RS/6000 SP

604 and 604e SMP High Node Service Guide

GA22-7446-00

RS/6000 SP

604 and 604e SMP High Node Service Guide

GA22-7446-00

Note!

Before using this information and the product it supports, read the safety information in the “Safety and environmental notices” on page xi and the information in “Notices” on page X-1.

First Edition (October 1999)

This edition applies to Version 3 Release 1 of the IBM Parallel System Support Programs for AIX (PSSP) Licensed Program, program number 5765-D51, and to all subsequent releases and modifications until otherwise indicated in new editions.

Order publications through your IBM representative or the IBM branch office serving your locality. Publications are not stocked at the address given below.

IBM welcomes your comments. A form for readers' comments may be provided at the back of this publication or you may address your comments to the following address:

International Business Machines Corporation
Department 55JA, Mail Station P384
522 South Road
Poughkeepsie, NY 12601-5400
U.S.A.

FAX (United States & Canada): 1+914+432-9405
FAX (Other Countries): Your International Access Code+1+914+432-9405

IBMLink (United States customers only): IBMUSM10(MHVRCFS)
IBM Mail Exchange: USIB6TC9 at IBMMAIL
Internet e-mail: mhvrcfs@us.ibm.com

If you would like a reply, be sure to include your name, address, telephone number, or FAX number.

Make sure to include the following in your comment or note:

- Title and order number of this book
- Page number or topic related to your comment

When you send information to IBM, you grant IBM a nonexclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

Contents

Figures

Tables

Safety and environmental notices

Safety notices (in English)

For general information concerning safety, refer to *Electrical Safety for IBM Customer Engineers* (S229-8124). For a copy of this publication, contact your IBM marketing representative or the IBM branch office serving your locality.

The following is a list of all safety notices (in English only) pertaining to SP hardware maintenance tasks from this and other RS/6000 SP node service guides. Translations of each of the safety notices into other languages are included in *RS/6000 SP: Installation and Relocation*

DANGER

Do not attempt to open the covers of the power supply. Power supplies are not serviceable and are to be replaced as a unit

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

Before installing or removing signal cables, ensure that the power cables for the system unit and all attached devices are unplugged.

When adding or removing any additional devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.

Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.

During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communications lines.

DANGER

In the U.S., Canada, and Japan, this product has a 4-wire power cable with a 4-prong plug. Use this power cable with a correctly grounded power receptacle to prevent possible electric shock.

DANGER

Before you connect the power cable of this product to ac power, verify that the power receptacle is correctly grounded and has the correct voltage.

DANGER

During an electrical storm, do not connect or disconnect any cable that has a conductive outer surface or a conductive connector.

DANGER

Switch off power and unplug the machine power cable from the power receptacle, before removing or installing any part that is connected to primary power.

DANGER

To prevent possible electrical shock during machine installation, relocation, or reconfiguration, connect the primary power cable only after connecting all electrical signal cables.

DANGER

High voltage present. Perform "Lockout safety procedures" to remove primary power to the frame.

DANGER

High voltage present. Perform "Lockout safety procedures" to remove primary power to the frame (and high-voltage transformer if present).

DANGER

High voltage present at test points. Use high voltage test probes.

DANGER

High energy present. Do not short 48V to frame or 48VRtn. Shorting will result in system outage and possible physical injury.

DANGER

If a unique power module fails, all LEDs will be off. The high voltage LED will be off even though the high voltage is still present.

DANGER

The remaining steps of the procedure contain measurements that are taken with power on. Remember that hazardous voltages are present.

DANGER

The frame main circuit breaker and the controller must not be switched on again now.

Before disconnecting the power cables from the power receptacles, ensure that the customer's branch distribution circuit breakers (customer power source circuit breakers) are Off and tagged with DO NOT OPERATE tags, S229-0237. Refer to "Lockout safety procedures", before proceeding.

DANGER

Before connecting AC power cords to electrical outlets, ensure that:

- **The customer's branch distribution circuit breakers (customer power source circuit breakers) are off and tagged with DO NOT OPERATE tags, S229-0237 (or national language equivalent).**
- **The activities in "Performing the Customer 50/60 Hz Power Receptacle Safety Check" have been performed on all customer power source outlets and cable connectors.**

DANGER

Ensure that the customer's branch distribution circuit breakers (customer power source circuit breakers) to the AC power outlets are off and tagged with DO NOT OPERATE tags, S229-0237 (or national language equivalent).

DANGER

Both the SEPBU power chassis and the PDU 48V power chassis are field replaceable units (FRUs) which contain NO serviceable parts; they are labeled as such. Do not attempt to isolate or repair these components, since doing so may result in severe injury or even death.

CAUTION:

The weight of the PDU assembly, 48 V dc power chassis, and the SEPBU power chassis is greater than 18 Kg (40 lbs). Be careful when removing or installing. Remove all 48 V dc power supplies from the power chassis before removing or installing the power chassis.

CAUTION:

The unit weight exceeds 18 Kg (40 lbs) and requires two service personnel to lift.

CAUTION:

The covers are to be closed at all times except for service by trained service personnel.

CAUTION:

When the unit is being serviced, the covers should not be left off or opened while the machine is running unattended.

CAUTION:

Due to weight of each thin node (under 18 Kg [40 lbs]), use care when removing and replacing thin nodes above shoulder height.

CAUTION:

The wide node weight may exceed 32 Kg (70.5 lbs).

CAUTION:

Do not open more than one wide node or switch assembly drawer at a time.

CAUTION:

Make sure the stability foot and wheel chocks are installed on the frame. These are required to maintain frame balance and position during service operations.

CAUTION:

Outer edges of chassis may be sharp. Care must be taken when removing and installing chassis.

CAUTION:

The ground strip may have sharp edges.

CAUTION:

Do not remove wide nodes or switch assemblies from the mounting slides. Caution must be observed when working with mounting slides to prevent pinched fingers or accidental release of the unit.

CAUTION:

Do not remove the drawer case mounting screws at the bottom of both sides.

CAUTION:

Once the latch is released, push the drawer closed. Do not pull, as the drawer may disengage from the rails, creating a safety hazard.

CAUTION:

Due to the weight of each wide node, use care when sliding and closing wide processor nodes above shoulder height.

CAUTION:

- **When moving frames into position, team members should work together. Using one person on each corner of the frame can prevent strain.**
- **In raised floor installations, mechanically safe moldings should be installed around floor cutouts. Extreme caution should be used when moving frames during installation or removal because of the proximity of floor cutouts to casters.**

CAUTION:

A Johnson bar (J-bar) or similar device must not be used at any time to lift or move frames.

CAUTION:

When using step ladder or step stool, be sure that the work surface is level and the step ladder or step stool is in good working order.

CAUTION:

Portable ladders present a serious safety hazard if not used properly. Follow these general guidelines:

- **Make sure the ladder is firm and steady, and has no defective rungs or braces.**
- **Work only on a level surface.**
- **Never use a metal ladder near electrical power lines.**
- **Never overreach. Instead, move the ladder.**

Be as careful on a short ladder as on a 30-foot extension ladder. False security can lead to carelessness and falls which can cause painful injuries.

Personal ESD requirements

The processor uses FRUs that are known to be sensitive to electrostatic discharge (ESD). To prevent ESD damage to FRUs or to prevent system failures, observe the following procedures:

- Keep the FRU in its original static-dissipative shipping container until the FRU is ready to be installed in the system. Move the static-dissipative container near the location where the FRU is to be installed (within ESD wrist strap distance). If the FRU must be put down for any reason, first place it in its static-dissipative container or place it on the static-dissipative mat.
- Open only the covers that are necessary to complete the task. Any time a cover is open the service representative and all people in the area must be ESD-safe. If power is switched on, or if removing or exchanging any FRU, always use the ESD kit (part 93F2649).
  1. Put on the ESD wrist strap.
  2. Attach the ESD cord to the wrist strap.
  3. Attach the ESD mat to the wrist strap, if required.
  4. Attach the insulated clip to the ESD cord.
  5. Attach the insulated clip to the frame holes labeled **ESD**. If the frame holes are not available, use a grounding point on the frame.

About this book

This book is to help you, as a customer engineer diagnose and repair an RS/6000 SP 604 or 604E SMP High Node by performing the following tasks:

- Identify field replaceable unit (FRU) locations
- Isolate RS/6000 SP failures using Maintenance Analysis Procedures (MAPs)
- Perform diagnostic service procedures
- Perform removal and replacement procedures
- Identify FRUs and their corresponding part numbers

RS/6000 SP hardware service library

Beginning with this release, *Maintenance Information Volumes 1-4* (GA22-7375, GA22-7376, GA22-7377, and GA22-7378) have been restructured into the following publications:

- *IBM RS/6000 SP: Installation and Relocation*, GA22-7441. Installation and relocation procedures, maintenance agreement and qualification procedures, frame and component identification information.
- *IBM RS/6000 SP: System Service Guide*, GA22-7442. General SP system service procedures, the system Start MAP, and MAPs and parts catalog for the frames and power subsystems. Use this book to begin a diagnostic procedure to isolate a problem to a specific major component of the SP system.
- *IBM RS/6000 SP: SP Switch Service Guide*, GA22-7443. Service procedures, MAPs, and parts catalog information specific to the SP Switch.
- *IBM RS/6000 SP: Uniprocessor Node Service Guide*, GA22-7445. Service procedures, MAPs, and parts catalog information specific to all uniprocessor-type nodes.
- *IBM RS/6000: 604 and 604e SMP High Node Service Guide*, GA22-7446. Service procedures, MAPs, and parts catalog information specific to these nodes (this book).
- *IBM RS/6000 SP: SMP Thin and Wide Node Service Guide*, GA22-7447. Service procedures, MAPs, and parts catalog information specific to these nodes.
- *IBM RS/6000 SP: POWER3 SMP High Node Service Guide*, GA22-7448. Service procedures, MAPs, and parts catalog information specific to this node.

As an alternative to ordering the individual books, you can use GBOF-5437 to order the complete RS6000 SP hardware service library.

For a complete list of other SP system publications and related information, see the bibliography section of *RS/6000 SP: Installation and Relocation*, GA22-7441.

Who should use this book

This book is intended for the product-trained Customer Engineer (CE). The procedures for RS/6000 SP and feature components described in this book represent a part of the overall support structure of the RS/6000 SP product.

User's responsibilities

Before calling the IBM customer engineer, the system administrator should use the problem determination section of the *IBM Parallel System Support Programs for AIX: Diagnosis Guide*, SC23-3866 for initial problem determination. If there is nothing wrong with the customer operating procedures, customer-supplied cables, or power source, the customer should call an IBM customer engineer.

How to use this book

This book is intended for product trained customer engineers only.

When performing RS/6000 SP maintenance, the CE must follow **all** “Maintenance Analysis Procedures” beginning with the Start MAPs in the *RS/6000 SP: System Service Guide*.

Beginning with the Start MAPs, isolate the problem to one or more of these RS/6000 SP components:

- Supervisor Subsystem
- Processor Node
- Power Subsystem
- High Voltage Transformer (World Trade)
- Ethernet Local Area Networks (LANs)
- MCA Adapter.

Note: If the diagnostic procedures indicate that the problem is isolated to a 604 or 604E SMP High Node, the information in *RS/6000 SP: System Service Guide* will direct you to return to this book.

If you cannot determine the failure's cause, you should request the assistance of the RS/6000 SP Field Support Center.

Getting more information

This book and other RS/6000 SP hardware and software documentation are available both on-line and in printed form from the following sources:

- The RS/6000 website at **http://www.rs6000.ibm.com**
- The Resource Center on the PSSP product media
- The Service Information Library (SIL)
- Printed and CDROM versions (which can be ordered from IBM)
- IBM internal use versions available on MKTTOOLS

For more information on these sources and an extensive listing of RS/6000 SP Related publications, see the bibliography section of *RS/6000 SP: Installation and Relocation*, GA22–7441.

Chapter 1. Maintenance analysis procedures (MAPs)

This chapter provides information for identifying problems and guides you to the most likely failed Field Replaceable Unit (FRU). The MAPs then refer you to the FRU Removal/Replacement procedures for the corrective action.

Lockout safety procedures

The following lockout safety procedures are used to electrically isolate the frame and ensure the safety of all service personnel while servicing this machine:

- For SEPBU equipped frames, refer to “SEPBU lockout procedures.”
- For PDU equipped frames, refer to “PDU lockout/tagout procedure” on page 1-2.

SEPBU lockout procedures

Initial SEPBU lockout procedure: This procedure ensures that no power is present in the machine, and that primary power can not be accidentally applied. This procedure is referenced as required by the maintenance procedures.

Note: Be sure that the ac line cord is disconnected from the customer's main power outlet before attaching the cord to the SEPBU.

1. Make sure the **frame's** main power switch is in the Off (‘0’).
2. The following phase-to-phase ac voltage measurements are to be taken at the ac filter (located inside the rear cover at the bottom of the frame):
   - Between test points Z1 and Z2.
   - Between test points Z1 and Z3.
   - Between test points Z2 and Z3.

   Note: The purpose of these measurements is to guarantee that primary power is initially present at the test points. If the voltages measurements indicate that primary power is not present, have customer switch on power for this frame, then go back to Step 2 of the “Initial SEPBU lockout procedure.”
3. Switch off frame circuit breaker (located inside rear cover near bottom) to disengage ac power inside frame.
4. Depending on your customer's safety requirements, you **must** perform either the “SEPBU lockout/tagout procedure” or the “SEPBU lockout/bagout procedure” on page 1-2 to completely isolate the frame from the electrical supply.

SEPBU lockout/tagout procedure: **After** completing the initial lockout procedure:

1. Have the customer switch off primary power to this frame from an **external** circuit breaker.
2. Verify that there is no power present by repeating the measurements made in Step 2 of the “Initial SEPBU lockout procedure.”
   - If power is still present, inform customer of this fact and return to Step 4 of the “Initial SEPBU lockout procedure.”
3. When the proper circuit breaker has been located, install a lock on the circuit breaker to lockout the circuit breaker.

- If a lock **is not** available, attach a DO NOT OPERATE tag (S229-0237) directly to the circuit breaker.

4. You may now perform maintenance on primary power components per the instructions.

SEPBU lockout/bagout procedure: **After** completing the initial lockout procedure:

1. Locate the power plug for this frame and remove the plug from the receptacle.
2. Verify that there is no power present by repeating the measurements made in Step 2 of the “Initial SEPBU lockout procedure” on page 1-1. If power **is** still present:
   a. Check with customer or other maintenance personnel **before reconnecting** the power plug you just removed.
   b. Return to Step 1 of “SEPBU lockout/bagout procedure” and locate the correct plug.
3. When the correct plug has been removed from the receptacle, install a safety lockout bag (part number 74F9606) over the plug and lock the bag closed.
4. You may now perform maintenance on primary power components per the instructions.

PDU lockout/tagout procedure

This procedure ensures that no power is present in the machine, and that primary power can not be accidentally applied. This procedure is referenced as required by the MAPs.

1. Use a multimeter with the pair of high-voltage probes (part number 93F2731). Set the multimeter to the highest ac voltage setting.
2. The following measurements are to be taken at the ac filter (located inside the rear cover at the bottom of the frame). Measure phase-to-phase ac voltage between test points O1 and O2. Repeat measurement for test points O1 and O3. Repeat measurement between test points O2 and O3.
3. The purpose here is to guarantee that initially primary power is present at the test points. If the voltages measured in Step 2 indicate that primary power is not present, have customer switch on power for this frame, then go back to Step 2.
4. Switch off frame circuit breaker (located inside rear cover near bottom) to disengage ac power inside frame.
5. Now have customer switch off primary power to this frame from an external circuit breaker.
6. Verify that there is no power present by repeating the measurements made in Step 2. If power is still present, inform customer of this fact and return to Step 4.
7. Now that the proper circuit breaker has been located, install a lock on this circuit breaker to lockout the circuit breaker, OR if a lock is not available, attach a DO NOT OPERATE tag (S229-0237) directly to the circuit breaker.
8. You may now perform maintenance on primary power components per the instructions.

PDU lockout/bagout procedure

This may be used as an alternative to the Lockout/Tagout Procedure to ensure that no power is present in the machine, and that primary power can not be accidentally applied. This procedure is also referenced as required by the MAPs.

1. Use a multimeter with the pair of high-voltage probes (part number 93F2731). Set the multimeter to the highest ac voltage setting.

2. The following measurements are to be taken at the ac filter (located inside the rear cover at the bottom of the frame). Measure phase-to-phase ac voltage between test points O1 and O2. Repeat measurement for test points O1 and O3. Repeat measurement between test points O2 and O3.
3. The purpose here is to guarantee that initially primary power is present at the test points. If the voltages measured in Step 2 indicate that primary power is not present, have customer switch on power for this frame, then go back to Step 2.
4. Switch off frame circuit breaker (located inside rear cover near bottom) to disengage ac power inside frame.
5. Now locate plug for this frame, and remove plug from receptacle.
6. Verify that there is no power present by repeating the measurements made in Step 2. If power is still present, check with customer or other maintenance personnel before reconnecting plug from Step 5. Return to Step 5 to locate the correct plug.
7. Now that the correct plug has been removed from the receptacle, install a safety lockout bag (part number 74F9606) over the plug and lock the bag closed.
8. You may now perform maintenance on primary power components per the instructions.

604 and 604e High Node MAPs

604 or 604e High Node environment (MAP 0250)

Note: Refer to “Service position procedures” on page 3-16 for placing processor nodes into the service position or for removing them from the service position.

Step 0250–001:

1. Are any messages displayed?
   - If yes, go to “Step 0250–002.”
   - If no, go to “Step 0250–006” on page 1-4.

Step 0250–002: TTY message indicates “rc.powerfail”, or **errpt -a | pg** displays “Loss of Electric Power” associated with processor node.

1. Check failing nodes error log by issuing **errpt -a | pg** on the affected nodes' AIX window to check for “Loss of Power” or warning messages.
2. Refer to “Power/keylock status register (PKSR)” on page A-24 to decode power register bits.
3. Does message indicate loss of power or power off?
   - If yes, go to “Step 0250–005” on page 1-4.
   - If no, go to “Step 0250–003” on page 1-4.

Step 0250–003: The message does not indicate a loss of power or that power is off.

1. Is the message a warning?
   - If yes, go to “Step 0250–004” on page 1-4.
   - If no, go to “Step 0250–006” on page 1-4.

Step 0250–004: Message is a warning.

1. Does this same message occur on more than one processor node?
   - If yes, notify next level of support.
   - If no, immediate service is not required. You may either:
     – Perform maintenance by returning to “Step 0250–002” on page 1-3, and treating the message as a “Shutdown” or “Failure” message.
     – Or defer service until a later date.

Step 0250–005: You have detected a serious environmental condition in the processor node.

Note: If service has just been completed on this processor node, check it for loose cables or shorts.

1. Based on the text of the message, use the following table to continue service:

Table 1-1. 604 or 604e High Node service actions

Condition	Action
Any power loss message	Go to “Step 0250–006.”
“...cooling problem...” or fan problem	Go to “Step 0250–016” on page 1-7.
“...memory protect...”	Go to “Step 0250–018” on page 1-9.

Step 0250–006: You have determined that there is a power problem on this processor node.

1. Check the node supervisor green LED 1.
2. Is the node supervisor green LED 1 On?
   - If yes, go to “Step 0250–007.”
   - If no, go to Go to “604 or 604e High Node power (MAP 0260)” on page 1-9.

Step 0250–007: The node supervisor green LED 1 is On.

1. Check the green LED for the node power supply.
2. Is the power supply green LED Off?
   - If yes, go to “Step 0250–009” on page 1-5.
   - If no, go to “Step 0250–008” on page 1-5.

Step 0250–008: The green LED on the power supply is not Off.

1. Check the node for airflow blockage or fan or cooling problems.
2. Did you find any airflow blockage, cooling problems, or fan malfunctions?
   - If yes, go to “Step 0250–016” on page 1-7.
   - If no:
     a. Verify that you have the correct processor node.
     b. Go to "Processor node diagnostics and descriptions (MAP 0130)" in *RS/6000 SP: System Service Guide*.

Step 0250–009: The green LED on the power supply is Off.

1. Go to the appropriate removal and replacement procedure in "Power Supply and Cooling Units" in Chapter 4, “FRU removals and replacements” on page 4-1 depending on:
   - If node N+1 power is present.
   - If node N+1 power is not present (place the high node in service position and replace the failing power supply/cooling unit).
2. Is the green LED on the power supply Off?
   - If yes, go to “Step 0250–010.”
   - If no:
     a. Remove processor node from service position.
     b. Reconnect all cables at rear of the processor node.
     c. Put circuit breakers at front of processor node in On (‘1’) position.
     d. Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.

Step 0250–010: The green LED on the power supply is Off.

1. Check the rear of the node to see if you have 48 volts at the high node power supply cable ends P1 and P2 (if N_1 power is present).
2. Measure voltage between any one of: pin 1, pin 2, or pin 3 and any one of: pin 7, pin 8, or pin 9.
3. Is the 48 volts missing?
   - If yes, go to “Step 0250–013” on page 1-6.
   - If no, problem with 48 volts sensing.
     – Go to “Step 0250–011.”

Step 0250–011: Problem with 48 volts sensing.

1. From the control workstation, power off the processor node.
2. Place the processor node in the service position.
3. Use the following prioritized table to continue service:

Table 1-2. 48 Volt sensing service priorities

Priority	Component	Action
1	Node supervisor card	1. Replace card 2. Go to “Step 0250–012” on page 1-6
2	SIB card	1. Replace card 2. Go to “Step 0250–012” on page 1-6
3	IOD card	1. Replace card 2. Go to “Step 0250–012” on page 1-6
4	Lateral planar 1 card	1. Replace card 2. Go to “Step 0250–012” on page 1-6
5	Media module/operator panel cable	1. Replace cable 2. Go to “Step 0250–012” on page 1-6
6	CPU planar	1. Replace planar 2. Go to “Step 0250–012” on page 1-6
7	I/O planar	1. Replace planar 2. Go to “Step 0250–012” on page 1-6
8	All replaced	Call next level of support.

Step 0250–012: You have completed the service actions recommended in “Step 0250–011” on page 1-5.

1. Remove processor node from service position.
2. From the control workstation, power on the processor node.
3. Is the power supply green LED off?
   - If yes, go to “Step 0250–011” on page 1-5 and replace the next highest priority component.
   - If no:
     a. Remove processor node from service position.
     b. Reconnect all cables at rear of the processor node.
     c. Put circuit breakers at front of processor node in On (‘1’) position.
     d. Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.

Step 0250–013: Problem with 48 volts supplied to power supply.

1. If node N+1 power is present, notify the customer that the 604 or 604e high node must be powered off before continuing.
2. If node N+1 power is not present, continue.
3. Place the 604 or 604e high node into service position.
4. Replace the high node power supply cable. Refer to “Replacing the power supply cable (at CBJ2)” on page 4-52.
5. Replace the 604 or 604e high node from the service position.
6. Is the green LED on the power supply Off?
   - If yes, go to “Step 0250–014” on page 1-7.

- If no:
  a. Remove processor node from service position.
  b. Reconnect all cables at rear of the processor node.
  c. Put circuit breakers at front of processor node in On (‘1’) position.
  d. Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.

Step 0250–014: The green LED on the power supply is Off.

1. Place the 604 or 604e high node in service position.
2. Replace the high node circuit breaker corresponding to the power supply. Refer to “Replacing the circuit breaker” on page 4-51.
3. Replace the 604 or 604e high node from the service position.
4. Is the green LED on the power supply Off?
   - If yes, go to “Step 0250–015.”
   - If no:
     a. Remove processor node from service position.
     b. Reconnect all cables at rear of the processor node.
     c. Put circuit breakers at front of processor node in On (‘1’) position.
     d. Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.

Step 0250–015: The green LED on the power supply is Off.

1. Place the 604 or 604e high node in service position.
2. Replace the high node power cable. Refer to “Replacing the power cable (at CBJ1)” on page 4-52.
3. Replace the 604 or 604e high node from the service position.
4. Is the green LED on the power supply Off?
   - If yes, Go to "PDU dc power loss from bulk dc power supplies (MAP 0510)" in *RS/6000 SP: System Service Guide*.
   - If no:
     a. Remove processor node from service position.
     b. Reconnect all cables at rear of the processor node.
     c. Put circuit breakers at front of processor node in On (‘1’) position.
     d. Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.

Step 0250–016: You found an airflow blockage, cooling problem, or fan malfunction.

1. Place processor node in service position.
2. Use the following table to reseat or replace components:

Table 1-3. Cooling problem priority table

Priority	Component	Action
1	Fan 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10 **Note:** See Figure 2-5 on page 2-8.	1. Check specified fan for blockage or loose cable connection. Refer to “Power/keylock status register (PKSR)” on page A-24 to decode power register bits. 2. Fix any obvious problem(s). If none are found, continue at Priority 2. 3. Continue at “Step 0250–017” on page 1-8.
2	Fan 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10 **Note:** See Figure 2-5 on page 2-8.	1. Replace fan and/or cooling module as described in Chapter 4, “FRU removals and replacements” on page 4-1. Refer to “Power/keylock status register (PKSR)” on page A-24 to decode power register bits. 2. Fix any obvious problem(s). 3. Continue at “Step 0250–017” on page 1-8.
3	Lateral planar 1 card	1. Replace card. 2. Continue at “Step 0250–017” on page 1-8.
4	SIB card	1. Replace card. 2. Continue at “Step 0250–017” on page 1-8.
5	Lateral planar 2 card	1. Replace card. 2. Continue at “Step 0250–017” on page 1-8.
6	Fan cable	1. Replace cable. 2. Continue at “Step 0250–017” on page 1-8.
7	All replaced	Call next level of support.

Step 0250–017: Component replaced or reseated.

1. Remove processor node from service position.
2. Reconnect all cables at rear of the processor node.
3. Put circuit breakers at the front of processor node in the On (‘1’) position.
4. Check error log or SRN.
5. Does the problem still exist?
   - If yes:
     a. Put circuit breakers at the front of the processor node in the Off (‘0’) position.
     b. Reinstall all components removed in previous steps.
     c. Go to “Step 0250–016” on page 1-7 to service next highest priority component.
   - If no, problem resolved.
     – Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.

Step 0250–018: You receive the following memory protection error: “memoryProtect”.

1. This fault is normally generated only when invalid memory cards are installed in the processor node.
2. Have processor node memory parts been changed since last successful IPL?
   - If yes:
     a. Check memory card and SIMM part numbers in *Diagnostic Information for Micro Channel Bus Systems* (SA38-0532) and *Adapters, Devices and Cable Information* (SA38-0533) to ensure that they are compatible with the fastest Type 7013 machines.
     b. If necessary, call next level of support.
   - If no, problem may be:
     – Base memory card
     – CPU card
     – I/O planar
     – Node supervisor control cable
     a. Replace parts, one at a time, until problem is corrected.
     b. If you are able to correct the problem, problem is resolved.
     – Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.
   - If you are unable to correct the problem, call next level of support.

604 or 604e High Node power (MAP 0260)

Note: Refer to “Service position procedures” on page 3-16 for placing processor nodes into the service position or for removing them from the service position.

Step 0260–001:

1. Check green LED 1 for the node supervisor card.
2. Is the green LED 1 Off?
   - If yes, go to “Step 0260–005” on page 1-10.
   - If no, go to “Step 0260–002.”

Step 0260–002: Processor node getting 48 V dc power.

1. Is the green LED 1 flashing?
   - If yes, go to “Step 0260–003” on page 1-10.
   - If no, Green LED 1 is On. This indicates that nothing is wrong with the power supply.
     a. Verify that you have the proper processor node.
     b. Go to "Processor node diagnostics and descriptions (MAP 0130)" in *RS/6000 SP: System Service Guide*.

Step 0260–003: Processor node is getting power.

1. Power on RS/6000 logic from the virtual front panel on the control workstation.
2. Does green LED 1 light and stay lit?
   - If yes, go to “Step 0260–004” on page 1-10.
   - If no:
     a. Make sure that the front panel cover of the node is installed properly. Be sure to depress the white interlock switch.
     b. If the front panel is installed properly, go to “604 or 604e High Node minimum configuration (MAP 0280)” on page 1-23.
     c. If the front panel is not installed properly:
        1) Fix front panel.
        2) Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.

Step 0260–004: RS/6000 logic getting power.

1. Does processor node IPL successfully?
   - If yes, no problem detected.
     a. Record reason for power-off condition.
     b. Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.
   - If no, processor node has problem with IPL.
     – Go to "Processor node diagnostics and descriptions (MAP 0130)" in *RS/6000 SP: System Service Guide*.

Step 0260–005: The processor node IPLs successfully.

1. Check yellow LED 5 for the node supervisor card.
2. Is the yellow LED 5 Off?
   - If yes, go to “Step 0260–006.”
   - If no, the base code loaded on node supervisor card.
     a. Go to “Updating the node supervisor code” on page 3-15.
     b. Go to “Step 0260–010” on page 1-12.

Step 0260–006: The yellow LED is Off.

1. Check the SIB green LED at the rear of the processor node.
2. Is the SIB green LED Off?
   - If yes, go to “Step 0260–007” on page 1-11.
   - If no, Go to 604 or 604e High Node environment (MAP 0250): “Step 0250–007” on page 1-4.

Step 0260–007: The SIB green LED is Off.

1. Check circuit breakers at front of processor node.
2. Make sure these circuit breakers are in the On (‘1’) position.
3. Do the circuit breakers go (trip) to the Off (‘0’) position?
   - If yes, go to “Step 0260–008” on page 1-11.
   - If no, go to “Step 0260–010” on page 1-12.

Step 0260–008: The circuit breakers trip to the Off (‘0’) position.

1. Place processor node in service position.
2. Check power harnesses at the following locations for any obvious problems which might cause a short:
   - Rear of node
   - Connection to the circuit breakers
   - 48-volt bulk power connections
3. Does everything appear to be okay?
   - If yes, go to “Step 0260–009.”
   - If no:
     a. Fix obvious problems.
     b. If necessary, replace node power harness.
     c. . Remove processor node from service position.
     d. Reconnect all cables at rear of the processor node.
     e. Go to “Step 0260–007.”

Step 0260–009: You did not find a problem that might contribute to a short.

1. Using a multimeter, check for a short between any pins in power supplies unit plug.
2. Did you find a short?
   - If yes:
     a. Replace corresponding power supply.
     b. Remove processor node from service position.
     c. Reconnect all cables at rear of processor node.
     d. Go to “Step 0260–007.”
   - If no:
     a. Using a multimeter, check for a short between any pins in node power plugs.
     b. Using a multimeter, check for a short between any tabs in circuit breakers.
     c. If a short is detected, isolate it to either the cable or circuit breaker and replace the corresponding part.
     d. Remove processor node from service position.
     e. Reconnect all cables at rear of the processor node.
     f. Go to “Step 0260–007.”

Step 0260–010:

1. From control workstation or processor node, check green LED 1 for this node.
2. Is green LED 1 off or is "No Power to Node" displayed on the control workstation?
   - If yes, go to “Step 0260–011” on page 1-12.
   - If no, processor node problem resolved.
     – Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.

Step 0260–011: Either the green LED 1 is off, or the phrase "No Power to Node" is displayed on the control workstation.

1. Check to see if processor nodes on any other dc power harness are powered on.
2. Ensure that the other processor node has its circuit breaker in the On (‘1’) position.
3. Check to see if the green LED 1 is On or Flashing.
4. High processor nodes receive 48-volt power through four power plugs. These plugs can be connected to two of the four power harnesses. The sets of processor nodes are as follows:

```
PDU-BH-P1:   Processor nodes  1, 2, 3, 4
PDU-BH-P2:   Processor nodes  5, 6, 7, 8
PDU-BH-P3:   Processor nodes  9, 10, 11, 12
PDU-BH-P4:   Processor nodes 13, 14, 15, 16
PDU-BH-P21:  first  SMP Node  1
PDU-BH-P22:  Second SMP Node  5
PDU-BH-P23:  Third  SMP Node  9
PDU-BH-P24:  Fourth SMP Node 13
```

5. Is the green LED 1 for any other processor node On or Flashing?
   - If yes, go to “Step 0260–012.”
   - If no, go to "Main power (MAP 0450)" in *RS/6000 SP: System Service Guide*.

Step 0260–012:

1. Check the other processor nodes on the same dc power harness for matching symptoms: circuit breaker on but green LED 1 not lit.
2. Is this the only processor node showing these symptoms?
   - If yes, go to “Step 0260–013.”
   - If no, problem with 48 V dc power distribution.
     – Go to "Open in 48V dc distribution (MAP 0560)" in *RS/6000 SP: System Service Guide*.

Step 0260–013: This is the only processor node with a green LED 1 that will not light when the circuit breaker is on.

1. Check the cable connections at the following locations:
   - The power supplies.
   - The circuit breakers behind CB panel below high node.
   - The four 48-volt power distribution connection.
2. Are the connections good?
   - If yes, go to “Step 0260–014” on page 1-13.

- If no, fix the problem.
  - Go to “Step 0260–010” on page 1-12.

Step 0260–014: All of the connections listed in “Step 0260–013” on page 1-12 are good.

1. Put circuit breakers CB01 and CB02 in the “on” (1) position.
2. Check at the rear of the node to see if there is 48 volts at the high node power supply cable ends P1 and P2 (if N+1 power is present).
3. Measure the voltage between either pin 1, pin 2, or pin 3 and either pin 7, pin 8, or pin 9.
4. If there is 48 volts present at both P1 and P2, go to “Step 0260–015.”
5. If you find 48 volts at only one of the two pins, go to “Step 0260–016.”
6. If you detect less than 48 volts at both pins, go to "Open in 48V dc distribution (MAP 0560)" in *RS/6000 SP: System Service Guide*.

Step 0260–015: 48 volts distribution is getting to node.

1. Check power supply/cooling unit green LEDs and running fans.
2. Are the power supply/cooling green LEDs On and are fans running?
   - If yes, go to “Step 0260–001” on page 1-9.
   - If no, go to 604 or 604e High Node environment (MAP 0250): “Step 0250–009” on page 1-5.

Step 0260–016: You find less than 48 volts at either P1 or P2.

1. If P1: replace CB01.
2. If P2: replace CB02.
3. Is voltage still missing at either P1 or P2?
   - If yes, go to “Step 0260–017.”
   - If no, go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.

Step 0260–017: You still find less than 48 volts at either P1 or P2.

1. Replace high node power supply cable.
2. Is voltage still missing at either P1 or P2?
   - If yes, go to "Open in 48V dc distribution (MAP 0560)" in *RS/6000 SP: System Service Guide*.
   - If no, go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.

604 or 604e High Node control (MAP 0270)

Note: Refer to “Service position procedures” on page 3-16 for placing processor nodes into the service position or for removing them from the service position.

Attention: If a 604 or 604e high node is present in this frame, it is possible that the 48 Volt power distribution is spread across more than one power harness. Check physical connections from circuit breakers to 48 V bulkhead connectors for actual power distribution.

Attention: The processor nodes must be removed from active configuration before continuing. If processor nodes are off, continue; otherwise, ask customers to initiate shutdown procedure and power-off processor nodes from the control workstation. Maintenance may also be deferred until all jobs are com-

pleted. Powering off processor nodes in a parallel environment will cause all jobs to flush from the queue and switch initialization to rerun.

Attention: Processor nodes may be equipped with either the High Performance Switch (HiPS) or the POWERparallel Switch (SPS). If the power is on, servicing a processor node equipped with either of these switches will effect the entire switch network. Make sure the processor node has been powered off, the switch data cable has been disconnected, or the processor node has been fenced.

Refer to “Service position procedures” on page 3-16 for placing processor nodes in or removing them from service position.

Refer to "Viewing Switch Partitions" in RS/6000 SP: SP Switch Service Guide for locating, fencing, or unfencing nodes within a switch partition.

Step 0270–001: Processor node problem detected by customer or CE. Use the following table to continue service:

Table 1-4. 604 or 604e High Node control diagnostics

Condition	Action
• Problem with node power	Go to “604 or 604e High Node environment (MAP 0250)” on page 1-3.
• 3-digit LEDs displayed but missing segments or remain blank	Go to “Step 0270–021” on page 1-21.
• Node will not reset • Mode switch problem—problem setting NORMAL, SECURE, or SERVICE.	Go to “Step 0270–002.”
• No response from TTY console	• Close existing TTY window and open another. • Go to “Step 0270–014” on page 1-18.
• Yellow or green LEDs on node will not light.	Go to “Step 0270–024” on page 1-22.

Step 0270–002: You detect a mode switch problem or find that the node will not reset.

1. Check with customer to make sure this processor node is not in the current active configuration.
   - If processor node is *not* operational and actively working at this time, continue service.
   - If it *is* operational and actively working, schedule a time convenient for the customer.
2. From the control workstation, open the node front panel display.
3. Make note of the mode switch position for this processor node.
4. Set mode switch to something other than that recorded above.
5. . If not already there, set the mode switch to SERVICE.

   Note: Do NOT recycle node power until reset fault is verified.
6. Does the mode switch fail to toggle?
   - If yes, go to “Step 0270–007” on page 1-16.
   - If no, go to “Step 0270–003” on page 1-15.

Step 0270–003: Problem not related to mode switch.

1. Was mode originally in SERVICE position as noted in previous step?
   - If yes, go to “Step 0270–005” on page 1-15.
   - If no, go to “Step 0270–004” on page 1-15.

Step 0270–004: Customer may have tried to reset processor node in SECURE mode. Reset will only take effect in NORMAL or SERVICE modes.

1. From the control workstation, reset this processor node.
2. Does processor node reset?
   - If yes, no problem found.
     a. Inform customer that the processor node will not reset if the mode switch is in the SECURE position.
     b. Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.
   - If no, problem with reset.
     – Go to “Step 0270–007” on page 1-16.

Step 0270–005:

1. From the control workstation, issue reset for this processor node.
2. Does processor node reset?
   - If yes, go to “Step 0270–006.”
   - If no, problem with reset.
     – Go to “Step 0270–007” on page 1-16.

Step 0270–006: Intermittent problem may be occurring.

1. Please record following:
   - Node number.
   - Date / Time fault reported.
   - Type of fault reported.
2. Check logs to see if this fault has been previously recorded.
3. Is this a recurring fault?
   - If yes, reoccurrence of intermittent fault has been detected.
     a. Treat this fault as a solid failure.
     b. Go to “Step 0270–012” on page 1-17.
   - If no, This is not a recurring fault.
     – Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.

.

Step 0270–007: Either the mode switch fails to toggle or there is a problem with reset.

1. From the control workstation node front panel display:
   - Shutdown and power-off processor node.
   - Power-on processor node.
   - Check 3-digit LEDs for LED sequence indicating IPL.
2. Do the 3-digit LEDs change?
   - If yes, go to “Step 0270–008.”
   - If no, node supervisor card not responding to commands.
     – Go to "Frame supervisor not responding (MAP 0110)" in *RS/6000 SP: System Service Guide*.

Step 0270–008: Processor node is IPLing.

1. Do 3-digit LEDs eventually indicate completion of IPL sequence (i.e. blank or “uuu”)?
   - If yes, go to “Step 0270–009.”
   - If no:
     a. Processor node has problem IPLing.
     b. If 3-digit LEDs stop at constant 200, problem with SECURE signal.
        – Go to “Step 0270–012” on page 1-17 to continue service.
     c. If 3-digit LEDs do not stop at constant 200, go to "Processor node function (MAP 0140)" Step 0140–004 in *RS/6000 SP: System Service Guide*, to continue service.

Step 0270–009: 3-digit LEDs indicate that processor node completes IPL sequence.

1. From node front panel display, click on “TTY” button to open a TTY console.
2. From the TTY console:
   - Select “Advanced Diagnostic Routines”
   - Select “System Verification”
   - Select “Base System”.
3. Follow directions for the “Key Mode Switch Test”, setting the mode switch from the processor node‘s front panel on the control workstation.
4. Does this test indicate a failure?
   - If yes, go to “Step 0270–012” on page 1-17.
   - If no, go to “Step 0270–010.”

Step 0270–010: The processor node passes the “Key Mode Switch Test”.

1. Reset this processor node from the control workstation.
2. Does processor node reset?
   - If yes, go to “Step 0270–011” on page 1-17.
   - If no, problem with reset.
     – Go to “Step 0270–012” on page 1-17 to continue isolation.

Step 0270–011: Node reset and mode switches functioning properly.

1. Was this a solid problem? If you solved the problem by power-on only, answer "No."
   - If yes, problem resolved.
     - Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.
   - If no, this is an intermittent problem.
     a. Please record following tracking information:
        - Node number
        - Date / Time fault reported
        - Type of fault reported
        - Action taken or component replaced

     b. Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.

Step 0270–012: Problem with reset or mode switch function.

1. From the control workstation, power off processor node.
2. Place processor node in service position.
3. Use the following prioritized table to continue service:

Table 1-5. Reset or mode switch problem priority table

Priority	Component	Action
1	Cable between frame supervisor and node supervisor card	1. Check for proper seating and opens/shorts. If no problem is found, continue at Priority 2. 2. Repair or replace cable assembly as required. 3. Go to “Step 0270–013” to verify fix.
2	Node supervisor card	1. Check for proper seating and opens/shorts. If no problem is found, continue at Priority 3. 2. Repair or replace cable assembly as required. 3. Go to “Step 0270–013” to verify fix.
3	Cable between node supervisor and S1	1. Replace card. 2. Perform "Verification test for supervisor bus" in *RS/6000 SP: System Service Guide*. 3. Go to “Step 0270–013” to verify fix.
4	I/O Planar Board	1. Replace board. 2. Go to “Step 0270–013” to verify fix.
5	All replaced	Call next level of support.

Step 0270–013: Component has been repaired or replaced.

1. Remove processor node from service position.
2. Reconnect all cables at rear of the processor node.
3. Put the circuit breaker at the front of the processor node in the On (‘1’) position.
4. Go to “Step 0270–008” on page 1-16.

Step 0270–014: You do not get a response from the TTY console for a processor node.

1. Make sure processor node was IPLed in NORMAL mode.
2. From system file server, telnet into this processor node:

   telnet *nodename*

   Log in as “root”. Have the customer check to make sure that the TTY port on the processor node is correctly defined.

   a. Check console configuration by issuing the following command in the processor node window:

      smit console

      Use the menu options to check or reconfigure the console as required. If the console is not configured to use the TTY port, then the processor node will not print messages to the screen during IPL.

   b. Check the TTY configuration by issuing the following command in the processor node window:

      smit tty

      Use the menu options to check and/or reconfigure the “s1” TTY port as required. The proper TTY parameters are listed in *IBM RS/6000 SP: Administration Guide*.

3. Is the TTY port defined properly, and the console setup to use the TTY port?
   - If yes, go to “Step 0270–015.”
   - If no, TTY not responding due to customer configuration.
     a. Customer must configure these parameters.
     b. Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.

Step 0270–015: Problem due to hardware.

1. Close console TTY window (if already open).
2. Log into the node over the Ethernet:

   telnet *nodename*

   Enter the following command:

   chcons /dev/tty1

   Use **diag** command to run "regular" (not "advanced") diagnostics on “TTY0”.

3. Do the diagnostics pass (no problem found)?
   - If yes, go to “Step 0270–018” on page 1-19.
   - If no, go to “Step 0270–016.”

Step 0270–016: The processor node does not pass the diagnostics; a problem still exists.

1. Run wrap diagnostics on S1 to node supervisor cable.
2. Do diagnostics fail?
   - If yes, go to “Step 0270–017” on page 1-19.
   - If no, go to “Step 0270–018” on page 1-19.

Step 0270–017: The processor node does not pass the diagnostics; a problem still exists.

1. Run wrap diagnostics on S1 to node supervisor cable.
2. Do the diagnostics pass (no problem found)?
   - If yes, go to “Step 0270–018” on page 1-19.
   - If no:
     a. Replace I/O planar board.
     b. Go to “Step 0270–019” on page 1-20.

Step 0270–018: The processor node has passed the diagnostics; no problems have been found.

1. Log into the node over the Ethernet:

   telnet *nodename*
2. Enter the following command:

   chcons /dev/tty0
3. From the control workstation, make sure the node front panel display is open.
4. Close TTY console at this time.
5. Have the customer remove the processor node from the active system configuration and power off the processor node.
6. Put the circuit breaker at the front of the processor node in the Off (‘0’) position.
7. Place processor node in service position.
8. Refer to the following table for priority of replacement or repair of components.

Table 1-6. Component maintenance and replacement priorities

Priority	Component	Action
1	Cable between node supervisor and S1	1. Replace cable. 2. Perform "Verification test for supervisor bus" in *RS/6000 SP: System Service Guide*. 3. Go to “Step 0270–019” on page 1-20 to verify fix.
2	Node supervisor card	1. Check for proper seating. If no problem found, continue at Priority 3. 2. Repair or replace cable assembly as required. 3. Go to “Step 0270–019” on page 1-20 to verify fix.
3	SIB card	1. Replace card. 2. Perform "Verification test for supervisor bus" in *RS/6000 SP: System Service Guide*. 3. Go to “Step 0270–019” on page 1-20 to verify fix.
4	Lateral planar 1 card	1. Replace card. 2. Perform "Verification test for supervisor bus" in *RS/6000 SP: System Service Guide*. 3. Go to “Step 0270–019” on page 1-20 to verify fix.
5	IOD card	1. Replace card. 2. Perform "Verification test for supervisor bus" in *RS/6000 SP: System Service Guide*. 3. Go to “Step 0270–019” on page 1-20 to verify fix.
6	Cables between frame supervisor and node supervisor card	1. Replace cable. 2. Go to “Step 0270–019” on page 1-20 to verify fix.
7	All replaced	Call next level of support.

Step 0270–019: Component has been repaired or replaced.

1. Remove processor node from service position.
2. Reconnect all cables at rear of the processor node.
3. As processor node completes IPL, check the TTY console window.
4. From the control workstation node front panel display, put the processor node in SERVICE mode.
5. Put the circuit breaker at the front of the processor node in the On (‘1’) position.
6. Do you get any data on the TTY console screen?
   - If yes, go to “Step 0270–020.”
   - If no, go to “Step 0270–018” on page 1-19 to service next highest priority component.

Step 0270–020: Processor node IPLed in SERVICE mode.

1. From the TTY console:
   - Select “Advanced Diagnostic Routines”
   - Select “System Verification”
   - Select “Base System”
2. Does processor node pass all diagnostics?
   - If yes, problem resolved.
     – Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.

- If no, repair problem as indicated by diagnostics.
  - Use "Processor node diagnostics and descriptions (MAP 0130)" in *RS/6000 SP: System Service Guide* as necessary.

Step 0270–021: 3-digit LED problem.

1. Have the customer remove the processor node from the active system configuration and power off the processor node.
2. Put the circuit breaker at the front of the processor node in the Off (‘0’) position.
3. Place processor node in service position.
4. Refer to the following table for priority of replacement or repair of components.

Table 1-7. 3–Digit LED diagnostics

Priority	Component	Action
1	Cable between frame supervisor and node supervisor card	1. Check for proper seating. If no problem found, continue at Priority 2. 2. Repair or replace cable assembly as required. 3. Go to “Step 0270–022” to verify fix.
2	Node supervisor card	1. Check for proper seating. If no problem found, continue at Priority 3. 2. Repair or replace cable assembly as required. 3. Go to “Step 0270–022” to verify fix.
3	Cable between node supervisor and S1	1. Replace card. 2. Perform "Verification test for supervisor bus" in *RS/6000 SP: System Service Guide*. 3. Go to “Step 0270–022” to verify fix.
4	I/O Planar Board	1. Replace board. 2. Go to “Step 0270–022” to verify fix.
5	All Replaced	Call next level of support.

Step 0270–022: Component has been repaired or replaced.

1. Remove processor node from service position.
2. Reconnect all cables at rear of the processor node.
3. From the control workstation, power on this processor node.
4. From the control workstation, make sure the 3-digit LEDs for this processor node are displayed on the screen.
5. Check the 3-digit LEDs for the IPL sequence.
6. Do the 3-digit LEDs indicate the IPL sequence?
   - If yes, go to “Step 0270–023” on page 1-22.
   - If no, go to “Step 0270–021” to service next highest priority component.

Step 0270–023: The 3-digit LEDs indicate the IPL sequence.

1. From the TTY console:
   - Select “Advanced Diagnostic Routines”
   - Select “System Verification”
   - Select “Base System”
2. Does processor node pass all diagnostics?
   - If yes, problem resolved.
     – Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.
   - If no:
     a. Repair problem as indicated by diagnostics.
     b. Use "Processor node diagnostics and descriptions (MAP 0130)" in *RS/6000 SP: System Service Guide* as necessary.

Step 0270–024: Yellow or green LED on node supervisor is not functioning.

1. Have the customer remove the processor node from the active system configuration and power off the processor node.
2. Put the circuit breakers at the front of the processor node in the Off (‘0’) position.
3. Perform “Node supervisor self-test” on page 3-12, ignoring PASS/FAIL results.
4. Check yellow and green LEDs on the node supervisor card to see if each LED lights at some point.
5. Does each of the eight LEDs light at any time?
   - If yes, all LEDs are operating.
     a. Remove processor node from service position.
     b. Reconnect all cables at rear of the processor node.
     c. Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.
   - If no, go to “Step 0270–025.”

Step 0270–025: At least one of the eight node supervisor LEDs will not light.

1. Place processor node in service position.
2. Repeat “Node supervisor self-test” on page 3-12.
3. . Check to see if same color LED is always Off in front and rear.
4. Are LEDs of same color always Off in rear?
   - If yes:
     a. Replace the node supervisor card.
     b. Perform “Node supervisor self-test” on page 3-12 to verify replacement.
     c. Remove processor node from service position.
     d. Reconnect all cables at rear of the processor node.
     e. Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.
   - If no, go to “Step 0270–026” on page 1-23.

Step 0270–026: At least some of the LEDs of the same color are On in the rear.

1. Replace LED display card.
2. Perform “Node supervisor self-test” on page 3-12.
3. Do both LEDs light at any time?
   - If yes, problem resolved; all LEDs are operating.
     – Remove processor node from service position.
     – Reconnect all cables at rear of the processor node.
     – Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.
   - If no:
     a. Replace the node supervisor card.
     b. Perform “Node supervisor self-test” on page 3-12 to verify replacement.
     c. Remove processor node from service position.
     d. Reconnect all cables at rear of the processor node.
     e. Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.

