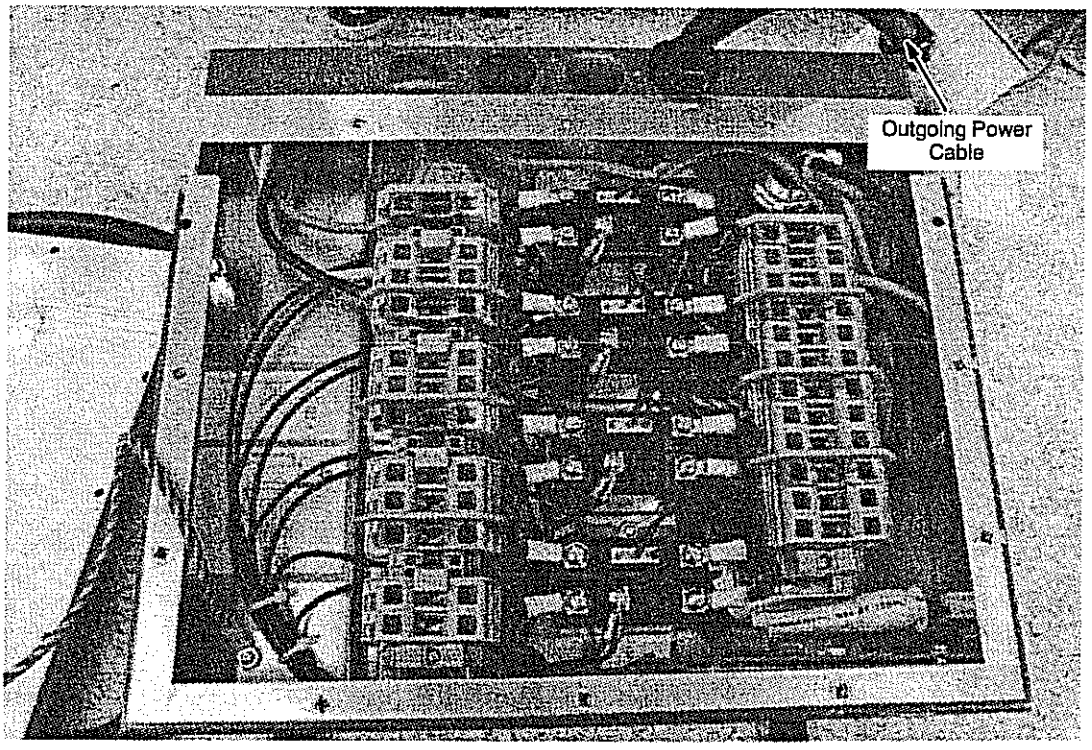

Figure 7-64. Outgoing Power Cable

15. Remove each AC cable strain-relief using a strain-relief pliers (part number 90232800), and remove the cables. The procedure for removing the strain-reliefs is inside the incoming power module. Refer to Figure 7-65.