604 or 604e High Node minimum configuration (MAP 0280)

Note: Refer to “Service position procedures” on page 3-16 for placing processor nodes into the service position or for removing them from the service position.

Attention: After the lateral planar 2 card is installed and the system is powered-up, the system ID is downloaded to the lateral planar 2 card from a backup source within the system. This ID becomes permanent on the lateral planar 2 and cannot be altered without special tools, Therefore, the lateral planar 2 cannot be transferred to another system. It must be returned to the plant of manufacture as a new defective part.

Attention: Lateral planar 2 and SIB EEPROMs contain the SYSID of the system. When one of the two components is to be replaced (for example the lateral planar 2), the SYSID information is copied from SIB EEPROM into the lateral planar 2 EEPROM when you start the system.

To avoid losing this information, do not replace both components at the same time. When you replace both components:

1. First substitute the SIB and start up the system: the SYSID information is copied from lateral planar 2 EEPROM to the SIB EEPROM.
2. Substitute the lateral planar 2 and start up the system: the SYSID information is copied from SIB EEPROM to the lateral planar 2 EEPROM.

This MAP is used to locate defective FRUs not found by normal diagnostics. For this procedure, diagnostics are run on a minimum-configured system. If a failure is detected on the minimum-configured system, the remaining FRUs are exchanged one at a time until the failing one is identified. If a failure is not detected, FRUs are added back until the failure occurs. The failure is then isolated to the failing FRU.

Notes:

1. The Graphical User Interface (GUI) Node Front Panel Layout may not release the serial port. It is necessary to issue:

   s1term -Gw *Frame# Node#* to take the serial port from the GUI and display the BUMP prompt and gain access to BUMP functions.

2. Ensure that all node 3-digit display summaries are up for the frame in which the node being serviced is located. This is the only reliable way to monitor for codes referenced in this MAP.
3. Install the memory cards in a right-to-left sequence beginning with slot A, and then continuing with slots B, C, and D. Memory cards must be installed with no empty slots between installed memory cards.
4. Install the CPU cards in a right-to-left sequence beginning with slot P, and then continuing with slots Q, R, and S. CPU cards must be installed with no empty slots between installed CPU cards.

Attention: When you disconnect a SCSI cable from the DASD, some of the data required to IPL the node may not be available. This can happen if a required file system is fully or partially on the disconnected DASD. In this case, the node will only boot to a code in the range **517-518** or **551-557**; consider this a successful IPL for purposes of this MAP only.

Although boot disk is typically set to *hdisk0* (which is typically the disk located in the lower CPU chassis DASD tray) it is possible that some other disk is defined as the boot disk. You can check the boot disk for this node using `splstdata -b` (then look at address jumpers on the disks). If possible, keep this boot disk in the configuration, even if it means physically moving the boot disk from the I/O expansion chassis to the CPU chassis.

The MAP steps instruct you to reduce the system to one or more of the following configurations:

Minimum Configurations for 604 and 604e High Nodes:

- Power distribution cable cluster, system planar (SP), I/O planars, I/O card (IOD), CPU module flex cables, I/O module flex cables, system interface board (SIB), one CPU card (CPU), one memory card (MC), power supply (PS), lateral planar 1 card, lateral planar 2 card, and node supervisor assembly.

  If no failure is detected, the maintenance menu is displayed. Any other response means one of the remaining FRUs is failing.

- Power distribution cable cluster, system planar (SP), I/O planars, I/O card (IOD), CPU module flex cables, I/O module flex cables, system interface board (SIB), one CPU card (CPU) and one memory card (MC), power supply (PS), SCSI adapter, lateral planar 1 card, lateral planar 2 card, and node supervisor assembly.

  If no failure is detected, the Diagnostic Operating Instructions frame is displayed when the diagnostics are loaded, and the system console is selected. Any other response means one of the remaining FRUs is failing.

Step 0280–001: Sometimes an SRN or BUMP Error Code will be logged in the BUMP Error Log. Before proceeding, check the BUMP Error Log for any SRNs or Error Codes. (See “Using the 604 or 604e High Node BUMP menus” on page 3-19 for BUMP menu descriptions). This is done as follows:

1. Power off.
2. From the GUI Node Front Panel Layout, set the physical key to the service position.
3. Press Enter at the TTY console.

4. Type **sbb**.
5. Press Enter.
6. Select “Set Flags” (1).
7. Enable the BUMP Console Present Flag, disable the Autoservice IPL flag.
8. To exit, type **x** twice.
9. Power on.
10. When the Maintenance Menu appears, display the BUMP Error Log. (Scan all pages).
11. If an SRN is logged, record it and any location codes. Location Codes are separated by a blank. Perform the listed action. An SRN will be preceded by ‘888 103’.
12. If no SRN is logged, check for an Error Code. If an Error Code is logged, record it and any location code. Location codes are separated by a blank. Perform the listed action. Look up the Error Code for possible FRUs. See Appendix A, “Messages and codes” on page A-1.
13. Perform the following:
    - Ensure that the diagnostics and the operating system are shut down. At the Maintenance Menu, select 5 and then hit ENTER.
    - Ensure that the key position switch is in the Service Position.
    - . Set the circuit breakers to the On (‘1’) position.
    - Ensure power supply cable(s) are connected to power supplies.
    - Perform service diagnostics from either hdisk0 or network boot.
    - Find the symptom in the following table that best matches the symptom on your system, and then perform the associated task.

Table 1-8. 604 and 604e High Node error code diagnostics

Information in Operator Panel Display	Other Conditions	Action
Blank	Diagnostic Operating Screen is displayed.	Go to “Step 0280–015” on page 1-32
Blank	Maintenance Menu is displayed.	Select System Boot, then Boot From List (disk or network boot). Wait for one of the other symptoms in this table to occur or if the Diagnostics do not load, go to “Step 0280–002” on page 1-26
888 flashing		Go to “Step 0280–002” on page 1-26
260	Main Menu is Displayed	Select Exit Main Menu and Start System (Boot) then press Enter. When the Starting System Boot menu displays, press Enter. **Note:** Repeat this procedure each time these conditions occur.
269 flashing		Go to “Step 0280–025” on page 1-38
269 (not flashing)		Go to “Step 0280–024” on page 1-37
c31	Instructions to select the system console are displayed on the screen.	Follow the instructions on the screen. Wait for one of the other symptoms in this table to occur.
325 or less	Digits are on solid for more than 3 minutes, except for ‘165’ which may display up to ten minutes with no activity on the BUMP console, and the Power light is on.	Go to “Step 0280–002” on page 1-26
326 or greater	Digits are on solid for more than 3 minutes, and the power light is on.	Go to “Step 0280–009” on page 1-30
Any symptom not listed above.		Go to “Step 0280–002” on page 1-26

Note: Before verifying any condition indicated in the following steps of this MAP (e.g., a certain code displayed on the operator panel display), be sure that the system activity has stopped on that condition (same condition for more than 3 minutes).

Step 0280–002: You have arrived at this step from Table 1-8.

1. Set the circuit breakers to the Off (‘0’) position.
2. Record the slot numbers of the adapters.
3. Label and record the location of any cables attached to the adapters.
4. Remove all the MCA adapters.
5. Record the slot numbers of the memory cards (MC), and then remove all the memory cards (MC), except the one in slot A.
6. Record the slot numbers of the CPU cards (CPU) and then remove all the CPU cards (CPU), except the one in slot P.
7. Set the circuit breakers to the On (‘1’) position.
8. Wait for one of the following conditions to occur:
   a. The Maintenance Menu is displayed.

b. The same three digit number is displayed in the operator panel display for longer than three minutes except for the number ‘165’ which may display to ten minutes with no activity on the BUMP console.

c. The number ‘888’ or ‘---’ is in the operator panel display.

9. Is the maintenance menu displayed?
   - If yes, go to “Step 0280–005” on page 1-28.
   - If no, go to “Step 0280–003.”

Step 0280–003: One of the FRUs remaining in the CPU Enclosure is defective.

1. To test each FRU, exchange the FRUs that have not already been exchanged in the following order:
   a. I/O card (IOD)
   b. CPU card (CPU)
   c. Memory card (MC)
   d. System planar (SP)
   e. I/O planars
   f. Power supply (PS)
   g. CPU module flex cables
   h. I/O module flex cables
   i. System interface board (SIB)

      Note: Once this part is used, return to plant as a “new defective, broken seal”.

   j. Lateral planar 1 card
   k. Lateral planar 2 card

      Note: Once this part is used, return to plant as a “new defective, broken seal”.

   l. Node supervisor card/supervisor interposer card
   m. Media power cable
2. If the maintenance menu is displayed, the system is working correctly and the last part you exchanged is defective. Take the following actions:
   a. Set the circuit breakers to the Off (‘0’) position.
   b. Exchange one of the FRUs in the list.
   c. Set the circuit breakers to the On (‘1’) position.
3. Is the maintenance menu displayed?
   - If yes, the last FRU you exchanged is the defective one.
     a. Reinstall all the FRUs you have exchanged, except the last one and power on the system.
     b. Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.
   - If no, go to “Step 0280–004” on page 1-28.

Step 0280–004: You do not see the maintenance menu on the display.

1. Repeat “Step 0280–003” until the defective FRU is identified or all the FRUs have been exchanged.
2. Did the symptom change?
   - If yes:
     a. Check for loose cards, cables, and obvious problems.
     b. If these components are not causing the problem, return to“Step 0280–001” on page 1-24 and follow the instructions for the new symptom.
   - If no, call the next level of support.

Step 0280–005: You have not detected any failures using this configuration.

1. Set the circuit breakers to the Off (‘0’) position.
2. Starting with the CPU cards, install one additional CPU card (CPU) or memory card (MC), if any.
3. Set the circuit breakers to the On (‘1’) position.
4. Wait for one of the following conditions to occur:
   - The Maintenance Menu is displayed.
   - The same three digit number is displayed in the operator panel display for longer than three minutes except for the number ‘165’ which may display for up to ten minutes with no activity on the BUMP console.
   - The number ‘888’ or ‘---’ is in the operator panel display.
5. Is the maintenance menu displayed?
   - If yes:
     a. Repeat “Step 0280–005” until all CPU cards (CPU) and all memory cards (MC) are installed and tested.
     b. After all CPU cards (CPU) and all memory cards (MC) are installed and tested, set the circuit breakers to the Off (‘0’) position.
     c. Install the SCSI adapter.
     d. Connect the SCSI cable from the SCSI adapter to the SCSI connector.
     e. Go to “Step 0280–010” on page 1-30.
   - If no, go to “Step 0280–006.”

Step 0280–006: The failure may be caused by the last CPU card (CPU) or memory card (MC) installed.

1. Set the circuit breakers to the Off (‘0’) position.
2. Exchange the last card installed (CPU or memory).
3. Set the circuit breakers to the On (‘1’) position.
4. Wait for one of the following conditions to occur:
   - The Maintenance Menu is displayed.
   - The same three digit number is displayed in the operator panel display for longer than three minutes except for the number ‘165’ which may display for up to ten minutes with no activity on the BUMP console.

- The number ‘888’ or ‘---’ is in the operator panel display.

5. Is the maintenance menu displayed?
   - If yes, go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.
   - If no, go to “Step 0280–007.”

Step 0280–007: One of the FRUs remaining in the CPU Enclosure is defective.

1. To test each FRU, exchange the FRUs in the following order:
   a. System planar (SP)
   b. I/O card (IOD)
   c. CPU cards (CPU)
   d. Memory cards (MC)
   e. I/O planars
   f. CPU module flex cables
   g. I/O module flex cables
   h. System interface board (SIB)

      Note: Once this part is used, return to plant as a “new defective, broken seal”.

   i. Node supervisor card assembly
   j. Lateral planar 1 card
   k. Lateral planar 2 card

      Note: Once this part is used, return to plant as a “new defective, broken seal”.

2. Set the circuit breakers to the Off (‘0’) position.
3. Exchange one of the FRUs in the list.
4. Set the circuit breakers to the On (‘1’) position.
5. Wait for one of the following conditions to occur:
   - The Maintenance Menu is displayed.
   - The same three digit number is displayed in the operator panel display for longer than three minutes except for the number ‘165’ which may display for up to ten minutes with no activity on the BUMP console.
   - The number ‘888’ or ‘---’ is in the operator panel display.

6. Is the maintenance menu displayed?
   - If yes, go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.
   - If no, go to “Step 0280–008.”

Step 0280–008: The maintenance menu is not displayed.

1. Reinstall the original FRU.
2. Repeat “Step 0280–007” until the defective FRU is identified or all the FRUs have been exchanged.
3. Did the symptom change?
   - If yes:
     a. Check for loose cards, cables, and obvious problems.

b. If you do not find a problem, return to "Step 0280–001" on page 1-24 and follow the instructions for the new symptom.

- If no, call the next level of support.

Step 0280–009: You have arrived at this step from Table 1-8 on page 1-26.

1. Set the circuit breakers to the Off ('0') position.
2. Record the slot numbers of the adapters.
3. Label and record the location of any cables attached to the adapters.
4. Go to "Step 0280–010."

Step 0280–010:

1. **EITHER** leave in the SCSI adapter and remove all DASD except the boot disk **OR** leave in the Ethernet adapter for a net boot diag and remove the SCSI adapter. (See the media drawer diagram in "Removing the DASD" on page 4-47
2. Set the circuit breakers to the On ('1') position.
3. If the Maintenance Menu is displayed, select System Boot, then Boot From List.
4. Wait for one of the following conditions to occur:
   - The system stops with a flashing or solid '269' displayed in the operator panel display.
   - The system stops with 'c31' displayed in the operator panel display.
   - The same three digit number is displayed in the operator panel display for longer than three minutes except for the number '165' which may display for up to ten minutes with no activity on the BUMP console.
   - The number '888' or '---' is in the operator panel display.
5. Is 'Diagnostic Operating Screen' or 'c31' displayed in the operator panel display?
   - If yes, go to "Step 0280–012" on page 1-31.
   - If no, go to "Step 0280–011."

Step 0280–011: One of the FRUs remaining in the CPU Enclosure is defective.

1. In the following order, exchange the FRUs that have not been exchanged:
   a. SCSI adapter
   b. Hdisk0
   c. SCSI cable
   d. Disk 1, Disk 4 receiver card
   e. Disk 2, Disk 3 receiver card
   f. Inter-receiver cable
   g. I/O card (IOD)
   h. I/O planars
   i. CPU module flex cables
   j. I/O module flex cables
   k. System planar (SP)

l. System interface board (SIB)
m. Power distribution cable cluster
n. CPU cards (CPU) (one at a time)
o. Memory cards (MC) (one at a time)
p. Power supply (PS)

2. Repeat “Step 0280–009” on page 1-30 until the defective FRU is identified or all the FRUs have been exchanged.
3. Did the symptom change?
   - If yes:
     a. Check for loose cards, cables, and obvious problems.
     b. If you do not find a problem, return to “Step 0280–001” on page 1-24 and follow the instructions for the new symptom.
   - If no, call the next level of support.

Step 0280–012: The system is working correctly with this configuration. One of the adapters that you removed is probably defective.

1. Set the circuit breakers to the Off (‘0’) position.
2. Install one adapter, and connect any cables and devices that were attached to it.
3. Set the circuit breakers to the On (‘1’) position.
4. Start the diag boot from hdisk0 or net boot.
5. If the Maintenance Menu is displayed, select System Boot, then Boot From List.
6. Wait for one of the following conditions to occur:
   - The system stops with ‘c31’ displayed in the operator panel display.
   - The system stops with a flashing or solid ‘269’ displayed in the operator panel display.
   - The same three digit number is displayed in the operator panel display for longer than three minutes except for the number ‘165’ which may display for up to ten minutes with no activity on the BUMP console.
   - The number ‘888’ or ‘---’ is in the operator panel display.
7. Is ‘Diagnostic Operating Screen’ or ‘c31’ displayed in the operator panel display?
   - If yes:
     a. Repeat “Step 0280–012” until all of the adapters are installed.
     b. Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.
   - If no, go to “Step 0280–013.”

Step 0280–013: After checking the operator panel display, you find that the terms ‘Diagnostic Operating Screen’ and ‘c31’ are both absent from the display.

1. Set the circuit breakers to the Off (‘0’) position.
2. Starting with the last installed adapter, disconnect one attached device and cable.
3. Set the circuit breakers to the On (‘1’) position.
4. If the Maintenance Menu is displayed, select System Boot, then Boot From List.

5. Wait for one of the following conditions to occur:
   - The system stops with ‘c31’ displayed in the operator panel display.
   - The system stops with a flashing or solid ‘269’ displayed in the operator panel display.
   - The same three digit number is displayed in the operator panel display for longer than three minutes except for the number ‘165’ which may display for up to ten minutes with no activity on the BUMP console.
   - The number ‘888’ or ‘---’ is in the operator panel display.
6. Is ‘Diagnostic Operating Screen’ or ‘c31’ displayed in the operator panel display?
   - If yes, the last device or cable you disconnected is defective.
     a. Exchange the defective device or cable.
     b. Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.
   - If no, go to “Step 0280–014.”

Step 0280–014: The terms ‘Diagnostic Operating Screen’ and ‘c31’ are both absent from the display.

1. Repeat “Step 0280–009” on page 1-30 until the defective device is identified or all the devices and cables have been exchanged.
2. If all the devices and cables have been removed, one of the FRUs remaining in the CPU Enclosure is defective. To test each FRU, exchange the FRUs in the following order:
   - Adapter (last one installed)
   - I/O card (IOD)
   - I/O planars
   - CPU module flex cables
   - I/O module flex cables
   - System interface board (SIB)
   - Power supply (PS)
3. Did the symptom change?
   - If yes:
     a. Check for loose cards, cables, and obvious problems.
     b. If you do not find a problem, return to “Step 0280–001” on page 1-24 and follow the instructions for the new symptom.
   - If no, call the next level of support.

Step 0280–015: The Diagnostic Operating Screen is displayed and contains no information.

1. Set the circuit breakers to the Off (‘0’) position.
2. Record the slot numbers of the adapters.
3. Label and record the location of any cables attached to the adapters.
4. Remove all the MCA adapters except:
   - The adapter attached to the hdisk0 from which you will IPL.
   - The adapter attached to your console.

   Note: Leave serial adapter cable and supervisor adapter cable attached.

5. Set the circuit breakers to the On (‘1’) position.
6. Perform service diagnostics from either hdisk0 or network book.
7. If the Maintenance Menu is displayed, select System Boot, then Boot From List.
8. Wait for one of the following conditions to occur:
   - The system stops with ‘c31’ displayed in the operator panel display.
   - The system stops with a flashing or solid ‘269’ displayed in the operator panel display.
   - The same three digit number is displayed in the operator panel display for longer than three minutes except for the number ‘165’ which may display for up to ten minutes with no activity on the BUMP console.
   - The number ‘888’ or ‘---’ is in the operator panel display.
9. Is ‘Diagnostic Operating Screen’ or ‘c31’ displayed in the operator panel display?
   - If yes, go to “Step 0280–016.”
   - If no, the symptom has changed.
     – Check for loose cards, cables, and obvious problems.
     – If you do not find a problem, return to “Step 0280–001” on page 1-24 and follow the instructions for the new symptom.

Step 0280–016: Either ‘Diagnostic Operating Screen’ or ‘c31’ is displayed in the operator panel display.

1. Follow the instructions on the display to select your console.
2. When you see the Diagnostics Operating Instructions, press the Enter key.
3. If the terminal type is not defined or you are IPLing from diag net boot, take the following actions before continuing with the diagnostics:
   a. Go to the FUNCTION SELECTION menu.
   b. Choose the Initialize Terminal Option to initialize the AIX operating system environment.

   Note: This is a different operation from the console display selection procedure.
4. Select Advanced Diagnostics Routines.
5. When the DIAGNOSTIC MODE SELECTION menu displays, select System Verification.
6. Run the diagnostics for each of the adapters and devices on the test list.
7. Did you get an SRN?
   - If yes, go to “Step 0280–017” on page 1-34.
   - If no, one of the adapters or devices you removed is causing the problem:
     a. Install the adapters and devices one at a time to determine which adapter or device is failing.
     b. Test the system after each adapter or device is installed.
     c. Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.

Step 0280–017: You received an SRN.

1. Look at the FRU part numbers associated with the SRN.
2. Have you exchanged all the FRUs that correspond to the failing function codes?
   - If yes, go to “Step 0280–002” on page 1-26.
   - If no:
     a. Exchange the FRU with the highest failure percentage that has not been changed.
     b. Repeat “Step 0280–017” until all the FRUs associated with the SRN have been replaced or System Checkout runs without incident.
     c. Run System Checkout after each FRU is exchanged.
     d. If System Checkout runs without error, go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.

Step 0280–018: The message ‘269–NO DEVICE’ flashes on your display screen.

1. Set the circuit breakers to the Off (‘0’) position.
2. Record the location of all the internal SCSI devices attached to the SCSI bus you are attempting to IPL from.
3. Remove all devices except the read boot disk (hdisk0).
4. Set the circuit breakers to the On (‘1’) position.
5. If the Maintenance Menu is displayed, select System Boot, Boot From List.
6. If the system stops with a ‘260’ displayed, and the Main Menu is displayed, select Exit Main Menu and Start System (Boot) and press Enter.
7. When the “Starting System Boot” menu displays, press Enter.
8. Repeat this procedure each time these conditions occur.
9. Wait for one of the following conditions to occur:
   - The system stops with a flashing or solid ‘269’ displayed in the operator panel display.
   - The system stops with ‘c31’ displayed in the operator panel display.
10. Is ‘Diagnostic Operating Screen’ or ‘c31’ displayed in the operator panel display?
    - If yes, go to “Step 0280–023” on page 1-36.
    - If no, one of the FRUs remaining in the CPU Enclosure is defective.
      – Go to “Step 0280–019.”

Step 0280–019: The terms ‘Diagnostic Operating Screen’ or ‘c31’ do not appear on the operator panel display.

1. This problem may be caused by:
   - The disk pulling the bus down on the SCSI adapter
   - A defective SCSI adapter
   - A defective terminator
   - A defective SIB
   - A defective cable

2. Set the circuit breakers to the Off (‘0’) position.
3. Remove the hdisk0.
4. Perform service diagnostics from network boot; this will normally be hdisk0.
5. Set the circuit breakers to the On (‘1’) position.
6. If the Maintenance Menu is displayed, select System Boot, then Boot From List.
7. If the system stops with a ‘260’ displayed, and the Main Menu is displayed, Select Exit Main Menu and Start System (Boot) and press Enter. When the “Starting System Boot” menu displays, press Enter. Repeat this procedure each time these conditions occur.
8. Wait for one of the following conditions to occur:
   - The system stops with a flashing or solid ‘269’ displayed in the operator panel display.
   - The system stops with ‘c31’ displayed in the operator panel display.
9. Is ‘Diagnostic Operating Screen’ or ‘c31’ displayed in the operator panel display?
   - If yes, Replace the hdisk0.
     – Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.
   - If no, One of the FRUs remaining in the CPU Enclosure is defective.
     – Go to “Step 0280–020.”

Step 0280–020: One of the FRUs remaining in the CPU Enclosure is defective.

1. In the following order, exchange the FRUs that have not been exchanged:
   - SCSI adapter
   - Hdisk0 (if still in the system).
   - System interface board (SIB)
   - SCSI cable
2. After each exchange, try performing service diagnostics from network boot to determine if replacing the FRU solved the problem.
3. Were you able to identify the failing FRU?
   - If yes:
     a. Replace the failing FRU.
     b. Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.
   - If no, one of the FRUs remaining in the CPU Enclosure is defective.
     – Go to “Step 0280–021.”

Step 0280–021: In the previous steps, you were not able to determine which FRU is failing.

1. Set the circuit breakers to the Off (‘0’) position.
2. Record the slot numbers of the adapters. Label and record the location of any cables attached to the adapters.
3. Remove all adapters except the SCSI from the I/O module.
4. Remove all devices except the diag net boot disk.
5. Set the circuit breakers to the On (‘1’) position.

6. If the Maintenance Menu is displayed, select System Boot, then Boot From List.
7. If the system stops with a '260' displayed, and the Main Menu is displayed, Select Exit Main Menu and Start System (Boot) and press Enter. When the "Starting System Boot" menu displays, press Enter. Repeat this procedure each time these conditions occur. Wait for one of the following conditions to occur:
   - The system stops with a flashing or solid '269' displayed in the operator panel display.
   - The system stops with 'c31' displayed in the operator panel display.
8. Is 'Diagnostic Operating Screen' or 'c31' displayed in the operator panel display?
   - If yes, go to "Step 0280–012" on page 1-31.
   - If no, go to "Step 0280–022."

Step 0280–022: One of the FRUs remaining in the CPU Enclosure is defective.

1. Exchange remaining original FRUs in the following order:
   a. I/O card (IOD)
   b. I/O planars (MCA planars)
   c. CPU module flex cables
   d. I/O module flex cables
   e. System planar (SP)
   f. System interface board (SIB)
   g. CPU cards (CPU) (one at a time)
   h. Memory cards (MC) (one at a time)
2. Repeat "Step 0280–021" on page 1-35 until you have either found the defective FRU, or all FRUs have been exchanged.
3. Did the symptom change?
   - If yes:
     a. Check for loose cards, cables, and obvious problems.
     b. If you do not find a problem, return to "Step 0280–001" on page 1-24 and follow the instructions for the new symptom.
   - If no, call the next level of support.

Step 0280–023: The system is working correctly with this configuration. One of the devices that you removed is probably defective.

1. Set the circuit breakers to the Off ('0') position.
2. Install a device.
3. Set the circuit breakers to the On ('1') position.
4. If the Maintenance Menu is displayed, select System Boot, Boot From List.
5. If the system stops with a '260' displayed, and the Main Menu is displayed, select Exit Main Menu and Start System (Boot); then press Enter. When the "Starting System Boot" menu displays, press Enter. Repeat this procedure each time these conditions occur.
6. Wait for one of the following conditions to occur:

- The system stops with a flashing or solid ‘269’ displayed in the operator panel display.
- The system stops with ‘c31’ displayed in the operator panel display.

7. Is ‘c31’ displayed in the operator panel display?
   - If yes, repeat “Step 0280–023” on page 1-36 until all of the devices are installed.
   - If no, the last device you inserted is defective.
     – Exchange the defective device or cable.
     – Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.

Step 0280–024: The numbers ‘269’ appear on the display; they are not flashing.

1. This problem can be caused by:
   - A SCSI device pulling the bus down or opening the PTC on the SCSI adapter
   - A defective SCSI adapter
   - A defective terminator
   - A defective system interface board (SIB)
   - A defective cable
2. The most likely problem is the SCSI adapter or a device pulling the bus down.
   a. Set the circuit breakers to the Off (‘0’) position.
   b. Remove all SCSI Adapters except the one you are trying to boot from.
   c. Set the circuit breakers to the On (‘1’) position.
   d. If the Maintenance Menu is displayed, select System Boot, Boot From List.
   e. Wait for one of the following conditions to occur:
      - The system stops with a flashing or solid ‘269’ displayed in the operator panel display.
      - The DIAGNOSTIC OPERATING INSTRUCTIONS screen is displayed.
3. If the system stops with a ‘c31’ in the operator panel display, follow the instructions on the display to select your console.
4. Is a flashing or solid ‘269’ displayed in the operator panel display?
   - If yes, go to “Step 0280–018” on page 1-34.
   - If no:
     a. If the DIAGNOSTIC OPERATING INSTRUCTIONS screen is displayed, the system is working correctly. One of the SCSI adapters you removed was defective.
        1) Reinstall the SCSI adapters one by one until you find the defective one.
        2) Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.
     b. If you have a different symptom, go to “Step 0280–001” on page 1-24 and follow the instructions for the new symptom.

Step 0280–025: The numbers ‘269’ are flashing on the display along with a message.

1. Find the message in the following table and perform the corresponding action..

Table 1-9. Error code actions

Message Displayed	Action
269 - NO BOOTABLE	Go to “Step 0280–026.”
269 - NO DEVICE	Go to “Step 0280–018” on page 1-34.
269 - NO DEV TYPE	Go to “Step 0280–027.”

Step 0280–026: The following message appears on your display:

- ‘269–NO BOOTABLE’.

1. Exchange remaining original FRUs in the following order:
   a. SCSI adapter
   b. I/O Planar
   c. I/O Card
   d. Flex Cable
2. After each exchange, try performing service diagnostics from network boot to determine if the FRU fixed the problem.
3. Were you able to identify the failing FRU?
   - If yes:
     a. Replace the failing FRU.
     b. Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.
   - If no, go to “Step 0280–018” on page 1-34.

Step 0280–027: The following message appears on your display:

- ‘269–NO DEV TYPE’.

1. Exchange the hdisk0.
2. Try performing service diagnostics from network boot to determine if the FRU fixed the problem.
3. Were you able to identify hdisk0 as the failing FRU?
   - If yes:
     a. Replace the hdisk0.
     b. Go to "End of call MAP (MAP 0650)" in *RS/6000 SP: System Service Guide*.
   - If no, go to “Step 0280–018” on page 1-34.

Chapter 2. Locations

Naming standard for RS/6000 SP components

The purpose of this section is to define a naming standard for all components in the RS/6000 SP system. This standard provides a consistent, logical naming convention system necessary for documentation including details, assembly drawings, schematics, manufacturing documents, service documents, and customer publications.

Format structure

The RS/6000 SP system is structured in a modular fashion with different levels of assembly which can be independently described. These levels are:

1. System level
2. Frame level
3. Major assembly level (e.g. processor node).
4. Sub-Assembly level (e.g. cards, fan assembly).

The format structure is used to individually identify any connection location at any level in the assembly. The main use of this format is to describe connector, cabling, and schematic locations shown in tables and diagrams throughout this manual.

Example of format structure: **Format:** `FRAME(WWW) - MAJOR ASSEMBLY(XXX) - SUBASSEMBLY(YY) - CONNECTOR NUMBER (ZZZZ)`

Frame (WWW)

- 1st character is the frame type:
  - E for RS/6000 SP frame
  - L for logical RS/6000 SP frame (used for models 30X and 40X)
  - S for multi-switch frame
  - C for control workstation
  - Z for another frame such as a server
- 2nd and 3rd characters are the frame number:
  - 00 for any/all frames (designates location inside any/all frames)
  - 01 - 99 for frames 1-99 (specific to that frame)

Notes:

1. E01 designates RS/6000 SP physical frame 1
2. L00 designates any/all RS/6000 SP logical frames
3. S00 designates any/all RS/6000 SP multi-switch frames
4. For locations inside a frame, the Frame (WWW) and/or Major Assembly (XXX) strings may be omitted, making the format YY-ZZZ

Major assembly (XXX)

- 1st character is the major assembly type (all three characters if the assembly occurs only once in a frame):
  - N for processor node assembly
  - S for switch assembly
  - PDU for power distribution unit assembly
  - ADC for ac/dc Converter assembly
  - FRA for frame
- 2nd and 3rd characters are the major assembly number:
  - 00 for any/all major assemblies (designates location inside any/all major assemblies)
  - 01 - 99 for major assembly 1-99 (specific to that major assembly)

Sub-assembly (YY): 1st and 2nd characters are the assembly designation inside the major assembly. (This string may be omitted in some cases.)

Refer to the lists of two-character designations associated with each major assembly throughout this chapter.

Example: `SC` denotes a switch card.

Connection location (ZZZZ)

- 1st character is the connection type:
  - P for plug (cable side)
  - J for jack (card/component side)
  - G for chassis ground connection
- 2nd, 3rd, and 4th characters are number identifiers. Leading zeroes may be omitted.

  Example: `P102` is plug 102

Examples for using complete levels of nomenclature: To describe the jack 23 on the switch assembly bulkhead in the second RS/6000 SP frame in a four-frame configuration, designate as:

```
E02-S01-BH-J23
```

To describe plug 1 on the power card of the any switch assembly of any RS/6000 SP frame in any size system configuration, designate as:

```
E00-S00-PC-P1 or just PC-P1
```

Location diagrams of the RS/6000 SP components

See Figure 2-1 on page 2-3, Figure 2-2 on page 2-4, and Figure 2-4 on page 2-6, in the pages that follow, for views of the RS/6000 SP frame locations. Refer to the diagrams included in this section for specific views and cabling of the main component sections in the RS/6000 SP frame.

Front and rear views of RS/6000 SP frame

Figure 2-1 shows a front view of the RS/6000 SP frame locations. “Frame (FRA)” on page 2-6 describes the assembly designations for the RS/6000 SP frame.

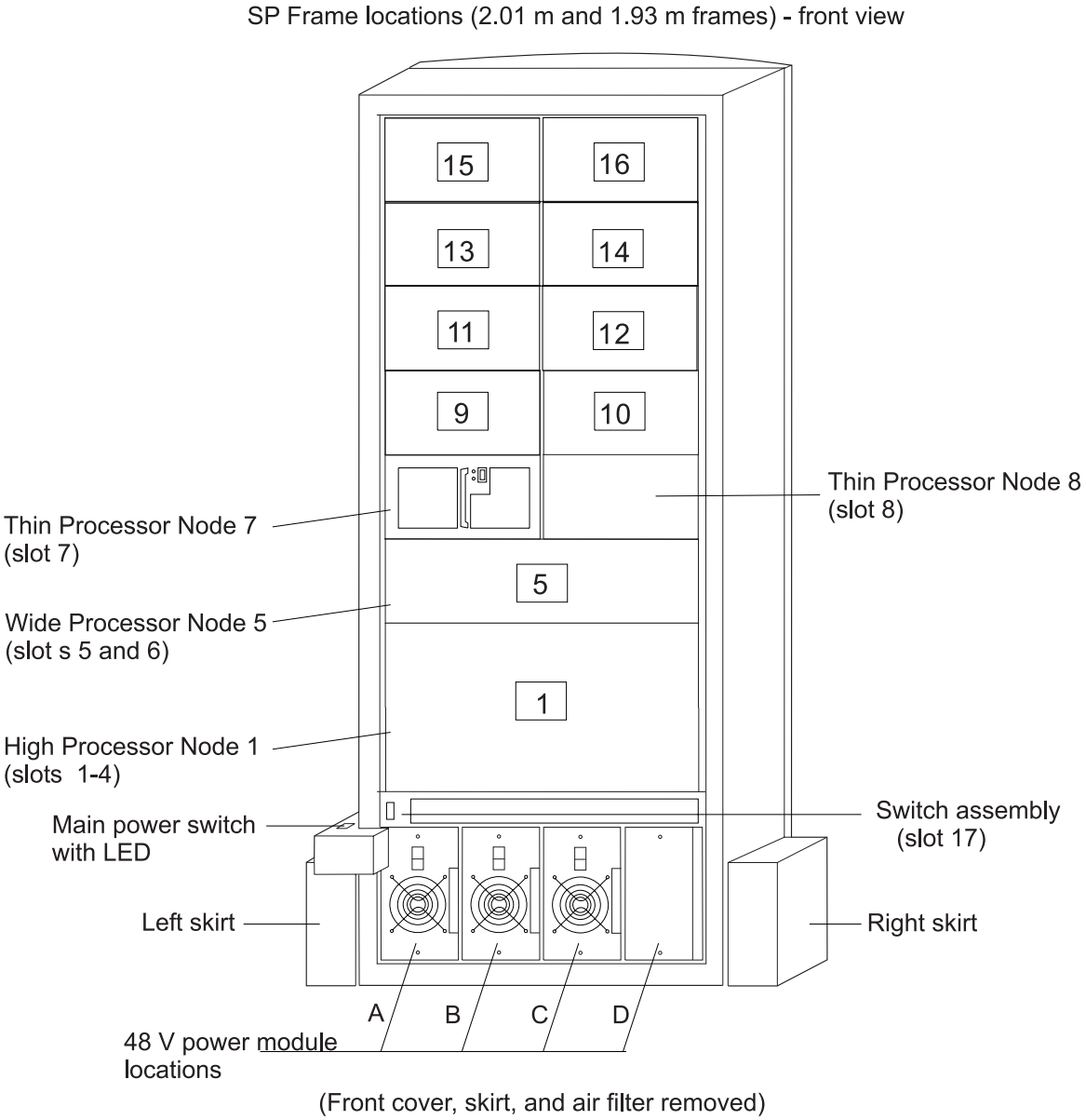


Figure 2-1. Front view of frame locations. See notes below.

Figure notes:

1. Wide processor nodes take up an entire shelf position (two thin processor node slots). They are identified by the odd numbered position.
2. In a F/C 2030/1 frame, switch assemblies take up an entire shelf partition. (They are identified by the even-numbered position.)
3. Processor node slots are numbered up to N16.
4. A High node or SMP High node takes up 2 shelf positions (slots). It is identified by the least odd number position of the occupied slots.

Figure 2-2 shows a front view of the RS/6000 SP multi-switch frame.

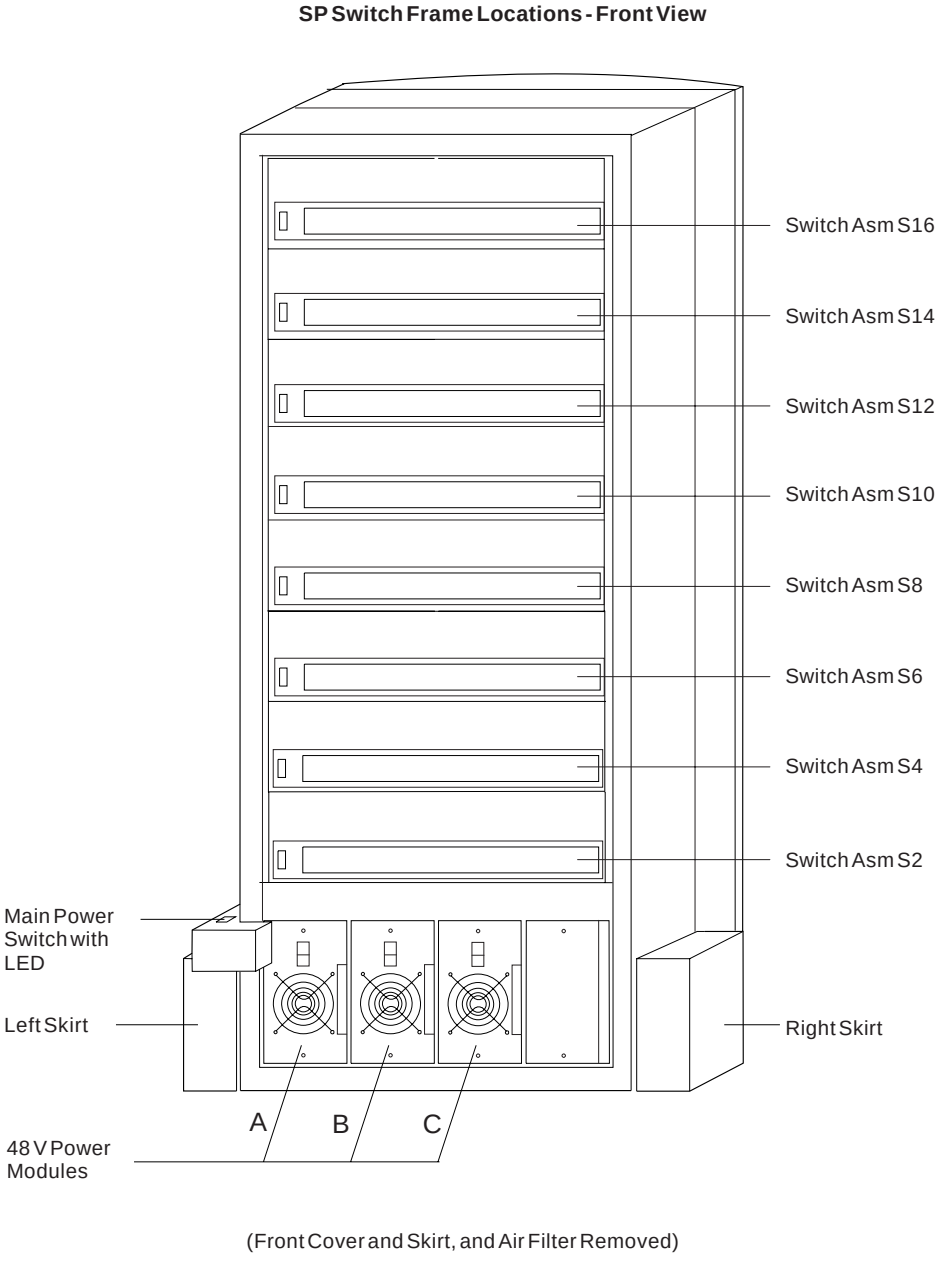


Figure 2-2. Front view of multi-switch frame locations

Figure 2-3 on page 2-5 shows a front view of the Model 3AX (49-inch) frame.

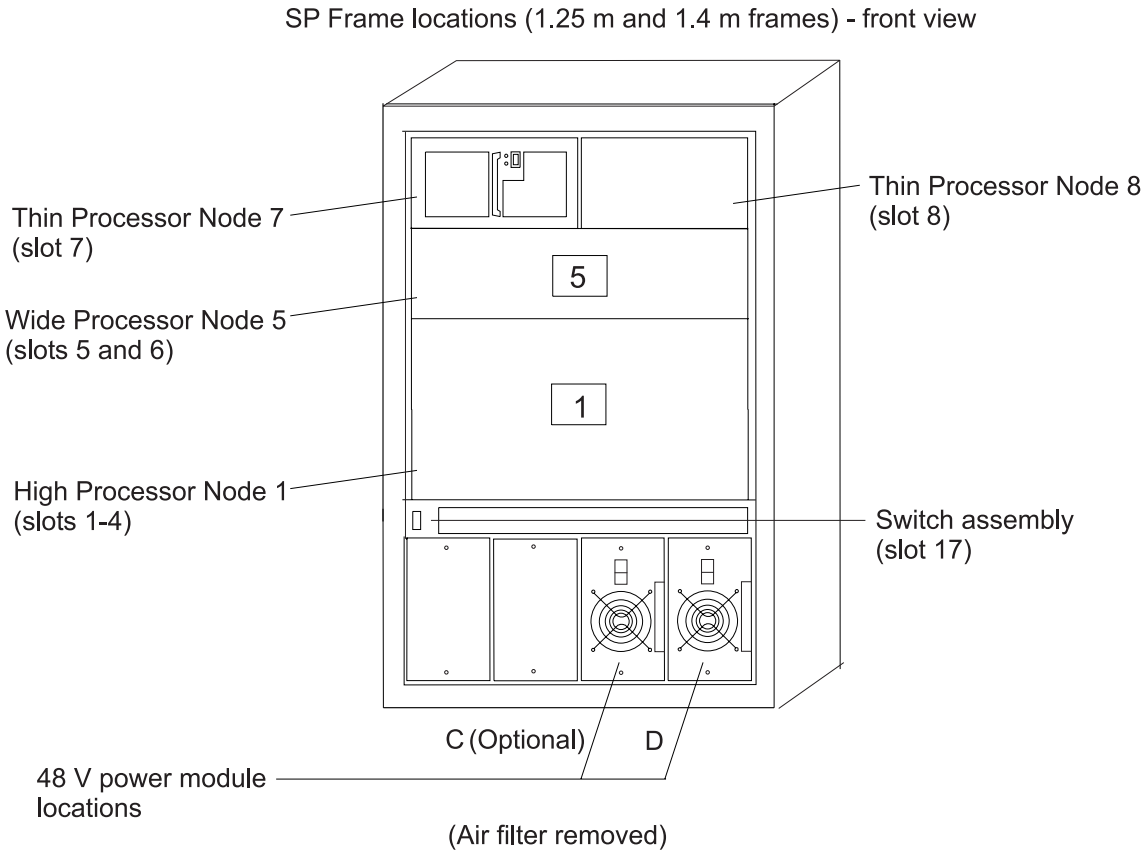


Figure 2-3. Front view of 49-inch frame locations. See notes below.

Figure notes:

1. Wide processor nodes take up an entire shelf position (two thin processor node slots). They are identified by the odd numbered position.
2. In a F/C 2030/1 frame, switch assemblies take up an entire shelf partition. (They are identified by the even-numbered position.)
3. Processor node slots are numbered up to N8.
4. The single-phase SEPBU power unit must have a power module in position “D” (right-most slot). For N+1 operation, a power module may be installed in position “C” (next to slot “D”).
5. There are no skirts on the 49-inch frame.
6. A High node or SMP High node takes up 2 shelf positions (slots). It is identified by the least odd number position of the occupied slots.
7. The switch assembly is not available in the 1.4 m frame.

Figure 2-4 on page 2-6 shows a rear view of the RS/6000 SP frame locations.

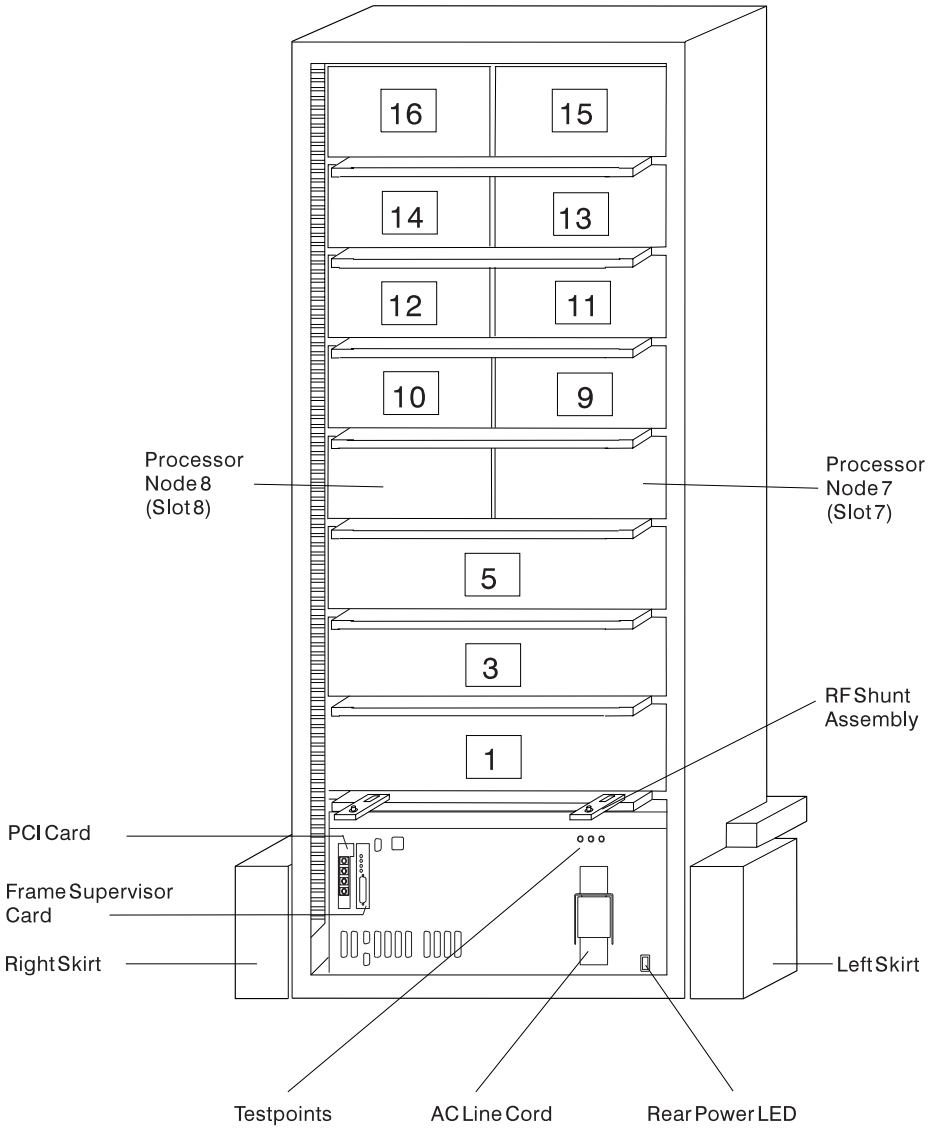


Figure 2-4. Rear view of frame locations

Note: See notes under Figure 2-1 on page 2-3 for processor node/switch assembly numbering.

Frame locations

Figure 2-1 on page 2-3 shows a front view of the RS/6000 SP frame locations, with numbered processor nodes, and the three phase SEPBU.

Frame (FRA): This list shows the designations specifically for the RS/6000 SP frame:

G1: Right-hand rear ground

G2: Left-hand rear ground

G3: PDU ac ground

G4: PDU dc ground

G5: Input cable ground

G6: Front door ground

G7: Rear door ground

G8: Ground

SW: Power-on switch

LD: LED card

FC: Front cover

RC: Rear cover

Example: `E01-FRA-G1`

604 or 604e High Processor Node locations

Refer to *7015 Models R30, R40, and R50 CPU Enclosure Installation and Service Guide* and the *7015 Supplemental Information* for more detailed information on the 604 or 604e High Node components.

Figure 2-7 on page 2-10 shows a top view of a RS/6000 SP 604 or 604e high processor node, and Figure 2-5 on page 2-8 shows a high-level component view of a 604 high processor node. Figure 2-6 on page 2-9 shows the Ethernet, MCA, SPS, and SCSI slots in the back of the node.