16. Slide the outgoing power cable out of the incoming power module.

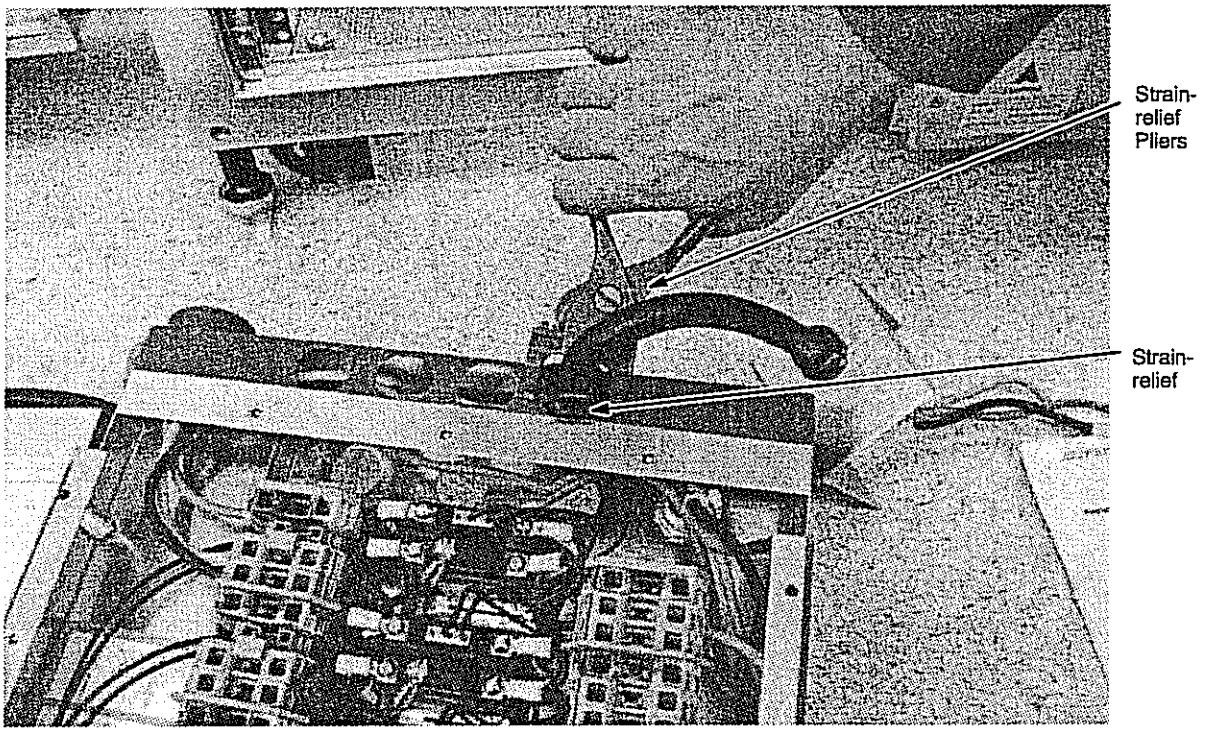

Figure 7-65. Cable Strain-relief Device and Strain-relief Pliers

FRP56

Replacing the Power Cord Assembly

You must install the incoming and outgoing power cable assemblies on the incoming power module before you replace the incoming power module. The power cord assembly consists of a long cable that connects the incoming power module to the external power source and a short cable that connects the incoming power module to the capacitor bank or power ride-through box.

CAUTION

Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

DANGER

Wait for the system to completely power down before you touch any components associated with the high-voltage circuits. Verify power loss by performing a voltage check; failure to do so will result in death or serious injury.

Procedure

1. Slide the outgoing AC power cable assembly (part number 90086301) through the cable-access hole in the incoming power module.
2. Insert the AC strain-relief into the access hole using a strain-relief pliers (part number 90232800).
3. Connect the line (black), neutral (white), and ground (green) wires to the outgoing terminal block by pressing down firmly with a flat-bladed screwdriver and pushing the wires into the terminal block.

4. Slide the incoming AC power cable assembly (part number 90086600) through the cable access hole in the incoming power module.

5. Connect the line (black) and neutral (white) wires to the incoming terminal block by pressing down firmly with a flat-bladed screwdriver and pushing the wires into the terminal block.

6. Connect the ground (green) wire to the incoming power module using a 3/8-inch nut driver.

7. Secure the AC cable assembly to the incoming power module with the connector and lock nut.

8. Tighten the lock nut by lightly tapping on the lock nut using a hammer and flat-bladed screwdriver.

9. Replace the back cover on the incoming power module assembly and secure it with ten countersunk Phillips screws.

10. Replace the two long and two short screws on the incoming power module.

11. Reconnect the J2, J3, and J4 connectors to the incoming power module.

12. Reconnect the outgoing power cable wires (black, white, and green) to the capacitor bank connectors using an 11/32-inch socket.

13. Replace the capacitor-bank access plate (four screws).

14. Replace the back panel and inner back-panel EMI shield using FRP8.

15. Replug all AC power cables to their power sources.

16. Power up the system using FRP1.

FRP57

Removing the Power Cord Assembly from Multicabinet Systems

You must remove the incoming power module from the mainframe cabinet before you can remove the power cord assembly. The power cord assembly consists of a cable that connects the incoming power module to the external power source and a cable that connects the incoming power module to the capacitor bank on each cabinet. On multicabinet systems, a power cord that connects power to a peripheral cabinet is connected from the incoming power module on the mainframe cabinet to the three terminal posts on the peripheral cabinet's capacitor bank. A separate power cord is attached to the incoming power module for each peripheral cabinet.

FRP55 contains photographs of the components involved in this procedure.

Procedure

CAUTION

Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

DANGER

Wait for the system to completely power down before you touch any components associated with the high-voltage circuits. Verify power loss by performing a voltage check; failure to do so will result in death or serious injury.

1. Power down the system using FRP2.
2. Unplug all AC cables from their power sources.

3. Separate the cabinets using FRP48.

NOTE: For the following steps, you should be working with the mainframe cabinet that contains the incoming power module.

4. Remove the mainframe cabinet's back panel and inner back-panel EMI shield using FRP7.

5. Remove the back capacitor-bank access plate by removing the four screws.

6. Remove the vertical wireway cover and back bulk converter connector cover.

7. Unplug the J2, J3, and J4 connectors from the incoming power module's data cables. Refer to Figure 7-61. The J3 connector is attached with two screws.

8. Remove the long and short screws and the two top-rack screws from the incoming power module.

9. Carefully lay the incoming power module beside the system with the breaker side down.

10. Remove the back cover of the incoming power module by removing the ten countersunk Phillips screws from the cover. Refer to Figure 7-62.

11. To disconnect the incoming power cable, first press down firmly with a flat-bladed screwdriver and pull the wires marked L1 (black) and L2 (white) from the incoming power module terminal block. Refer to Figure 7-63.

12. After disconnecting the L1 and L2 wires, disconnect the outgoing power cable ground (green) wire from the incoming power module using a 3/8-inch nut driver or a 3/8-inch socket. Refer to Figure 7-63.

13. Loosen the lock nut that retains the outgoing power cable, using a wide-jaw channel-lock pliers.

14. Remove the lock nut and slide the cable assembly out of the incoming power module.

15. To disconnect the outgoing power cable, press down firmly with a flat-bladed screwdriver and pull the L1 (black), L2 (white), and ground (green) wires from the incoming power module terminal block. Refer to Figure 7-64.

16. Remove each AC cable strain-relief using a strain-relief pliers and remove the cables. The procedure for removing a strain-relief is inside the incoming power module. Refer to Figure 7-65.

17. Slide the outgoing power cable out of the incoming power module.

18. Remove the power cord from the cable carrier.

19. Disconnect the three wires from the terminal posts on the peripheral cabinet's capacitor bank using an 11/32-in socket.

FRP58

Replacing the Incoming Power Cord Assembly in Multicabinet Systems

Procedure

1. Install the power cable with the strain-relief device attached to the cover cutout in the capacitor bank.
2. Route the power cord along the cable-routing tray and through the appropriate cable-routing tray cutout. Ensure that the power cord is routed correctly and that the cable is tied with tie wraps. Allow for a bend in the power cord.
3. Attach the new cable to the capacitor bank's terminal posts as shown in Figure 7-66.
4. Attach the incoming power cord to the incoming power module.
   a. Insert the power cord strain-relief.
   b. Insert the L1, L2, and ground (green) wires into their correct locations inside the incoming power module using a flat-bladed screwdriver. The connections are color-coded to match the wire color. The wire color for international sites is in parenthesis.
5. Slide the cable assembly back into the incoming power module and replace the lock nut.
6. Replace the back cover of the incoming power module and reconnect the screws.
7. Place the entire incoming power module assembly into its correct position, and replace the long and short screws and the two top-rack screws.
8. Plug the J2, J3, and J4 connectors back into the incoming power module's data cables.
9. Replace the vertical wireway and back bulk-converter connector cover.
10. Replace the capacitor-bank access plate and its four screws.