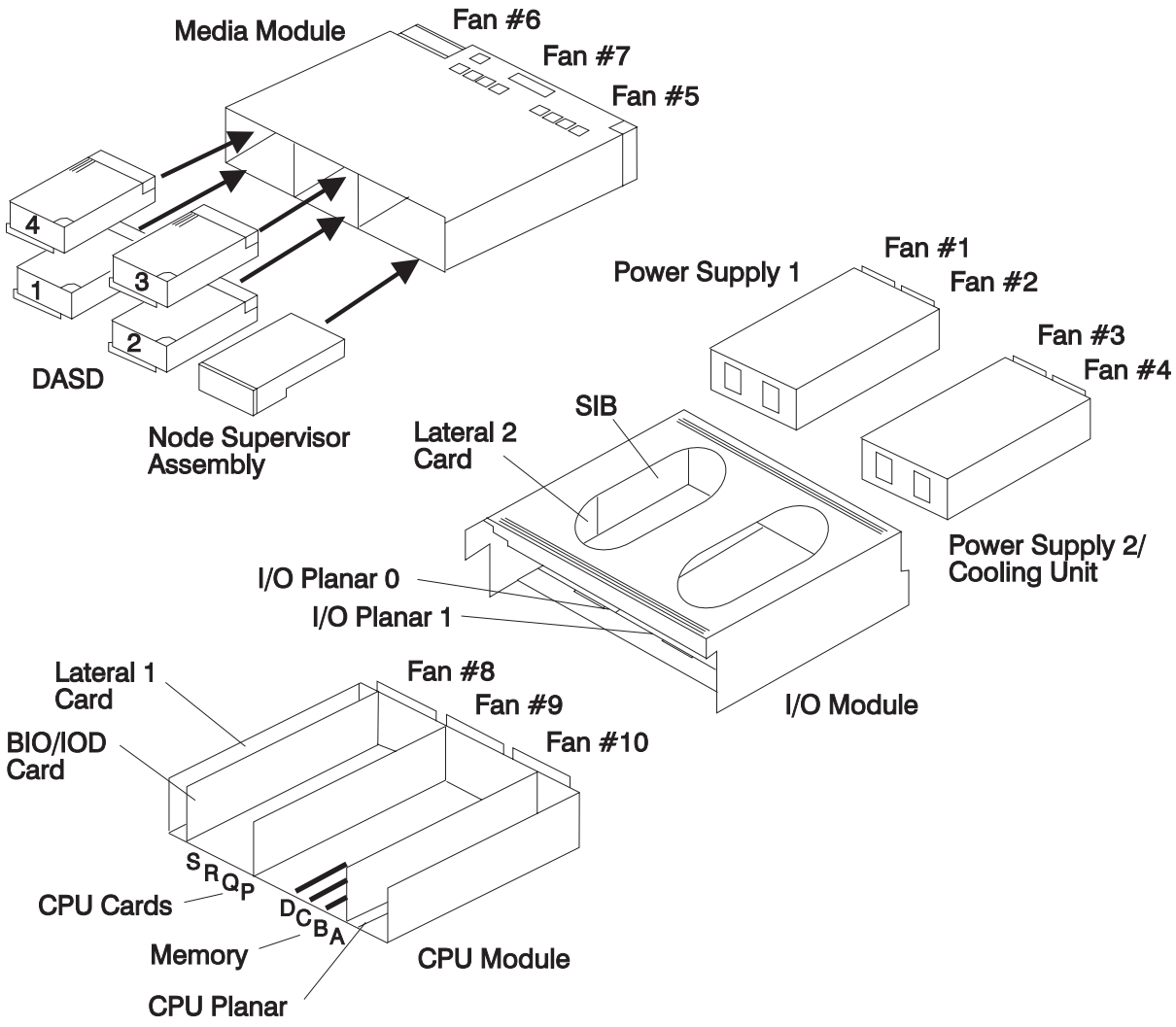


Figure 2-5. 604 or 604e High Node high level component diagram

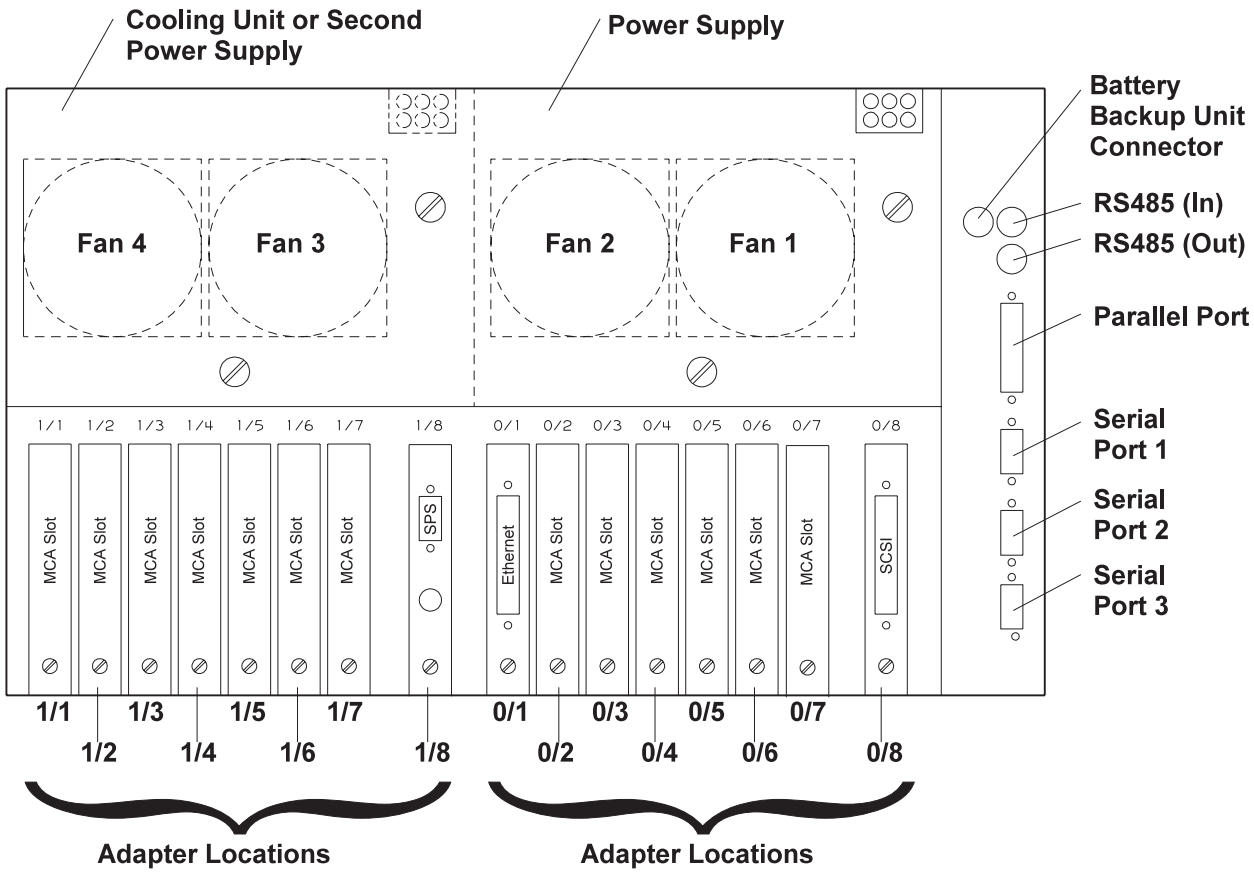


Figure 2-6. 604 or 604e High Node rear view

CPU module

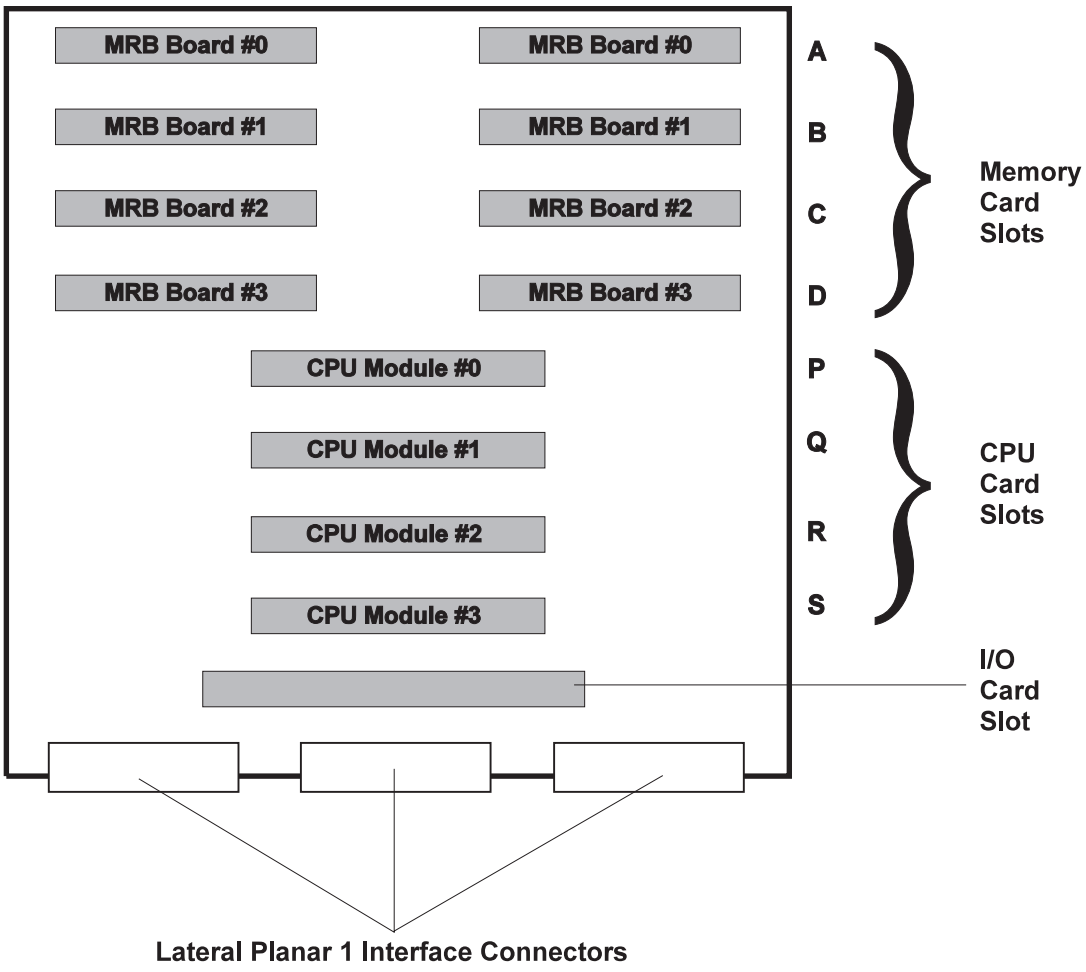


Figure 2-7. 604 or 604e High Processor Node system planar top view

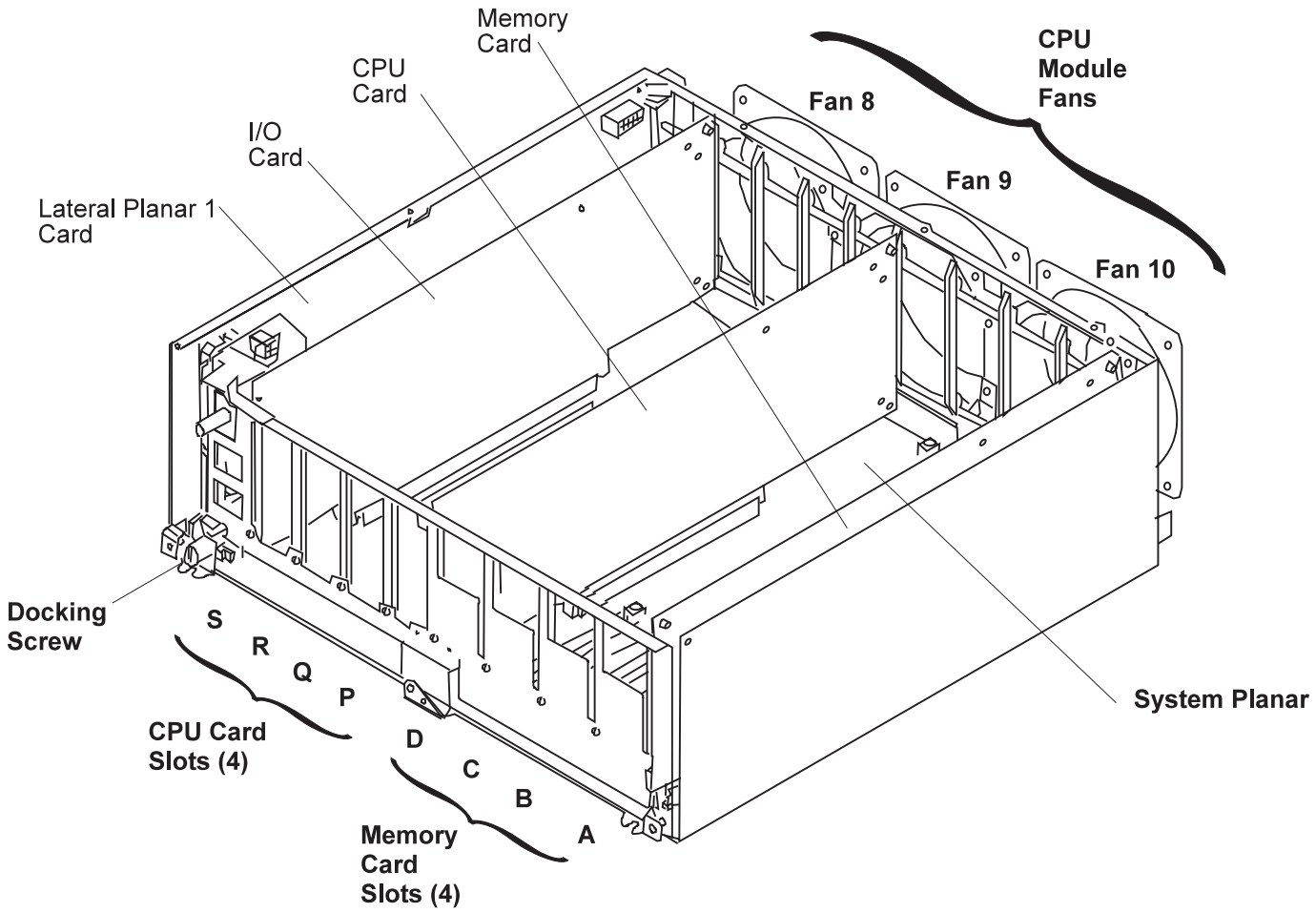
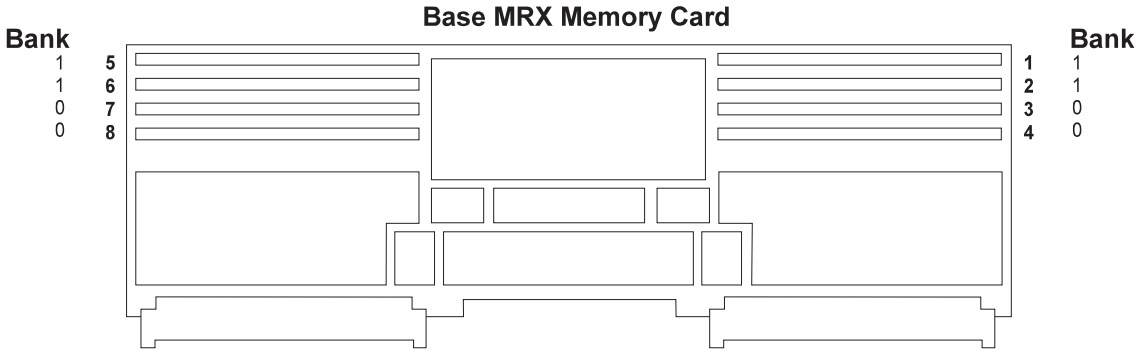


Figure 2-8. CPU module locations. Top view with top cover removed.

Memory cards: There are four types of memory card available for use with the 604 and 604e processor nodes: MRX card, RLX card, NFX card, and SF5 card.

The following figure shows the base MRX memory card.



Memory cards must be installed starting from memory slot A. Additional memory cards must be installed using memory slot B first, then C, then D.

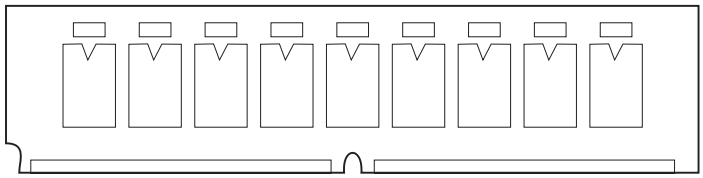
The system can be upgraded by installing up to three additional memory cards.

Two kinds of memory modules can be installed on memory cards:

- 8MB memory modules which use 4Mb technology.

- 32MB memory modules which use 16Mb technology.

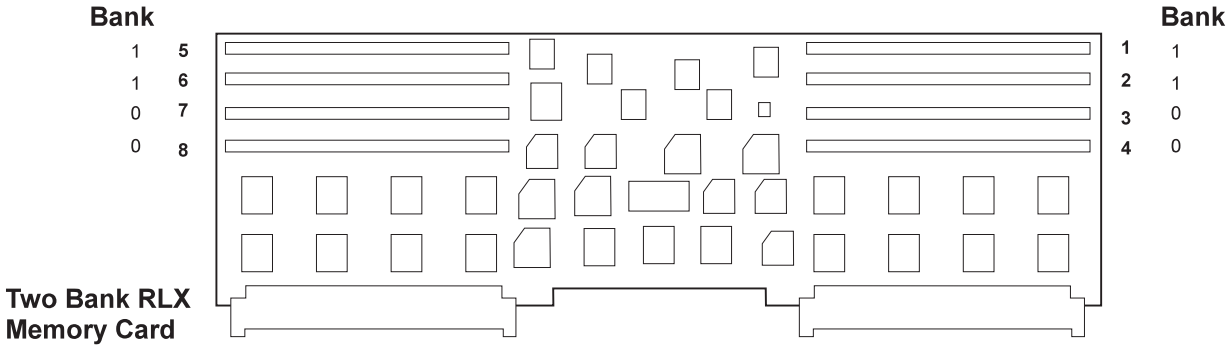
The following figure shows a memory module.

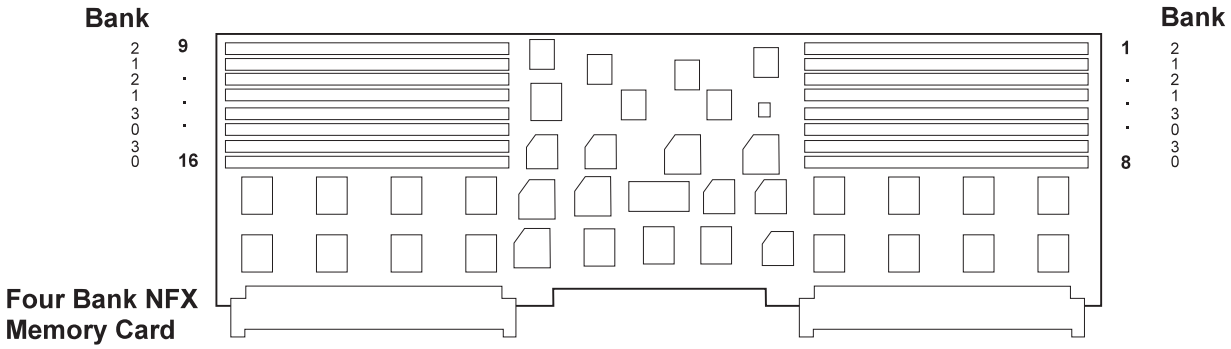


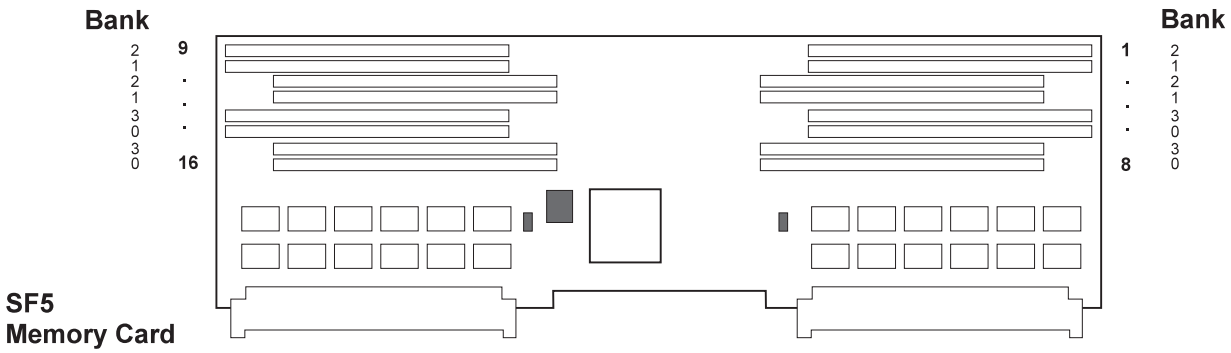
According to the type of memory module installed on the memory card, the total memory size is:

- If it has eight 8MB memory modules, the memory card has 64MB memory.
- If it has 32MB memory modules, the memory card has 256MB memory.

The following figure shows the other three types of memory card. A two bank (8 slots) RLX card, a four bank (16 slots) NFX card, and a four bank (16 slots) SF5 card. Each bank can house four memory modules kits. Each kit is composed of four memory modules each, which comply with the JEDEC standard for 168 pin, ECC, 60 ns, 5 volt memory modules.







The following figure shows a standard memory module.

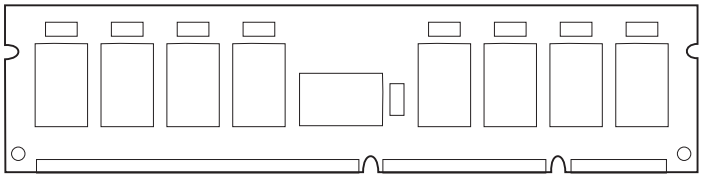


Table 2-1 shows the memory module kits supported by RLX, NFX, and SF5 cards for 604 and 604e processor nodes, and the resulting memory capacity for each kit.

Table 2-1. 604 and 604e memory module kits

Name of the Kit	Description	Resulting Memory Capacity
MM32	4 modules of 8MB each	32MB memory
MM64	4 modules of 16MB each	64MB memory
MM128	4 modules of 32MB each	128MB memory
MM256	4 modules of 64MB each	256MB memory

The maximum memory reachable with this kind of memory card is 1024MB, since up to four of kits (indicated in Table 2-1) can be installed on the memory card.

Do not install memory modules from different kits on the same RLX, NFX, or SF5 card.

According to both the size and number of memory module kits installed on the RLX, NFX, or SF5 cards, these can be divided into the following:

- **NF64** board, based on 4M bit technology, which gives 64MB memory. It houses two MM32 memory module kits.
- **NF128** board, based on 4M bit technology, which gives 128MB memory. It houses two MM64 memory module kits.
- **NF256** board, based on 16M bit technology, which gives 256MB memory. It houses two MM128 memory module kits.
- **NF512** board, based on 16M bit technology, which gives 512MB memory. It houses four MM128 memory module kits.
- **NF1024** board, based on 16M bit technology, which gives 1024MB memory. It houses four MM256 memory module kits.

Note: The maximum memory configuration yields a system with:

- 604 Node — 2048BM (4 x 512MB)
- 604e Node — 4096MB (4 x 1024MB)

Media module

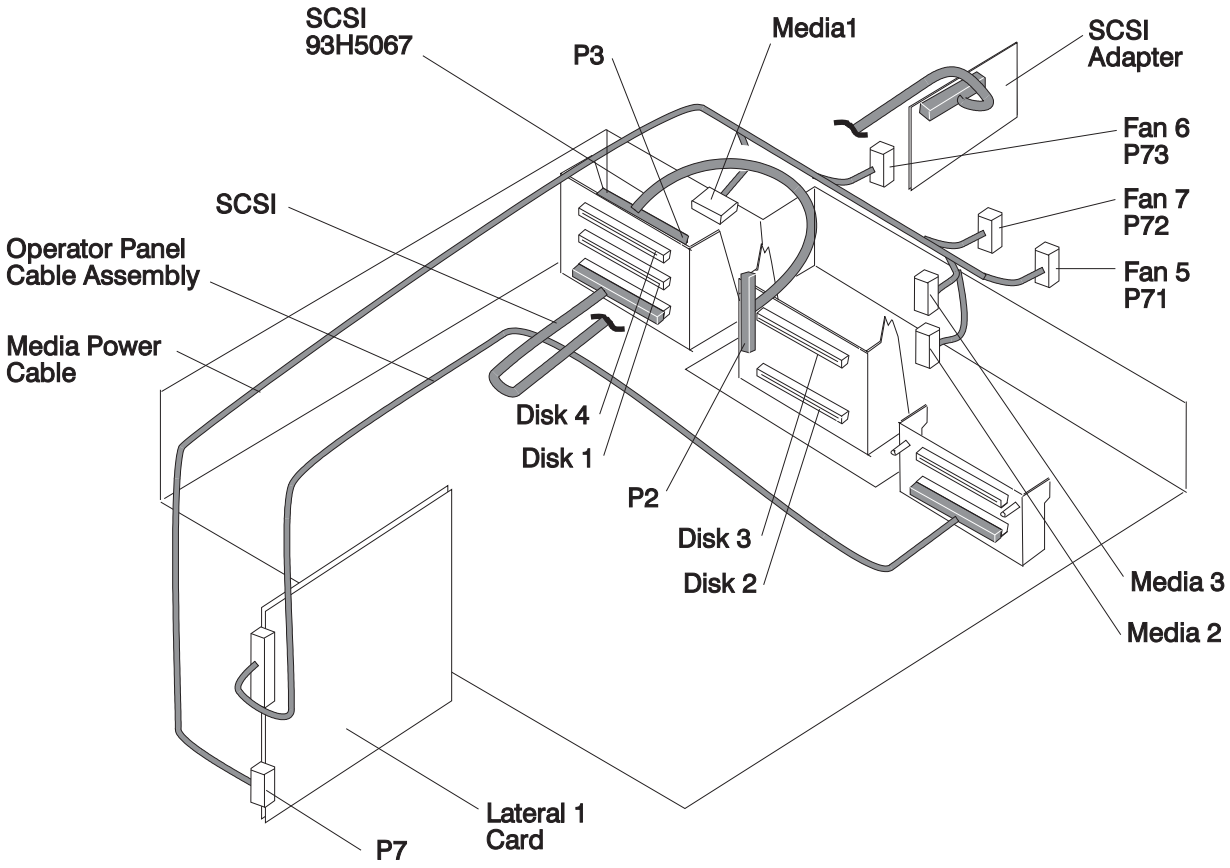


Figure 2-9. Media module locations

Attention: Use care when removing or replacing the media module in a 604e High Node to prevent damage to the SCSI cable.

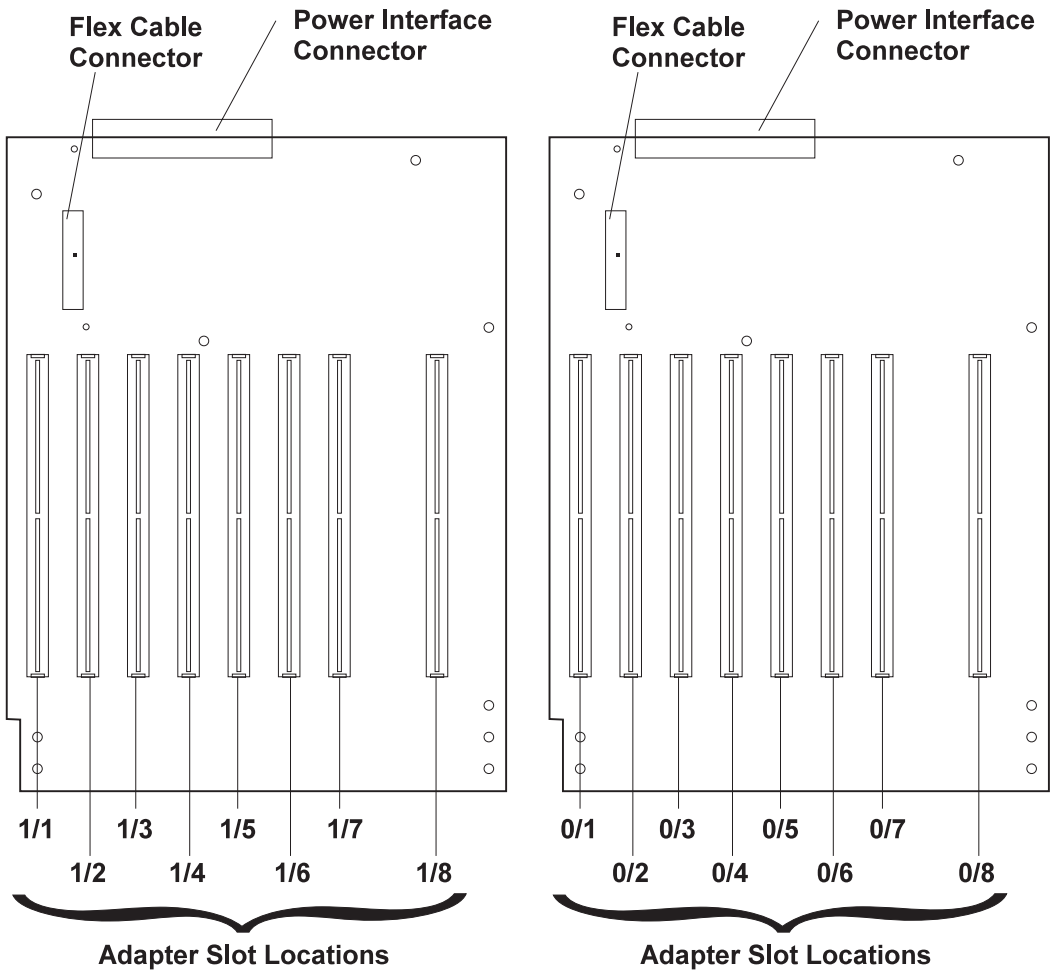


Figure 2-10. 604 and 604e Node I/O planars, top view

High Processor Node (NXX): This list shows the designations for the high processor node:

PR: Processor planar

PL: System I/O planar

SV: Node supervisor

F1-F10: Fans 1 - 10

CB: Circuit breaker

ME: Memory card

MC: Micro Channel card

PS: Power supply

EN: Ethernet card

D1-D3: Direct access storage devices 1-3

BH: I/O bulkhead

Connector details

Figure 2-11 on page 2-16 shows RS/6000 SP component connector details.

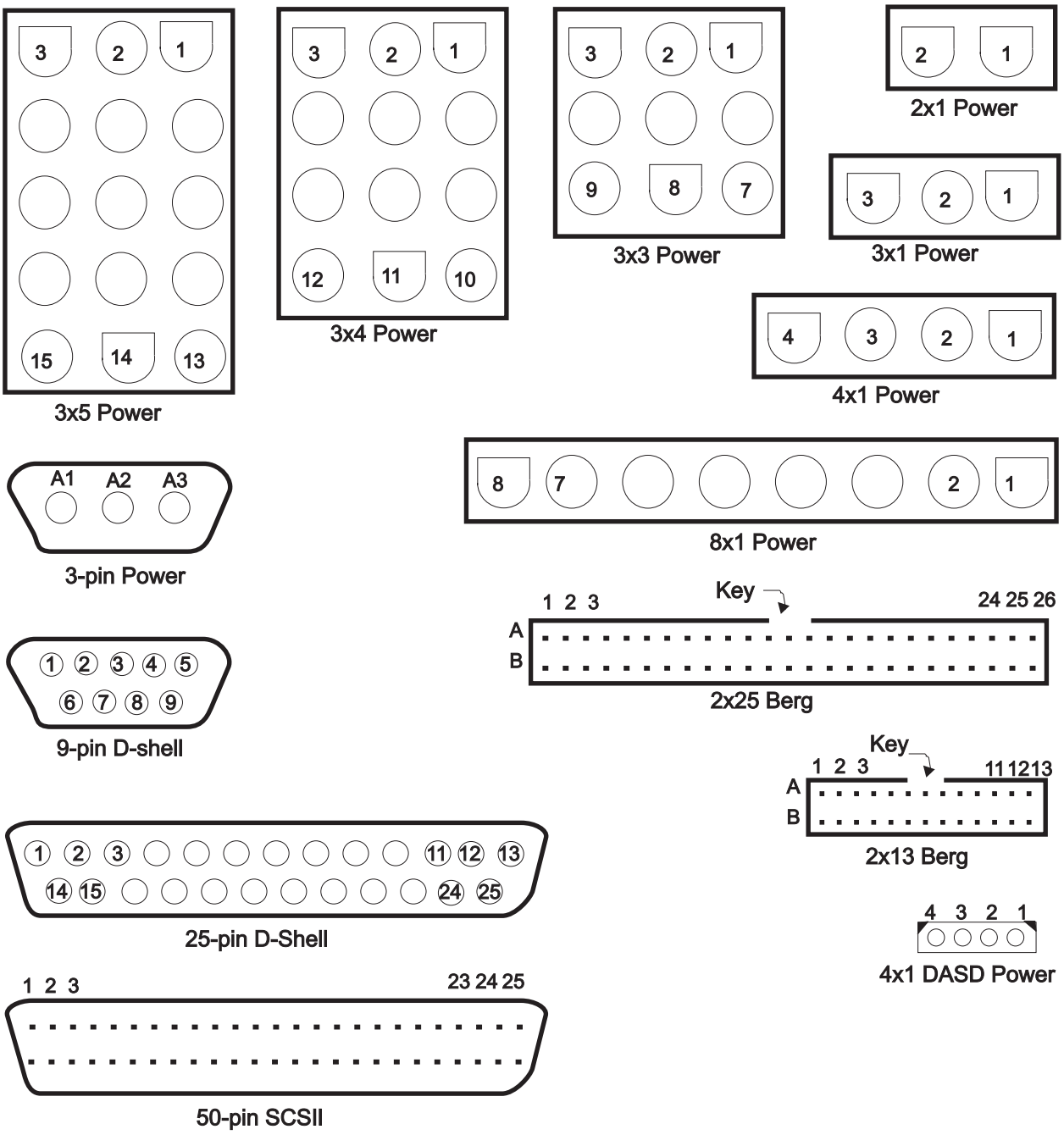


Figure 2-11. RS/6000 SP connector details (as seen at receiving ends, not at cable ends)

Cable routing

Figure 2-12 on page 2-17 and Figure 2-13 on page 2-17 show back views of the RS/6000 SP frame, showing the horizontal and vertical paths of cable routing from connector-to-connector, with the depth amplified on the drawing.

Note: When attaching exterior and interior cables to a POWER3 SMP High Node allow for enough cable for a 2-foot service loop for node movement into service position.

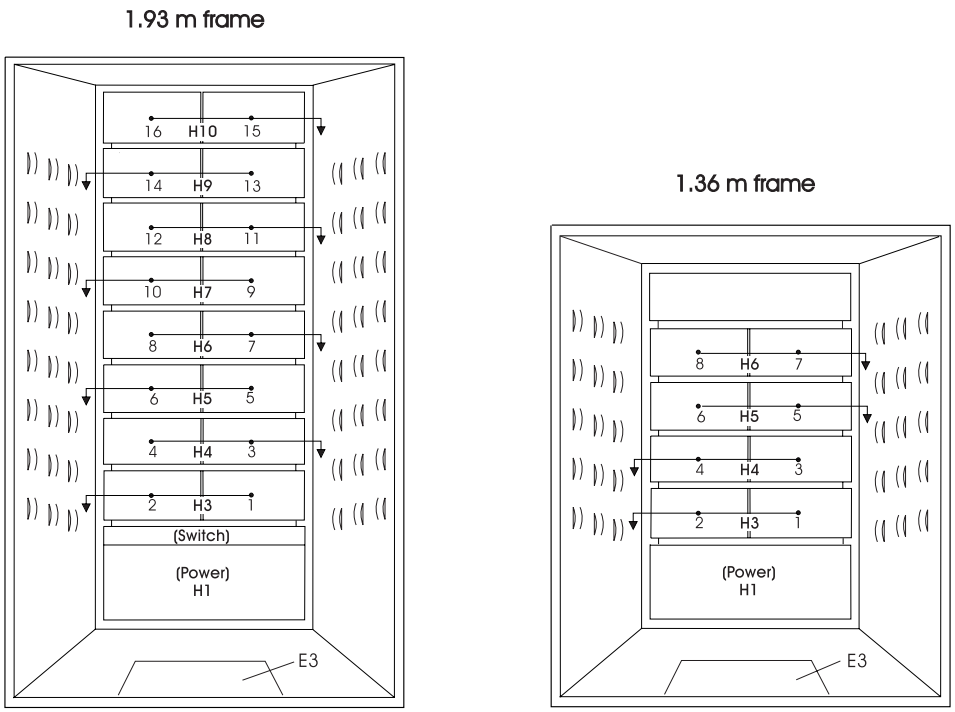


Figure 2-12. Frame cabling routing path in rear of RS/6000 SP frame — 1.93 m frame

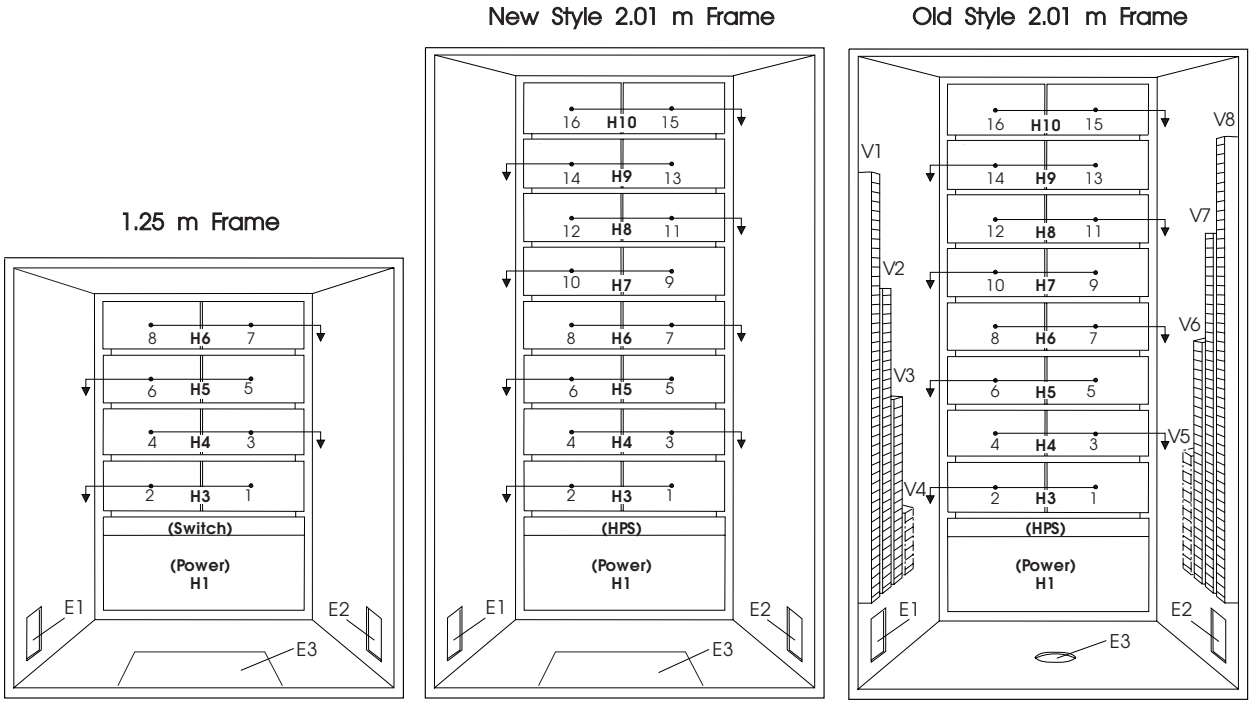


Figure 2-13. Frame cabling routing path in rear of RS/6000 SP frame — 2.01 m frame

Note: For a multi-switch frame (F/C 2030/1), refer to Figure 2-12.

Table 2-2 on page 2-18 shows external cable routing in a RS/6000 SP frame populated with 16 processor nodes. (Refer to “Cable routing” on page 2-16 to see the routing paths.)

Table 2-2. External cable routing

Slot Number (Node)	Cable Budget millimeters (inches)	Frame Entrance (New Style)	Frame Entrance (Old Style)	Vertical Routing (Old Style)	Horizontal Routing (Old Style)
1	1800 (71)	E3	E1	V4	H3
2	1500 (59)	E3	E1	V4	H3
3	1680 (66)	E3	E2	V5	H4
4	1980 (78)	E3	E2	V5	H4
5	2160 (85)	E3	E1	V3	H5
6	1850 (73)	E3	E1	V3	H5
7	2030 (80)	E3	E2	V6	H6
8	2340 (92)	E3	E2	V6	H6
9	2510 (99)	E3	E1	V2	H7
10	2210 (87)	E3	E1	V2	H7
11	2390 (94)	E3	E2	V7	H8
12	2690 (106)	E3	E2	V7	H8
13	2870 (113)	E3	E1	V1	H9
14	2570 (101)	E3	E1	V1	H9
15	2740 (108)	E3	E2	V8	H10
16	3050 (120)	E3	E2	V8	H10

Chapter 3. Service procedures

Running diagnostics in a processor node

Use the following procedures for processor nodes that can be IPLed in NORMAL or SERVICE mode.

Note: If resource is not available, you must use “SERVICE mode (from disk)” on page 3-2 or “Basic stand-alone mode (from network boot)” on page 3-3 to test the device.

NORMAL mode (concurrent diagnostics)

Use the following procedure for processor nodes that have already been IPLed in NORMAL mode.

Note: If the processor node has a *root* password, that password is required to perform Step 2 below. Running diagnostics from SERVICE modes does not require a *root* password.

1. Open a TTY console or telnet session to this processor node.

   TTY console:
   a. From the Hardware Perspectives screen, select the processor node
   b. Click "Actions" on the tool bar
   c. Click on the “Open TTY” button

   Telnet session:
   a. From the control workstation, find an available AIX window
   b. Click on the AIX window, then type “telnet *nodename*” and press **ENTER**
2. Log on as *root*. Ask the customer to supply or type the password, if required
3. Type “export TERM=aixterm” and press **ENTER**
4. Type “diag” and press **ENTER**
5. Press **ENTER** to continue
6. To run advanced diagnostics against a device/system, follow these procedures:
   a. Select “Advanced Diagnostic Routines” option, then press **ENTER**
   b. Select “System Verification” option, then press **ENTER**
   c. Select the device from the system, then press **ENTER**
7. Return to the MAP you came from.

SERVICE mode (from disk)

Use the following procedure for processor nodes that can be IPLed in SERVICE mode or booted using a “maintenance” image.

Note: If node is currently in use (IPLed in NORMAL mode), ask the customer to remove it from the active configuration before continuing.

1. Open a TTY console on the control workstation using the Perspectives display:
   a. Select the applicable “Node Number” in the correct frame
   b. Select “Notebook”
   c. Select “Node Status”
2. Boot from local disk:
   a. For Thin or Wide Node:
      1) Set the mode switch to SERVICE by clicking on the “Service” button
      2) Reboot the node by powering off/on the node
   b. For 604 or 604e High Node:
      1) Open the TTY console
      2) Issue **ssb**
      3) Select “1 Set Flags”
      4) Check for “1 BUMP Console Present disabled”
      5) Change “2 Autoserve IPL” to “ENABLE”
      6) Change “6 FAST IPL” to “DISABLE”
      7) Exit the BUMP menu
      8) Power on the node
      9) When the diagnostic menu appears, it might ask you to set the terminal type. If so, select “Initialize Terminal” option, and define the terminal type as “LFT”.

3. If booting from Ethernet LAN (“maintenance” image), make sure that the processor node has been set up to boot using a “maintenance” image. See “Selecting a processor node boot response” on page 3-6.
   a. If necessary, open the TTY console by clicking on the “Open TTY” button
   b. When the diagnostic menu appears, it might ask you to set the terminal type. If so, select “Initialize Terminal” option, and define the terminal type as “LFT”.
   c. To run advanced diagnostics against a device/system, go to step 6 in “NORMAL mode (concurrent diagnostics)” on page 3-2

Basic stand-alone mode (from network boot)

Note: Use this method for AIX 4.1.3 or higher along with PSSP 2.1 and higher.

The following procedure describes how to perform a verification test of most devices on one or more processor nodes. Some Micro Channel adapters are not supported.

This procedure should be performed from a window on the control workstation.

1. From the Hardware Perspectives screen, select the processor node
2. If booting from Ethernet LAN (“diag” image), make sure that the processor node has been set up to boot using a “diag” image. See “Selecting a processor node boot response” on page 3-6.

   Note: The command should be:

   spbootins -r diag *frame# slot#* **1**
3. Make sure the TTY console is closed
4. From the Hardware Perspectives window:
   a. Make sure that no processor nodes are selected, then click on the processor node(s) which you are going to verify
   b. Click on “Network Boot” button
   c. Click on “Apply” button
5. Open TTY console by clicking on the “Open TTY” button from the "Actions" tool bar for this processor node
6. A diagnostic menu appears when the processor node has completed IPL
7. When you have completed diagnostics, you can power off the processor node
8. After completion, you can set the boot response for the processor node(s) to an appropriate value. Refer to “Selecting a processor node boot response” on page 3-6 for more information.

Extended stand-alone mode (from network boot)

Note: Use this method for nodes running AIX 3.2.5 or lower.

The following section describes how to load and use an extended diagnostics image. This procedure requires additional software (shipped on an EC tape). Use only under the direction of support personnel; it might also require permission of customer to perform certain steps.

Supported functions: This image is designed specifically to support functions that cannot be provided by any other method:

1. Diagnostics on HIPPI adapters
2. Diagnostics on S/370 Channel Emulator adapters
3. Disk Format/Certify of DASD
4. Microcode download

Loading image from tape to control workstation: Perform the following procedures to load image from tape to control workstation:

1. Make sure tape drive is connected to the control workstation, and both are powered on
2. Determine the *device_name* of this tape drive (for example, rmt0)
3. Insert the EC tape into tape drive
4. From an available AIX window, type the following commands:

   cd /usr/lib/boot tar -xvf /dev/*device_name*

5. The files then load from the tape drive
6. When complete, check file by typing:

   ls -l net.image.console

   The result is:

```
-rw-r--r--     1 root    system  5592064 May 19 14:01 net.image.console
-rwxr-xr-x     1 root    system  1228    Mar 30 13:57 net.image.console.README
```

Setting up the boot server: Perform the following procedures to set up the boot server:

1. From the control workstation, enter:

   splstdata -a

2. For each processor node, look under the column labeled “server” or “srvr” for the boot server number
3. If number is ‘0’, skip to step 7
4. Find the node number corresponding to this number, and get its host name
5. Telnet to this boot server host name:

   tn *hostname*

6. FTP the file from the control workstation:

   cd /usr/lib/boot
   ftp *CWS_hostname*
   image
   cd /usr/lib/boot
   mget net.image.console*
   quit

7. Export the following directories:
   - **/etc/lpp**
   - **/etc/SP** (probably already exported)
   - **/usr/lib**
   - **/usr/lpp**
   - **/usr/share/lib**

   a. Enter:

      smitty mknfsexp

   b. For each processor node and for each directory in the above list, enter the following:

      [Entry Fields]

      *** PATHNAME of directory to export [***directory***]**

      *** MODE to export directory read-mostly**

      HOSTNAME list. If exported read-mostly [*nodename***]**

      Anonymous UID [-2]

      HOSTS allowed root access [*nodename***]**

HOSTS & NETGROUPS allowed client access []

Use SECURE option? [no]

*** EXPORT directory now, system restart or both [now]**

PATHNAME of Exports file if using HA-NFS []

Using image on processor nodes: Perform the following procedures to use image on processor node(s):

1. Make sure the processor node(s) is off
2. Edit "/etc/bootptab" file to select this image by:
   a. Enter:

      ```
      vi /etc/bootptab
      ```

   b. Find the line(s) for the processor node(s) you are going to boot, then change the field:

      ```
      ... :bf=/tftpboot/NODE_IP_ADDRESS: ...
      ```

      to:

      ```
      ... :bf=/usr/lib/boot/net.image.console: ...
      ```

   c. Make sure to remove any "#" characters from the beginning of the lines
3. Perform "IPLing processor nodes from network device (two methods)" on page 3-7, using the manual method
4. From the TTY console(s), you might have to press the **1** and **Enter** keys to enable the console
5. In this TTY console, enter the following command:

   ```
   diag
   ```

6. Continue with diagnostic menus. Some additional information:
   - **HIPPI MCA**: Appears as "hippi0" in device list
   - **S/370 Channel Emulator MCA**: Appears as "chna0" in device list
   - **Disk Format/Certify**: Select "Service Aids", select "Disk Media", select "Format Disk" or "Certify Disk", select appropriate device from list
   - **Microcode Download**: Select "Service Aids", select "Microcode Download", select appropriate device from list, then select "Download the latest level of microcode"
7. When you have completed diagnostics, you might need to power off the processor node. No shutdown is required

Cleaning up the control workstation: Perform the following procedures to return the control workstation to its original state:

1. Unexport the directories:
   a. Enter:

      ```
      smitty rmnfsexp
      ```

   b. For each directory except **/etc/SP**, enter the directory name
2. Set the boot response for the processor node(s) to an appropriate value. Refer to "Selecting a processor node boot response" on page 3-6 for more information
3. You might have to optionally remove the diagnostic boot image by entering:

   ```
   rm /usr/lib/boot/net.image.console
   ```

Selecting a processor node boot response

The following procedure describes how to select the boot response for a single processor node.

1. Determine the physical frame number (*frame#*) and slot number (*slot#*) of the processor node you want to change by entering:

   splstdata -n

2. Check the current boot response for this processor node boot by entering:

   splstdata -b

   For this processor node, check for a *response* field with a value from the table below; make note of this value, so you can return the processor node to this original value
3. If the *response* field is “disk”, check the *install_disk* field to determine which disk it will IPL from.
4. Determine which boot response (*response*) you need to use:

Table 3-1. Selectable processor node boot responses

response	**Description**
disk	Configures the processor node to boot from its local disk.
install	Configures the processor node to: boot over the Ethernet LAN, install AIX on the local disk, customize the processor node, then reboot from its target disk. **Note:** Ensure that the target disk is functioning.
customize	Configures the processor node to update node-specific information on its local disk, i.e. IP addresses.
maintenance	Configures the processor node to boot over the Ethernet LAN in maintenance mode. A maintenance menu is then displayed from which the user can select further actions.
diag (see note)	Configures the processor node to boot over Ethernet LAN in diagnostics mode. A diagnostics menu is then displayed from which the user can select further actions: • Diagnostic Routines • Service Aids • Advanced Diagnostic Routines
Note: Supported only with AIX 4.1.3 or higher and PSSP 2.1 or higher.	