11. Replace the mainframe cabinet's back panel and inner back-panel EMI shield using FRP8.

12. Push the cabinets back together and reconnect them using Steps 1 through 6 of FRP49.

13. Plug the system in.

14. Power up the system using FRP1.

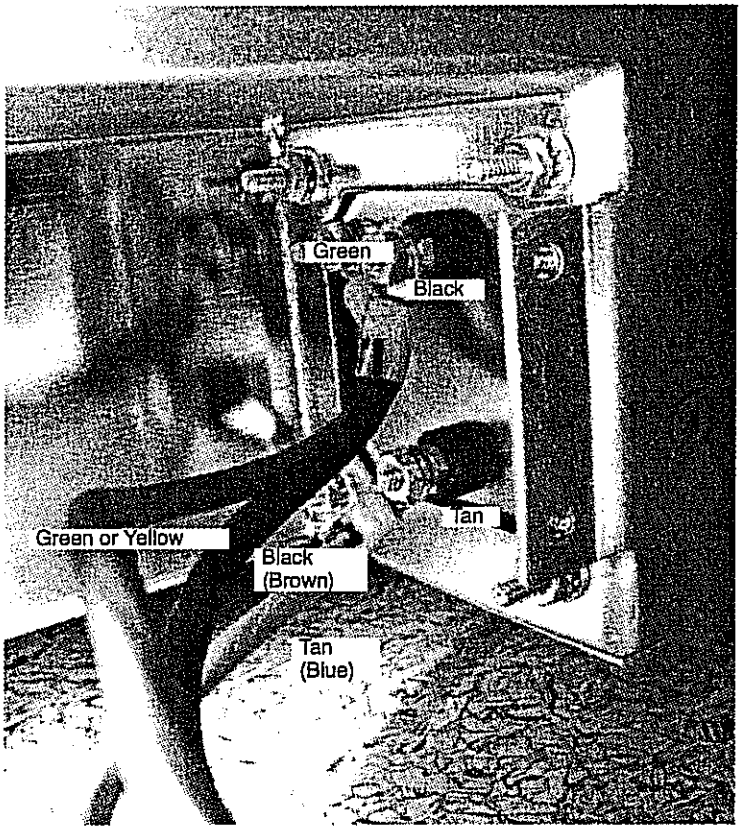

Figure 7-66. AC Power Feed-through Box Terminal Posts

FRP59

Removing the MAB

Use this procedure whenever you remove a CRAY EL98 CPU board.

CAUTION

Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

Procedure

1. Power down the system using FRP2.
2. Open and remove the right side panel using FRP 5.
3. Disconnect the Y1 cables.
4. Remove the ten screws from the CPU card cage and pull the card cage out.
5. Remove the MAB by lifting it out, as shown in Figure 7-67.