5. From an available window on the control workstation, enter the following command, filling in the variables (in *italics*) with the appropriate values:

   spbootins -r *response frame# slot#* **1**

6. Make sure that the tty is closed before performing the network boot.
7. If selecting a response of “install”, “customize”, “diag”, or “maintenance”: From the “Global Controls” panel on the control workstation, click on the “Net Boot” button, click on this processor node, then click on the “Do Command” button.
8. If selecting a response of “disk”: From the system monitor, power off/on processor node.
9. The processor node should now boot using the selected boot response.

Note: Remember to set the *response* field back to the original value from Step 2 once you have completed service. To do so, enter the following command, where *response* is the original value:

spbootins -r *response frame# slot#* **1**

You can check the current *response* value by repeating step 2.

Examples of **spbootins** command:

- To configure frame# 2, slot# 2 to boot in diagnostics mode:

```
spbootins  -r  diag  2  2  1
```

- To configure frame# 1, slot# 4 to boot from its local disk:

```
spbootins  -r  disk  1  4  1
```

IPLing processor nodes from network device (two methods)

Perform one of the following procedures to make a processor node IPL from network:

Method one: network boot method

1. From the SP Perspectives Launch Pad, select "Hardware Perspectives"
2. Click on the processor node (or nodes) you are going to boot from a network
3. Click on “Actions” button on the tool bar
4. Verify the nodes selected, then click on the "Apply" button
5. IPL from network device begins

   Note: If Packets Received always shows “00000”, there is a network or configuration problem.

Method two: manual (hand-conditioning) method

1. If applicable, have customer shutdown the processor node (or nodes)
2. From the SP Perspectives Launch Pad, select "Hardware Perspectives"
3. Click on the processor nodes you are going to network boot
4. From the "Actions" button, select "Change Key Switch" and "Secure", then click on "Apply" button
5. From the "Actions" button, select "LCD and LED Display"
6. From the "Actions" button, select "Power on...." for the node
7. From the "Actions" button, select "Open TTY" for the node
8. When the LEDs reach **200**
   a. Select "Change Key Switch" from the "Actions" button on the tool bar
   b. Change the key to "Service" and click the "Apply" button
   c. Then **immediately** click on "Actions", "Power off, Reset...". Select "Reset" then click on "Apply" button.
9. The LEDs should show **1xx**, then proceed to **26x**.
10. From the TTY console, look for “MAIN MENU”. If you get a “SELECT LANGUAGE” screen, select language if necessary, then enter “99” to return to main menu.

    High Node

    On the Maintenance Menu:

    - Enter “6” to select System Boot

    Note: Refer “SystemGuard maintenance menu access” on page 3-23 to access the maintenance menus.

11. Enter “1” to “Select BOOT (Startup) Device”.
12. From the “SELECT BOOT (STARTUP) DEVICE” menu, select the number corresponding to the network that you will be IPLing from. Normally this is one of the following:
    - Thin Node: **Ethernet: Built-In**
    - Wide Node: **Ethernet: Slot 0/1, BNC connector (1-pin)**
    - 604 or 604e High Node: **Ethernet: Slot 0/1, BNC connector (1-pin)**

Note: On the wide and 604 or 604e High Node, be careful to choose BNC (1-pin) in the slot that corresponds to *EN0*.

13. When you get to the “SET OR CHANGE NETWORK ADDRESSES” menu, make sure that either all addresses show “000.000.000.000” (IPL from anywhere) **or** the “Client address” (node IP address), “BOOTP server address” (IP address of workstation containing IPL image), and optional “Gateway address” are correct.

    Note: If IP addresses are modified, make sure to later reset them to appropriate values; otherwise, Network Boot function might not work properly.

14. When you have completed this menu, enter “99” to return to the main menu.
15. From the “MAIN MENU”, you might optionally run the step “Send Test Transmission (PING)” to test network connection. The test requires that you supply IP addresses.
16. From the “MAIN MENU”, enter “4” to “Exit Main Menu and Start System (BOOT)”.
17. From the node front panel, put the processor node in NORMAL mode by clicking on the “Normal” button.
18. From the “STARTING SYSTEM (BOOT)” menu, press ENTER to continue.
19. IPL from network device should now begin. LEDs will remain at **231** until IPL image has completed transfer.

    Note: If Packets Received always shows “00000”, there is a network or configuration problem.

Updating the Ethernet hardware address

Perform the following steps to update the Ethernet hardware address:

1. If necessary, have customer shut down and power off the processor node.
2. Close the console TTY window (if opened).
3. Delete node entry from **/etc/bootptab.info** file on the control workstation. (Do this if the file exists and the node entry in the file exists.)
4. Use the **sphrdwrad** command to obtain the new Ethernet hardware address:
   a. Determine *frame#* and *slot#* of this processor node.
   b. Issue the following command from the control workstation:

      sphrdwrad *frame# slot#* **1**

5. Copy the collected address into **/etc/bootptab.info**
6. If the node was powered down, power it back on.

Checking errors using “errpt”

The following section describes how to use the **errpt** command to access error log information and how to interpret the information in the error log.

Using the “errpt” command

Note: You can also use **smit errpt**.

errpt –? Will return a list of various parameters with descriptions.

errpt –a –N sphwlog | pg
Shows detailed list of RS/6000 SP-specific hardware errors.

errpt –a –N sphwlog –T PERM | pg
Shows detailed list of RS/6000 SP-specific hardware failures requiring service action (for example, shutdown condition)

errpt –a –N sphwlog –T TEMP | pg

Shows detailed list of RS/6000 SP-specific hardware warnings.

Interpreting “errpt” output for “sphwlog” errors

The following describes how to read various relevant sections of the results of an “errpt –a ...” command. For an example, refer to “Sample “errpt –a ...” output report” on page 3-10.

Date/Time Date and time that event was logged.

Node Id Workstation where the information was logged; not processor node.

Type Indicates status/priority of the error. For hardware errors:

- PERM (Permanent)—Used to indicate higher priority errors where service is required (for example, shutdown condition or frame supervisor not responding)
- TEMP (Temporary)—Used to indicate lower priority errors, where a momentary or minimal impact condition has occurred; maintenance could be deferred (for example, warning condition)
- UNKN (Unknown)—Used for informational messages (for example, node has been powered off)
- PEND (Pending)—Used to indicate conditions expected to impact system availability soon.

Resource Name

“sphwlog” refers to items logged for RS/6000 SP-specific errors.

Error Description/Probable Causes/Failure Causes/Recommended Actions

Use this section for quick reference; however, Maintenance Analysis Procedures (MAPs) in Volume 2 should be used to perform full service action since they provide more detailed analysis and procedures.

Diagnostic Explanation

To interpret, look for the following key items:

1. “Condition cleared” (end of line)—indicates error condition no longer present. Error has been fixed or has cleared on its own; check for intermittent conditions.
2. Severity:
   - “Failure”—indicates higher priority problem, (for example, shutdown)
   - “Warning”—indicates lower priority problem.
3. Component:
   - “Frame #:0”—indicates error concerns frame #.
   - “Node #:#” — indicates error concerns frame #, node in slot address #, respectively.
   - “Switch #:#” — indicates error concerns frame #, switch in slot address #, respectively.
4. Variable—refers to specific variable on which condition was detected (for example, “nodefail1”).
5. Error message—specific message indicating the problem that was detected (for example, “Supervisor not responding for slot.”). This message is used by the MAPs to help isolate and service this error.

Sample “errpt –a ...” output report

```
ERROR LABEL:    SPMON_EMSG101
ERROR ID:       A1843F1E

Date/Time:       Wed Sep 14 13:29:38
Sequence Number: 9217
Machine Id:      000016691C00
Node Id:         workstn3
Class:           H
Type:            PERM
Resource Name:   sphwlog
Resource Class:  NONE
Resource Type:   NONE
Location:        NONE

Error Description
UNABLE TO COMMUNICATE WITH REMOTE NODE

Probable Causes
SYSTEM I/O BUS

Failure Causes
SYSTEM I/O BUS

        Recommended Actions
        CHECK CABLE AND ITS CONNECTIONS

Detail Data
DETECTING MODULE
LPP=PSSP,Fn=splogd.c,SID=1.8,L#=666,
DIAGNOSTIC EXPLANATION
0026-101 Failure; Frame 1:0; nodefail1; Supervisor not responding for slot.
---------------------------------------------------------------------------
```

Diagnosing a machine check

Machine checks occur for processor data bus parity errors (and uncorrectable ECC errors). Machine checks also occur for some internal 60x processor errors.

Determining validity

Most machine check entries are valid in the AIX error log. They are labeled

`Machine_Check_604`

However, if the error label is not `Machine_Check_604`, then it is not a valid machine check. (For example, NVRAM was drained and the resulting corrupted data looked like a non-SMP machine check.)

Determining type of machine check

Machine checks are recorded for Data Bus Parity Error, Uncorrectable ECC Errors, and certain internal processor errors.

Note: Retain HSF H123277 shows how to decode machine checks and corrective actions.

To decode the type of error you need the value of the MACHINE STATUS SAVE/RESTORE REGISTER 1. The value is found under the Detail Data for the Machine Check. For example, the following register:

```
1002 9030
```

The left-most bit is **bit 31**. The right-most bit (least-most bit) is **bit 0**. Bits 21, 20, 17, and 16 represent the type of checkstop that occurred:

Bit 21 = 1 CPU internal data cache parity error

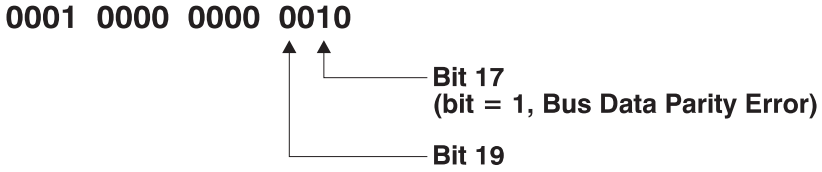
Bit 20 = 1 CPU internal instruction cache parity error

Bit 17 = 1 CPU data bus parity error

Bit 16 = 1 CPU address bus parity error

Note: On a 604 High Node, Bit 17 = 1 shows a machine check occurred. On a 604e High Node, Bit 17 is not used (and will equal 0).

In the preceding example register (`1002 9030`), the 1002 is decoded as:



Determining which CPU caused the machine check

A stanza in the Machine Check Error Log labeled:

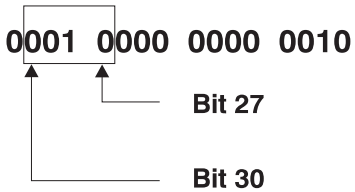
```
Central Processing Unit Number
```

Under this stanza is the number of the CPU which caused the machine check (0—1 is on the first processor card, 1—2 is on the second processor card, and so on).

If this stanza is not present in the checkstop file, then find the CPU causing the machine check using Bits 30—27 of the MACHINE STATUS SAVE/RESTORE REGISTER 1 (which was previously used to determine the type of machine check). For example, if the register showed:

```
1002 A030
```

The first 16 bits (1002) represent:



Bits 30—27 are `0010`, which gives CPU2 (numbered from 0—15, where Card 0 has CPUs 0 and 1, Card 1 has CPUs 2 and 3, and so on).

Correcting a machine check

For any case other than the Data Bus Parity Error, replace the processor card containing the CPU that produced the error.

For a 604 Data Bus Parity Error, there are two possible causes:

1. There was an actual data bus parity error caused by the processor card containing the CPU with the error.
2. The main memory received an uncorrectable ECC error. (By design, the Data Cross bars can force bad parity at the 604 to cause the machine check.)

To determine the cause, look in the error log for entries that took place at the time of the machine check. Search for another entry, with a memory card as the resource type, which shows an unrecoverable memory error (and calls out a specific memory card and DIMM).

- If there is one, handle the problem as a memory error.
- If there is none, assume the problem is caused by the processor. Replace the processor card containing the CPU that caused the error.

Node supervisor self-test

The following procedures will help you perform self-test on the node or switch supervisor cards. Upon completion of this test, return to the procedure that sent you here.

If this is a 604 or 604e High Node:

1. Disconnect the node supervisor adapter cable from the node supervisor card assembly.
2. Locate LED 5. See Figure 3-1.

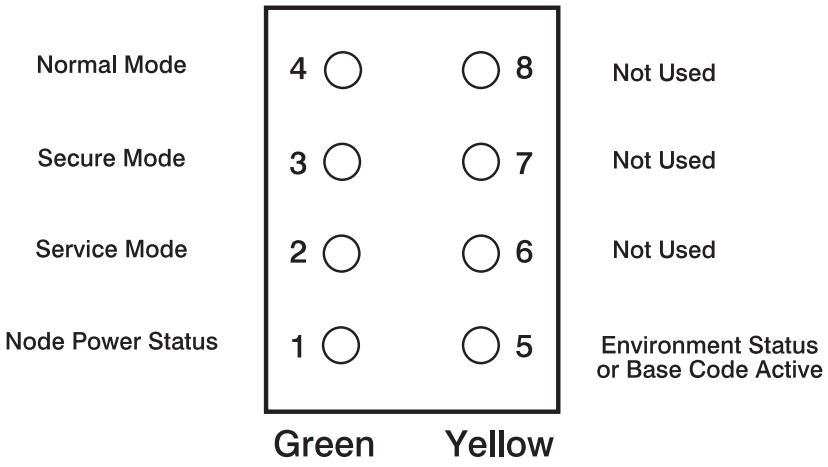


Figure 3-1. 604 and 604e High Node LEDs

3. Reconnect the node supervisor adapter cable to the node supervisor card assembly.
4. Check the green and yellow LEDs on the node supervisor card.

   This self-test should indicate one of the following conditions for the processor node:

Self-test Conditions

Pass sequence

1. All 8 LEDs will be on for 10 seconds
2. LED 5 will flash node address
3. All 8 LEDs will be on for 1 second

Fail conditions

- Green and Yellow LEDs never light
- LED 5 flashes wrong address

Base Code

1. All 8 LEDs will be on for 10 seconds
2. LED 1 will flash node address
3. LED 5 is On.

Verification tests using Perspectives

This section gives you the basic information needed to check the supervisor cards on a single node, frame, or switch.

Node supervisor verification

From the Hardware Perspectives window:

1. The Hardware Perspective should open with a node pane displayed. If it does not, or if you would like to open an additional node pane:
   a. Click the "Add Pane" icon on the tool bar
      - The Add Pane dialog box opens
   b. From the "Pane Type" pulldown, select "Nodes"
   c. Select your choice of adding the pane to the current window or to a new window
   d. If desired, enter a new pane title
   e. Click "OK" to open the pane and close the dialog box
2. In the Node pane, click the icon of the node you want to verify
3. Click the "Notebook" icon on the tool bar
   - When the Notebook window opens, make certain that the "Node Status" tab is selected
4. The "Node failure:" attribute displays the status of the node supervisor
   - "No" displayed in a **green** box indicates that the node supervisor **has not failed** and the supervisor is responding
   - "Yes" displayed in a **red** box indicates that the node supervisor has failed and it **is not responding**

Note: Clicking "Help" in the Notebook window's lower right corner displays attribute descriptions.

Frame supervisor verification

From the Hardware Perspectives window:

1. Unless you have saved display settings, the Hardware Perspective does not open with a frame pane displayed. To open a frame pane:
   a. Click the "Add Pane" icon on the tool bar
      - The Add Pane dialog box opens
   b. From the "Pane Type" pulldown, select "Frames and Switches"
   c. Select your choice of adding the pane to the current window or to a new window
   d. If desired, enter a new pane title
   e. Click "OK" to open the pane and close the dialog box
      - You may repeat these steps to add additional frame panes
2. In the Frame and Switch pane, click the icon of the frame you want to verify
3. Click the "Notebook" icon on the tool bar
   - When the Notebook window opens, make certain that the "Frame Status" tab is selected
4. The "Controller responds:" attribute displays the status of the frame supervisor
   - "OK" displayed in a **green** box indicates that the frame supervisor **is responding**
   - "No response" displayed in a **red** box indicates that theframe supervisor **is not responding**

Note: Clicking "Help" in the Notebook window's lower right corner displays attribute descriptions.

Switch supervisor verification

From the Hardware Perspectives window:

1. Unless you have saved display settings, the Hardware Perspective does not open with a switch pane displayed. To open a switch pane:
   a. Click the "Add Pane" icon on the tool bar
      - The Add Pane dialog box opens
   b. From the "Pane Type" pulldown, select "Frames and Switches"
   c. Select your choice of adding the pane to the current window or to a new window
   d. If desired, enter a new pane title
   e. Click "OK" to open the pane and close the dialog box
      - You may repeat these steps to add additional switch panes
2. In the Frame and Switch pane, click the icon of the switch you want to verify
   - A switch icon is displayed next to the frame icon **only if** a switch is installed in the frame
3. Click the "Notebook" icon on the tool bar
   - When the Notebook window opens, make certain that the "Switch Status" tab is selected
4. The "Node failure:" attribute displays the status of the **switch** supervisor.
   - "No" displayed in a **green** box indicates that the switch supervisor **has not failed** and the supervisor is responding to communication from the frame supervisor.

- "Yes" displayed in a **red** box indicates that the switch supervisor has failed and it **is not responding** to the frame supervisor.

Note: Clicking "Help" in the Notebook window's lower right corner displays attribute descriptions.

Base code verification

Perform the following procedure to check for supervisor conditions that require action.

1. From the control workstation window, enter:

   smitty supervisor

2. The following menu is displayed:

```
    Check For Supervisors That Require Action (Single Message Issued)
>   List Status of Supervisors (Report Form)
    List Status of Supervisors (Matrix Form)
    List Supervisors That Require Action (Report Form)
    List Supervisors That Require Action (Matrix Form)
    Update *ALL* Supervisors That Require Action (Use Most Current Level)
    Update Selectable Supervisors That Require Action (Use Most Current Level)
```

   Select the second option, “List Status of Supervisors (Report Form)“

3. A frame, similar to the following example, is displayed:

```
spsvrmgr: Frame  Slot  Supervisor  Media         Installed     Required
                       State       Versions      Version       Action

          _____  ____  __________  ____________  ____________  ________
          1      0      Active     u_10.3c.0706  u_10.3c.0709  None
                                   u_10.3c.0707
                                   u_10.3c.0709

          _____  ____  __________  ____________  ____________  ________
                 4      Active     u_10.36.0700  u_10.36.0703  None
                                   u_10.36.0701
                                   u_10.36.0703

          _____  ____  __________  ____________  ____________  ________
                 7      Active     u_10.3e.0700  u_10.3e.0703  None
                                   u_10.3e.0701
                                   u_10.3e.0703

          _____  ____  __________  ____________  ____________  ________
                 17     Active     u_80.09.0609  u_80.09.060b  None
                                   u_80.09.060b
```

Updating the node supervisor code

1. If they are not already on, turn the node's circuit breakers to the On (‘1’) position.
2. Enter:

   smitty supervisor

3. Select “List Supervisors That Require Action“
4. Note the frame number and slot number
5. Hit PF3 (Cancel).
6. Select “Update Selectable Supervisors That Require Action“
7. Enter the frame number and slot numbers to be updated.

   Note: This will take at least 12 minutes to complete.

8. Perform “Resetting the clock and bootlist after servicing a node” on page 3-16 before returning to the procedure that directed you here.

Service position procedures

Note: When preparing to place processor node(s) and/or switch assembly(s) into service position, ensure that the customer has removed the processor node(s) and/or switch assembly(s) from the active configuration.

Placing a 604 or 604e High Node Into service position

Attention: Removing the front panel will shut down the node. The LED will show ‘888-103-409-0980’.

1. Set both circuit breakers (below the node front panel) in the Off (‘0’) position.
2. Remove the power cables connected to power supplys/cooling unit.
3. If performing service on the media or CPU modules, remove the node front panel cover and the front access plate.
4. If performing service on the I/O module or power/cooling units, remove the rear panel cover.

Replacing a 604 or 604e High Node from service position

1. Replace removed access plates and panel covers. Pay strict attention to the front panel, depressing the interlock switch.
2. Reconnect the power cables to power supplys/cooling unit.
3. Set both circuit breakers (below the node front panel) in the On (‘1’) position.

Resetting the clock and bootlist after servicing a node

When servicing a node, the node becomes disconnected from its power source for a period of time. Since nodes normally do not have a real battery, the NVRAM will loose it's memory when disconnected from power for about 10 minutes (sometimes less). This will cause the date to be reset to January 1, 1970, and the bootlist to be cleared. This can cause some problems with booting.

It is **highly recommended** to reset the clock and bootlist before booting the node. This is done as follows:

1. Before powering down the node to be serviced, display the current bootlist:
   a. Run diagnostics (**diag**)
   b. Choose the “Service Aids” panel
   c. Choose the “Display/Alter Bootlist” panel
   d. Choose “Normal Mode”
   e. Choose “Display Current Bootlist”

   This will display the current bootlist.
2. Power down the node, service it, and hook it back into the frame.
3. On the control workstation, run **spbootins** to set the node to boot in maintenance mode. For example, if it is node 12 of frame 2, enter:

   ```
   spbootins -r maintenance 2 12 1
   ```

4. On the control workstation, netboot the node:
   a. From the SP Perspectives Launch Pad, select "Hardware Perspectives"

b. Click on the processor node (or nodes) you are going to boot from a network
c. Click on “Actions” button on the tool bar
d. Verify the nodes selected, then click on the "Apply" button
e. IPL from network device begins

Note: If Packets Received always shows “00000”, there is a network or configuration problem.

5. When this boots, a console window will pop up on your display. Follow the prompts:
   a. “Start Maintenance Mode for System Recovery”
   b. “Access a Root Volume Group”
   c. “Continue”
   d. Choose correct disk from the list
   e. Access this volume group and start a shell
6. In the maintenance shell, set the date command. For example, to set the date to August 3, 1995, do "date 0803123095"
7. In the maintenance shell, set the boot list.
   a. Run diagnostics (**diag**)
   b. Choose the “Service Aids” panel
   c. Choose the “Display/Alter Bootlist” panel
   d. Choose “Normal Mode”
   e. Choose “Alter Current Bootlist”
   f. Set the bootlist the way it was before the node was serviced
8. Close the console window
9. On the control workstation, set the node to boot from disk. For example:

```
spbootins -r disk 2 12 1
```

10. On the control workstation, use Perspectives to power off the node and then power it back on.

The node will now boot from the device that you specified in step 7 with the correct time.

Installing firmware updates on SP nodes

Firmware updates (for example, IPL ROS updates for SP nodes or system and service processor firmware updates for 332 MHz SMP or POWER3 SMP Thin and Wide nodes), are available at **http://www.rs6000.ibm.com/support/micro/download.html**. Alternatively, you can search AIXTOOLS for the latest versions of the firmware updates. (for example, look for **P2SC_IPL** on AIXTOOLS for the latest version of IPL ROS on SP Nodes.)

Follow the instructions in the README file within the package.

Installing adapter microcode packages

Certain adapters are shipped with an adapter firmware diskette. For factory configured systems, the microcode is installed on the SP nodes. However for field installations the adapter firmware must be installed.

This adapter firmware must be installed on the SP nodes along with the adapter. The following procedure outlines the adapter microcode installation. Updates are periodically made to microcode and your service representative can search AIXTOOLS for the latest version of Adapter Microcode.

The following 3 adapters **require** functional microcode to be installed:

Adapter	Package
ESCON Control Unit Adapters Feature 2756	ESCON
BLKMUX S/370 Control Unit Feature 2755	BLKMUX
FDDI Adapters Features 2723, 2724, 2725, 2726	FDDI

These adapters **might** need updating to the latest level in their FLASH EPROM:

Adapter	Package
SSA Adapters Features 6214, 6216, 6217, 7133 Drives	SSAFLASH
SCSI Adapters Features 2412, 2415, 2416	ECA192
Note: The ECA192 instructions differ from the above and are included with the ECA192 Package.	

Note: This procedure is similar to that used for performing software updates (PTF's) to SP nodes. You can Refer to *RS/6000 SP Installation Guide* (GC23-3898) Section 5, “Performing Software Maintenance” for a general idea of how to perform the installation.

1. Locate the diskette (either shipped with your adapter or obtained from the TOOLS disk.
2. Copy the adapter microcode to a temporary directory on the control workstation:
   a. Insert the diskette in the control workstation diskette drive
   b. Log on as *root*.
   c. Select a name in a temporary directory to store the microcode image such as “/tmp/microcode” or “/tmp/escon”
   d.

      ```
      bffcreate -l -d /dev/fd0
      ```

      This will list the contents of the diskette. Record the package name results (for example, escon.cuu). This will be useful if you decide to store other adapter microcode in the same directory.
   e.

      ```
      bffcreate -t /tmp/microcode -d /dev/fd0 all
      ```

      This will copy the data to the designated directory and update a table of contents file (.toc)
3. NFS Export that directory to the nodes:

   ```
   exportfs -i /tmp/microcode
   ```

4. Either use the **dsh** command to control one or more nodes directly from the control workstation, or telnet to each individual node. (Commands in following steps would be executes as in the example, but without the “dsh” prefix)

   Note: Refer to *IBM RS/6000 SP: Administration Guide* for help on using **dsh**.

5.

   ```
   dsh -a "umount /mnt"
   ```

6.

   ```
   dsh -a "mount <control wks>:/tmp/microcode /mnt"
   ```

7.

   ```
   dsh -a "installp -qacXd /mnt all"
   ```

   The “all” can be replaced by the individual microcode package as recorded earlier.

8.

```
dsh -a "umount /mnt"
```

9.

```
exportfs -u /tmp/microcode
```

To complete the microcode update, it is usually necessary to remove and then replace the device from the configuration. The most reliable method to do this is to reboot the node. Some adapters can actually require a power off cycle to complete the microcode update. Others can be updated simply by running **cfgmgr**.

Note: During microcode download for SSA adapters, there is a possibility that the download process could result in an error. When an unrecoverable error (loss of power) occurs during the download process the adapter can be left with no microcode. If this happens, repeat the microcode download. If unsuccessful, replace the adapter.

7133 Disks can also be updated, however the method varies, depending upon which disks are attached. If they are 4.5GB or 9.1GB "Scorpion" disks, and the AIX version is either 4.1.5 or 4.2.1, then run **dsh "ssadload -u"** to update the disks. Other disks will be updated by a **cfgmgr** or reboot cycle.

Using the 604 or 604e High Node BUMP menus

The following section shows a representation of menu selections that are seen when using options within the 604 or 604e High Node Bring Up Micro Processor (BUMP).

1. From the node front panel, select “Service Mode.”
2. Open an S1 Term session by issuing:

   slterm -Gw *Frame# Node#*

   (You might need to press **Enter** twice.)
3. At the BUMP prompt (>), issue:

   ```
   sbb
   ```

4. The following display appears:

   ```
   STAND-BY MENU :  rev 17.03

   0 Display Configuration
   1 Set Flags
   2 Set Unit Number
   3 Set Configuration
   4 SSbus Maintenance
   5 I2C Maintenance
   ```

5. Choose the appropriate option:
   a. **0 Display Configuration** Option:

      The following display appears:

```
                Display Configuration

SID TM          7015R30 10004           SID Y2              00010004
SID Y3  7fffff003935313132380000        UNIT  PAAAAAAA  00
CPU conf        CCAAAAAA                MM conf         CCAAAAAAAAAAAAAA
FLASH_FW  0922  MM size   0040         OP_KEY  SRV     E_KEY   NRM
OPP   E13134A   46H9308
SP    D78605    19H0471                 IOC   E38048    19H0481
CPU0  D78611    19H0255                 CPU1
CPU2                                    CPU3
MC0   D78605    19H0473                 MC1
MC2                                     MC3
SIB10 D28460    11H8431                 PS00  D28426A   11H8276
                                        PS10
```

Notes:

1) A=Absent, C=Configured

2) SID TM here contains “7015R30 10004” where 7015 is the machine type, R30 is the model, and 10004 is the serial number.

Press **Enter** after the first menu. The DISPLAY CONFIGURATION — MAIN UNIT is displayed.

Select Option "7" for *I/O 0*, and Option "8" for *I/O 1*. Information similar to the following will be displayed:

```
Status:     Adapter #1 -> Valid & Enabled
            Adapter #2 -> Absent
            Adapter #3 -> Absent
            Adapter #4 -> Absent
            Adapter #5 -> Absent
            Adapter #6 -> Absent
            Adapter #7 -> Valid & Enabled
            Adapter #8 -> Valid & Enabled
BIST/POST:  Adapter #1 -> 0x0000    EC:              PN:
            Adapter #2 -> ------
            Adapter #3 -> ------
            Adapter #4 -> ------
            Adapter #5 -> ------
            Adapter #6 -> ------
            Adapter #7 -> 0xffff    EC:              PN:
            Adapter #8 -> 0x0000    EC:              PN:
```

Note: If the BIST and POST for en0 and SCSI are anything other than "0x0000", then they did not configure correctly.

b. **1 Set Flags** Option:

The following display appears:

```
Set Flags

0 Remote Authorization                          Disabled
1 Bump Console Present                          Enabled
2 Autoservice IPL                               Disabled
3 Extended Tests                                Enabled
4 PowerOn Tests in Trace Mode                   Disabled
5 PowerOn Tests in Loop  Mode                   Disabled
6 Fast IPL                                      Disabled
7 Set Electronic Mode Switch to Normal          NRM
```

Notes:

1) To change enable/disable status, select flag number and enter.
2) Remote Authorization—allows remote access to BUMP.
3) Bump Console Present—if disabled, cannot use BUMP.
4) Autoservice IPL—when enabled, bypasses maintenance menu.
5) PowerOn Tests—toggles loop and trace modes enabled and disabled.
6) Fast IPL—toggles PON test on and off.
7) Set Electronic Mode Switch to Normal—not important.

c. **2 Set Unit Number** Option:

The following display appears:

```
Configured units number: 0
```

d. **3 Set Configuration** Option:

The following display appears:

```
Set Configuration

00 CPU0
01 CPU1
02 CPU2
03 CPU3
04 MC0
05 MC1
06 MC2
07 MC3
08 basic MCA
09 exp   MCA
```

If you specified “00 CPU0”, you would see the following:

```
CPU0     Set      Status

00 CPU0  C        C
01 CPU0  D
02 CPU0  T
03 CPU1  C        C
04 CPU1  D
05 CPU1  T
```

Notes:

1) C=Configured, T=Temporarily disabled, D=Disabled
2) There are two CPs per CPU card.

Or if you specified “08 basic MCS”, you would see the following:

```
UNIT0   Set    Status  | UNIT0   Set    Status

00 MCA1 C      A         12 MCA5 C      A
01 MCA1 D                13 MCA5 D
02 MCA1 T                14 MCA5 T
03 MCA2 C      A         15 MCA6 C      A
04 MCA2 D                16 MCA6 D
05 MCA2 T                17 MCA6 T
06 MCA3 C      A         18 MCA7 C      C
07 MCA3 D                19 MCA7 D
08 MCA3 T                20 MCA7 T
09 MCA4 C      A         21 MCA8 C      C
10 MCA4 D                22 MCA8 D
11 MCA4 T                23 MCA8 T
```

This allows you to configure/deconfigure cards on the MCA bus.

e. **4 SSbus Maintenance** Option:

   This is used by support for PD. (SSbus = System Service Bus.)

f. **5 I2C Maintenance** Option:

   The following display appears:

```
          I2C  Maintenance

00 rd OP status                05 wr LCD
01 rd UNIT status              06 rd i/o port SP
02 rd EEPROM                   07 fan speed
03 margins                     08 powering
04 on/off OP LEDs
```

6. Exit the Standby menu back to the > prompt. Issue:

   power

   (If you had tried to power on from the node front panel at this point, nothing would have happened.)

   BUMP starts PON tests (assuming that the Fast IPL flag had been set to DISABLE).

   If you had the mode set to the SERVICE position and the Autoservice IPL flag had been set to DISABLE, you will see the BUMP Maintenance Menu:

```
MAINTENANCE MENU (Rev. 06.02)


0> DISPLAY CONFIGURATION
1> DISPLAY BUMP ERROR LOG
2> ENABLE SERVICE CONSOLE
3> DISABLE SERVICE CONSOLE
4> RESET
5> POWER OFF
6> SYSTEM BOOT
7> OFF-LINE TESTS
8> SET PARAMETERS
9> SET NATIONAL LANGUAGE
```

   This works in the same way as the Standby Menu, except that you have access to the PON test results and what the system really sees for resources.

SystemGuard maintenance menu access

Use Figure 3-2 on page 3-23 to access the SystemGuard maintenance menu.

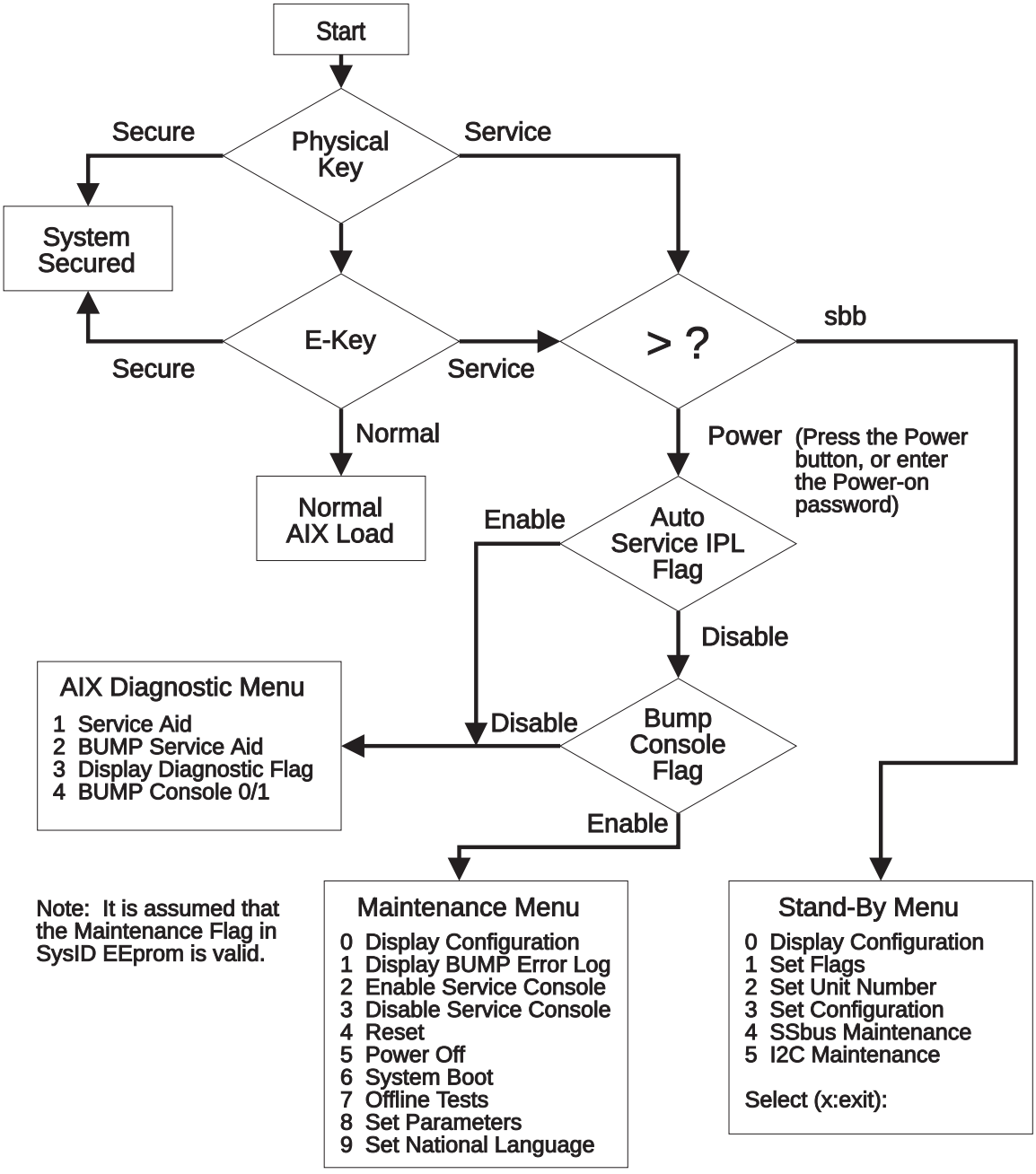


Figure 3-2. SystemGuard maintenance menu access

Notes:

1. In order to access the maintenance menu, the following conditions must be satisfied:
   - The system must be in Service Mode.
   - The AutoService IPL flag must be disabled.
   - The BUMP console must be enabled.
2. In order to access the AIX diagnostic menu, the following condition must be satisfied:

- The BUMP console must be disabled.

Diagnosing an LED 292 hang condition

An LED 292 status indicates a Power-On Self Test (POST) failure on a DASD boot device (SCSI, SSA, or Serial DASD adapter). If the failing device is the device you want to boot from, or is another device in the boot chain (before your device), the system will not boot. To isolate the problem, minimum configuration of DASD bootable adapters can be required.

Boot sequence

After completion of PON tests, and before the system attempts to boot AIX or diagnostic tests, the Micro Channel Bus is checked for adapters. If the adapter has built-in Power-On Self Tests, the POSTs are run on the adapter.

The BUMP console will show test progress such as the following example sequence:

```
Processor 0 on IPL Init
216
220
288
280
279
292
292
292
286
279
292
292
292
```

The screen then clears.

If in Service and AutoService IPL=0, Maintenance Menu is displayed. Otherwise, the following is shown:

```
Processor 0 on IPL Start                (usually)
223, 233, 243, 253                      (if successful)
299                                     (if unsuccessful)
269
```

Deciphering the hang condition

If the system hangs on one of the LEDs, you can identify the adapter causing the hang by using the LED information and comparing it to the system configuration.

In this example, assume the system configuration is for a 604 High Node (functional equivalent to an RS/6000 Model R40):

Slot Number	Adapter Type	Slot Number	Adapter Type
01	ENET (2-1)	11	T/R (2-2)
02	FDDI (2-S)	12	FDDI (2-S)
03	FDDI (2-R)	13	FDDI (2-R)
04	128-P (3-7)	14	128-P (3-7)
05	128-P (3-7)	15	128-P (3-7)
06	SSA (4-G)	16	SSA (4-G)
07	SSA (4-G)	17	SSA (4-G)
08	SCSI (4-7)	18	SCSI (4-2)

Also assume the following LEDs are displayed on the BUMP console:

```
216
220
288
280
279
292
292
292
286
279
292 "HANG"
```

Using information from *Diagnostic Information for Micro Channel Bus Systems* and POST indicators, the following information is determined for the preceding list of LEDs:

Note: The Bus is tested beginning with slot 01 and continues through slot 18.

216 (IPL ROM code being uncompressed into memory)

220 (IPL control block is being initialized)

288 (Adapter card slots being queried

280 (3com Ethernet POST)

279 FDDI POST

292 SCSI POST running (or SSA, or SERDASDA)

292 SCSI POST running (or SSA, or SERDASDA)

292 SCSI POST running (or SSA, or SERDASDA)

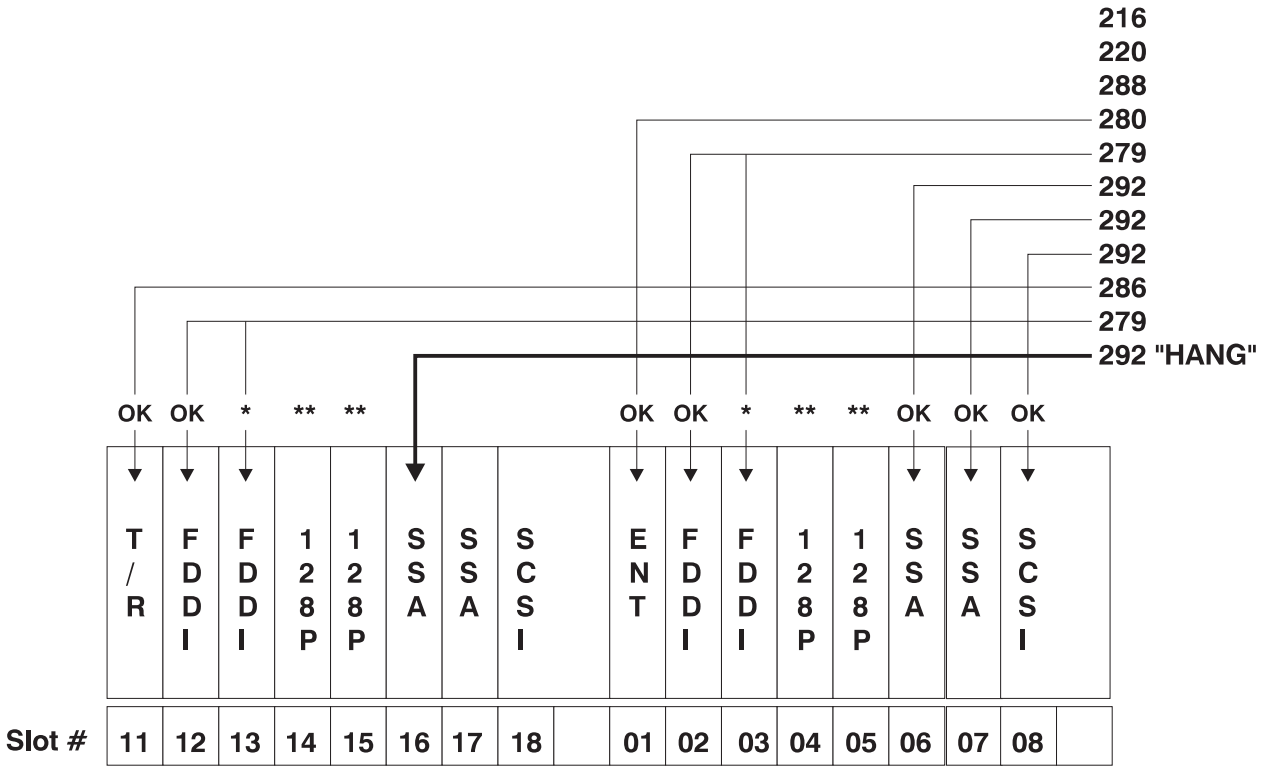
286 Token-Ring adapter POST running

279 FDDI POST

292 SCSI POST running (or SSA, or SERDASDA)

With this "known" information from the LEDs, you can determine which adapters in the configuration passed POST.

Note: Not all adapters have built-in POSTs.



* Two port FDDI with one POST

** 128-port cards have no POST

Chapter 4. FRU removals and replacements

Attention: Components in the frame are susceptible to damage from static discharge. Always use an ESD wristband when working inside frame covers. (See “Personal ESD requirements” on page xv for more details.) Do not touch the pins or circuitry on these components.

This chapter describes the removal and replacement of RS/6000 SP product-specific Field Replaceable Unit (FRU) components.

For common RS/6000 components, refer to the *7012 POWERstation and POWERserver: Installation and Service Guide* (SA23-2624) for the Thin Node component, the *7013 POWERstation and POWERserver: Installation and Service Guide* (SA23-2622) for the Wide Node component, or the *7015 Models R30, R40, and R50 CPU Enclosure Installation and Service Guide* (SA23-2743) for the 604 or 604e High Node.

Handling static-sensitive devices

Attention: Adapters, planars, disk drives, supervisor cards and memory cards are sensitive to static electricity discharge. These devices are wrapped in antistatic bags or containers to prevent this damage.

Perform the following procedures to prevent damage to these devices:

1. Do not remove the device from the antistatic bag or container until you are ready to install the device in the system unit.
2. You must wear an ESD wristband while installing or removing any static-sensitive devices.
3. With the device still in its antistatic bag, touch it to a metal frame of the system.
4. Grasp cards and boards by the edges. Hold drives by the frame. Avoid touching the solder joints and pins.
5. Handle the devices carefully in order to prevent permanent damage.

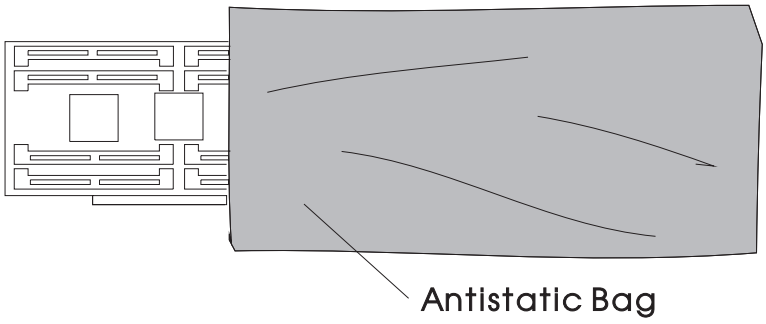


Figure 4-1. Handling an anti-static device

Removing the node front access plate

1. Ensure ESD antistatic wrist device is attached.
2. At the front of the frame, locate the circuit breaker assembly below the 604 or 604e High Node.
3. Place both circuit breaker assembly switches in the Off (‘0’) position.
4. Remove the hex head retainer screws from the front of the node. Retain the screws.
5. Remove the front access plate.

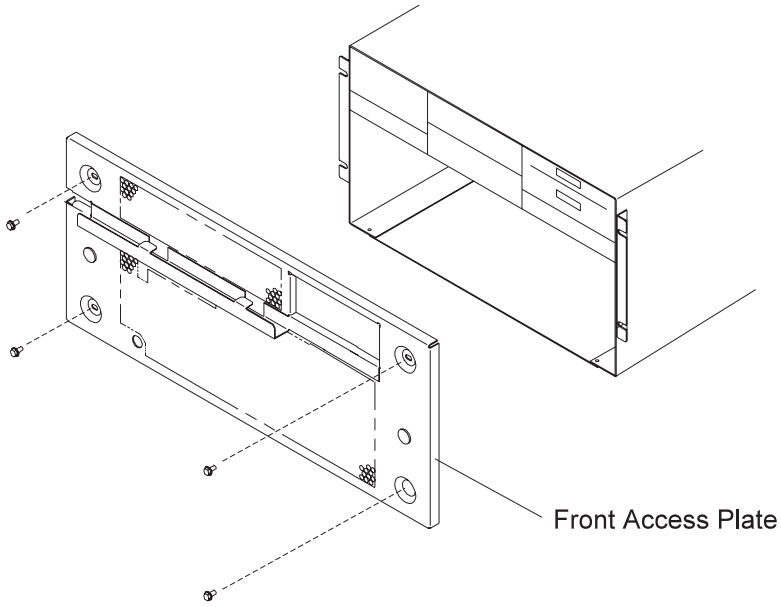


Figure 4-2. Removing the 604 or 604e High Node front access plate

Replacing the node front access plate

1. Ensure ESD antistatic wrist device is attached.
2. Replace the front access plate in the front of the node and secure with the hex head screws that were previously removed.
3. Place both circuit breaker assembly switches in the On (‘1’) position.
4. Perform “Updating the node supervisor code” on page 3-15.

Removing the media module

1. Perform “Removing the node front access plate.”
2. Disconnect the operator panel cable (push the connector tabs away from the center of the connector).
3. Disconnect the media power cable.
4. **604e only**– Disconnect the two supervisor data cables.
5. Disconnect the SCSI cable:

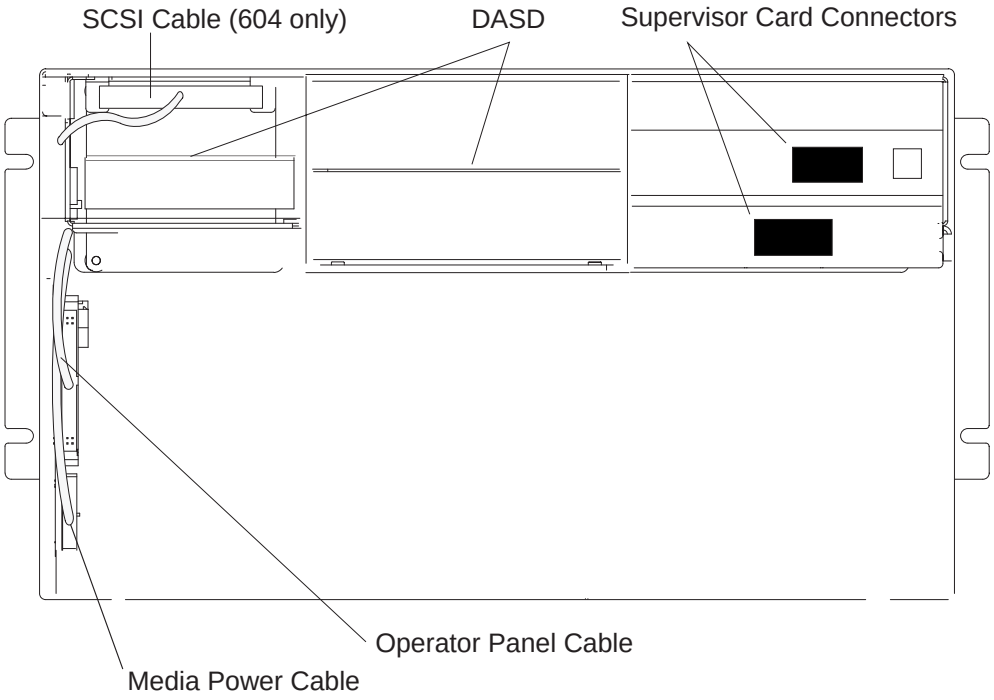


Figure 4-3. Removing the 604e High Node media module

- **604 High Nodes** – Remove the connector on the front of the DASD.
- **604e High Nodes** – Slide the media module toward you until you can access the bottom of the disk drive docking connector card, then remove the SCSI cable connector from the bottom of the docking connector card.

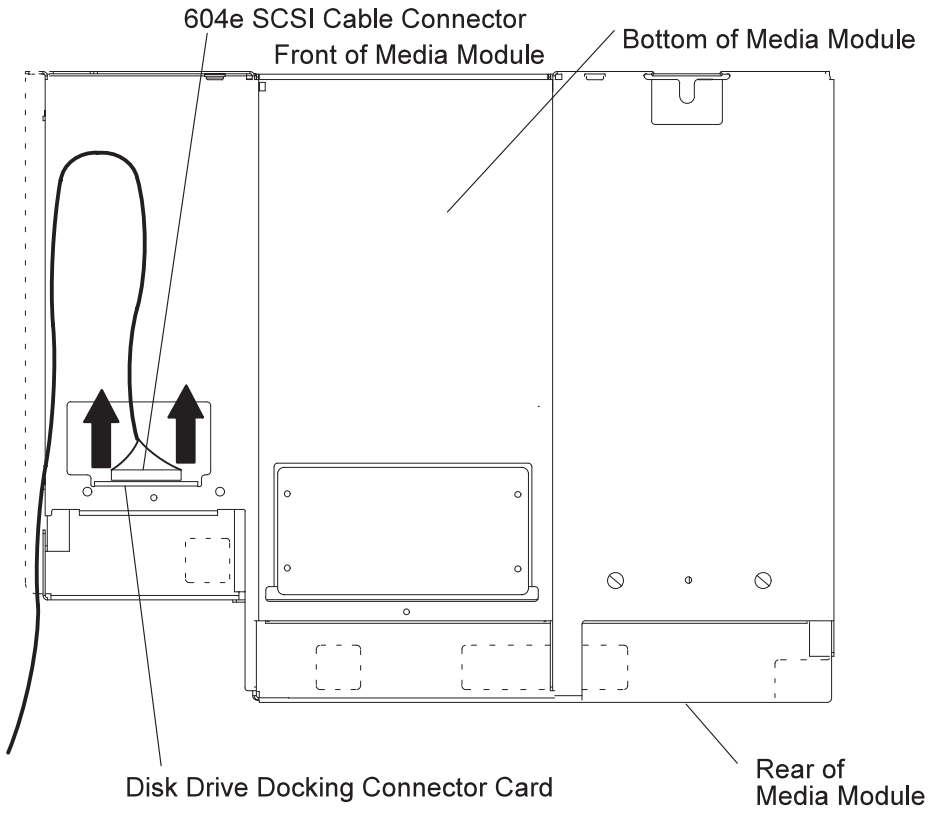


Figure 4-4. Removing the 604e High Node media module

6. Slide the media module toward you until you can place your hand under it, then slide the media module out of the node chassis.
7. Place the media module on a stable surface.

Replacing the media module

1. Ensure ESD antistatic wrist device is attached.
2. SCSI cable:
   - 604 nodes–Slide the media module in completely, then reconnect the SCSI cable.
   - 604e nodes–Slide the module partially in, reattach the SCSI connector to the bottom of the module, then slide the module in completely.
3. Reconnect the media power cable.
4. Reconnect the operator panel cable.
5. Reconnect the two supervisor data cables.
6. Perform “Replacing the node front access plate” on page 4-3.

Removing the media module fans

1. Perform “Removing the media module” on page 4-4.
2. Disconnect the fan power cable for the fan you are removing.
3. Remove all four vibration isolators by pulling the fan, either downward or away from the media module, until the vibration isolators disengage from either the fan or the media module. See Figure 4-5 on page 4-6 and Figure 4-6 on page 4-7.
4. Pull the fan out of (or away from) the media module.

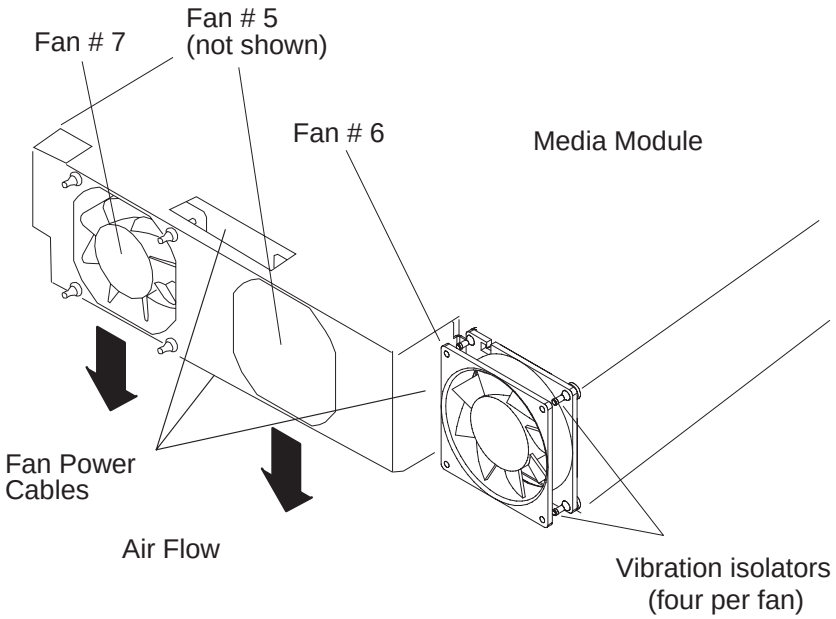


Figure 4-5. Removing the 604 or 604e High Node media module fan

Replacing the media module fans

1. Ensure ESD antistatic wrist device is attached.
2. Replace the vibration isolators.
   a. Check the direction of the air flow marked on the fan, then place the long end of the vibration isolator through the mounting hole of the fan.
   b. Pull the long end of the vibration isolator through the mounting hole until the center ring of the vibration isolator is against the fan.
   c. Repeat the two previous steps until all four vibration isolators are mounted on the fan.
   d. Place the short end of each vibration isolator through the mounting holes of the fan mounting bracket. If you are replacing a fan that mounts inside the media module, slide the fan inside the media module, then pull each short end of the vibration isolators through the fan mounting bracket.
   e. Pull the short end of each vibration isolator through the mounting holes of the fan mounting bracket until the center ring of the vibration isolator is against the bracket.
3. Reinstall the fan into the media module.
4. Reconnect the fan power cable.
5. Reconnect the operator panel cable.
6. Perform “Replacing the media module” on page 4-5.

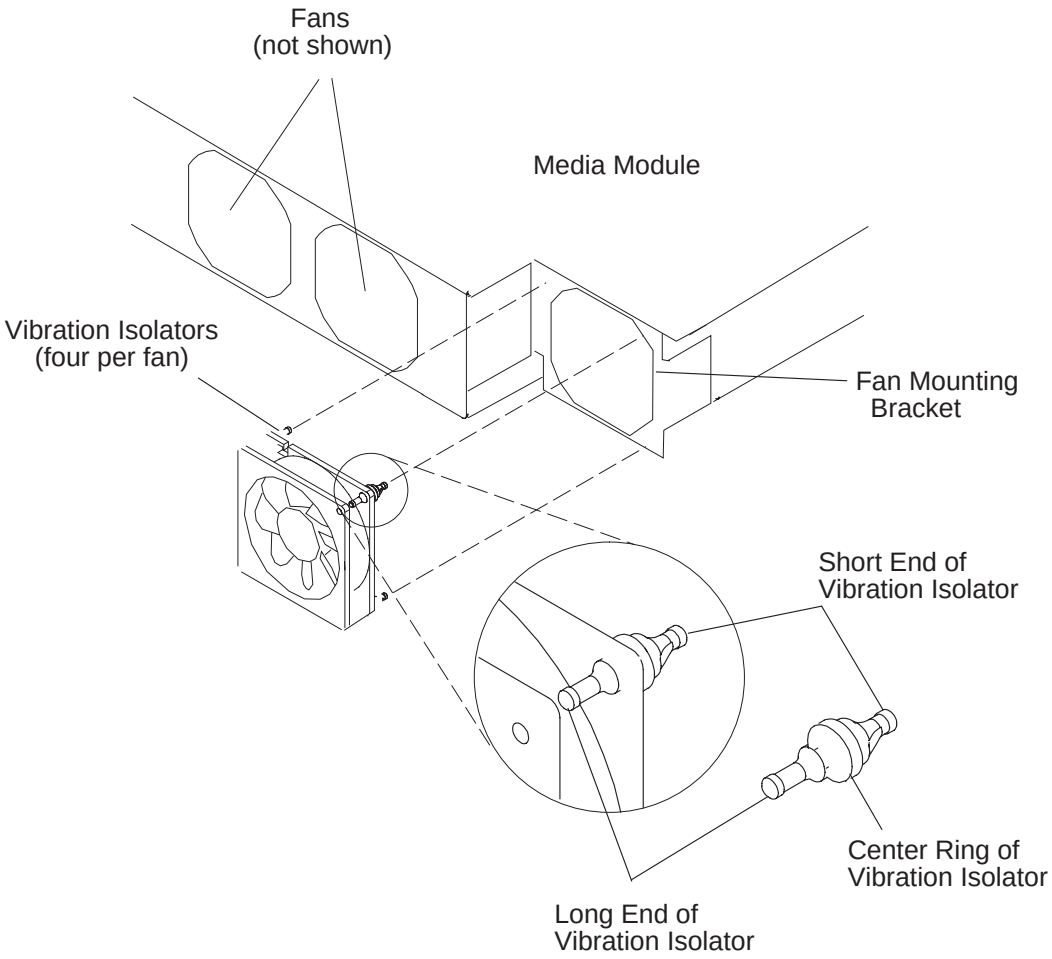


Figure 4-6. Replacing the 604 or 604e High Node media module fan

Removing the media module cables and docking connector cards

Notes:

1. If you are removing the **SCSI cable** connected to the disk drive and media docking cards, perform steps 1-10 .
2. If you are removing the **disk drive docking connector card**, perform steps 1-3 , 5-6 , and 12- 14.
3. If you are removing the **power cable cluster**, perform steps 1-9 , 11-12 , and 15.

1. Perform “Removing the DASD” on page 4-47.
2. Perform “Removing the media module” on page 4-4.
3. Place the media module upside-down on a stable surface with the rear of the media module facing you.
4. If you are removing the SCSI cable connected to the media and disk drive docking cards, remove the two mounting screws attaching the SCSI connector in the front of the disk drive position (604e High Nodes do not have this connector).

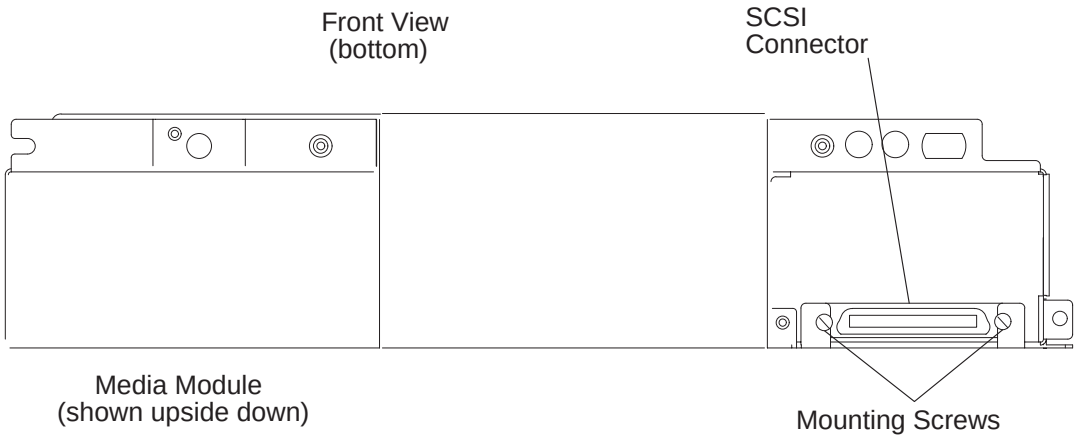


Figure 4-7. Front view of 604 or 604e High Node media module

5. Remove the disk drive fan and media fan. Refer to “Removing the media module fans” on page 4-5.
6. Disconnect the SCSI cable connector on the rear of the disk drive docking connector card.
7. Remove the two rear mounting screws attaching the media docking connector bracket to the rear of the media module (these screws are not present on all media modules).
8. Remove the four mounting screws on the media docking bracket, then lift the media docking bracket out of the media module to access the SCSI cable connector on the media docking connector card.

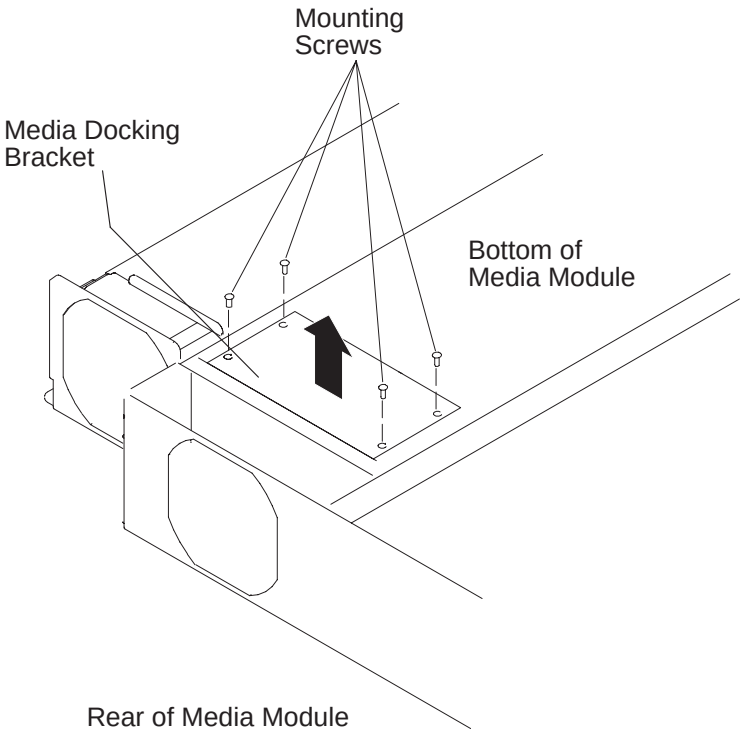


Figure 4-8. Rear view of 604 or 604e High Node media module (upside-down)

9. Disconnect the SCSI cable connector on the media docking connector card.
10. Guide the SCSI cable out of the media module through the disk drive opening.
11. If you are removing either the docking connector card or the power cable assembly, disconnect the two power cable connectors (P75 and P76) from the docking connector card.

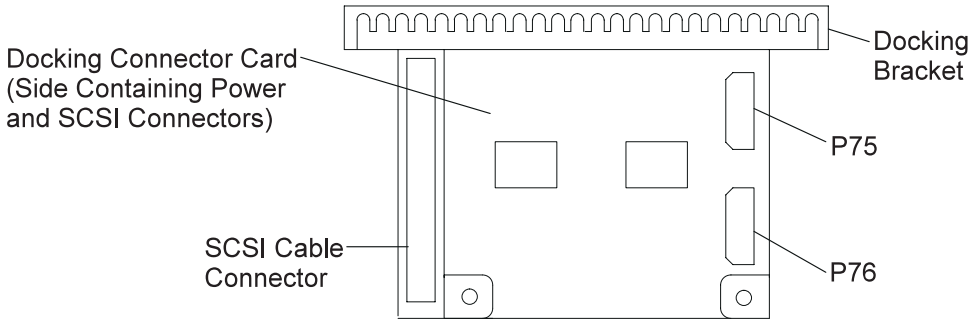


Figure 4-9. 604 or 604e High Node docking connector card

12. If you are removing the docking connector card on the disk drive docking bracket, disconnect the power cable connector on the docking connector card.
13. Remove the two mounting screws attaching the docking bracket, then guide the bracket through the rear of the media module.

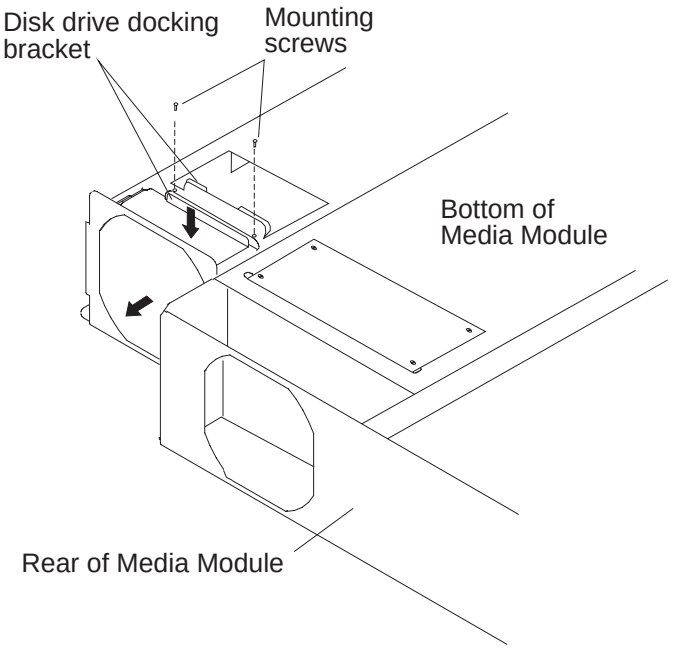


Figure 4-10. Removing the 604 or 604e High Node Media module disk drive docking bracket

14. If you are removing the disk drive docking connector card from the docking bracket, remove the four mounting screws, then remove the docking connector card.

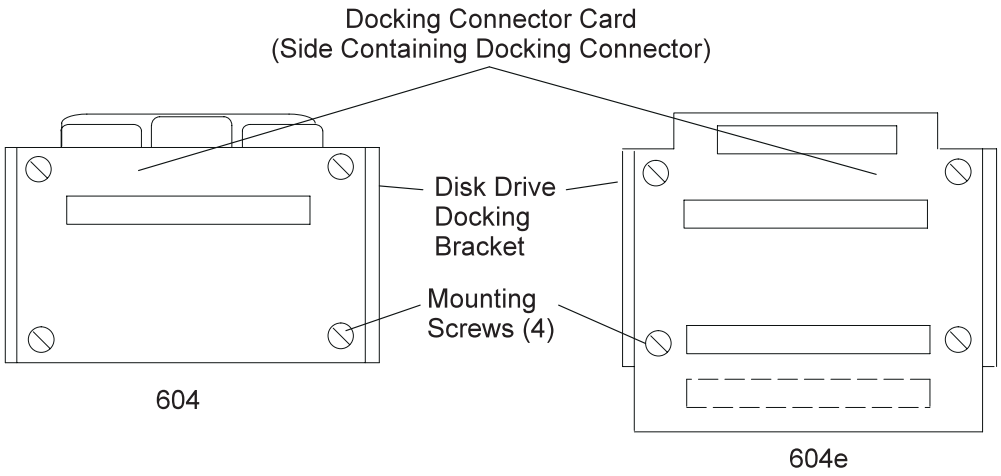


Figure 4-11. Removing the 604 or 604e High Node media module disk drive docking connector card

15. If you are removing the power cable assembly, perform the following:
    a. Using pliers, gently remove connectors P71, P72, and P73 from the rear of the media module.
    b. Remove the power cable from the plastic cable retainers, then guide the power cable out of the media module.

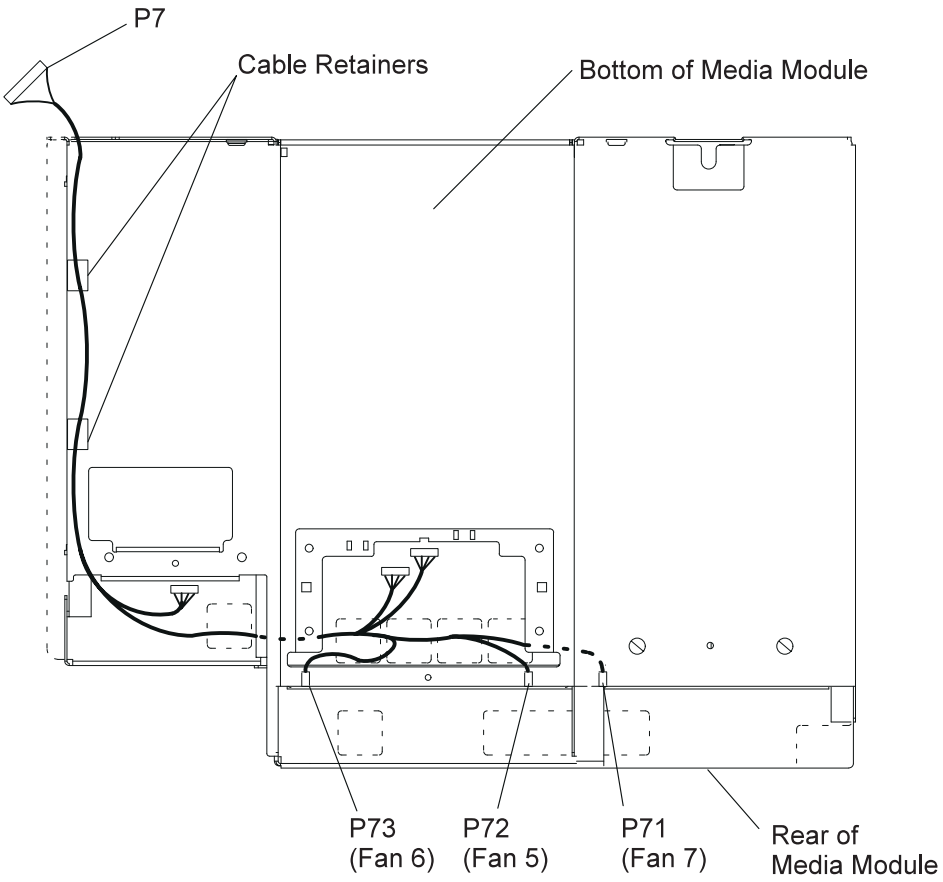


Figure 4-12. Bottom view of 604 or 604e High Node media module

Note: If connector P71 on your cable is marked "Fan 4", disregard. This connector connects Fan 7, as shown in Figure 4-12.

Replacing the media module cables and docking connector cards

Depending on which cable or docking connector card was removed, replace (in reverse order) using “Removing the media module cables and docking connector cards” on page 4-7 as a guide.

Removing the CPU module

1. Perform “Removing the node front access plate” on page 4-3.
2. Disconnect the operator panel cable and the media power cable, then move the cables away from the front of the CPU module.

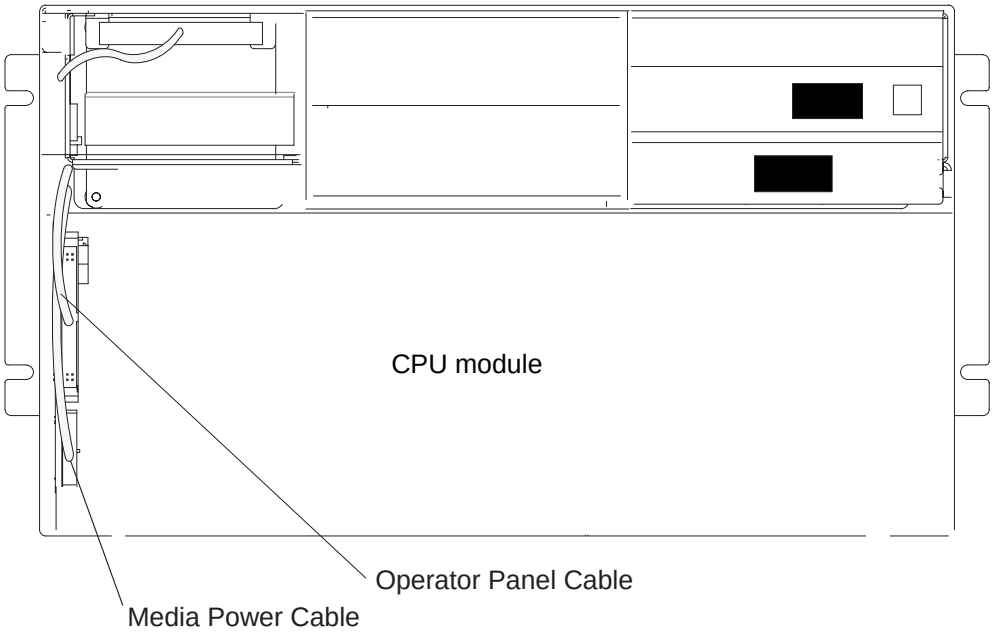


Figure 4-13. Removing the 604 or 604e High Node CPU module

3. Remove the two retainer screws.
4. Loosen the docking screw until the CPU module is disengaged from the I/O planar interface connectors.
5. Grasp the front of the CPU module and pull it toward you until you can grasp each side of the CPU module.

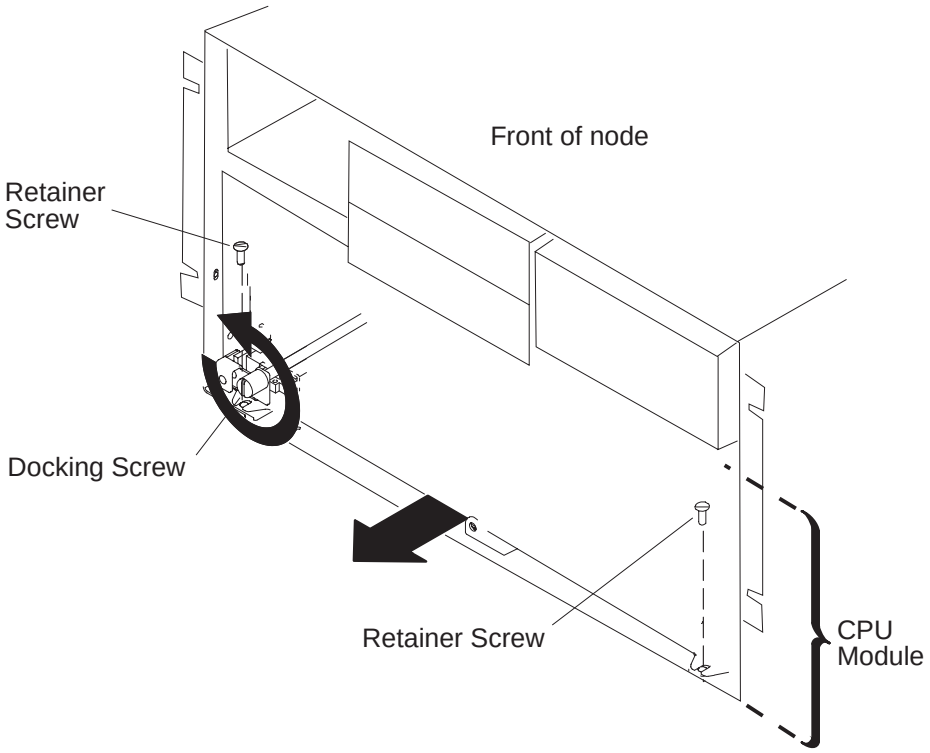


Figure 4-14. Removing the 604 or 604e High Node CPU module

Note: Make sure that the operator panel cable an the media power cable are placed out of the path of the CPU module.

6. Grasp each side of the CPU module (bottom) and pull it toward you until it is out of the chassis, then place the CPU module on a stable surface.

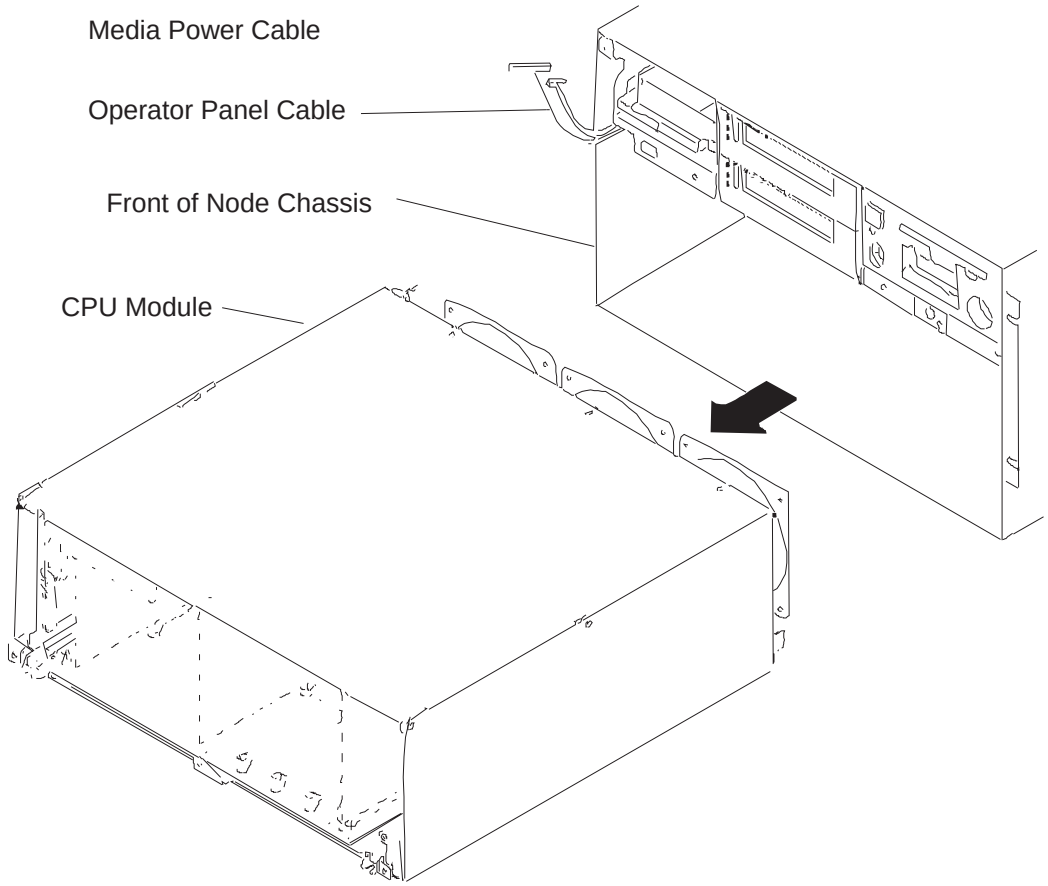


Figure 4-15. Removing the 604 or 604e High Node CPU module

Replacing the CPU module

Note: When placing the CPU module in the node chassis, make sure that the operator panel cable and the media power cable are placed out of the path of the CPU module.

1. Ensure ESD antistatic wrist device is attached.
2. Grasp the bottom of the CPU module with both hands and slowly slide it into the node chassis until the threaded tip of the docking screw touches the nut in the I/O module.

   Note: The CPU module should slide easily into the node chassis until the docking screw meets its nut in the I/O module. The system planar edge should be approximately 2 mm inside the bottom front edge of the node chassis.

3. Start tightening the docking screw just until the CPU module is far enough into the node chassis to install the two retaining screws.
4. Install the two retaining screws, but do not tighten them.
5. Tighten the docking screw.
6. Tighten the two retaining screws.

Removing the interlock cable

1. Ensure ESD antistatic wrist device is attached.
2. Perform “Removing the CPU module” on page 4-11.
3. Remove the seven screws from the CPU module top cover, then remove the top cover.
4. Disconnect the interlock cable connector from the lateral planar 1 card, then remove the interlock switch from the CPU-module frame.

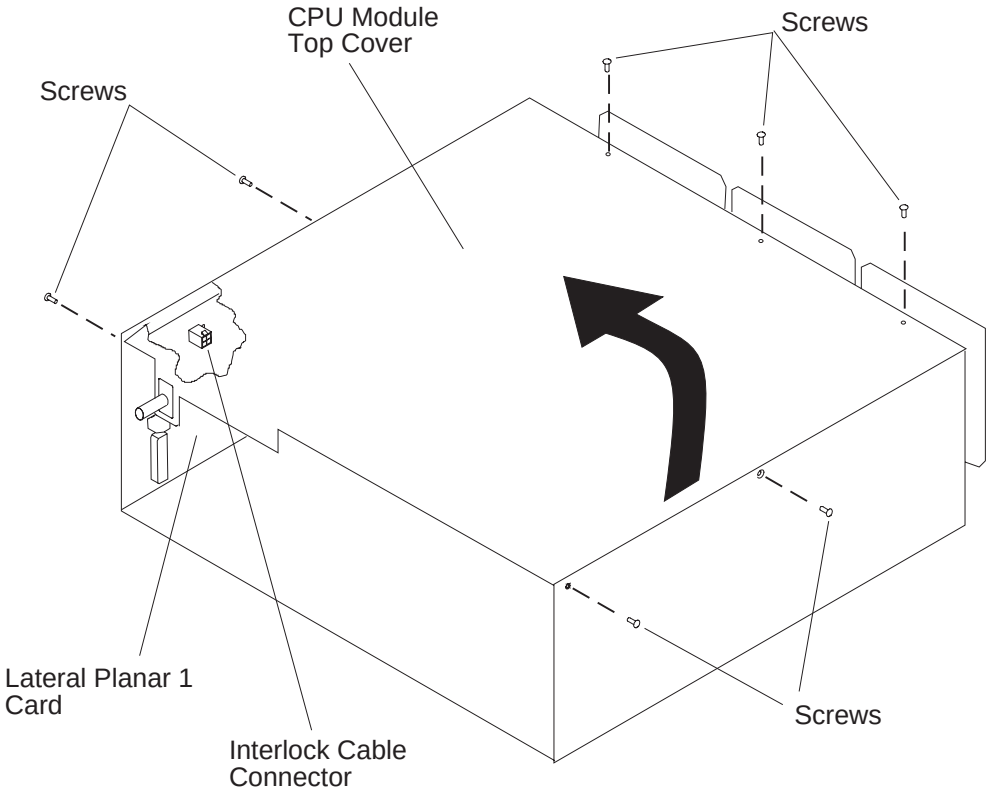


Figure 4-16. Removing the 604 or 604e High Node interlock cable

Replacing the interlock cable

1. Ensure ESD antistatic wrist device is attached.
2. Connect the interlock cable connector to the lateral planar 1 card, then connect the interlock switch to the CPU-module frame.
3. Replace the CPU top cover, then replace the seven screws in the CPU module top cover.
4. Perform “Replacing the CPU module” on page 4-13.

Removing memory, CPU and I/O cards

Note: Removing the memory, CPU, or I/O card requires using the extraction tools which are stored on the left side of the front access plate. Loosen the two screws from their standoffs to release the extraction tools.

1. Ensure ESD antistatic wrist device is attached.
2. Perform “Removing the CPU module” on page 4-11.
3. Remove the seven screws from the CPU module top cover, then remove the top cover.

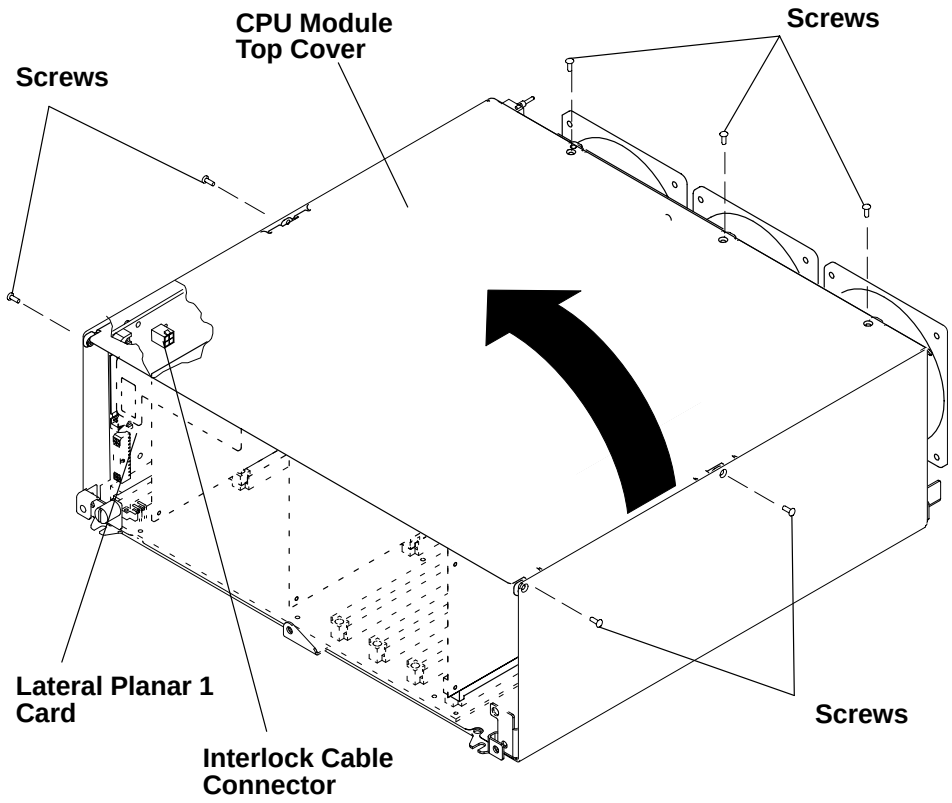


Figure 4-17. Removing the 604 or 604e High Node memory, CPU, and I/O cards

4. If you are removing the I/O card, disconnect both flex cables connected to the I/O card.
5. Locate the card you are removing and position the extraction tools with their pins through the holes in the top corners of the card.

   Attention: 604 only – Ensure that the bottom of the dual-piece extraction tool is placed under the system planar (on the frame of the CPU module) before removing a card. Do not place the dual-piece extraction tool on the system planar since it can cause damage to the planar.

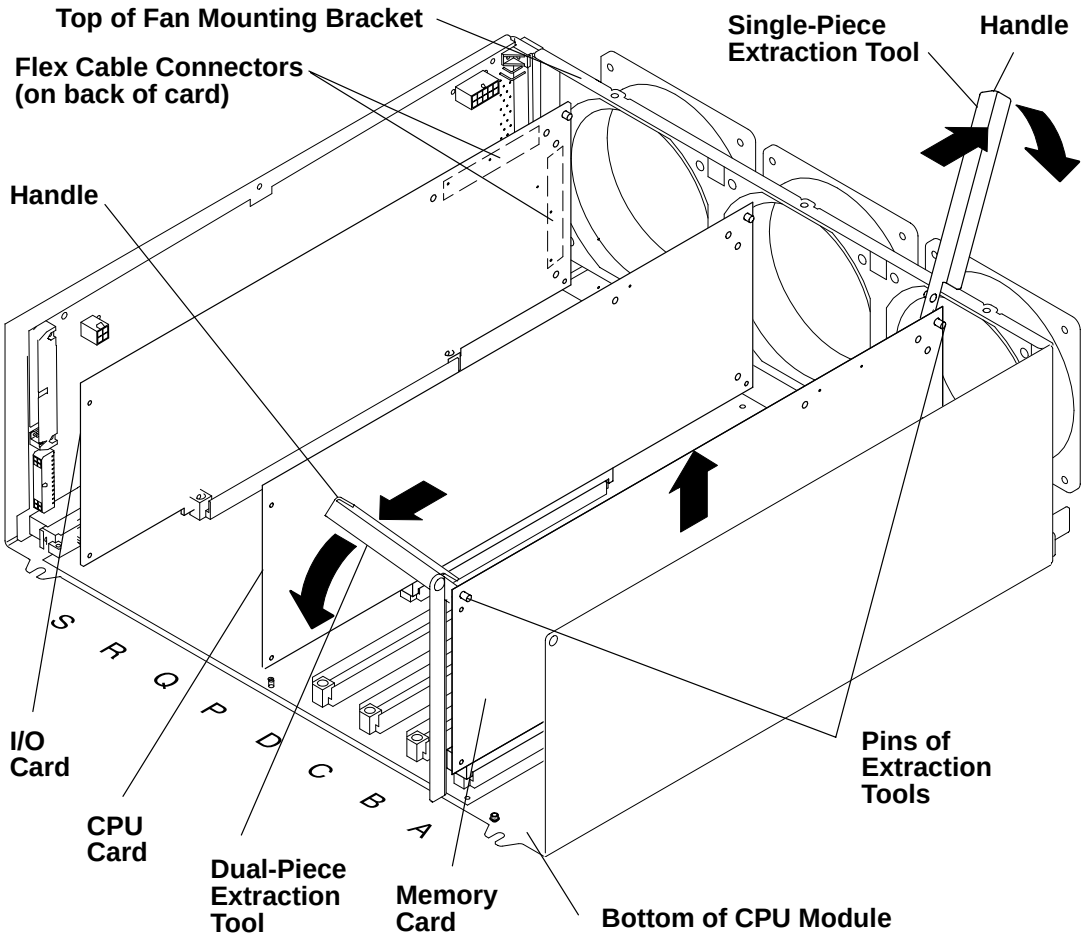


Figure 4-18. Removing the 604 High Node memory, CPU, and I/O cards

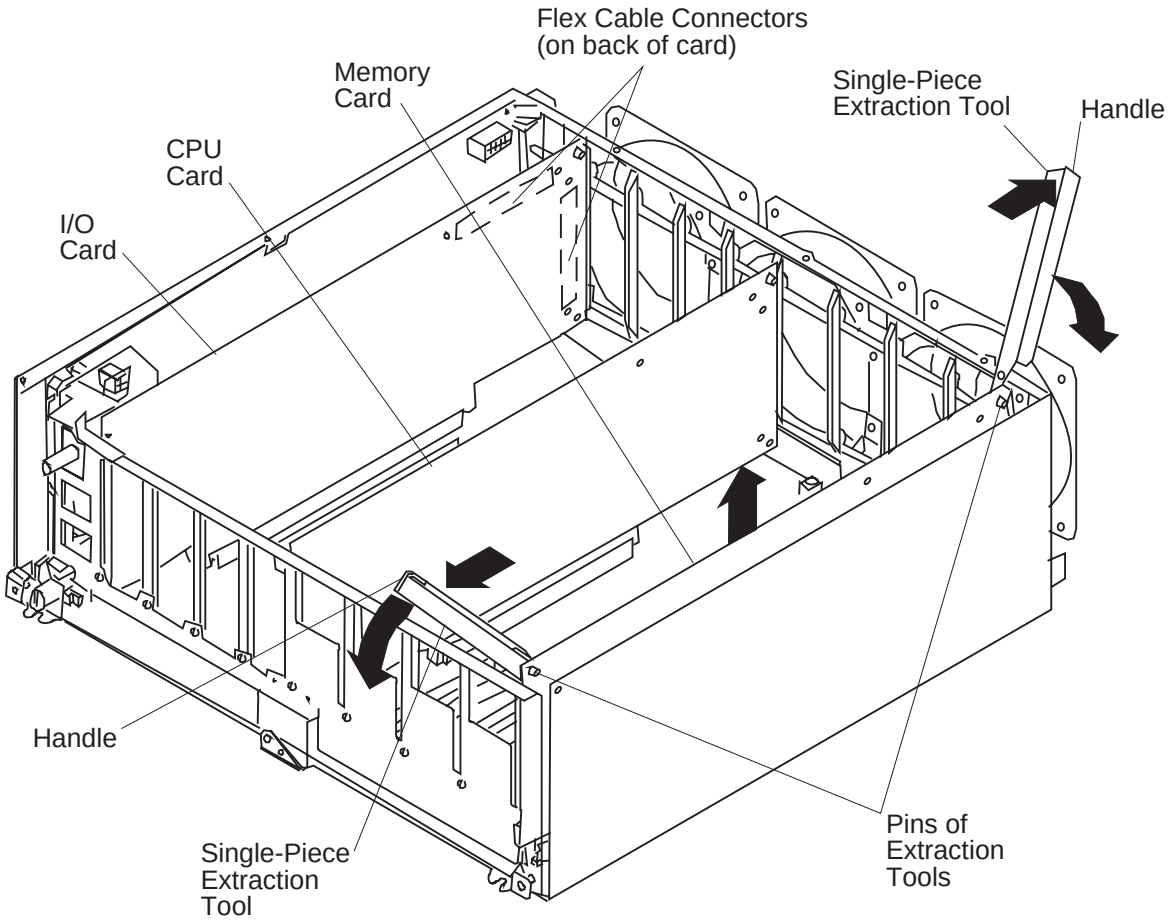


Figure 4-19. Removing the 604e High Node memory, CPU, and I/O cards

6. With both extraction tools positioned on the card, firmly rotate both handles of the extraction tools downward until the card disengages from the slot, then remove the card.
7. If you are removing a single in-line memory module from a memory card, refer to “Removing memory modules” on page 4-18.

Replacing memory, CPU and I/O cards

Notes:

- Install the memory cards in a right-to-left sequence, beginning with slot A, then continuing with slots B, C, and D. Memory cards must be installed with no empty slots between installed memory cards.
- Install CPU cards in a right-to-left sequence beginning with slot P, then continuing with slots Q, R, and S. CPU cards must be installed with no empty slots between installed CPU cards.
- See “604 or 604e High Processor Node locations” on page 2-7.

Replace cards by carefully lining up their connectors and then firmly inserting the cards into place.

For more information about memory cards and memory types, refer to *Diagnostic Information for Micro Channel Bus Systems*.

Removing memory modules

1. Ensure ESD antistatic wrist device is attached.
2. Remove the memory card, see “Removing memory, CPU and I/O cards” on page 4-14.
3. Push the release tabs away from the memory module until the memory module disengages from the slot, then remove the memory module.

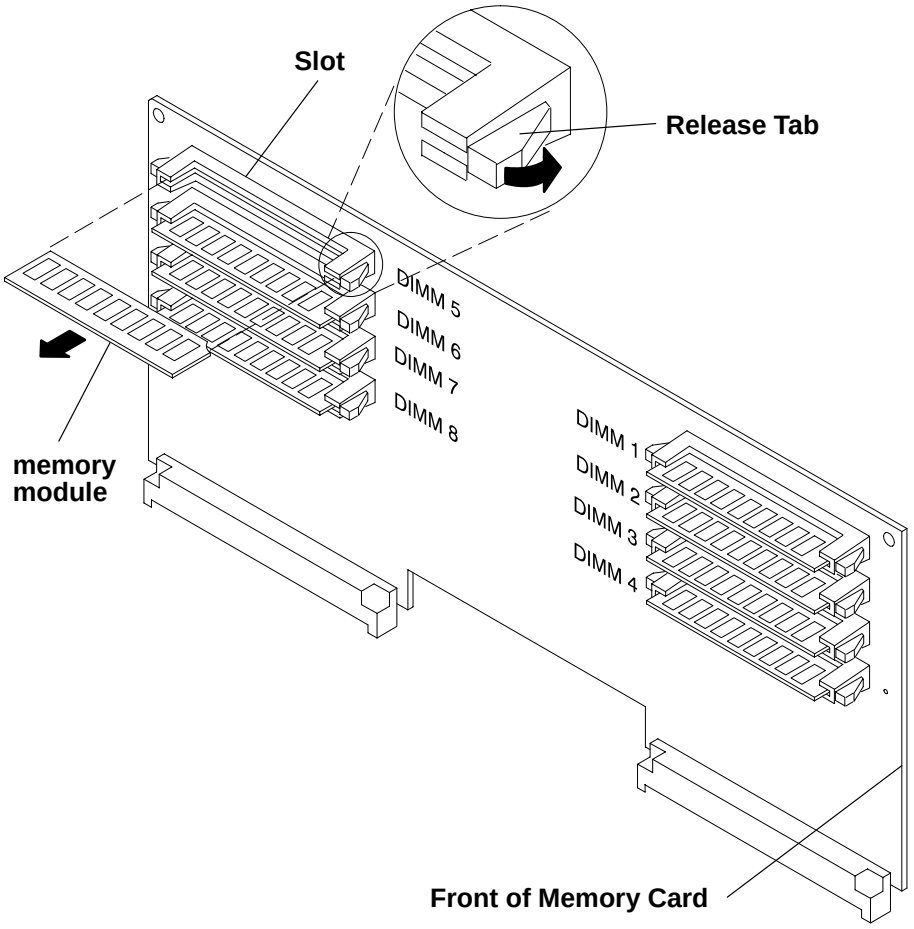


Figure 4-20. Removing the 604 or 604e High Node memory modules

Replacing memory modules

1. Place the memory module in the slot on the memory card, then press the memory module into the slot until the memory module is firmly seated.
2. Replace the memory card. See “Replacing memory, CPU and I/O cards” on page 4-17.

For more information about memory type, memory module size, and memory module part numbers, refer to *Diagnostic Information for Micro Channel Bus Systems*.

Removing CPU module fans

1. Ensure ESD antistatic wrist device is attached.
2. Perform “Removing the CPU module” on page 4-11.
3. Remove the cable tie holding the fan power cable connector, then disconnect the fan power cable connector.
4. Remove all four vibration isolators by pulling the fan away from the media module until the vibration isolators disengage from either the fan or the media module.
5. Remove the fan.

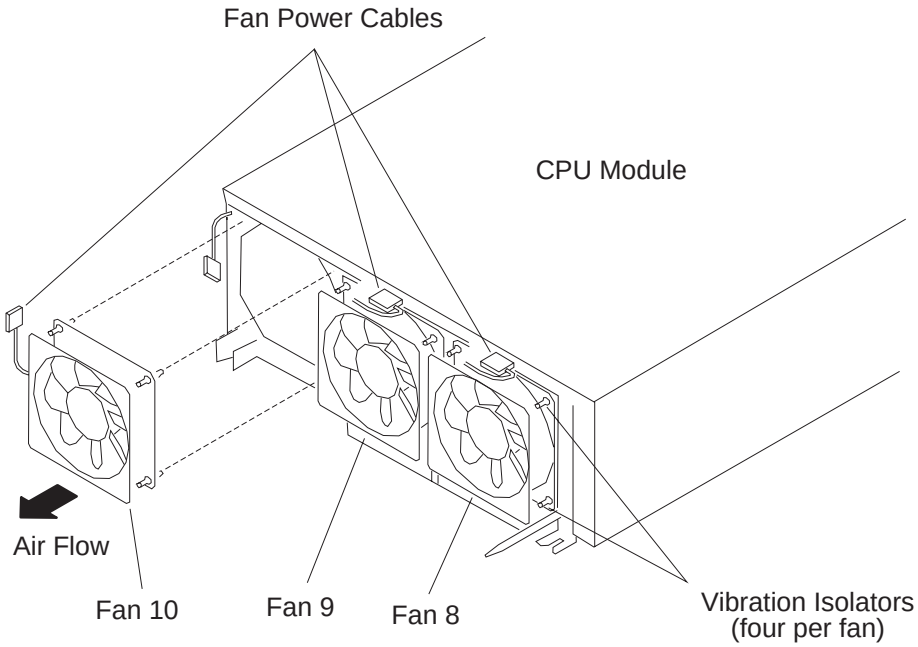


Figure 4-21. Removing the 604 or 604e High Node CPU module fans

Replacing CPU module fans

1. Remove the module top cover and I/O card, refer to “Removing memory, CPU and I/O cards” on page 4-14.
2. Check the direction of the air flow marked on the fan, then place the long end of the vibration isolator through the mounting hole of the fan.
3. Pull the long end of the vibration isolator through the mounting hole until the center ring of the vibration isolator is against the fan.
4. Repeat the two previous steps until all four vibration isolators are mounted on the fan.
5. Place the short end of each vibration isolator through the mounting holes of the fan mounting bracket.
6. Pull the short end of each vibration isolator through the mounting holes of the fan mounting bracket until the center ring of the vibration isolator is against the bracket.
7. Connect the fan power cable.
8. Secure the fan power cable connector with a cable tie.
9. Perform “Replacing the CPU module” on page 4-13.