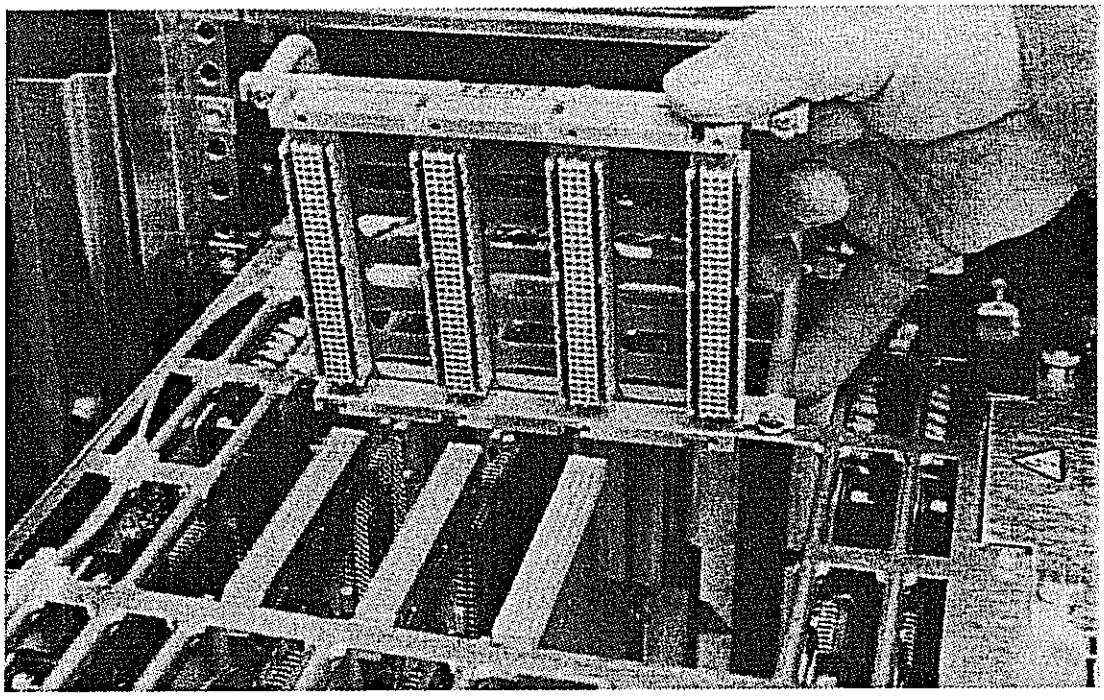

Figure 7-67. Removing the MAB

FRP60

Replacing the MAB

Procedure

1. Place the new MAB in the top card guide cutout.
2. Push the CPU card cage back into the mainframe and replace its ten screws.
3. Reconnect the Y1 cables.
4. Replace the right side panel using FRP6.
5. Power up the system using FRP1.

FRP61

Removing the Scan Adapter Board

If the deadstart and exchange sequences do not work, the scan adapter board may be faulty. You must remove the card cage in order to access the scan adapter board.

CAUTION

Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

Procedure

1. Perform the entire FRP19, step by step.
2. Lay the removed CPU card cage on its left side so the filter capacitors are facing upward.
3. Remove the eight hex screws that attach the filter capacitors to the CPU card cage. Refer to Figure 7-68.
4. Remove the filter capacitors.
5. Turn the card cage so the front is facing downward.
6. Remove the backplane cover by removing the five Phillips screws from each side and the six screws from the front.
7. Remove the 16 nuts (Figure 7-69) that attach the bus bars to the backplane.
8. Slide the bus bars out and remove them.

CAUTION

The scan adapter board connectors fit tightly. A lot of pressure is required to release the scan adapter board. Be careful not to bend the pins or crack the board.