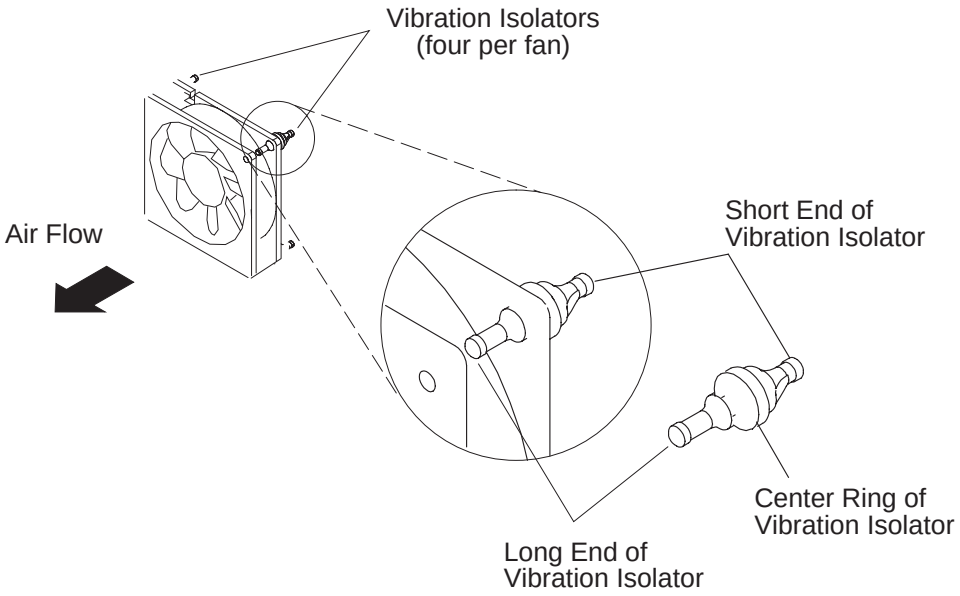


Figure 4-22. Replacing 604 or 604e High Node CPU module fans

Removing the system planar

1. Ensure ESD antistatic wrist device is attached.
2. Perform “Removing the interlock cable” on page 4-14.
3. Perform “Removing memory, CPU and I/O cards” on page 4-14 to remove all of the memory, CPU, and I/O cards.
4. **604e High Nodes** – Remove the seven screws holding the front guide bracket, then lift the bracket out of the CPU module.

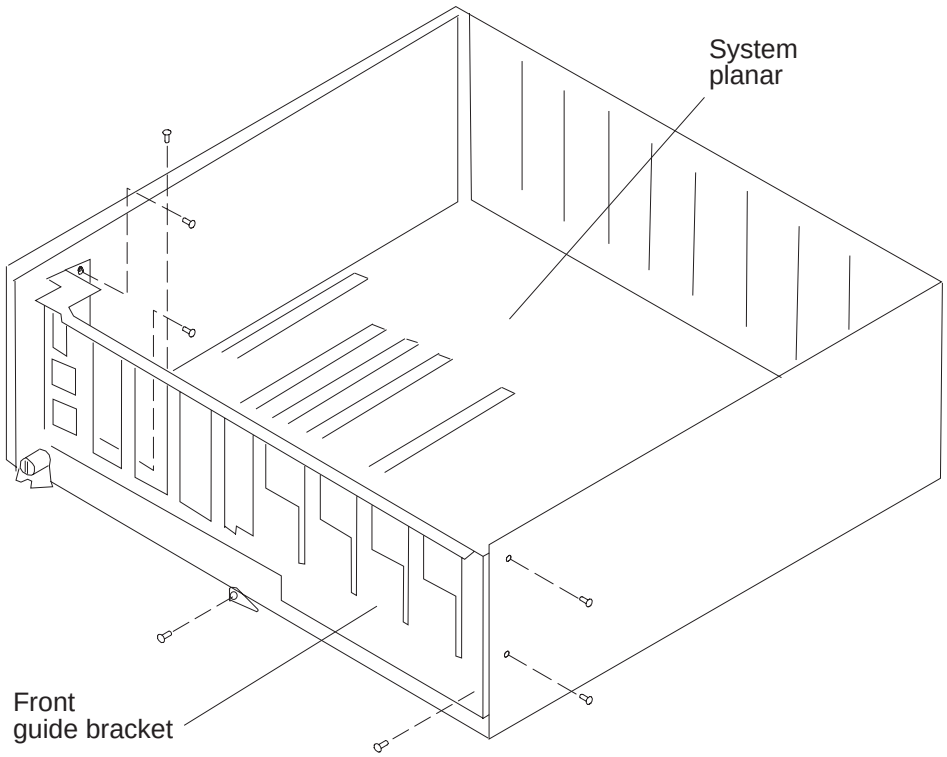


Figure 4-23. Removing the 604 or 604e High Node system planar

If the node chassis has a docking screw retention bracket, perform the next two steps, otherwise, go to step 8 on page 4-21.

5. Remove the screw holding the docking screw retention bracket.
6. Move the docking screw aside to provide access to the system planar mounting screws.
7. Go to step 9.

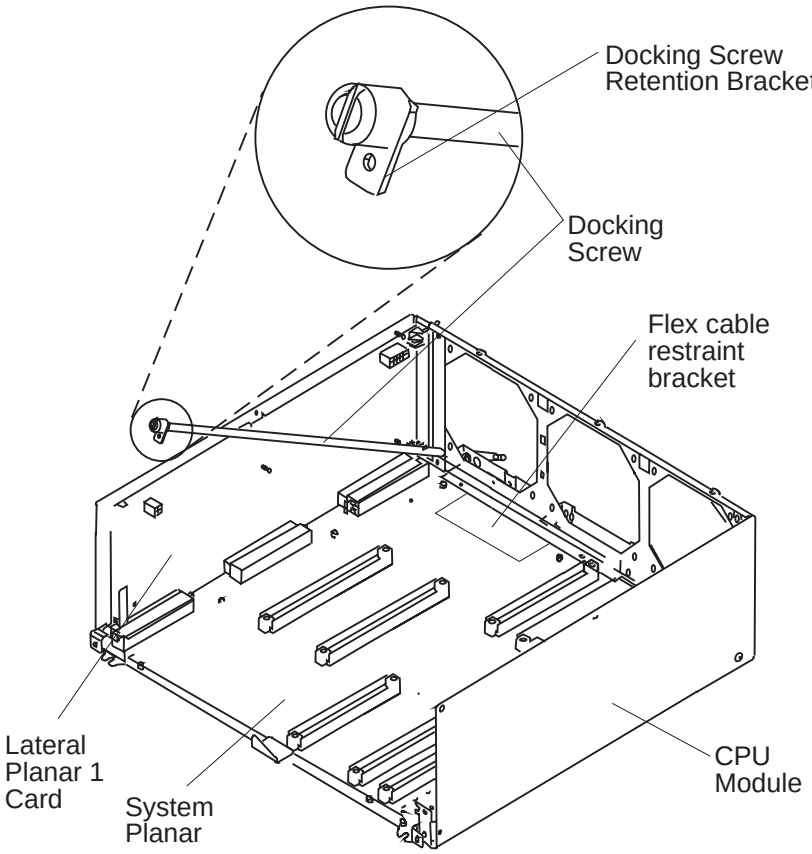


Figure 4-24. Removing the 604 or 604e High Node system planar

If the node chassis does NOT have a docking screw retention bracket, perform the next step, otherwise, go to step 9.

8. For earlier versions of the CPU module, remove the docking screw by removing the two retainer clips and the three washers, then remove the docking screw.
9. Remove the flex cable restraint bracket retainer screw and the flex cable restraint bracket from the CPU module.
10. Remove the nine mounting screws (604e High Node uses 12 screws) attaching the system planar to the CPU module.
11. Grasp the system planar near the three power interface connectors, then pull the system planar away from the lateral planar 1 card until the system planar disconnects from the lateral planar 1 card; immediately lift the system planar out of the CPU module.

    Attention: As soon as the system planar is disconnected from the lateral planar 1 card, lift the planar upward to avoid sliding the bottom of the system planar on the CPU module which can damage the soldered connectors on the bottom of the system planar.

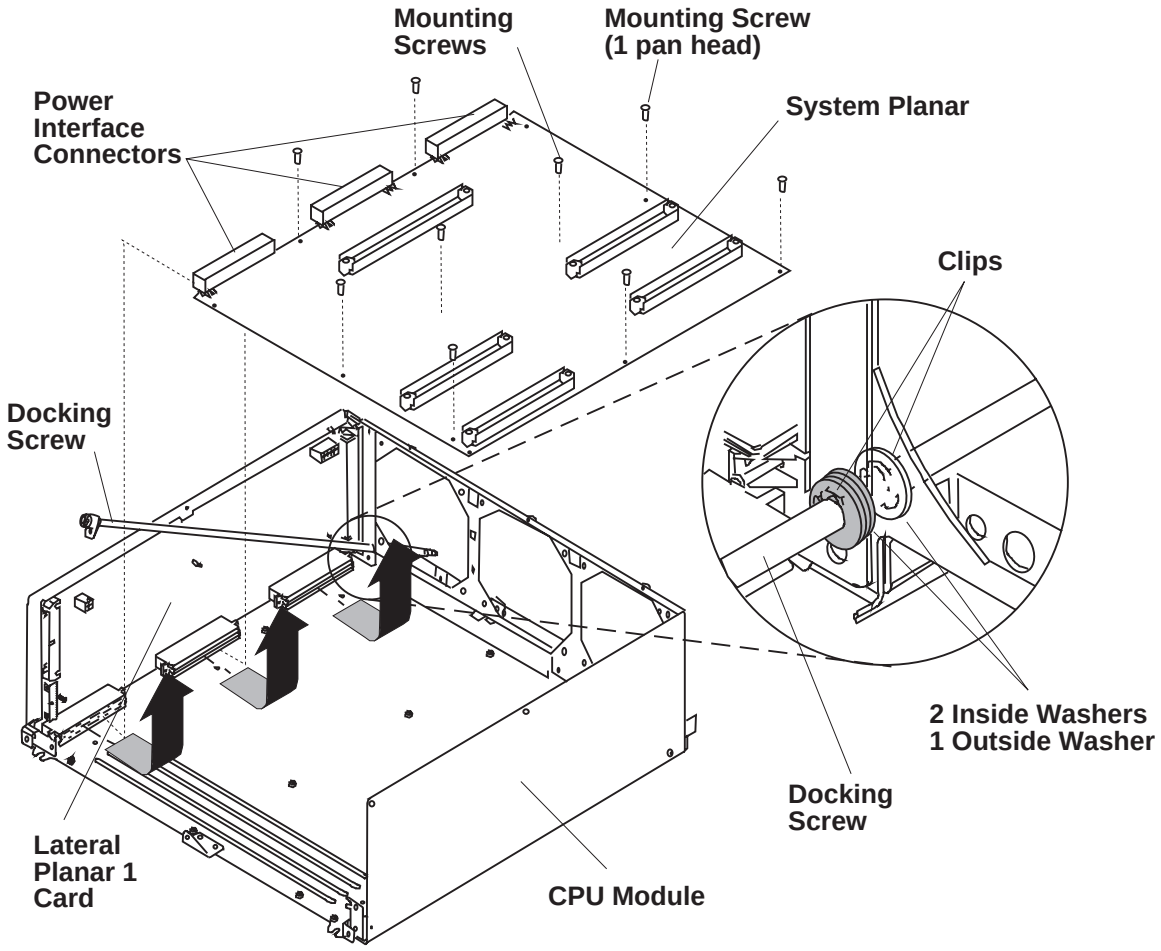


Figure 4-25. Removing the 604 or 604e High Node system planar

Replacing the system planar

1. Ensure ESD antistatic wrist device is attached.
2. Connect the system planar to the power connectors.
3. Position the system planar over the mounting holes and install the mounting screws.

   Note: Do not tighten the mounting screws until all of the screws are started in the mounting holes.

4. After all mounting screws are started in the mounting holes, tighten all of the screws.
5. Reconnect the flex cable restraint bracket and retainer screw.
6. If applicable, install the docking screw, two retainer clips and three washers.
7. If applicable, install the screw to secure the docking screw retention bracket.
8. **604e High Nodes** – Reinstall seven screws to secure the front guide bracket in the CPU module.
9. Perform “Replacing memory, CPU and I/O cards” on page 4-17.
10. Perform “Replacing the interlock cable” on page 4-14.

Removing lateral planar 1 card

Note:

1. Ensure ESD antistatic wrist device is attached.
2. Remove the lateral planar 1 card using the following procedures:
   a. “Removing the CPU module” on page 4-11.
   b. “Removing memory, CPU and I/O cards” on page 4-14 to remove all of the memory cards, CPU cards, and I/O card.
   c. “Removing the system planar” on page 4-20
3. Disconnect the fan power cable connector.
4. Remove the mounting screws (and standoff/screws if applicable) attaching the lateral planar 1 card to the CPU module, then remove the lateral planar 1 card.

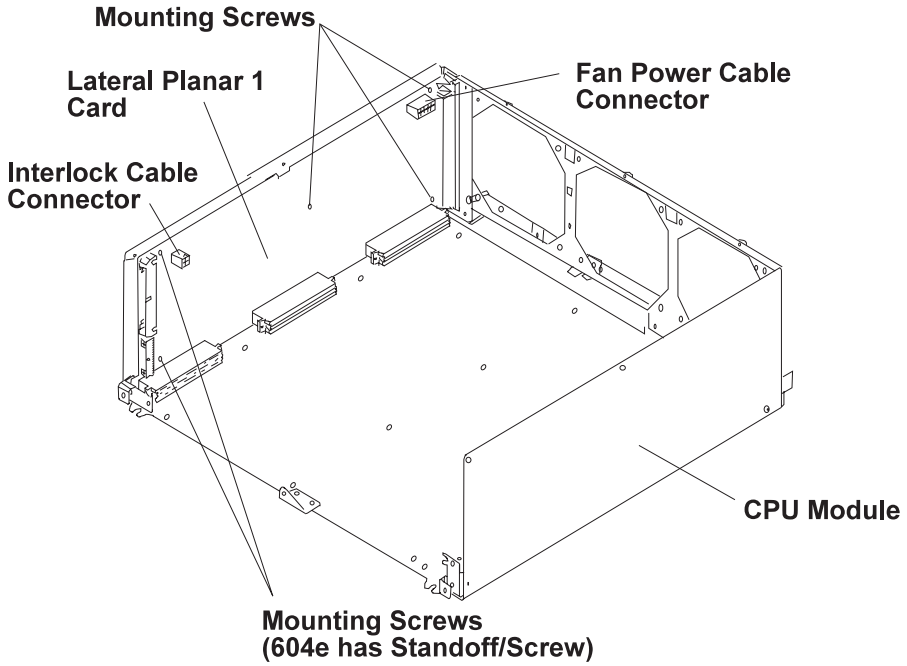


Figure 4-26. Removing the 604 or 604e High Node CPU lateral planar 1 card

Replacing lateral planar 1 card

1. Ensure ESD antistatic wrist device is attached.
2. Attach the lateral planar 1 card to the CPU module, then install the mounting screws (and standoff/screws if applicable).
3. Connect the fan power cable connector.
4. Perform the following procedures:
   a. “Replacing the system planar” on page 4-22
   b. “Replacing memory, CPU and I/O cards” on page 4-17 to replace all of the memory cards, CPU cards, and I/O card.
   c. “Replacing the CPU module” on page 4-13.

Removing CPU module flex cables

1. Perform “Removing the CPU module” on page 4-11.
2. Perform “Removing memory, CPU and I/O cards” on page 4-14 to remove the I/O card, and all of the CPU cards.
3. Remove the mounting screw on the flex cable retainer bracket.
4. Rotate the retainer bracket upwards until you can pull the retainer bracket out of the retainer bracket tab opening, then remove the retainer bracket.

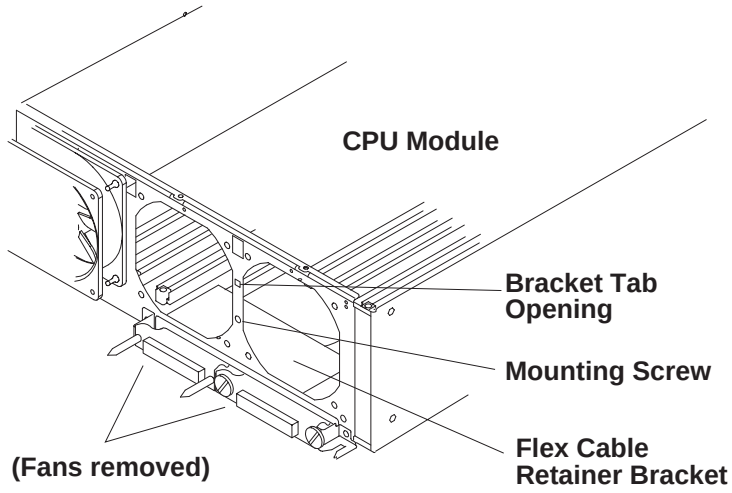


Figure 4-27. Removing the 604 High Node CPU module flex cables

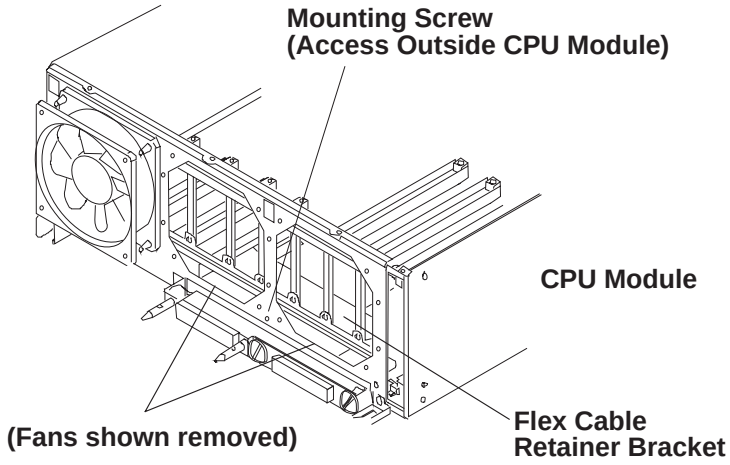


Figure 4-28. Removing the 604e High Node CPU module flex cables

5. Record the location of the flex cable connectors.
6. If you are removing the flex cable connected to the horizontal connector on the I/O card, remove the two large slotted mounting screws.

   If you are removing the flex cable connected to the vertical connector on the I/O card, remove the two guide pin mounting screws.

Attention: To prevent damage to the guide pins, do not use pliers to remove them. Use an open-end wrench in the slots in the pins.

7. Remove the fan located above the flex cable connector you are removing. Refer to “Removing CPU module fans” on page 4-19.

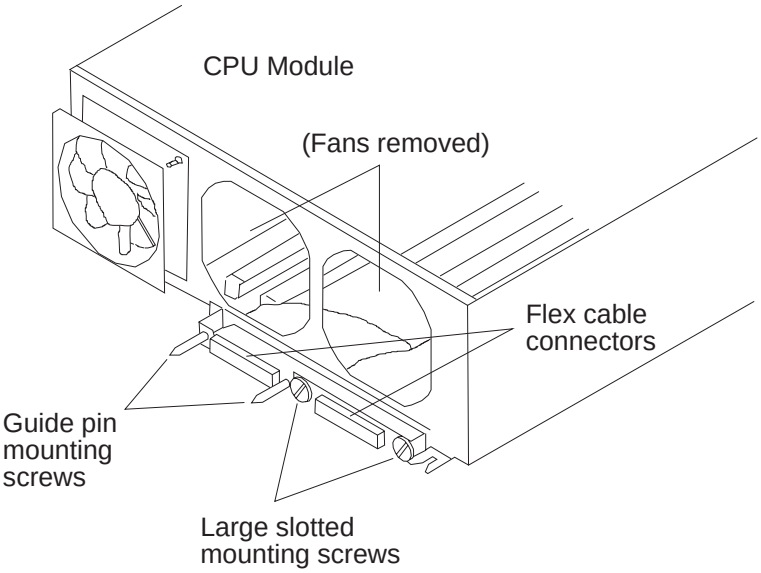


Figure 4-29. Removing the 604 or 604e High Node CPU module flex cables

8. Guide the flex cable you are removing over the connector mounting bracket, then guide the I/O card connector end under the fan mounting bracket; remove the flex cable.

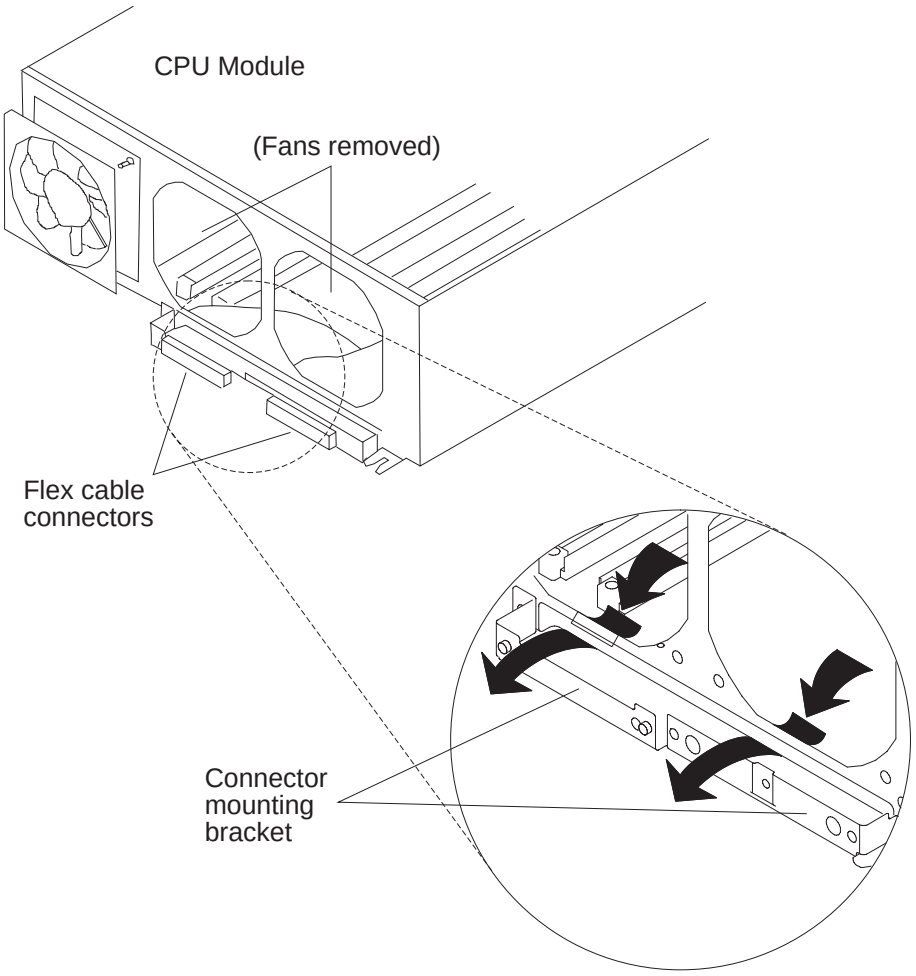


Figure 4-30. Removing the 604 or 604e High Node CPU module flex cables

Replacing CPU module flex cables

1. Guide the I/O card connector end of the flex cable under the fan mounting bracket, then over the connector mounting bracket.
2. Replace the fan located above the flex cable connector. Refer to “Replacing CPU module fans” on page 4-19.
3. Connect the flex cable connectors in the location recorded in the remove procedure.

   If you are replacing the flex cable in the horizontal connector on the I/O card, replace the two large slotted mounting screws.

   If you are replacing the flex cable in the vertical connector on the I/O card, replace the two guide pin mounting screws.
4. Install the flex cable retainer bracket in the retainer bracket tab opening.
5. Replace the mounting screw on the flex cable retainer bracket.
6. Perform “Replacing memory, CPU and I/O cards” on page 4-17 to replace the I/O card, and all of the CPU cards.
7. Perform “Replacing the CPU module” on page 4-13.

Removing rear EMC cover

1. Ensure ESD antistatic wrist device is attached.
2. At the front of the frame, locate the circuit breaker assembly below the 604 or 604e High Node.
3. Place both circuit breaker assembly switches in the Off (‘0’) position.
4. Loosen the four retainer screws until the screws disengage from the node chassis then pull the rear EMC cover away from the node chassis.

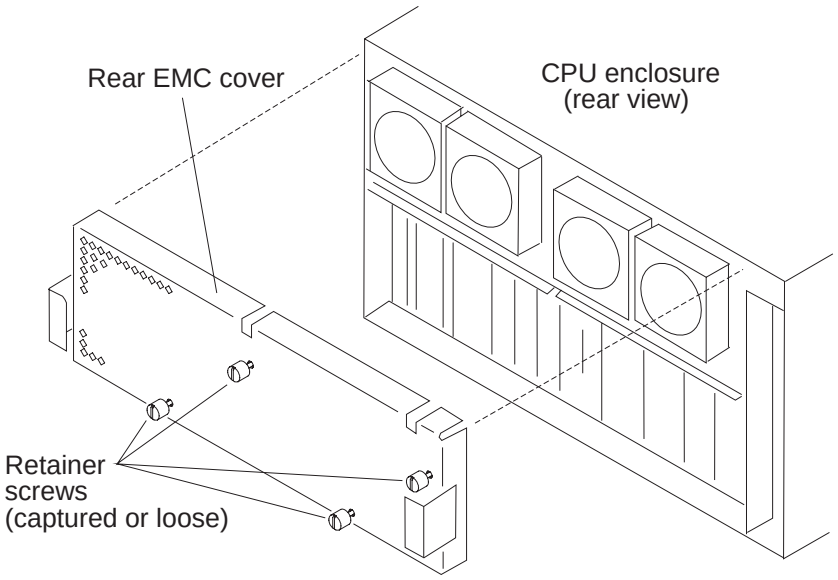


Figure 4-31. Removing the 604 or 604e High Node rear EMC cover

Replacing rear EMC cover

1. Reinstall the rear EMC cover with four retainer screws.

   Notes:

   a. Ensure the grounding strips located around the edges of the rear EMC cover are firmly attached and in place before replacing the rear EMC cover.

   b. Do not over tighten the four retainer screws on the rear EMC cover.

2. Place both circuit breaker assembly switches in the On (‘1’) position.

Removing and replacing power supplies or cooling units

Perform one of the following procedures to remove the 604/604e power supplies or cooling units depending whether the system power is on or off.

Removing a power supply or cooling unit while system power is off

The power supply position farthest from the system interface board can contain either an optional power supply or a cooling unit.

DANGER

Do not attempt to open the covers of the power supply. The power supply is not serviceable and is to be replaced as a unit.

1. Perform “Removing rear EMC cover” on page 4-27.

Attention: This unit may have more than one power supply cord. To completely remove power, you must disconnect all power supply cords.

2. If you are removing the power supply, disconnect the power supply power cord from the power distribution system installed in the frame.
3. Loosen the docking screw until the screw is disengaged.
4. Slowly pull the power supply or cooling unit toward you until you can place a hand under it for support, and then remove the power supply or cooling unit from the node chassis.

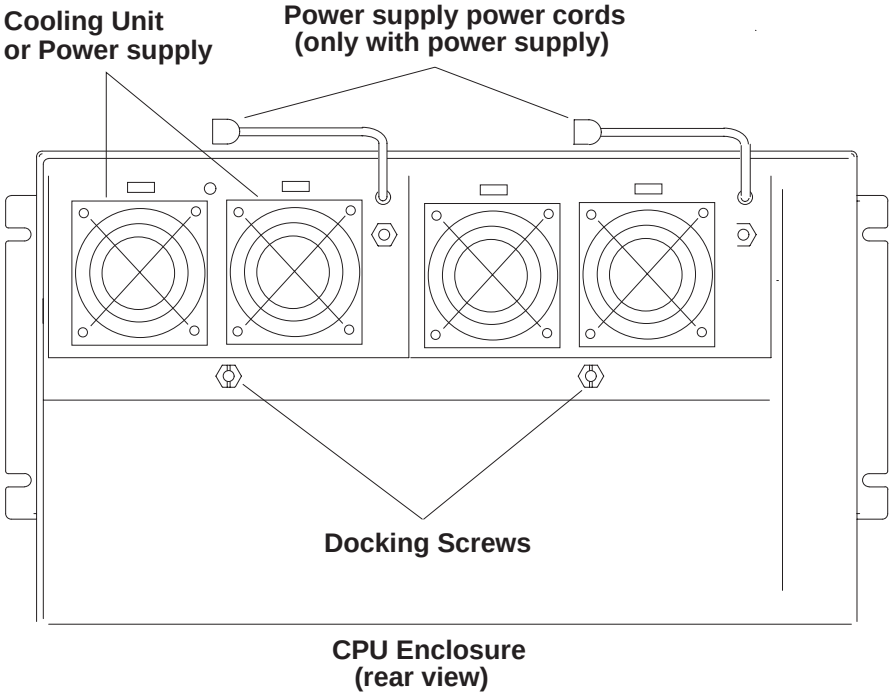


Figure 4-32. Removing the 604 or 604e High Node power supplies or cooling units

Replacing power supplies or cooling units while system power is off

Attention: Ensure you completely replace the power supply before plugging the power supply power cord. Possible data loss will occur if the power cord is plugged before completing the power supply replacement.

1. Ensure guide rails are engaged, then slowly slide the power supply or cooling unit into the enclosure.
2. Tighten the docking screw.
3. Perform “Replacing rear EMC cover” on page 4-27.
4. Reconnect all power cords.

Removing and replacing a power supply while system power is on

Attention: If system power must be removed before the power supply can be removed, see “Removing a power supply or cooling unit while system power is off” on page 4-27.

When you see the following message:

```
Broadcast message from UNKNOWN@localhost (tty) at 16:55:22 ...

rc.powerfail: init has received a SIGPWR signal.
The system is now operating with a power problem. ...
```

Inspect the LEDs on the top rear of the power supplies. If an LED is not lit, suspect a malfunctioning power supply.

1. Disconnect the ac line cord from the malfunctioning power supply.
2. Loosen the mounting screw of the disconnected power supply.

   Attention: A shutdown timer starts once the power supply is disengaged. The power supply must be replaced within eight minutes. The timer is started or restarted each time the power supply is disengaged. The timer is stopped and reset when the power supply is engaged.

   The following messages appear:

   ```
   Broadcast message from UNKNOWN@localhost (tty) at 16:56:25 ...

   rc.powerfail: init has received a SIGPWR signal.
       The system has no backup cooling .
       The system will shut down in 8 minutes unless the problem is
       resolved before then. Execute rc.powerfail --h as the root user
       for more information. ......

   Broadcast message from UNKNOWN@localhost (tty) at 16:56:30 ...

   rc.powerfail: The system will shut down in 8 minutes.
       The system will shut down because either a fan failure has occurred
       or the system is running on battery backup power. ....
   ```

   At the same time the fans of the remaining power supplies increase in speed.
3. Remove the disconnected power supply.
4. Insert the new power supply.
5. Tighten the mounting bolt of the new power supply.

   As you tighten the bolt the SIB LED turns off. When the bolt is sufficiently tightened, the SIB LED lights, the fans return to normal speed and the following messages appear:

   Note: These messages may take several minutes to appear.

   ```
   .Broadcast message from UNKNOWN@localhost (tty) at 16:58:29 ...

   rc.powerfail: The power status has changed.
       The system shutdown has been canceled. .....

   Broadcast message from UNKNOWN@localhost (tty) at 16:58:29 ...

   rc.powerfail: init has received a SIGPWR signal.
       The system is now operating without backup power. ....
   ```

6. Reconnect ac line of new power supply.

a. The LED of the new power supply comes on

b. The SIB LED comes on

Note: These messages may take several minutes to appear.

```
.Broadcast message from UNKNOWN@localhost (tty) at 16:59:24 ...

rc.powerfail: init has received a SIGPWR signal.
    The power status is currently 0.
    The system may power down immediately.
    Execute rc.powerfail --h as the root user for more information. ....
```

Removing power supply or cooling unit fans

1. Perform “Removing rear EMC cover” on page 4-27.
2. Disconnect the power cable connector for the power supply fan or the cooling unit fan you are removing.
3. Remove all four vibration isolators by pulling the fan away from the power supply or cooling unit until the vibration isolators disengage from either the fan, power supply, or cooling unit.

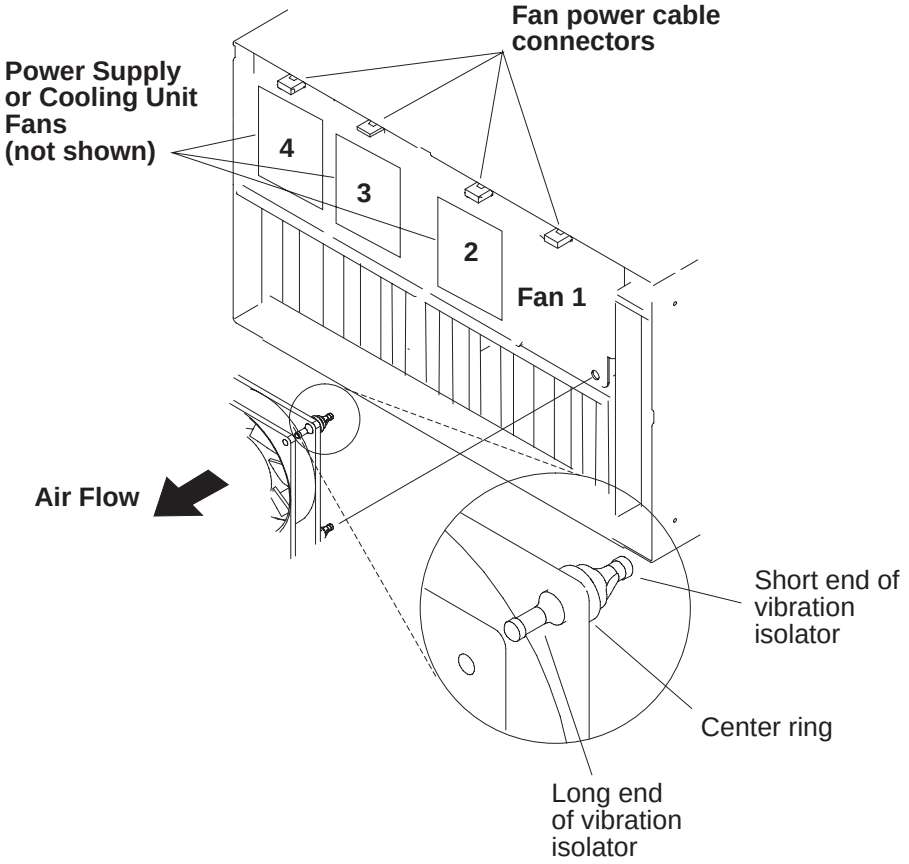


Figure 4-33. Removing the 604 or 604e High Node power supply or cooling unit fans

Note: If a cooling unit is installed in the optional power supply position, Fan #4 and Fan #3 are reversed.

replacing power supply or cooling unit fans

Note: check the air flow direction on the fan before replacing the fan.

1. replace all four vibration isolators in the fan.
2. connect the power cable connector for the power supply fan or the cooling unit fan you are replacing.
3. perform “Replacing rear EMC cover” on page 4-27.

Removing and replacing the system interface board (SIB)

Attention: Lateral planar 2 and system interface board (SIB) EEPROMs contain the SYSID of the system. When one of the two components is to be replaced (for example the Lateral Planar 2), the SYSID information is copied from SIB EEPROM into the lateral planar 2 EEPROM when you start the system.

To avoid losing this information, do not replace both components at the same time. When both components are to be replaced, proceed as follows:

1. Replace the SIB and start up the system: the SYSID information is copied from the lateral planar 2 EEPROM to the SIB EEPROM.
2. Replace the lateral planar 2 and start up the system: the SYSID information is copied from SIB EEPROM to the Lateral Planar 2 EEPROM. (See “Removing lateral planar 2 card” on page 4-35.)

Removing system interface board (SIB)

1. Ensure ESD antistatic wrist device is attached.
2. At the front of the frame, locate the circuit breaker assembly below the 604 or 604e High Node.
3. Place both circuit breaker assembly switches in the Off (‘0’) position.
4. Loosen, but do not remove the two mounting screws.
5. Pull the SIB toward you until the SIB disengages, then remove it from the node chassis.

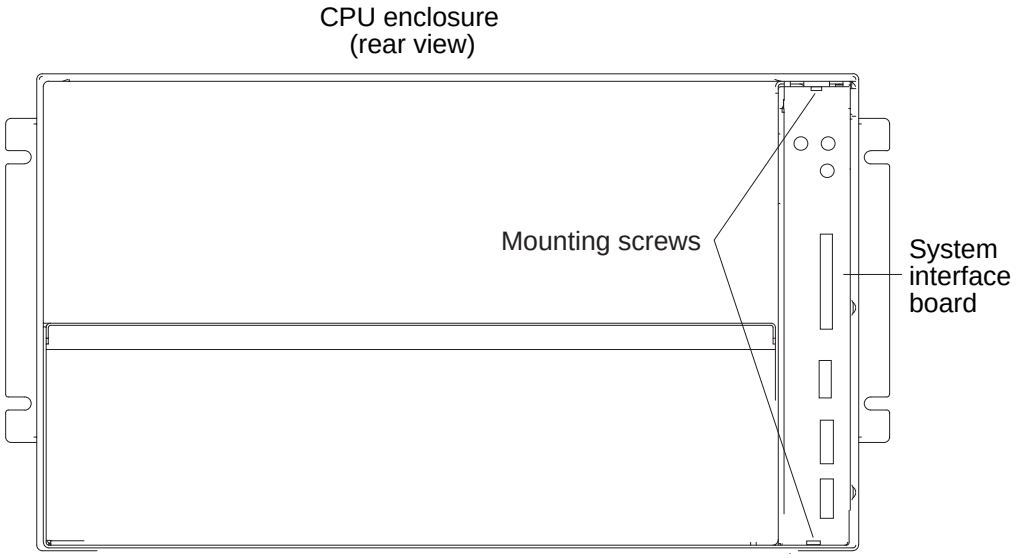


Figure 4-34. Removing the 604 or 604e High Node system interface board (SIB)

Replacing system interface board (SIB)

Note: Before replacing the SIB in the I/O module, make sure the SIB is placed correctly on the guide rails.

1. Ensure ESD antistatic wrist device is attached.
2. Insert the SIB into the enclosure and push the SIB until it is engaged.
3. Tighten the two mounting screws.
4. At the front of the frame, locate the circuit breaker assembly below the 604 or 604e High Node.
5. Place both circuit breaker assembly switches in the On (‘1’) position.

Removing the I/O module

1. At the front of the frame, locate the circuit breaker assembly below the 604 or 604e High Node.
2. Place both circuit breaker assembly switches in the Off (‘0’) position.
3. Perform “Removing adapter cables” on page 4-37.
4. Remove the power supply and cooling unit (or optional power supply). Refer to“Removing and replacing power supplies or cooling units” on page 4-27.
5. Remove the SIB (see “Removing and replacing the system interface board (SIB)” on page 4-31).
6. Disconnect the SCSI-2 cable connector from the top center of the SCSI-2 adapter.
7. Remove the SCSI-2 cable from the retainer clips by pulling the cable downward, then guide the SCSI cable through the opening for the system interface board and out the I/O module.

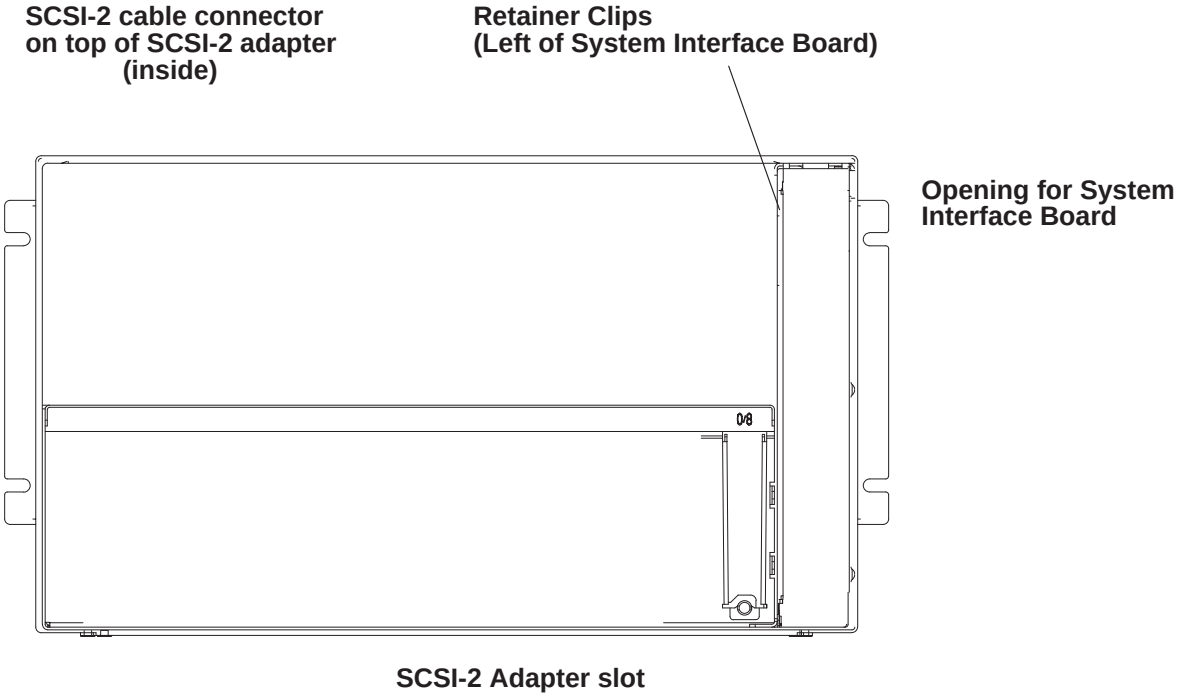


Figure 4-35. Removing the 604 or 604e High Node I/O module

Note: The retainer screw on your right is also one of the retainer screws for attaching the system interface board in the I/O module.

8. Remove the remaining retainer screw.

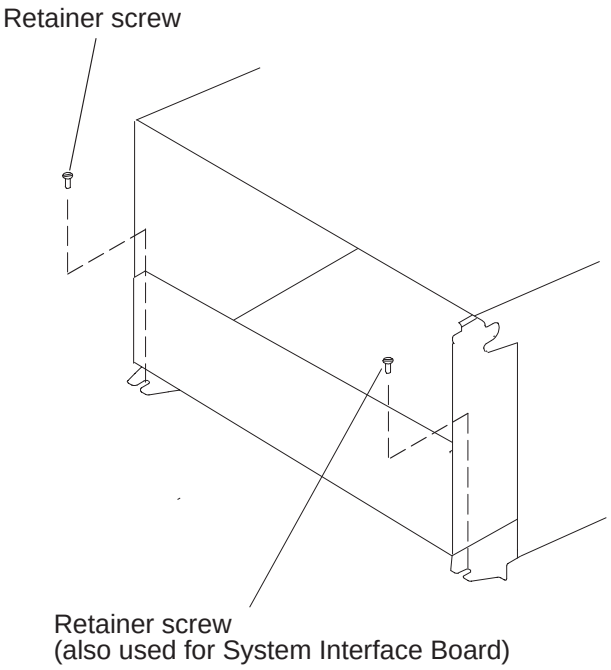


Figure 4-36. Removing the 604 or 604e High Node I/O module

9. Loosen the docking screw on the front of the CPU module until the I/O module disengages.

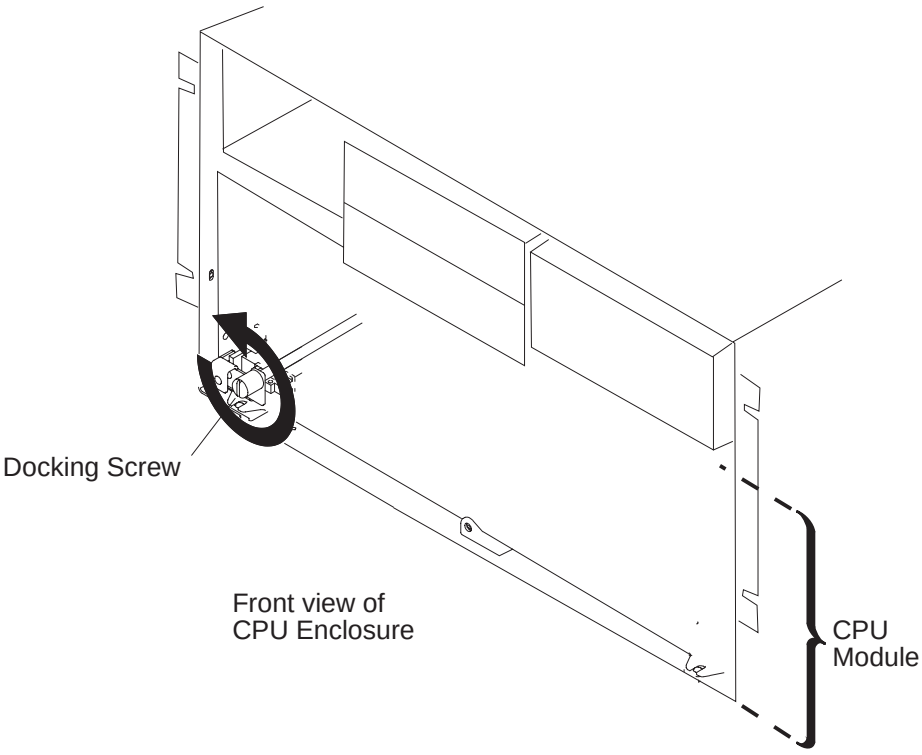


Figure 4-37. Removing the 604 or 604e High Node I/O module

10. Slide the I/O module toward you until you can grasp the bottom of the I/O module on both sides, then remove the I/O module from the node chassis.
11. Place the I/O module on a stable surface.

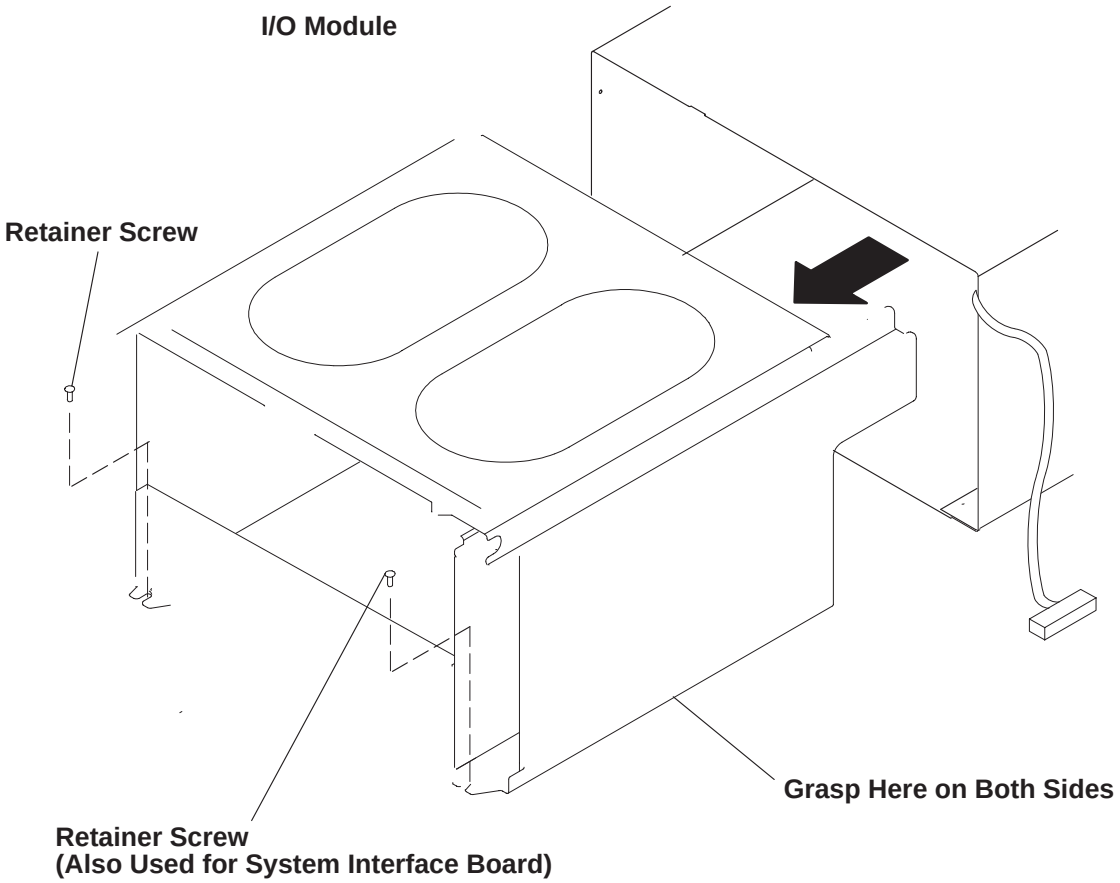


Figure 4-38. Removing the 604 or 604e High Node I/O module

Replacing the I/O module

1. Grasp the bottom of the I/O module with both hands and slowly slide it into the node chassis until the nut on the I/O module touches the tip of the docking screw on the CPU module.

   Note: The I/O module should easily slide into the node chassis until it touches the docking screw. When this occurs, the bottom rear edge of the I/O module should be approximately 9 mm outside the bottom rear edge of the node chassis.