9. Pull the scan adapter board off of the backplane. Refer to Figure 7-70.

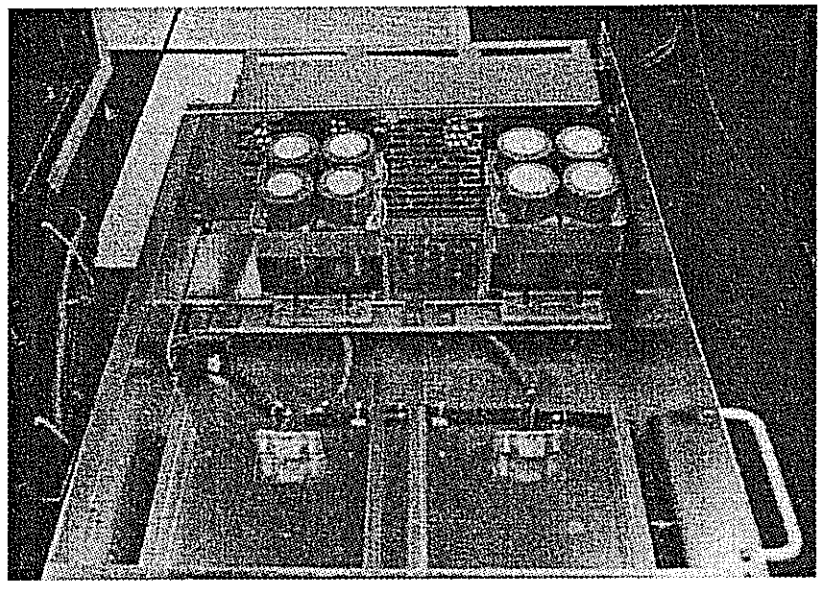

Figure 7-68. Filter Capacitors

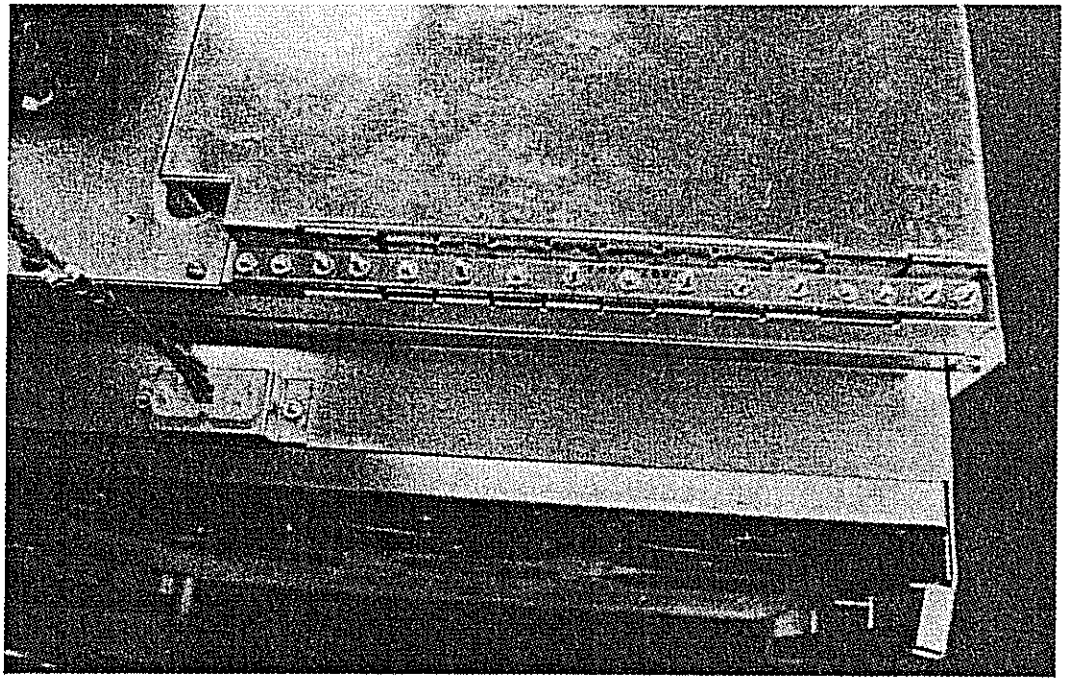

Figure 7-69. Bus Bar

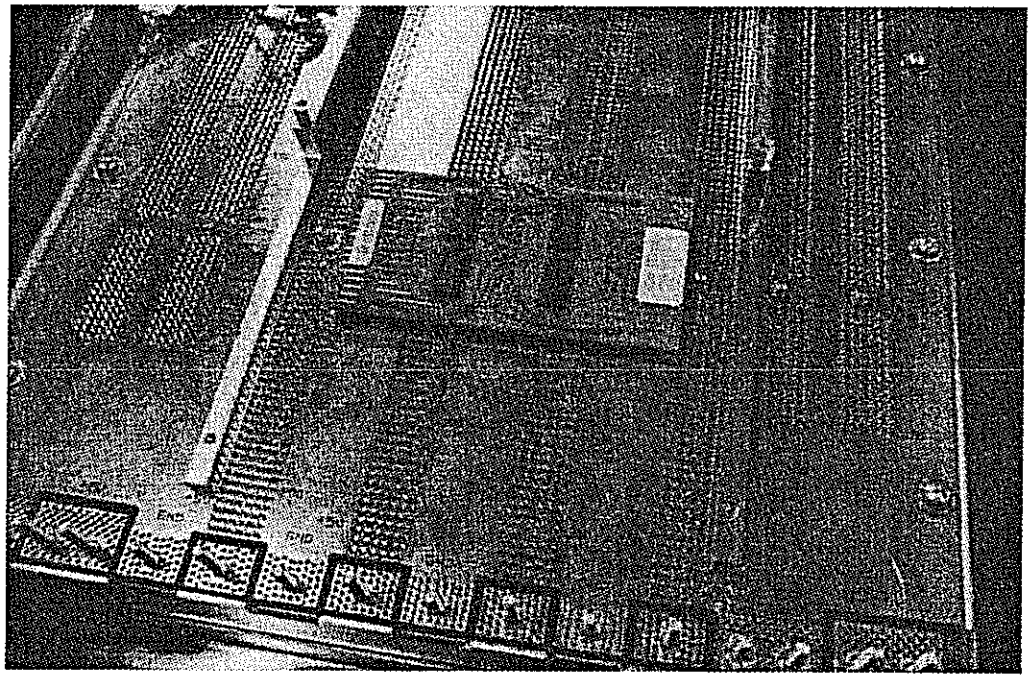

Figure 7-70. Scan Adapter Board

FRP62

Replacing the Scan Adapter Board

Procedure

CAUTION

The scan adapter board connectors fit tightly. A lot of pressure is required to release the scan adapter board. Be careful not to bend the pins or crack the board.