2. Turn the docking screw until the I/O module is pulled far enough into the enclosure to install the two retaining screws.
3. Install the two retaining screws but do not tighten them.
4. Tighten the docking screw.
5. Tighten the two retaining screws.
6. Guide the SCSI-2 cable in the I/O module and through the opening for the system interface board.
7. Connect the SCSI-2 cable connector to the top center of the SCSI-2 adapter.
8. Install the cable in the retainer clips.
9. Replace the SIB (see “Removing and replacing the system interface board (SIB)” on page 4-31).
10. Replace the cooling unit and the power supply. (Refer to “Removing and replacing power supplies or cooling units” on page 4-27.
11. Perform “Replacing adapter cables” on page 4-38.
12. At the front of the frame, locate the circuit breaker assembly below the 604 or 604e High Node.
13. Place both circuit breaker assembly switches in the On (‘1’) position.

Removing and replacing the lateral planar 2 card

Attention: After the lateral planar 2 card is installed and the system is powered-up, the system ID is downloaded to the lateral planar 2 card from a backup source within the system. This ID becomes permanent on the lateral planar 2 and cannot be altered without special tools. Therefore, the lateral planar 2 cannot be transferred to another system. It must be returned to the plant of manufacture as a new defective part.

Attention: Lateral planar 2 and SIB EEPROMs contain the SYSID of the system. When one of the two components is to be replaced (for example the lateral planar 2), the SYSID information is copied from SIB EEPROM into the lateral planar 2 EEPROM when you start the system.

To avoid losing this information, do not replace both components at the same time. When both components are to be replaced, proceed as follows:

1. Replace the SIB and start up the system: the SYSID information is copied from lateral planar 2 EEPROM to the SIB EEPROM. (See “Removing and replacing the system interface board (SIB)” on page 4-31.)
2. Replace the lateral planar 2 and start up the system: the SYSID information is copied from SIB EEPROM to the lateral planar 2 EEPROM.

Removing lateral planar 2 card

1. Perform “Removing the I/O module” on page 4-32.
2. Disconnect connectors P10, P11, P12, P12A, P13, and P14.
3. Remove the mounting screw holding the air deflector, then remove the air deflector.

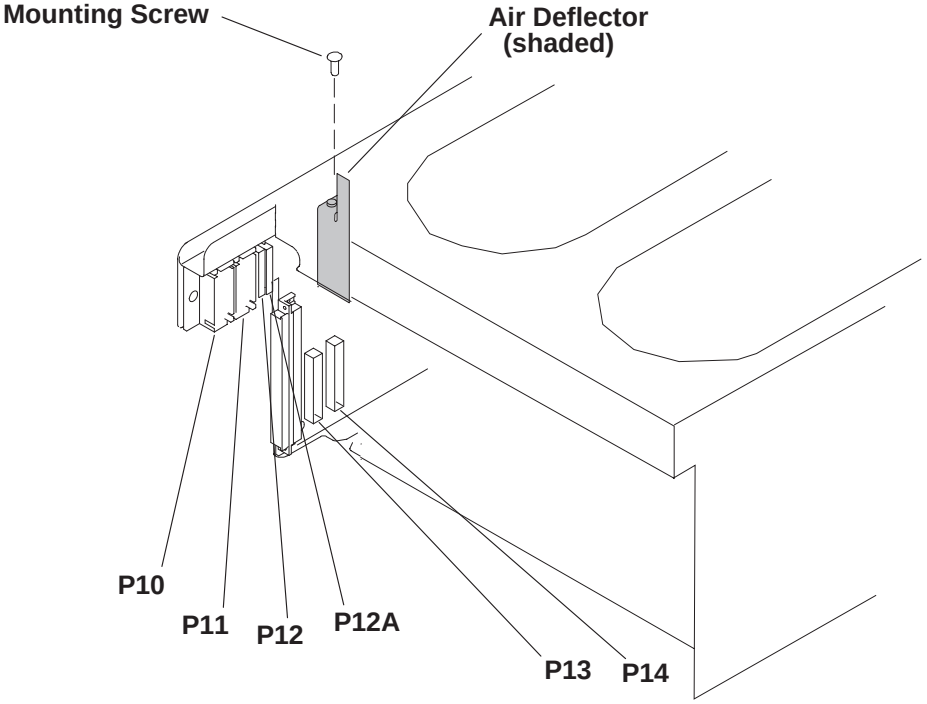


Figure 4-39. Removing the 604 or 604e High Node lateral planar 2 card

4. Remove the system interface board (see “Removing and replacing the system interface board (SIB)” on page 4-31).
5. Remove the mounting screws.

6. If necessary, remove any other card that obstructs access to the lateral planar 2 card.
7. Pull the lateral planar 2 card away from the side of the I/O module, and then remove the lateral planar 2 card from the I/O module.

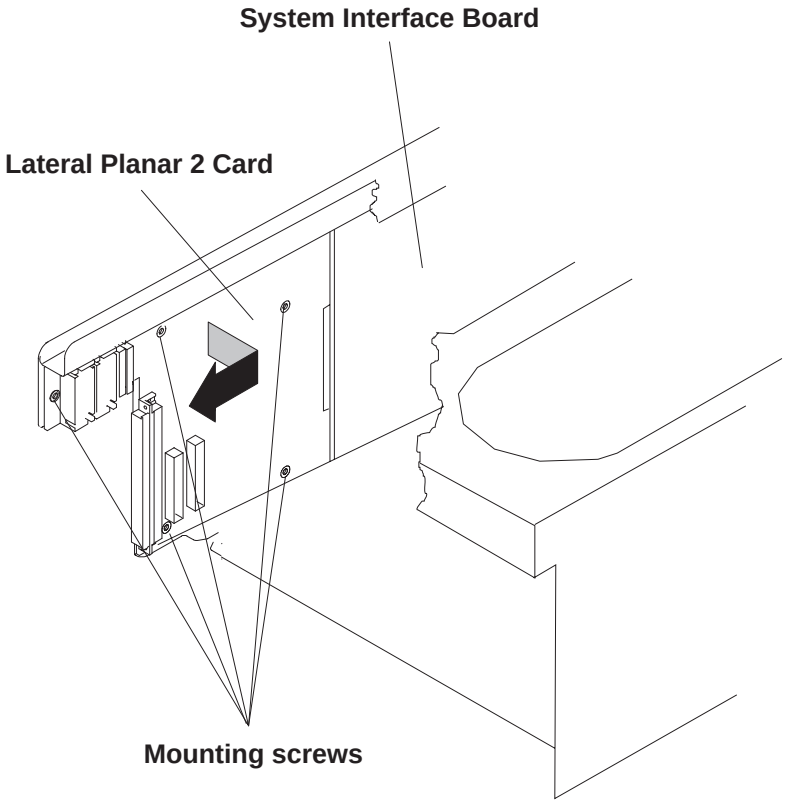


Figure 4-40. Removing the 604 or 604e High Node lateral planar 2 card

Replacing lateral planar 2 card

1. Replace the lateral planar 2 card in the I/O module.
2. If necessary, replace any other card that was removed.
3. Replace the mounting screws.
4. Replace the system interface board (see “Removing and replacing the system interface board (SIB)” on page 4-31).
5. Replace the air deflector and secure with the mounting screw.
6. Install connectors P10, P11, P12, P12A, P13, and P14.
7. Perform “Replacing the I/O module” on page 4-34.

Removing adapter cables

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

Before installing or removing signal cables, ensure that the power cables for the system unit and all attached devices are unplugged.

When adding or removing any additional devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.

Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.

During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communications lines.

1. At the front of the frame, locate the circuit breaker assembly below the 604 or 604e High Node.
2. Place both circuit breaker assembly switches in the Off (‘0’) position.
3. Record the location and label each adapter cable being removed.
4. To remove adapter cables, do either of the following:
   - If screws are used to connect the adapter cable connector to the adapter, remove the screws, then remove the cable.
   - If retainer clips are used to connect the adapter cable connector to the adapter, rotate the clips away from the cable connector, then remove the cable.
   - For BNC connectors, twist counterclockwise and remove.

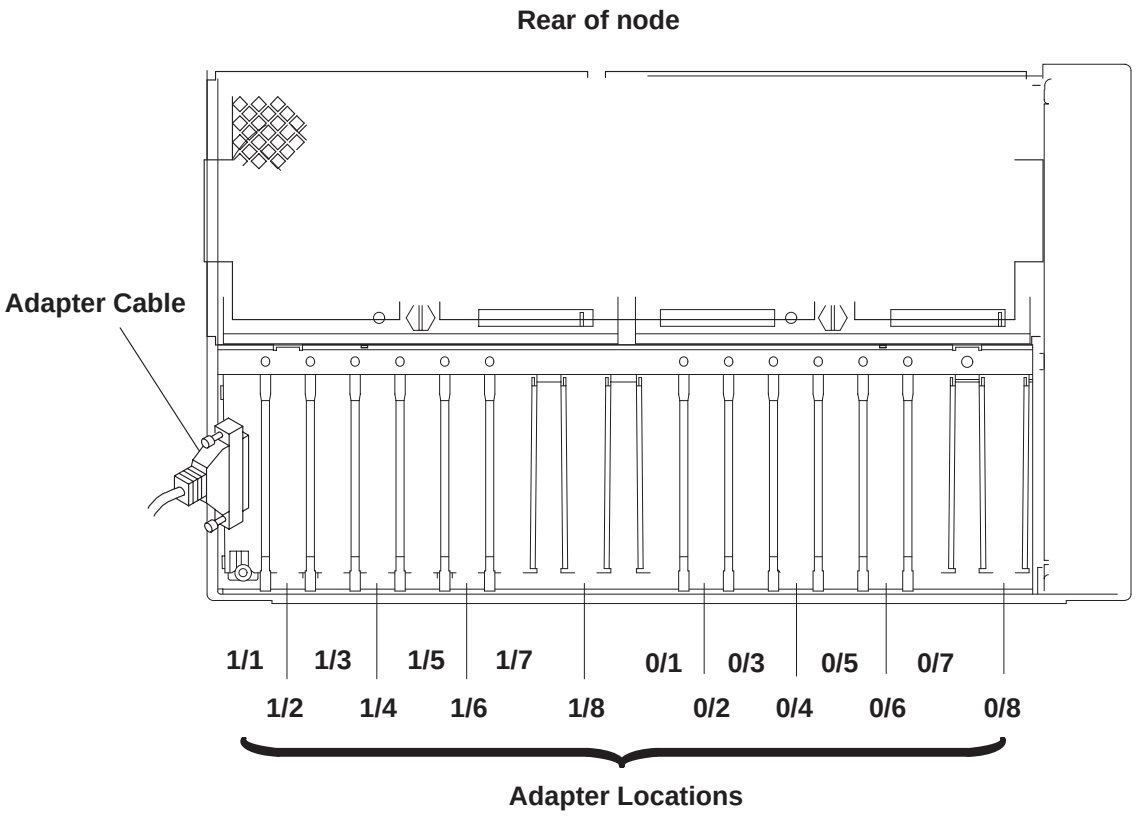


Figure 4-41. Removing the 604 or 604e High Node adapter cable

Replacing adapter cables

1. To replace an adapter cable (labeled in the removal procedure), do either of the following:
   - If screws are used to connect the adapter cable connector to the adapter, replace the cable and secure with two screws.
   - If retainer clips are used to connect the adapter cable connector to the adapter, replace the cable and rotate the clips toward the cable connector.
   - For BNC connectors, line up pins and twist clockwise until tightened.
2. At the front of the frame, locate the circuit breaker assembly below the 604 or 604e High Node.
3. Place both circuit breaker assembly switches in the On (‘1’) position.

Removing an adapter

1. Ensure ESD antistatic wrist device is attached.
2. Remove the power supply or cooling unit located above the adapter you are removing (see “Removing and replacing power supplies or cooling units” on page 4-27).
3. Perform “Removing adapter cables” on page 4-37 for the adapter you are removing.
4. Loosen the thumbscrew on the adapter you are removing.

   Note: If you are removing the SCSI-2 adapter, disconnect the SCSI-2 cable from the top center of the SCSI-2 adapter.

5. Reach through the access opening above the adapters, then lift both ends of the top of the adapter until the adapter disconnects from the slot.
6. Remove the adapter from the I/O module.

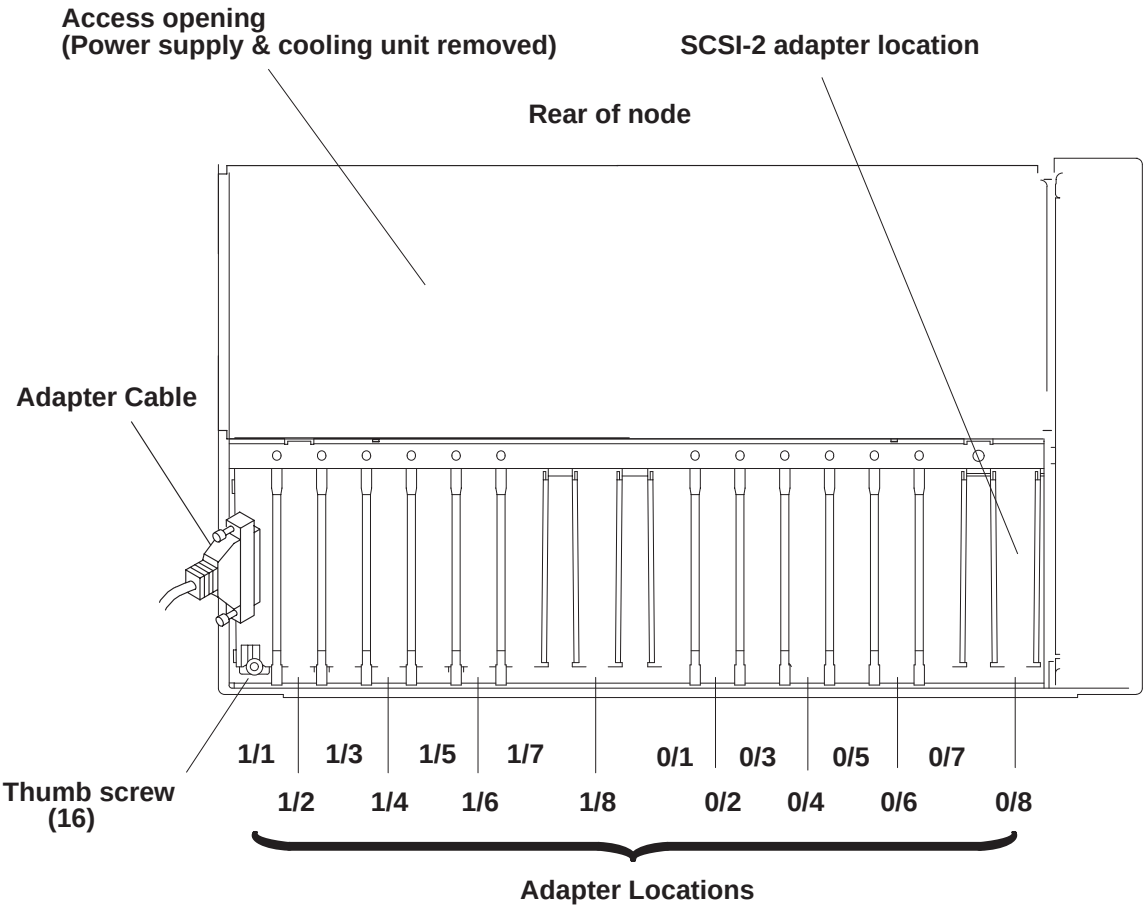


Figure 4-42. Removing the 604 or 604e High Node adapter

Replacing an adapter

1. Ensure ESD antistatic wrist device is attached.
2. Insert the adapter in the I/O module slot and push down evenly on the adapter until it is securely engaged.
3. Tighten the thumbscrew on the adapter you are replacing.

   Note: If you are replacing the SCSI-2 adapter, connect the SCSI-2 cable on the top center of the SCSI-2 adapter.

4. Perform “Replacing adapter cables” on page 4-38 for the adapter you are replacing.
5. Replace the power supply or cooling unit above the adapter (see “Removing and replacing power supplies or cooling units” on page 4-27).

Removing I/O module flex cables

1. Perform “Removing the I/O module” on page 4-32.
2. If any adapters are located over the flex cables, perform “Removing an adapter” on page 4-38.
3. Flex cables:

   - If you are removing the flex cable attached to the I/O planar 0, remove the two guide pins.

     Attention: To prevent damage to the guide pins, do not use pliers to remove them. Use an open-end wrench in the slots in the pins.

- If you are removing the flex cable attached to the I/O planar 1, then remove the two large, slot-head mounting screws.

4. Disconnect the flex cable from the I/O planar, and then remove the flex cable.

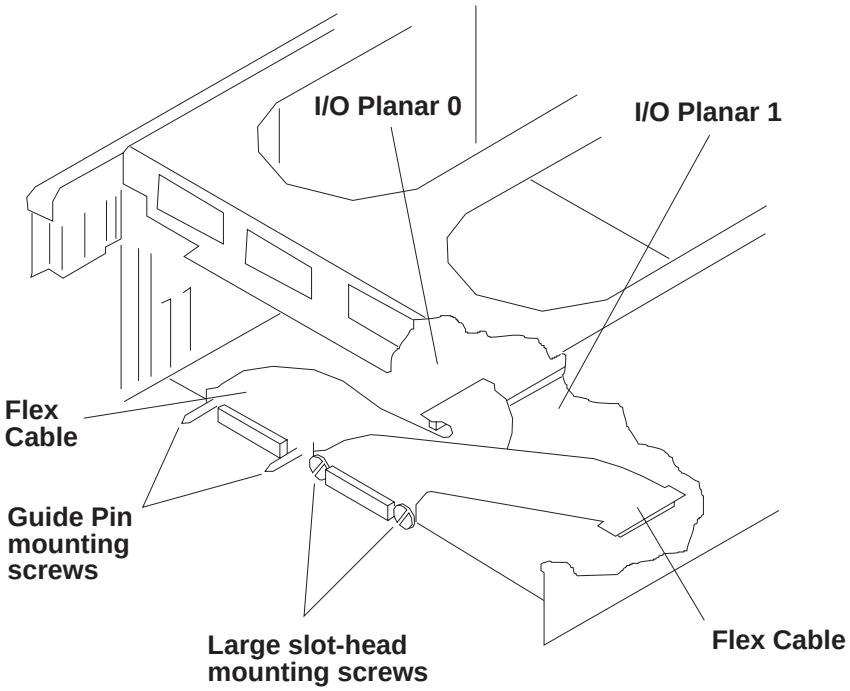


Figure 4-43. Removing the 604 or 604e High Node I/O module flex cables

Replacing I/O module flex cables

1. Connect the flex cable to the I/O planar.
2. If you removed the flex cable from I/O planar 0, then replace the two guide pin mounting screws.

   If you removed the flex cable from I/O planar 1, then replace the two large slotted-head mounting screws.
3. Perform “Replacing an adapter” on page 4-39 to replace all adapters that were previously removed.
4. Perform “Replacing the I/O module” on page 4-34.

Removing I/O planar power cables

1. Perform “Removing the I/O module” on page 4-32.
2. If any adapters are located over the I/O planar power cables, perform “Removing an adapter” on page 4-38.

   Attention: To prevent damage to the flex cables it is important to remove the I/O module flex cables before removing or replacing the I/O planar power cables.
3. Perform “Removing I/O module flex cables” on page 4-39 to access the connectors for the I/O planar power cables.
4. Remove the mounting nut on each of the cable retainers.

   Note: If you are removing both power cables, record the location of the connectors and note how the cables are positioned.
5. Remove the shipping tape from the top of the I/O planar power cable you are removing.
6. Disconnect the I/O planar power cable connector on the I/O planar.

7. Depending on the I/O planar power cable connector you are removing, disconnect either P13 or P14 on the lateral planar 2 card, then remove the I/O planar power cable.

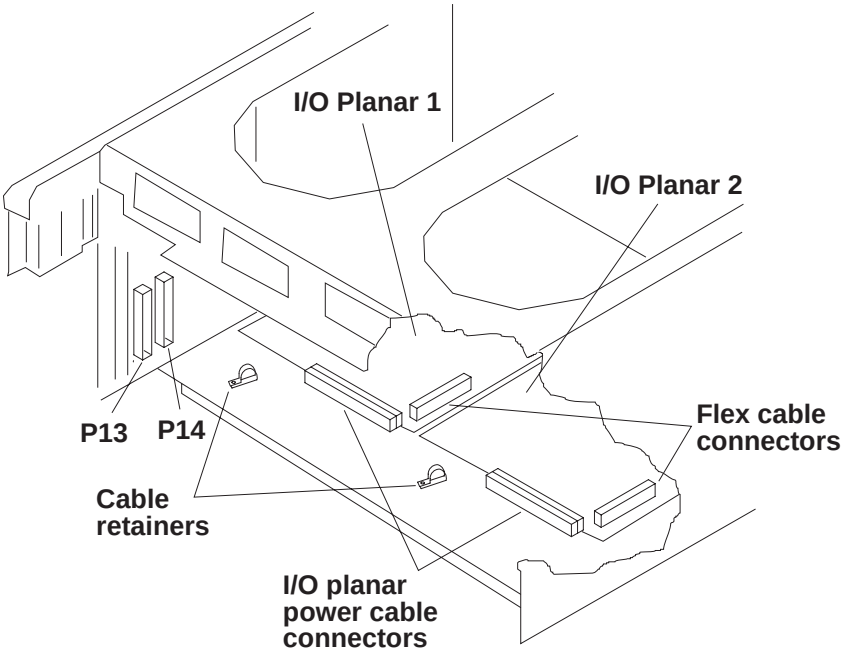


Figure 4-44. Removing the 604 or 604e High Node I/O planar power cables

Replacing I/O planar power cables

1. Depending on the I/O planar power cable connector you removed, connect either P13 or P14 on the lateral planar 2 card.
2. Connect the I/O planar power cable connector to the I/O planar.
3. Replace the mounting nut on each of the cable retainers.
4. Perform “Replacing I/O module flex cables” on page 4-40.
5. Perform “Replacing an adapter” on page 4-39 to replace all adapters that were previously removed.
6. Perform “Replacing the I/O module” on page 4-34.

Removing I/O planars

1. Ensure ESD antistatic wrist device is attached.
2. Perform “Removing the I/O module” on page 4-32.
3. Remove all adapters installed on the I/O planar you are removing, see “Removing an adapter” on page 4-38.
4. To access the mounting screws on the I/O planars, disconnect both flex cable connectors, see “Removing I/O module flex cables” on page 4-39.
5. Disconnect the power cable connector from the rear of the I/O planar you are removing.

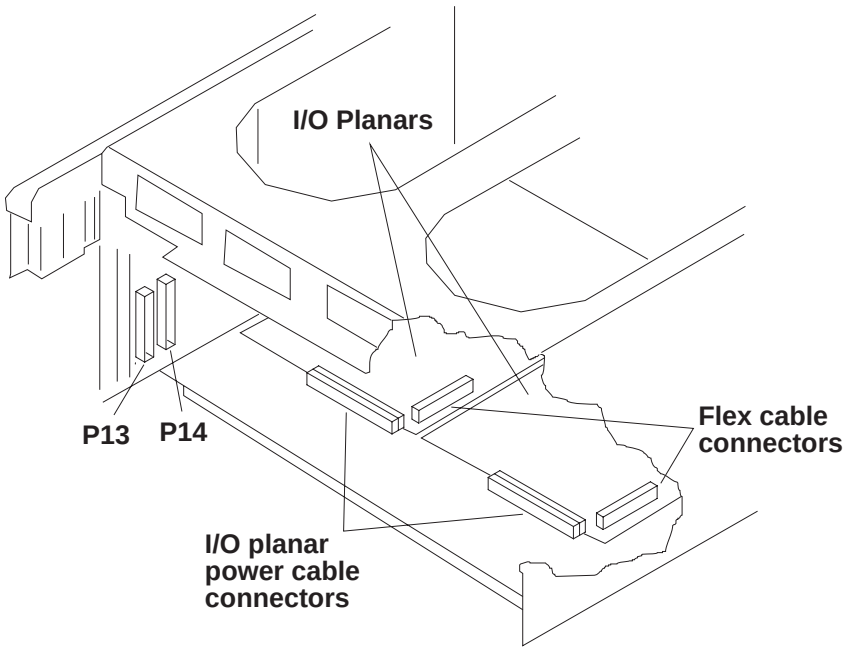


Figure 4-45. Removing the 604 or 604e High Node I/O planars

Note: Before removing the mounting screws, record the screw types and locations of all of the mounting screws.

6. Remove the seven mounting screws on the I/O planar you are removing, and then remove the I/O planar from the I/O module.

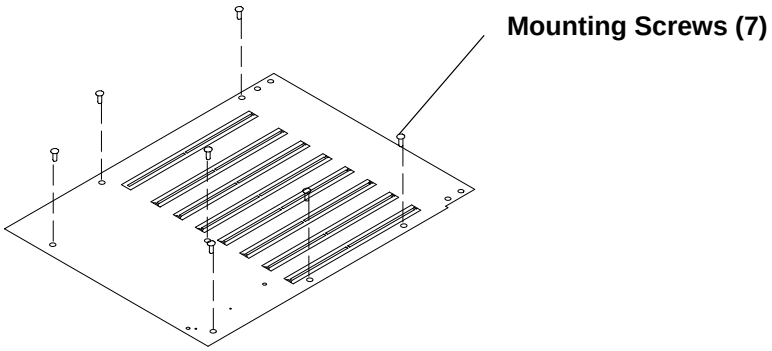


Figure 4-46. Removing the 604 or 604e High Node I/O planars

Replacing I/O planars

1. Ensure ESD antistatic wrist device is attached.
2. Replace the I/O planar in the I/O module, then secure with seven mounting screws, installing the screw types and locations as recorded in the removal procedure.
3. Connect the power cable connector in the rear of the I/O planar.
4. Connect both flex cable connectors, see “Replacing I/O module flex cables” on page 4-40.
5. Replace all adapters on the I/O planar that you removed, see “Replacing an adapter” on page 4-39.
6. Perform “Replacing the I/O module” on page 4-34.

Removing power distribution cables

1. Remove the power supply and either the cooling unit or optional power supply, see “Removing and replacing power supplies or cooling units” on page 4-27.
2. Perform “Removing the I/O module” on page 4-32.
3. Carefully cut the cable restraint strap for the power distribution cable.
4. Disconnect connectors P10, P11, P12, and P12A located on the lateral planar 2 card.

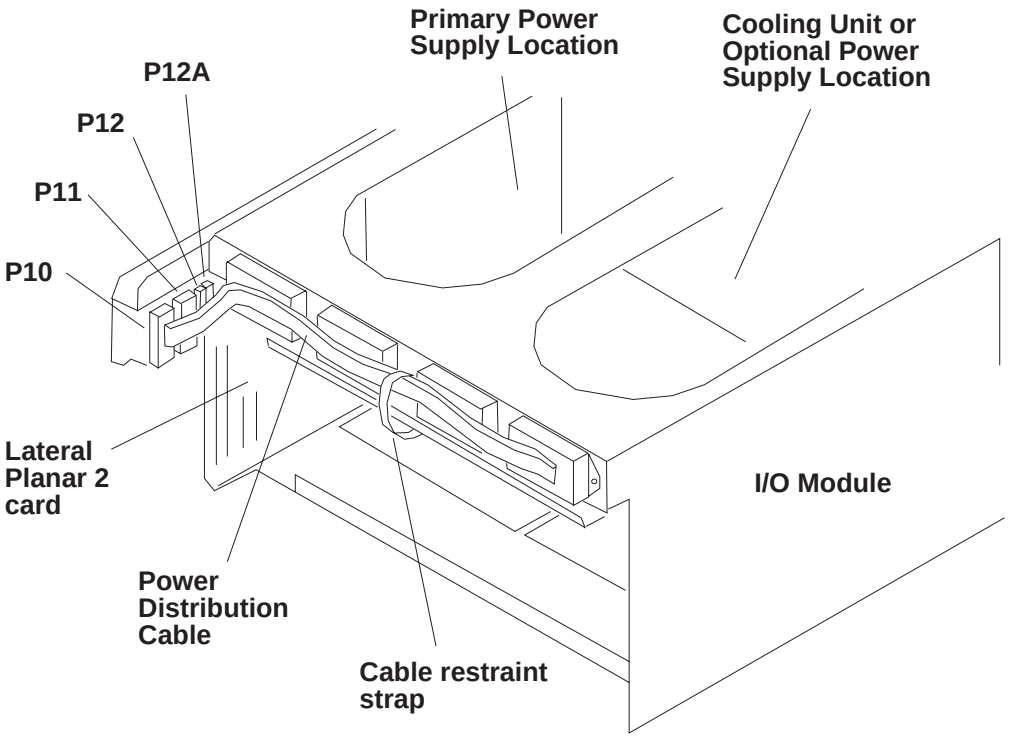


Figure 4-47. Removing the 604 or 604e High Node power distribution cables

Note: The docking connector mounting screws for the primary power supply, cooling unit, and optional power supply are located inside the I/O module

5. Remove the power distribution cable:
   - If you are removing the power distribution cable for the optional power supply, remove the two mounting screws on the two optional power supply docking connectors, then remove the power distribution cable.
   - If you are removing the power distribution cable for the primary power supply, remove the two mounting screws on the two power supply docking connectors, and then remove the power distribution cable.

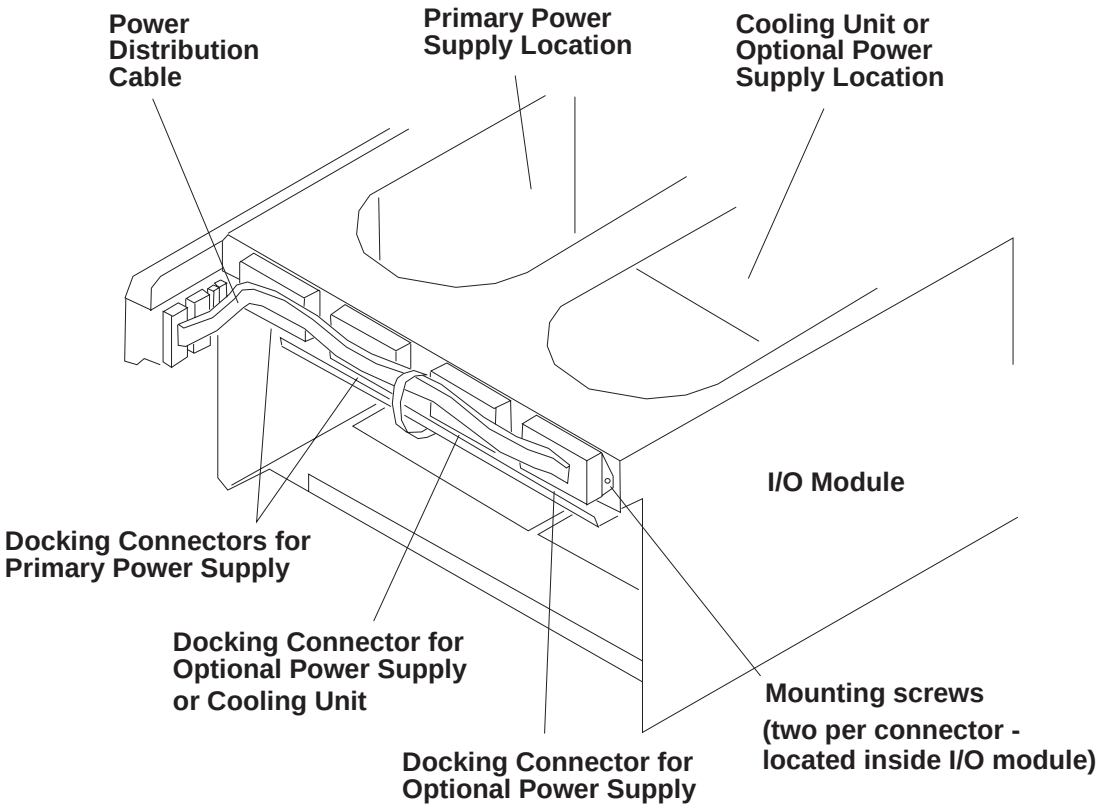


Figure 4-48. Removing the 604 or 604e High Node power distribution cables

Replacing power distribution cables

Note: Ensure that a new cable restraint strap is installed around the power distribution cables before replacing the I/O module into the CPU enclosure.

1. Replace the power distribution cable:
   - If you are removed the power distribution cable for the optional power supply, replace the two mounting screws on the two optional power supply docking connectors.
   - If you are removed the power distribution cable for the primary power supply, replace the two mounting screws on the two power supply docking connectors.

Note: The docking connector mounting screws for the primary power supply, cooling unit, and optional power supply are located inside the I/O module

2. Install connectors P10, P11, P12, and P12A on the lateral planar 2 card.
3. Install a new cable restraint strap for the power distribution cable.
4. Perform “Replacing the I/O module” on page 4-34.
5. Replace the power supply and either the cooling unit or optional power supply, see “Removing and replacing power supplies or cooling units” on page 4-27.

Removing the node supervisor card

1. Ensure ESD antistatic wrist device is attached.
2. At the front of the frame, locate the circuit breaker assembly below the 604 or 604e High Node.
3. Place both circuit breaker assembly switches in the Off (‘0’) position.
4. Disconnect the serial adapter cable from the supervisor card.
5. Remove the two screws that secure the card to the bracket assembly and remove the card.

Replacing the node supervisor card

1. Ensure ESD antistatic wrist device is attached.
2. Slide card into bracket assembly and secure with two screws.
3. Reinstall the serial adapter cable to the supervisor card.
4. Place both circuit breaker assembly switches in the On (‘1’) position.
5. Perform “Updating the node supervisor code” on page 3-15.

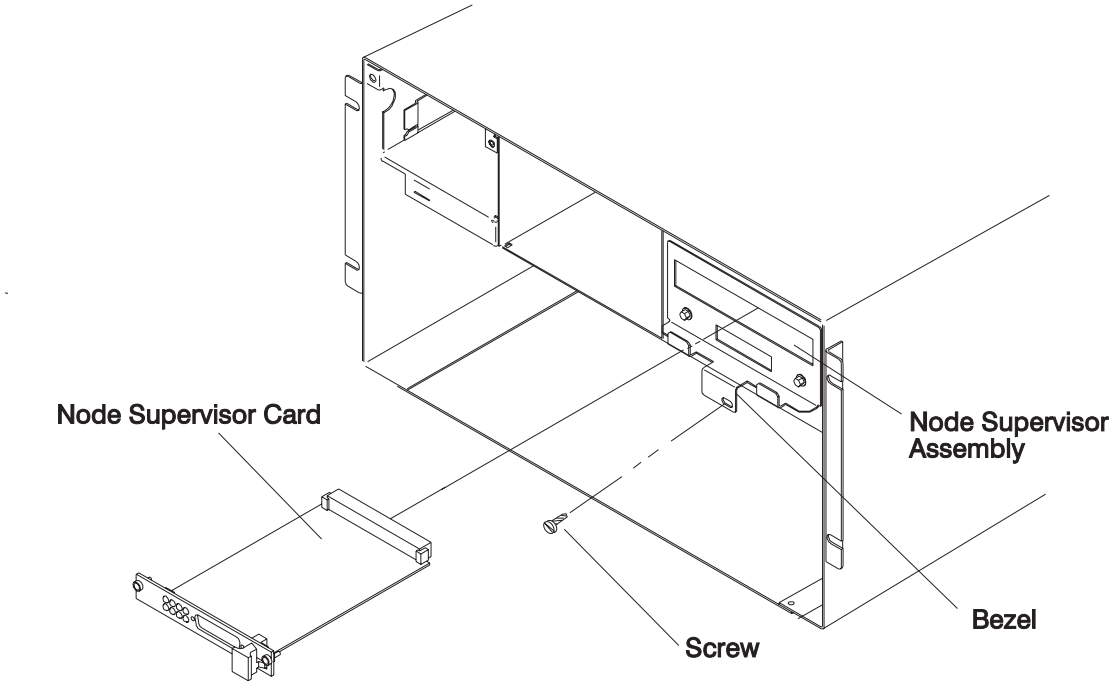


Figure 4-49. Removing the 604 or 604e High Node supervisor card

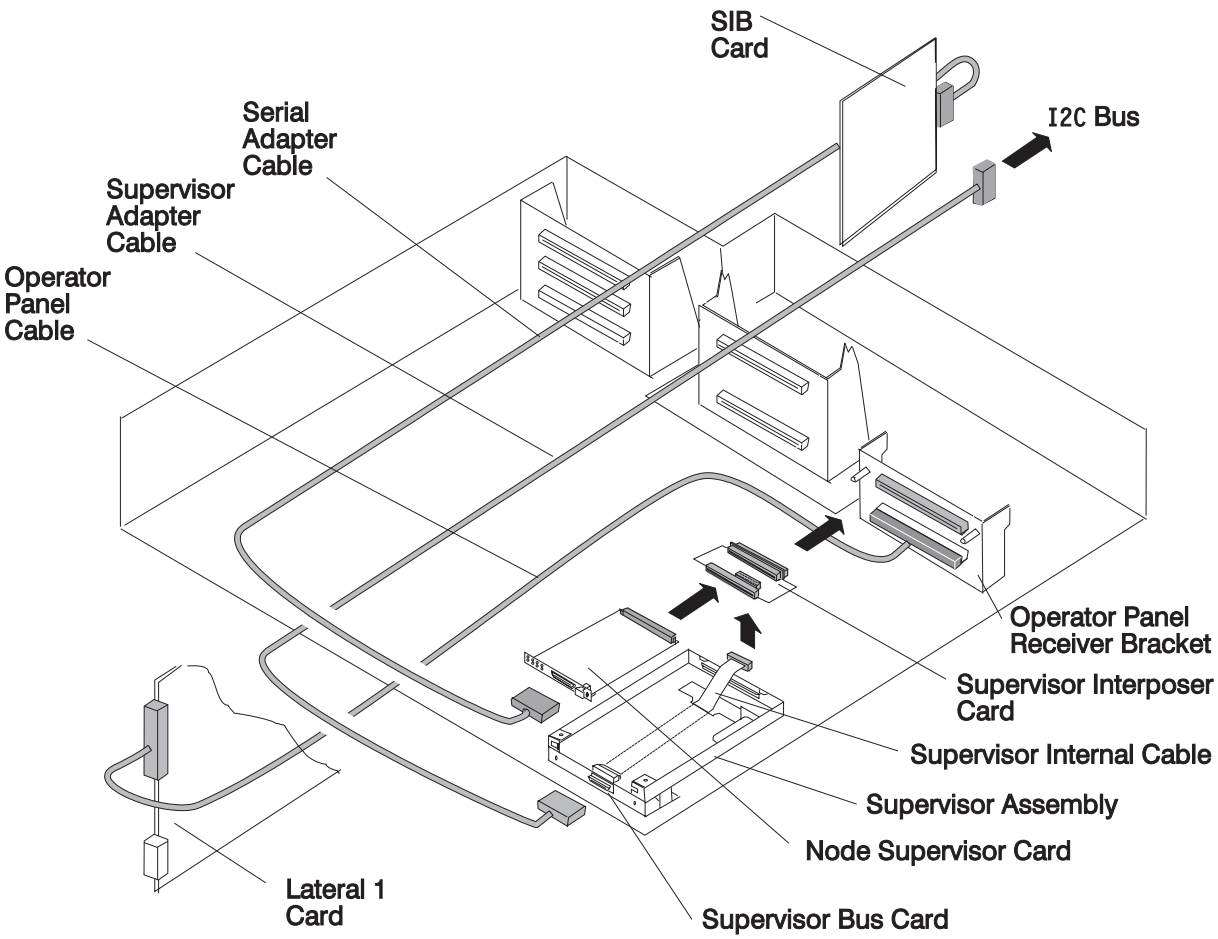


Figure 4-50. 604 or 604e High Node supervisor data flow

Removing the node supervisor assembly

Note: This procedure will drop power to the NVRAM.

1. Ensure ESD antistatic wrist device is attached.
2. At the front of the frame, locate the circuit breaker assembly below the 604 or 604e High Node.
3. Place both circuit breaker assembly switches in the Off (‘0’) position.
4. Disconnect the supervisor adapter cable from the bottom of the assembly.
5. Disconnect the serial adapter cable from the supervisor card.
6. Remove the screw from the front of the supervisor assembly bezel (see Figure 4-49 on page 4-45).
7. Remove the assembly by pulling on the bezel.

Replacing the node supervisor assembly

1. Ensure ESD antistatic wrist device is attached.
2. Slide the supervisor assembly into the bracket assembly.
3. Replace the screw in the front of the supervisor assembly bezel.
4. Reinstall the serial adapter cable to the supervisor card.
5. Reinstall the supervisor adapter cable to the bottom of the assembly.
6. Place both circuit breaker assembly switches in the On (‘1’) position.
7. Perform “Updating the node supervisor code” on page 3-15.

Removing the DASD

1. At the front of the frame, locate the circuit breaker assembly below the 604 or 604e High Node.
2. Set both circuit breakers in the Off (‘0’) position.
3. Remove the power cables plugged into power supplies in the rear of the 604 or 604e High Node.
4. Remove the serial adapter cable from the supervisor card, and the node supervisor adapter cable from the bracket below it.
5. Remove tie wraps that secure cables to front cover panel (if necessary).
6. Remove the four screws that secure the front cover and remove cover.
7. Disconnect the SCSI cable:

   604 From the bulkhead connector.

   604e From beneath the media module.

8. Remove the screw and retaining bracket from DASD module. Save for reinstallation.
9. Grasp the front of the DASD bracket and remove from the DASD module.
10. Check jumper position on DASD (if any) for address, and record for proper setting on replacement DASD (see Figure 4-52 on page 4-48).

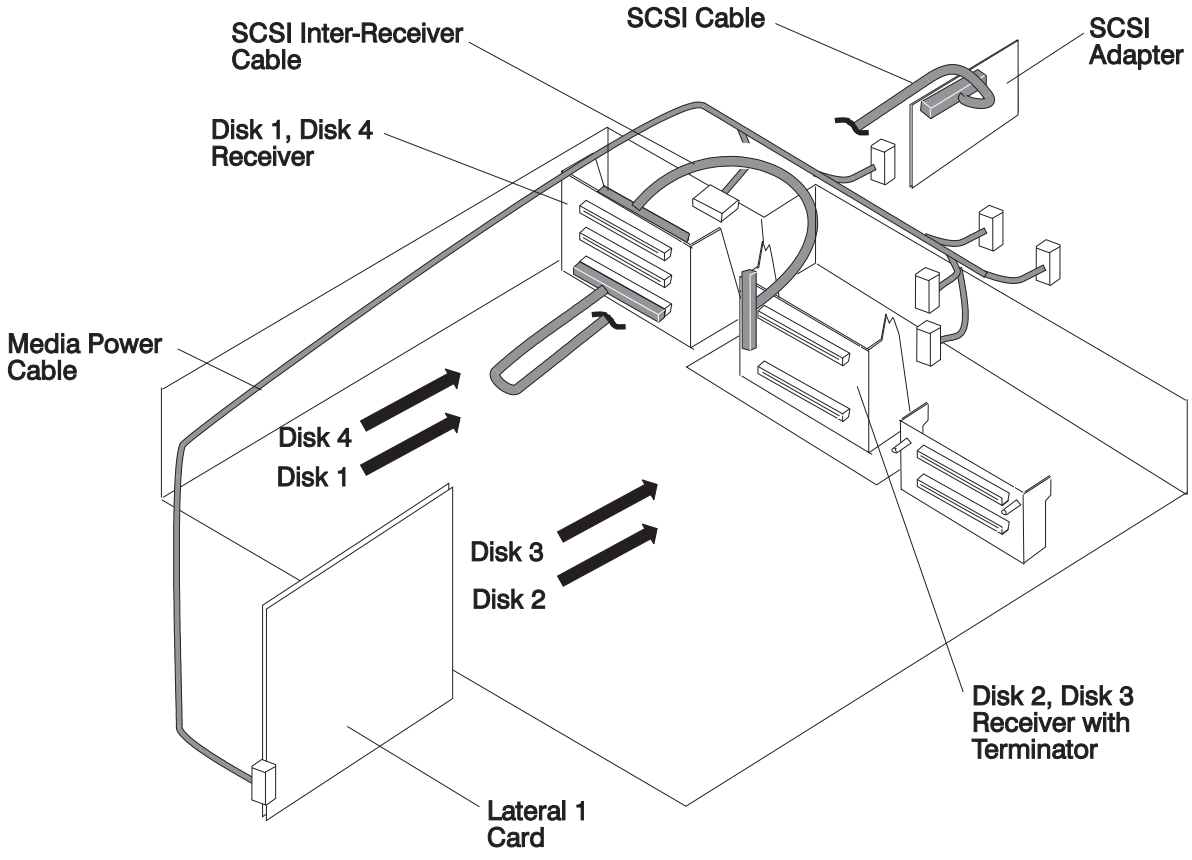


Figure 4-51. 604 or 604e High Node media drawer - SCSI path and power cable

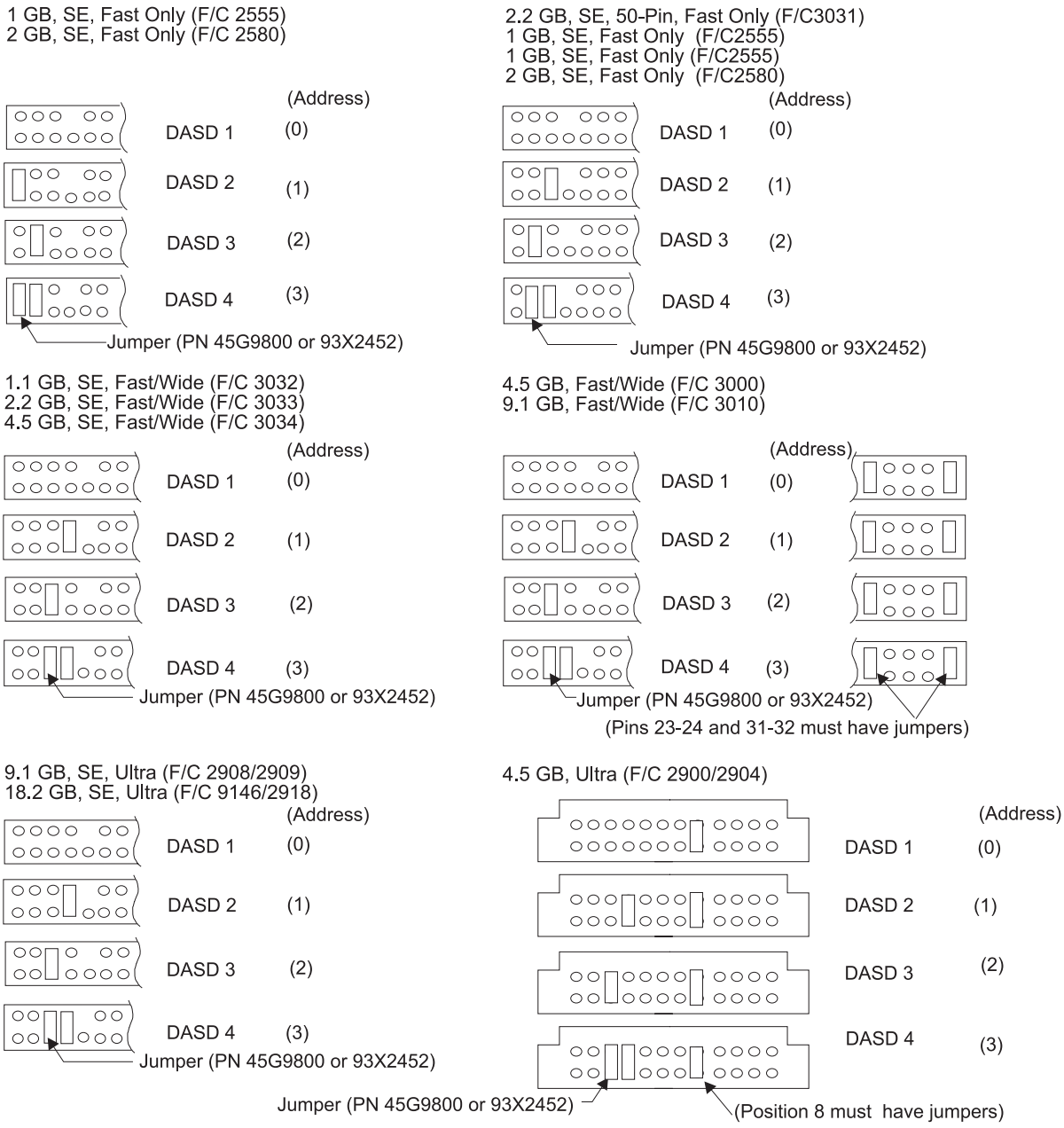


Figure 4-52. Setting the DASD address (Note: F/C 2904, 2909, and 2918 are mirror DASD)

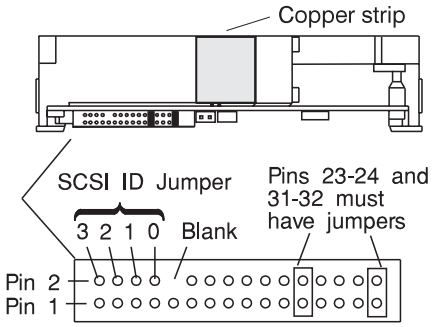


Figure 4-53. 4.5 GB DASD (F/C 3000) jumper locations

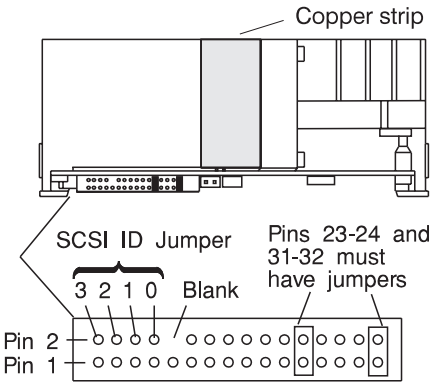


Figure 4-54. 9.1 GB DASD (F/C 3010) jumper locations

Attention: Use care when removing or replacing the media module in a 604e High Node to prevent damage to the SCSI cable.