1. Insert the new scan adapter board by grasping the board near its connectors. Ensure that the arrows are pointing upwards.
2. Slide the bus bars back in.
3. Replace the 16 nuts that attach the bus bars to the backplane.
4. Replace the backplane cover.
5. Turn the CPU card cage so the left side is facing upwards.
6. Replace the filter capacitors.
7. Replace the eight hex screws that attach each filter capacitor to the CPU card cage.
8. Replace the card cage by performing the entire FRP20, step by step.

FRP63

Removing the Y1 Channel Board

The Y1 channel board, as shown in Figure 7-71, is attached to a CPU board and can be pulled off and replaced in the field.

CAUTION

Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

Procedure

1. Power down the system using FRP2.
2. Open the right side panel using FRP5.
3. Remove the faulty CPU board using FRP15.
4. Place the board in an antistatic workspace.
5. Remove the Y1 channel board's two Phillip screws that are located near the Y1 channel connection on the front faceplate.
6. Remove the five screws from the bottom of the CPU board's front faceplate. Refer to Figure 7-72.
7. Remove the two nylon standoff screws that attach the Y1 channel board to the CPU board.
8. Carefully pry the Y1 channel board from the CPU board.

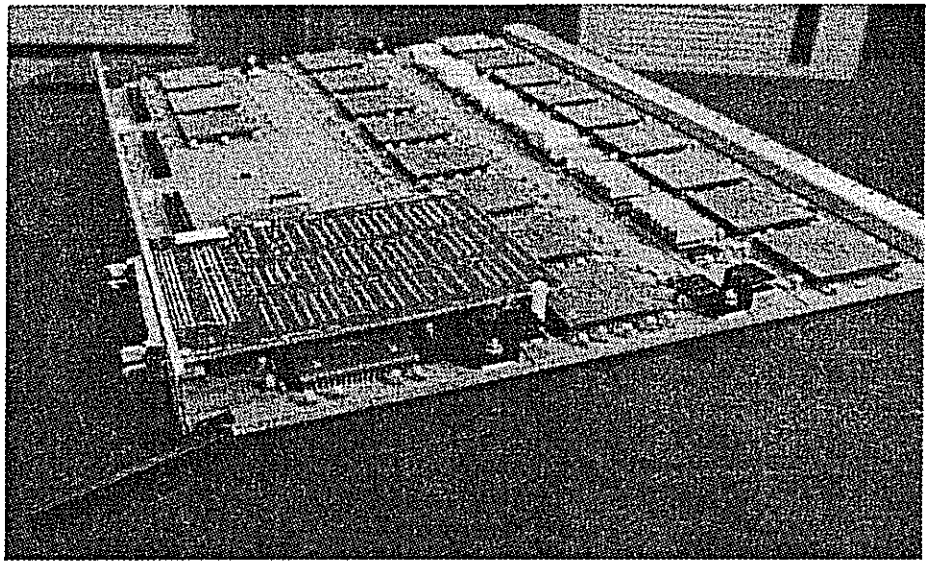

Figure 7-71. Y1 Channel Board

Figure 7-72. Y1 Channel Board Phillips Screws

FRP64

Replacing the Y1 Channel Board

CAUTION
Observe ESD precautions when handling static-sensitive devices. Damage to the computer equipment will result if these precautions are not followed.

Procedure

1. Place the new Y1 channel board in its correct location on top of the CPU board.
2. Replace the two nylon standoff screws on the Y1 channel board.
3. Replace the faceplate assembly.
4. Replace the two Phillips screws, one on each side of the Y1 cable bus connection.
5. Replace the CPU board using FRP16.