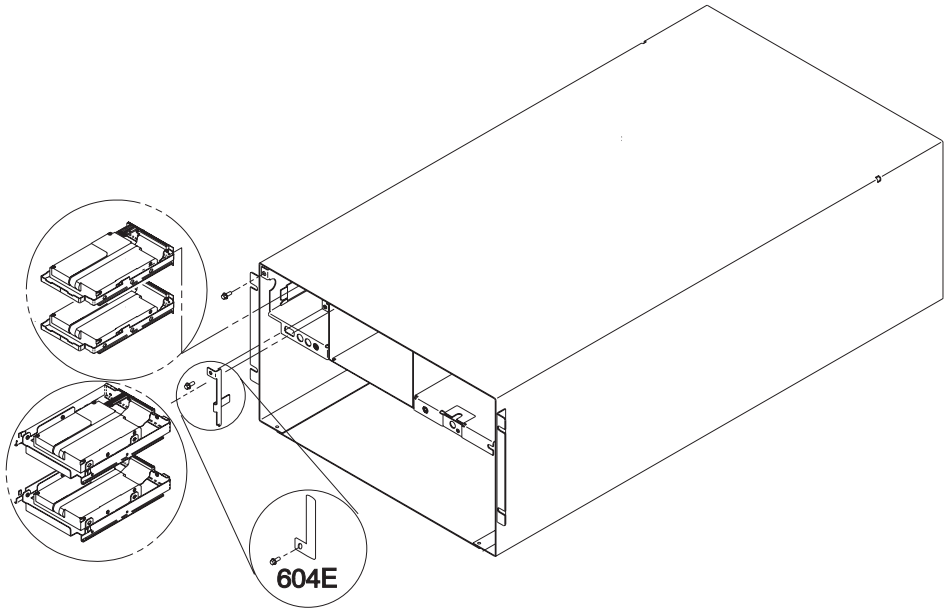


Figure 4-55. Removing the 604 or 604e High Node DASD, diagram 1

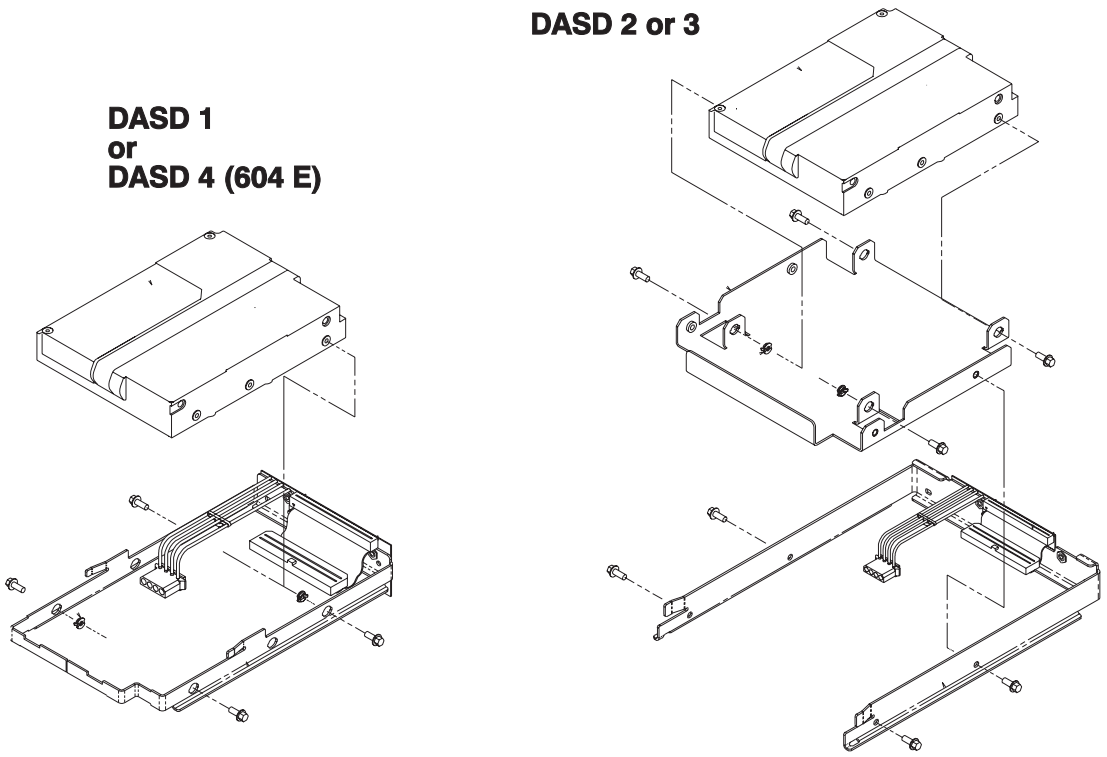


Figure 4-56. Removing the 604 or 604e High Node DASD, diagram 2

Replacing the DASD

1. Set jumper position on DASD (if any) for proper setting, as recorded in removal procedure.

   Note: If the replacement DASD is the same part number as the original, install jumpers in the original positions; otherwise, see Figure 4-52 on page 4-48.

2. Ensure all required DASD jumpers are installed. Refer to *Adapters, Devices, and Cable Information for Micro Channel Bus Systems*, SA38-0533, for the required jumper information.
3. Slide DASD bracket assembly into DASD module until fully seated.
4. Reinstall the retaining bracket and secure with screw.
5. Reinstall SCSI cable. (604 only)
6. Install front cover panel of the 604 or 604e High Node, using the four screws removed previously.
7. Connect the serial adapter cable to the supervisor card, and the node supervisor adapter cable to the bracket below it.
8. Connect the power cables to power supplies in the rear of the 604 or 604e High Node.
9. Set both switches on the circuit breaker assembly into the On (‘1’) position.

Removing the circuit breaker

Note: If you have in-line connectors, you will need EC EZ95930 to ECA020.

1. Carefully disconnect the 48-volt 604 or 604e High Node power cable from the SEPBU.
2. Loosen the four screws holding the plate housing the circuit breaker assembly to the front of the frame and remove the plate. Retain screws for later installation.
3. Remove the power supply cables connected to CBJ2 at the rear of the circuit breaker assembly.
4. Remove the 604 or 604e High Node power cables connected to CBJ1 at the rear of the circuit breaker assembly.

5. Remove the two screws holding the circuit breaker housing cover and remove the housing cover. Retain screws for later installation.
6. Remove the circuit breaker(s) retaining screws, nuts and washers for later installation

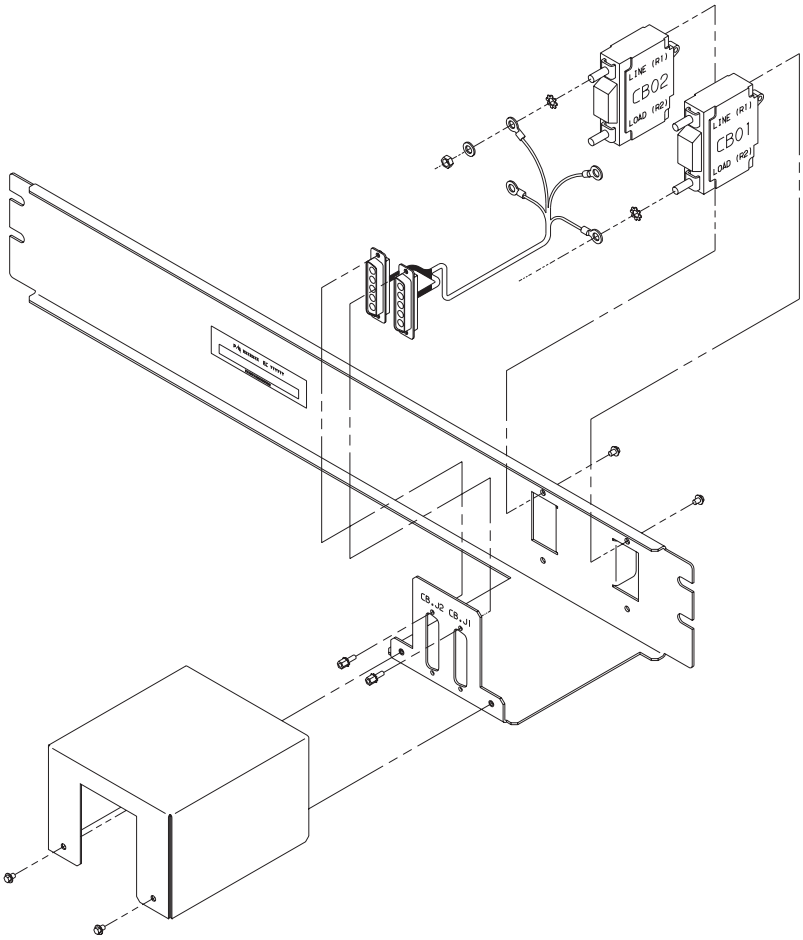


Figure 4-57. Removing the 604 or 604e High Node circuit breaker

Replacing the circuit breaker

1. Install the circuit breaker(s) using screws, nuts and washers retained from removal task.
2. Install the circuit breaker housing cover and tighten the screws retained from removal task.
3. Connect the 604 or 604e High Node power cables to CBJ1 at the rear of the circuit breaker assembly.
4. Connect the power supply cables to CBJ2 at the rear of the circuit breaker assembly.
5. Install the plate housing the circuit breaker assembly to the front of the frame and tighten screws retained from removal task.
6. Set the circuit breakers in the Off (‘0’) position.

Removing the power cable (at CBJ1)

1. Carefully disconnect the 48- volt 604 or 604e High Node power cable from the SEPBU.
2. Loosen the four screws holding the plate housing the circuit breaker assembly to the front of the frame and remove the plate. Retain screws for later installation.
3. Remove the 604 or 604e High Node power cables connected to CBJ1 at the rear of the circuit breaker assembly.

Replacing the power cable (at CBJ1)

1. Connect the 604 or 604e High Node power cables to CBJ1 at the rear of the circuit breaker assembly.
2. Install the plate housing the circuit breaker assembly to the front of the frame and tighten screws retained from removal task.
3. Set the circuit breakers in the Off (‘0’) position.
4. Carefully connect the 48-volt 604 or 604e High Node power cable to the SEPBU. (Line up the arrows at the tops of the connectors.)

Removing the power supply cable (at CBJ2)

1. Loosen the four screws holding the plate housing the circuit breaker assembly to the front of the frame and remove the plate. Retain screws for later installation.
2. Remove the power supply cables connected to CBJ2 at the rear of the circuit breaker assembly.
3. Remove the power supply cables from the power supplies at the rear of the 604 or 604e High Node.

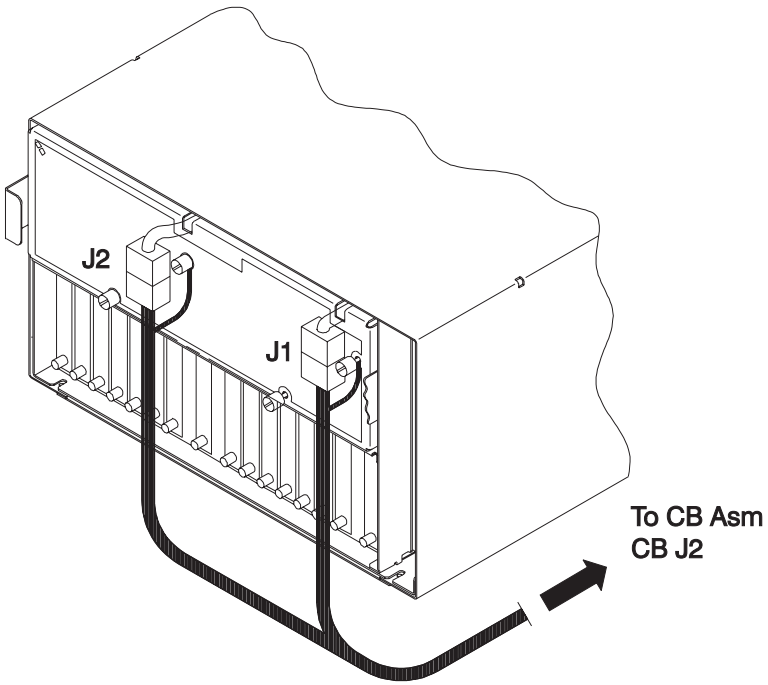


Figure 4-58. Removing the 604 or 604e High Node power supply cable

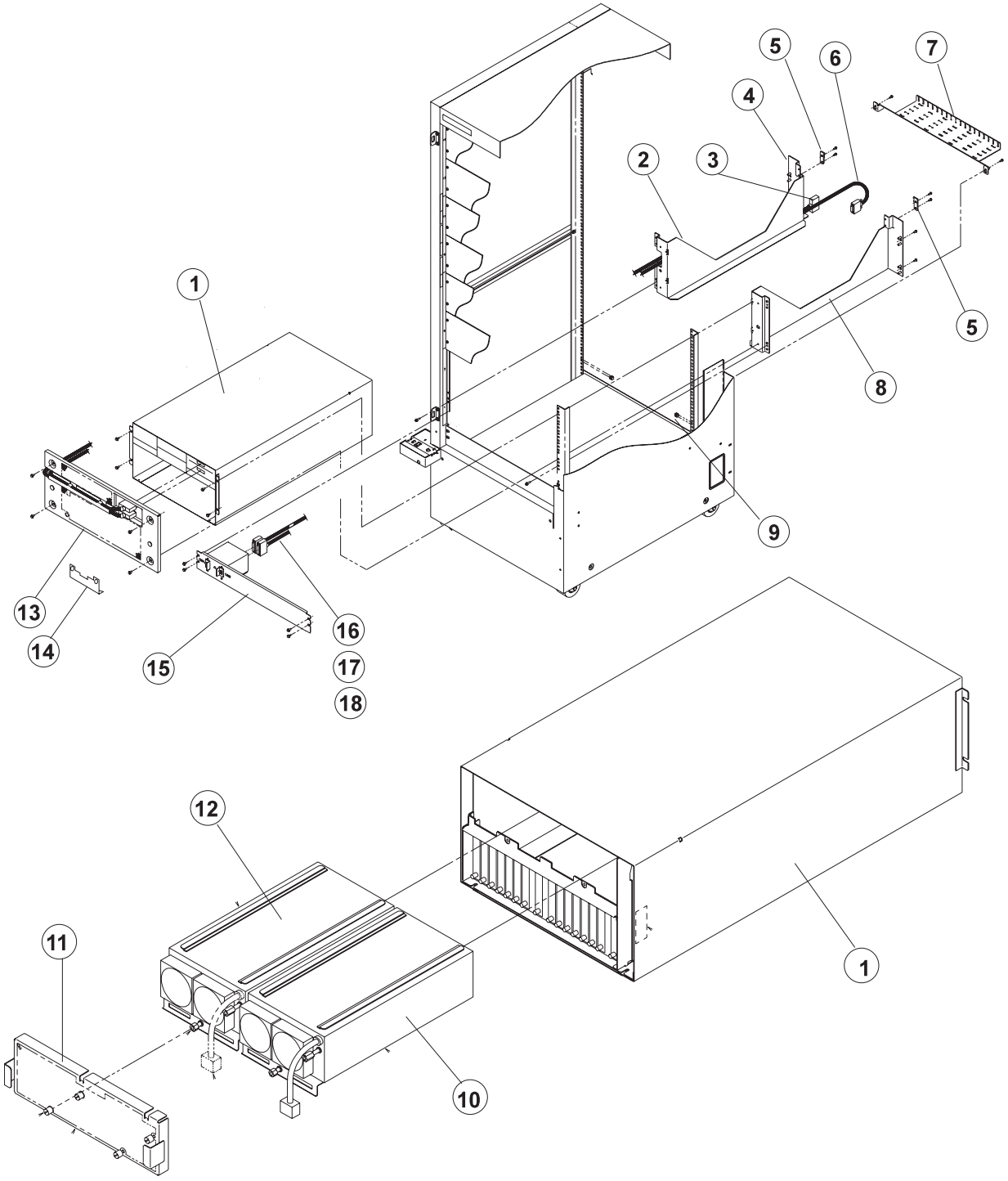
Replacing the power supply cable (at CBJ2)

1. Connect the power supply cables to the power supplies at the rear of the 604 or 604e High Node.
2. Connect the power supply cables to CBJ2 at the rear of the circuit breaker assembly.
3. Install the plate housing the circuit breaker assembly to the front of the frame and tighten screws retained from removal task.
4. Set the circuit breakers in the Off (‘0’) position.

Chapter 5. Parts catalog

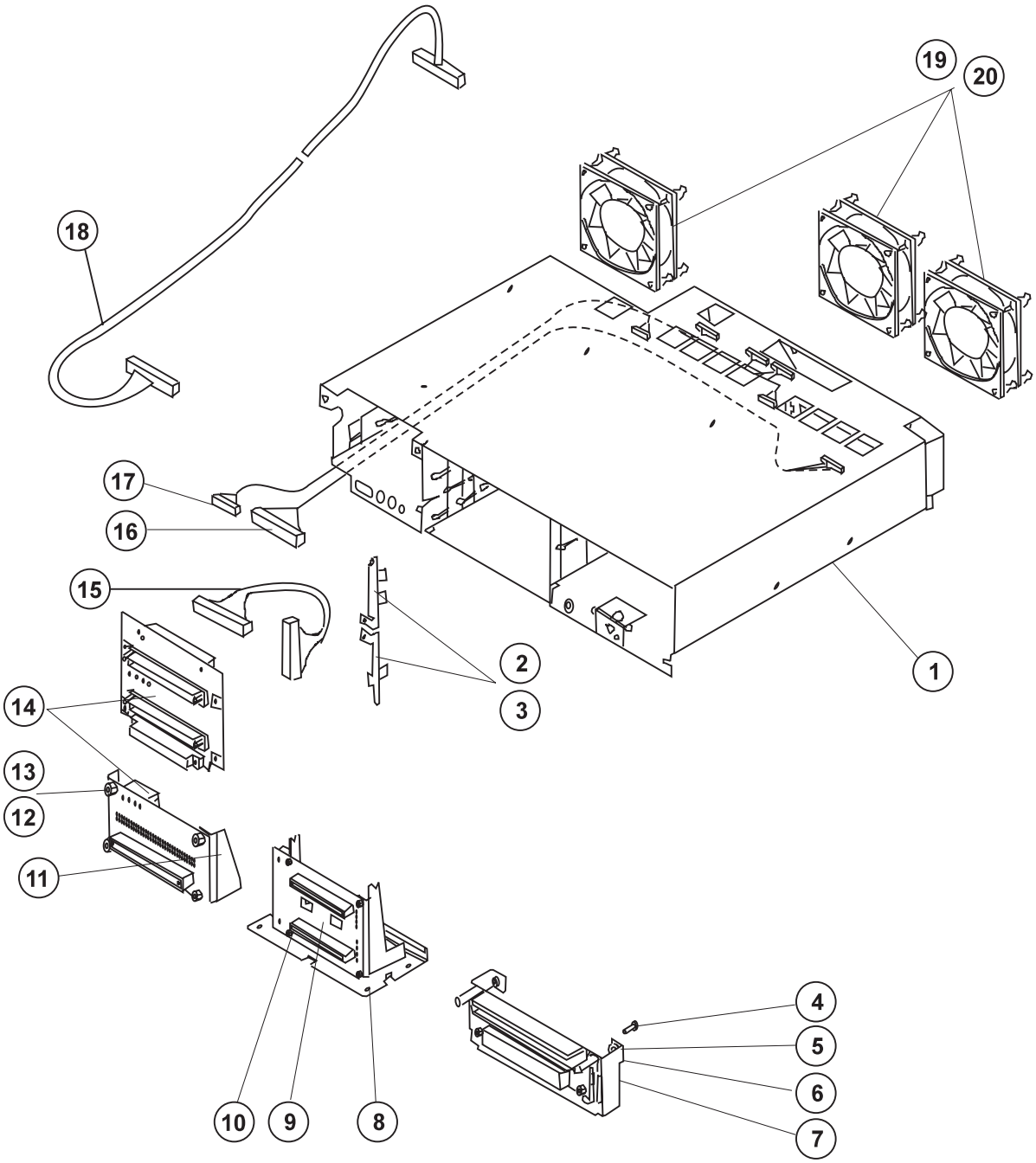
This chapter presents the Parts Catalog listing of RS/6000 SP 604 or 604E SMP High Node parts and FRUs, with corresponding figures containing indexed descriptions.

Assembly 1: 604 or 604e High Node asm (F/C 2006/2009) (view 1)



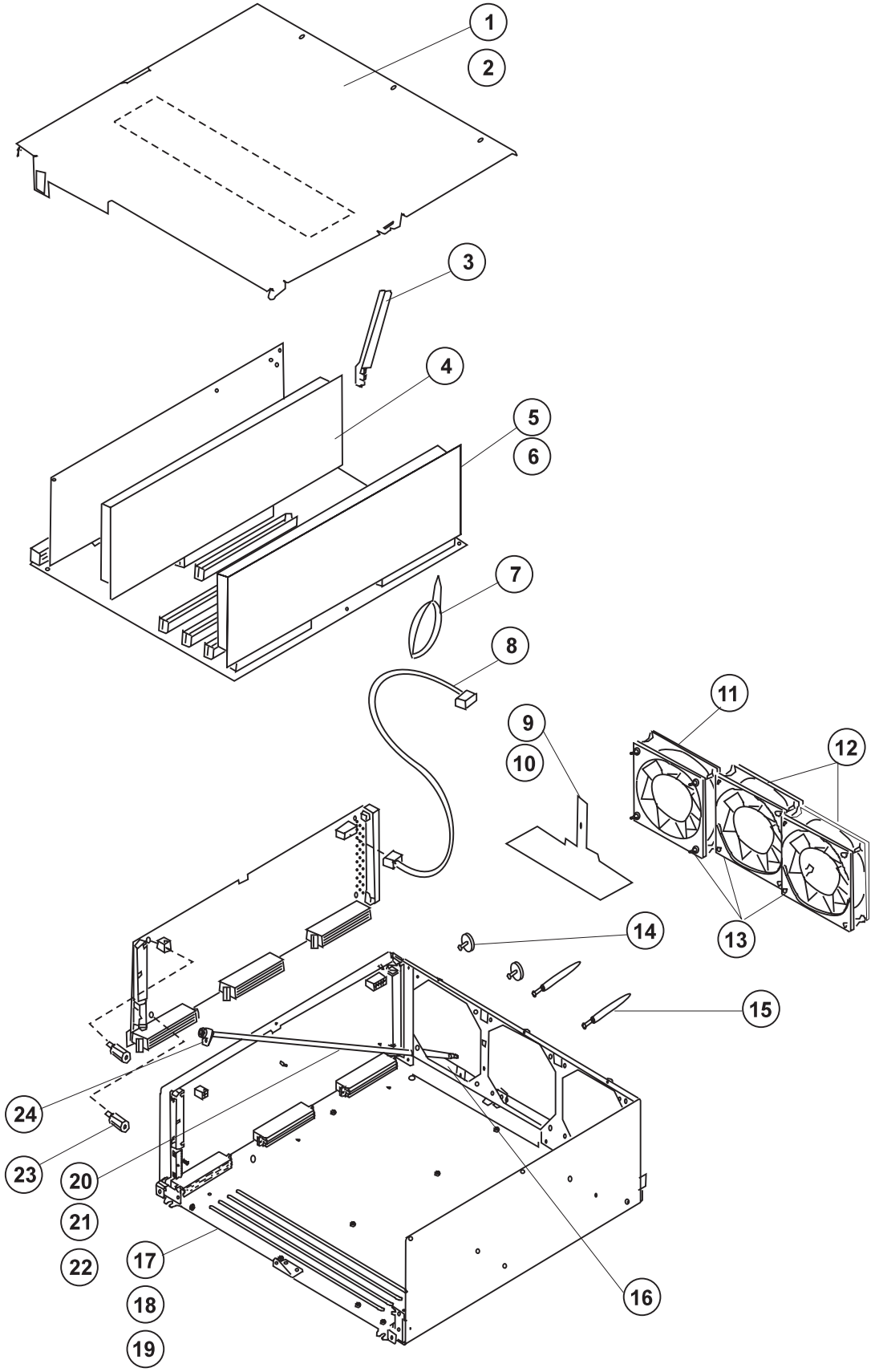
Asm–Index	Part Number	Units	Description
1–1			604 High Processor Node Assembly (F/C 2006) (reference only)
–1			604e High Processor Node Assembly (F/C 2009) (reference only)
–2	46H9277	1	• Rail, Left
–	54G2882	4	• • Screw
–	07H6655	2	• • Tie, Cable Velcro
–3	46H9783	1	• Cable, Supervisor Adapt
–4	46H9279	1	• Strain Relief, Cable
–	33F5638	2	• • Screw
–5	46H9801	2	• Bracket
–	84X4761	4	• • Screw
–6	46H9281	1	• Cable, Serial Adapter
–7	46H9324	1	• Tray, Cable Mgmt
–	54G2882	2	• • Screw
–	07H6655	6	• • Tie, Cable Velcro
–8	46H9278	1	• Rail, Right
–	54G2882	4	• • Screw
–9	0375867	10	• Nut, Clip
–10	93H6192	1	• Power Supply
–	11H8321	2	• • Fan
–11	11H2661	1	• Cover, Rear EMC
–12	11H2712	1	• Cooling Unit
–13	46H9276	1	• Cover, Front
–	54G2882	4	• • Screw
–14	40H0502	1	• Front access plate retainer bracket
–	32G1547	2	• • Screw
–15	46H9756	1	• CB Assembly
–	54G2882	4	• • Screw
–16	46H9755	1	• Cable, 48 V Pwr Dist
–17	08J5858	1	• Cable, 48 V Pwr Single (CBJ1)
–18	46H9754	1	• Cable, SMP Pwr (CBJ2)

Assembly 2: 604e High Node media module



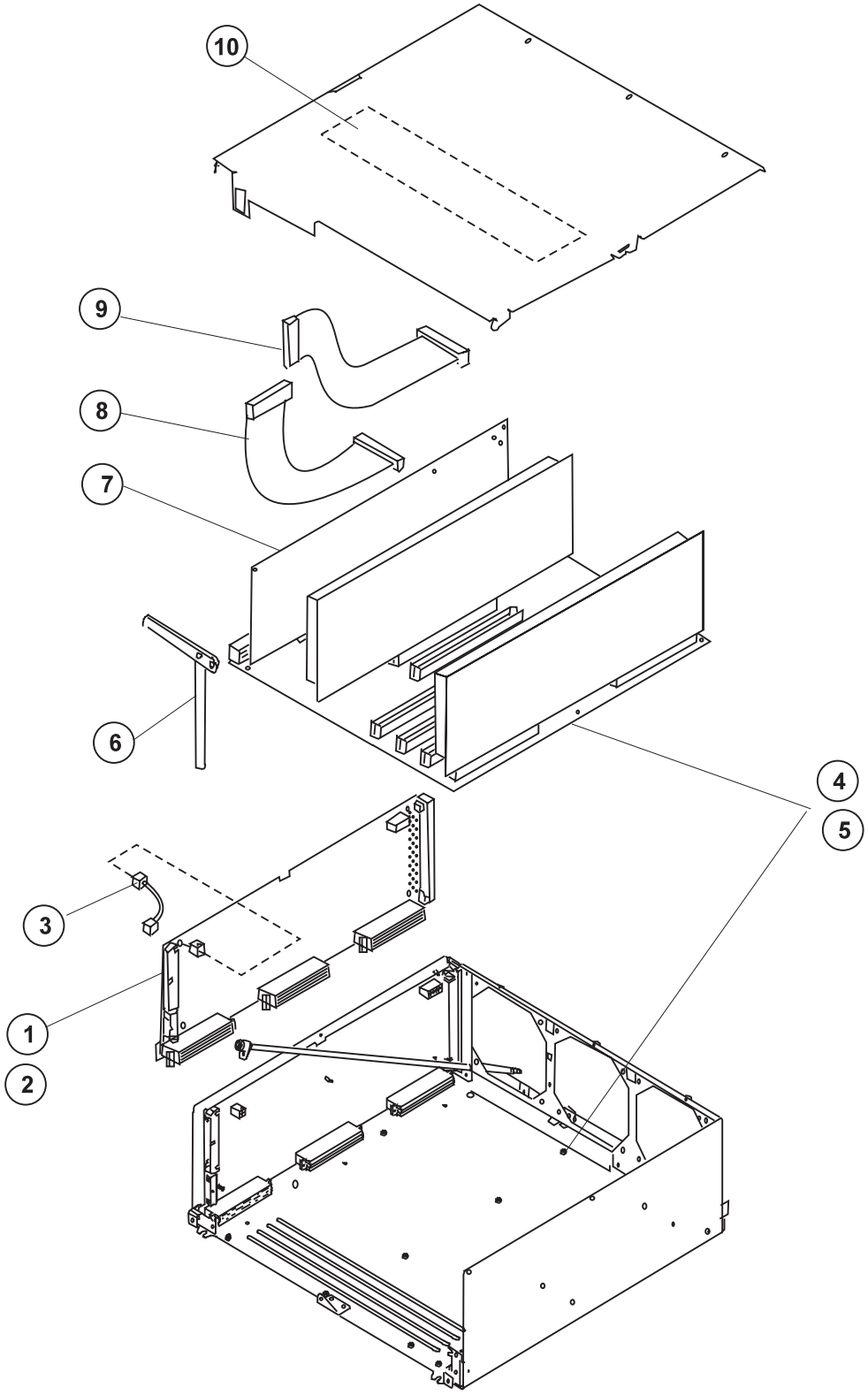
Asm–Index	Part Number	Units	Description
2–1	93H7119	1	Media module (604e)
–2	93H5065	1	Retainer bracket
–3	00G1268	1	Screw
–4	78X8993	4	Screw
–5	00G1268	4	Screw–Autodocking receiver mounting (M4x7 hex head)
–6	40H0738	1	Operator panel receiver bracket assembly
–7	11H8229	2	Stud
–8	40H0732	1	Media receiver bracket assembly
–9	11H3190	1	Media receiver board assembly
–10	1621170	4	Screw (M3x6 pan head)
–11	40H0737	1	DASD receiver bracket assembly
–12	04G1559	4	Screw (M3x6)
–13	00G1269	2	Screw–DASD receiver mounting (M4x10)
–14	93H2483	1	DASD receiver board assembly
–15	93H5067	1	SCSI cable (DASD receiver board to Media receiver board)
–16	11H8261	1	Operator panel cable/receiver assembly
–17	11H2676	1	Cable, power (To media and fans.)
–18	93H5066	1	SCSI cable (To SCSI adapter.)
–19	11H8321	3	Fan
–20	81F7977	12	Vibration isolator

Assembly 3: 604e High Node CPU module (view 1)



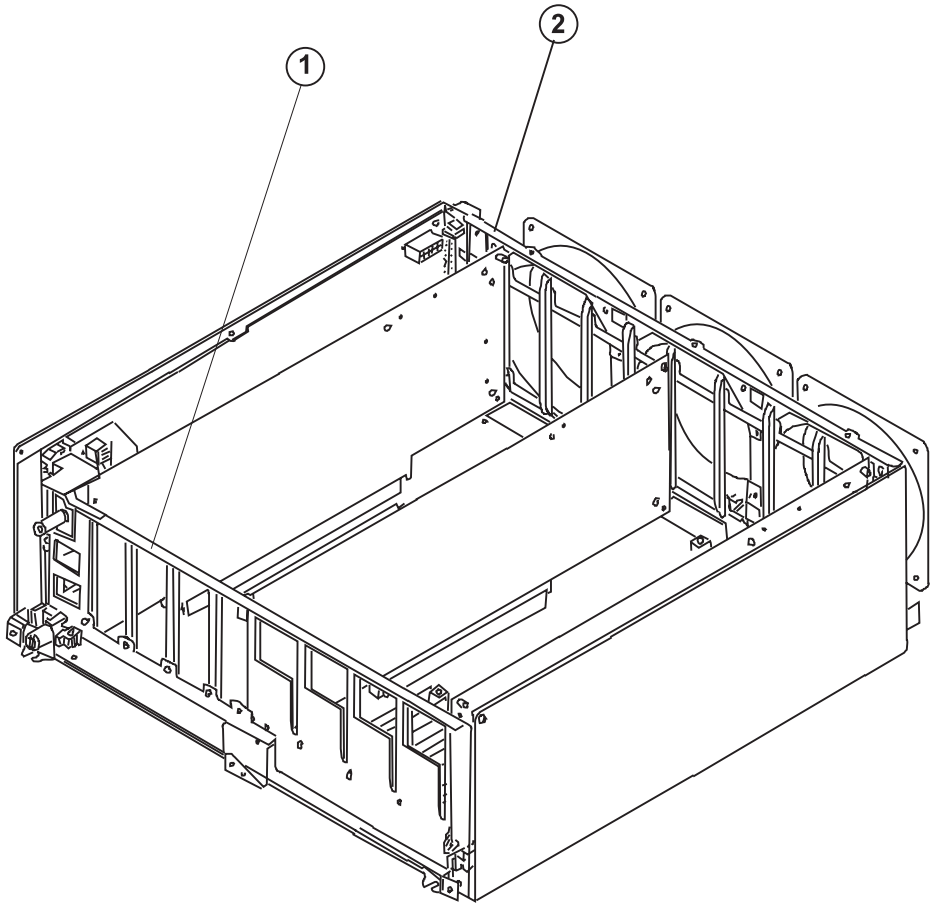
Asm–Index	Part Number	Units	Description
3–1	93H5071	1	Top cover (part of CPU module assembly)
–2	1621285	6	Screw
–3	11H3280	1	Extraction tool (single-piece)
–4	41L5020	1	CPU card, type 4EG 604e processor
–5	19H0283	1-4	MR2 memory card (256MB base) without memory modules
–5	09J4779	1-4	MR4 memory card (256MB base) without memory modules
–5	93H4357	1-4	SF5 memory card, base without memory modules
–6	19H0240	8	Memory module, 8MB (MR2)
–6	19H0271	8	Memory module, 32MB (MR4)
–6	19H0287	4-16	Memory module, 8MB (NFX,RLX, or SF5)
–6	19H0288	4-16	Memory module, 16MB (NFX,RLX, or SF5)
–6	19H0289	4-16	Memory module, 32MB (NFX,RLX, or SF5)
–6	08L0160	4-16	Memory module, 64MB (SF5)
–7	1159913	4	Cable tie, fan cable
–8	11H2677	1	Fan power cable
–9	93H5061	1	Retainer bracket, CPU flex cable
–10	04G1559	1	Screw
–11	40H7070	1	Fan assembly
–12	93H5822	2	Fan
–13	81F7977	12	Vibration isolator
–14	11H2691	2	Screw
–15	93H5064	2	Guide pin screw
–16	40H7000	1	Mounting plate assembly (flex cable mounting)
–17	94H0616	1	CPU module
–18	32G1547	2	Screw
–19	93H5063	1	Insulator (system planar)
–20	40H7074	1	Docking screw (with clamp attached)
–21	93H5466	3	Washer
–22	1622977	1	Retainer ring
–23	93H5062	2	Standoff
–24	04G1559	1	Screw (M3x6)

Assembly 4: 604e High Node CPU module (view 2)



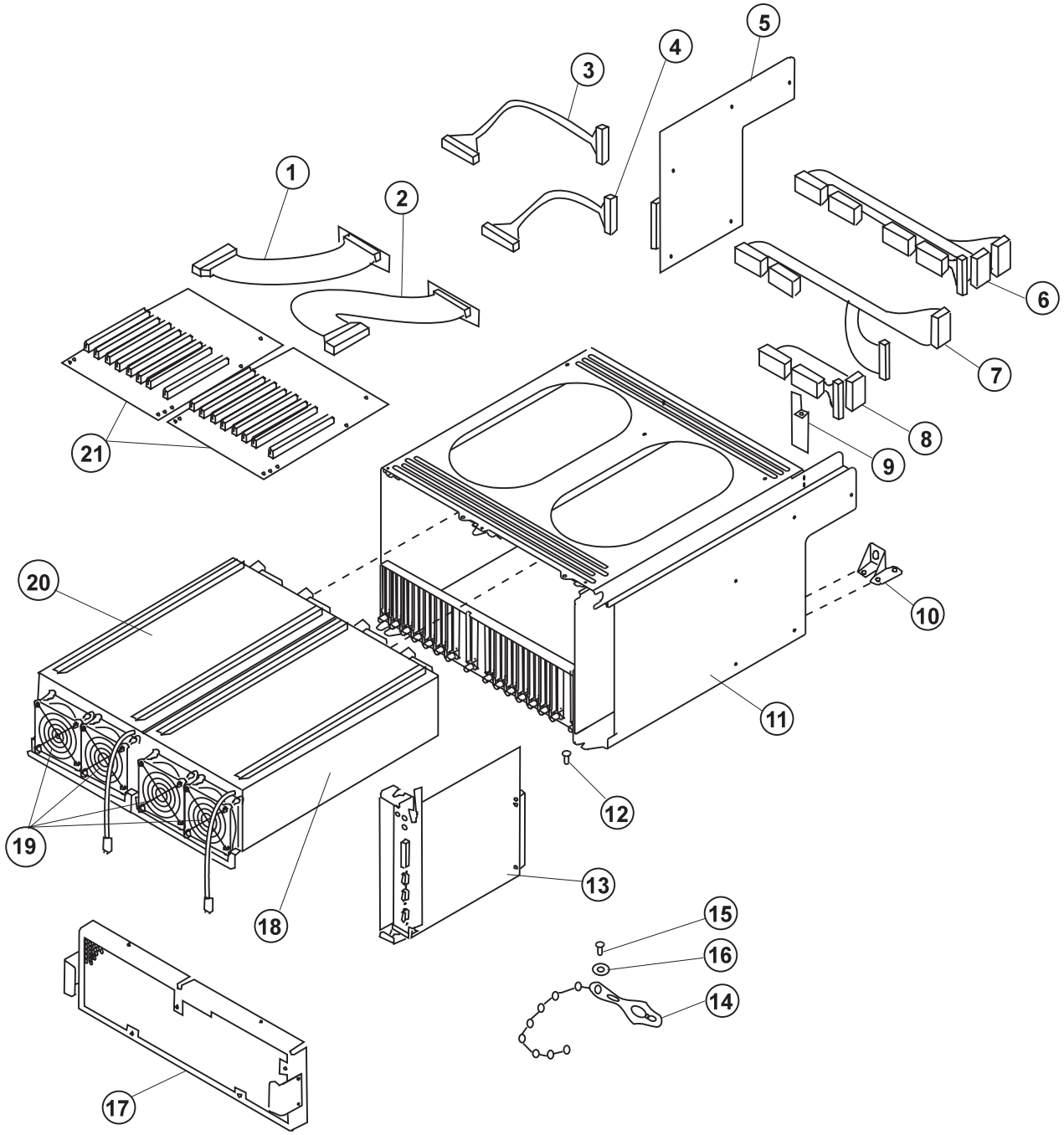
Asm–Index	Part Number	Units	Description
4–1	93H7764	1	Lateral planar 1
–2	04G1559	4	Screw
–3	11H2678	1	Interlock cable
–4	09J4887	1	System planar
–5	04G1559	11	Screw, hex head
–5	1621187	1	Screw, pan head
–6	11H2697	1	Extraction tool (dual-piece)
–7	09J4902	1	I/O card
–8	08L1101	1	Flex cable (To horizontal connector on I/O card.)
–9	08L1100	1	Flex cable (To vertical connector on I/O card.)
–10	93H5074	1	Card restraint

Assembly 5: 604e High Node CPU module (view 3)



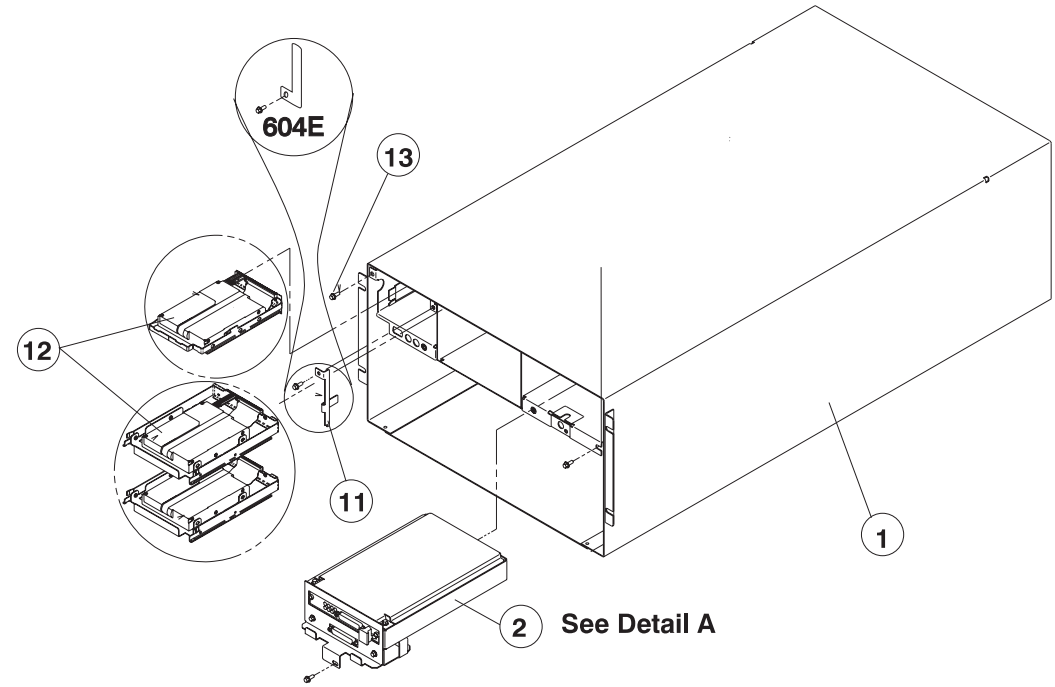
Asm–Index	Part Number	Units	Description
5–1	93H7441	1	Front guide bracket assembly
–2	93H7442	1	Rear guide bracket assembly

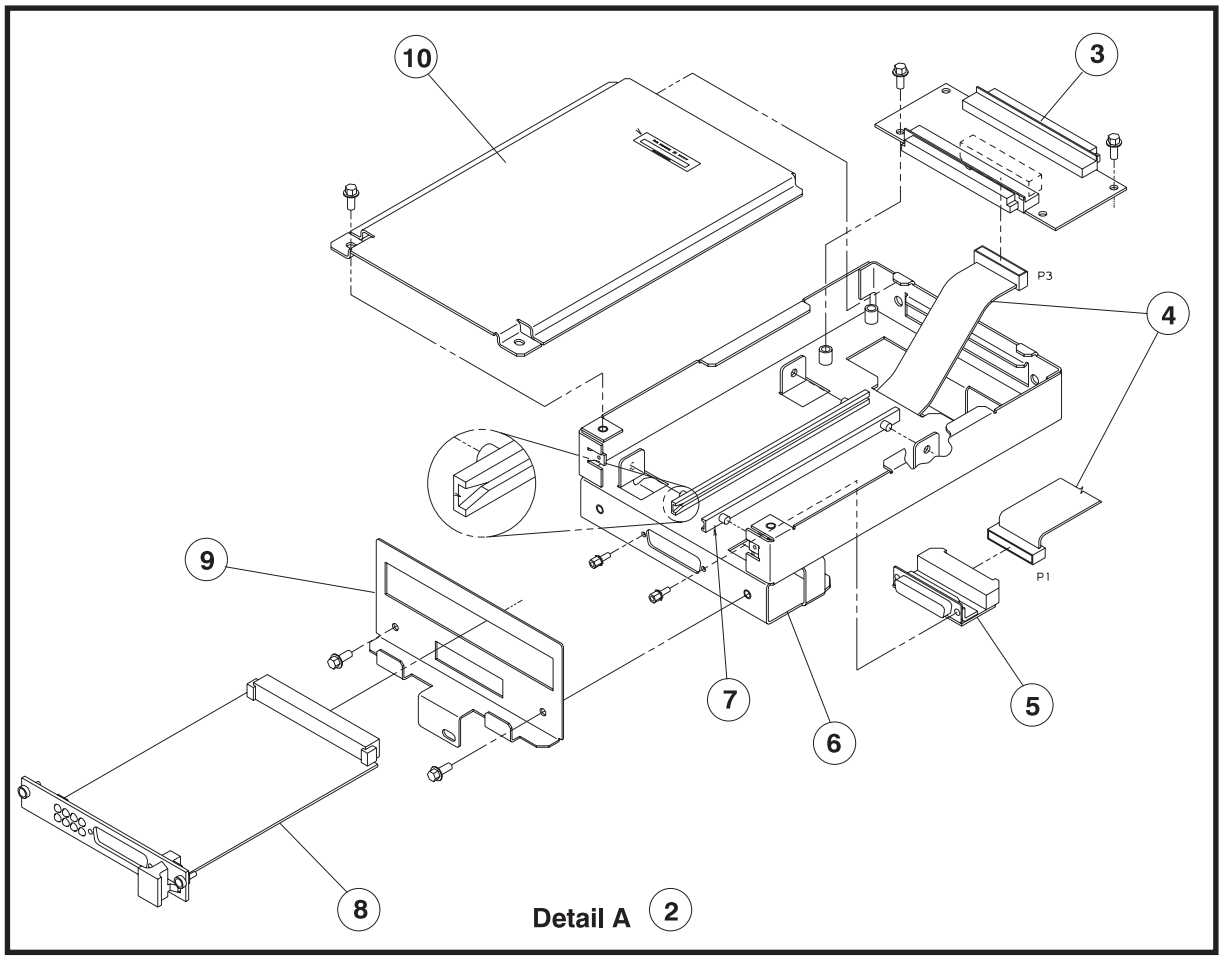
Assembly 6: I/O module



Asm–Index	Part Number	Units	Description
6–1	08L1100	1	Flex cable (for I/O planar 1)
–2	08L1101	1	Flex cable (for I/O planar 0)
–3	11H2684	1	Power cable (long–I/O planar to SIB card)
–4	11H2683	1	Power cable (short–I/O planar to SIB card)
–5	40H7014	1	Lateral planar 2
–	11H2689	5	• Grommet
–	04G1559	5	• Screw
–	11H3158	1	• Insulator (lateral planar 2 card)
–6	11H2692	8	Screw
–7	40H0875	1	Primary power supply cable bundle
–8	40H0876	1	Optional power supply cable bundle
–9	11H3264	1	Air deflector
–	162192	1	• Screw
–10	93H7443	1	Docking screw bracket
–	1622417	3	• Locknut
–11	93H7120	1	I/O module
–12	00G1268	1	Mounting screw, system interface board
–13	40H7012	1	System interface board
–14	52G5668	1	Cable clamp–I/O power cable
–15	1621187	1	Screw (M3x6 pan head)
–16	1622288	1	Washer
–17	11H7396	1	Rear access plate
–18	93H6192	1	Power supply (-48 V dc)
–19	11H8321	4	Fan
–	81F7977	16	• Vibration Isolator
–20	11H2712	1	Cooling unit
–21	35H8834	2	I/O planar
–	04H1559	10	• Mounting screw, I/O planar
–	11H7315	4	• Shoulder mounting screw (M3), I/O planar
–	11H3159	2	• Insulator, I/O planar

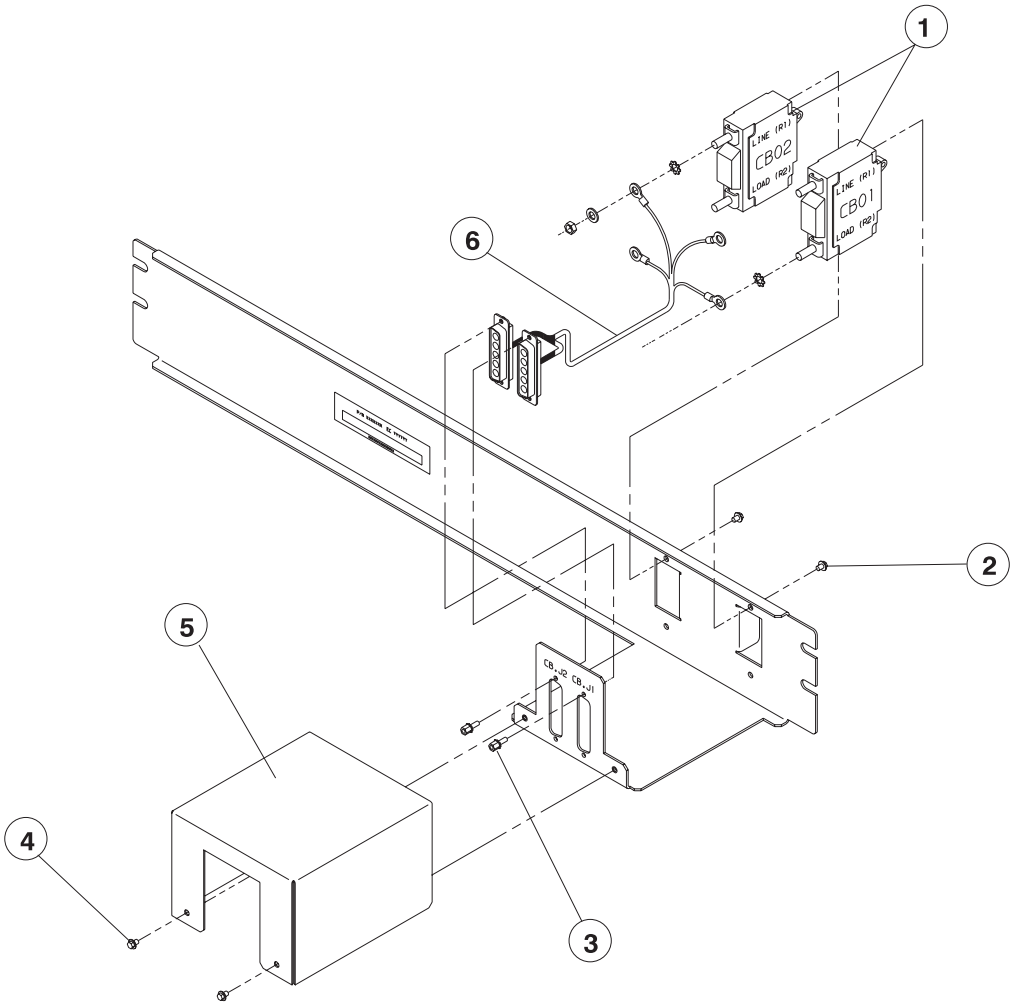
Assembly 7: 604 or 604e High Node asm (F/C 2006/2009) (view 2)





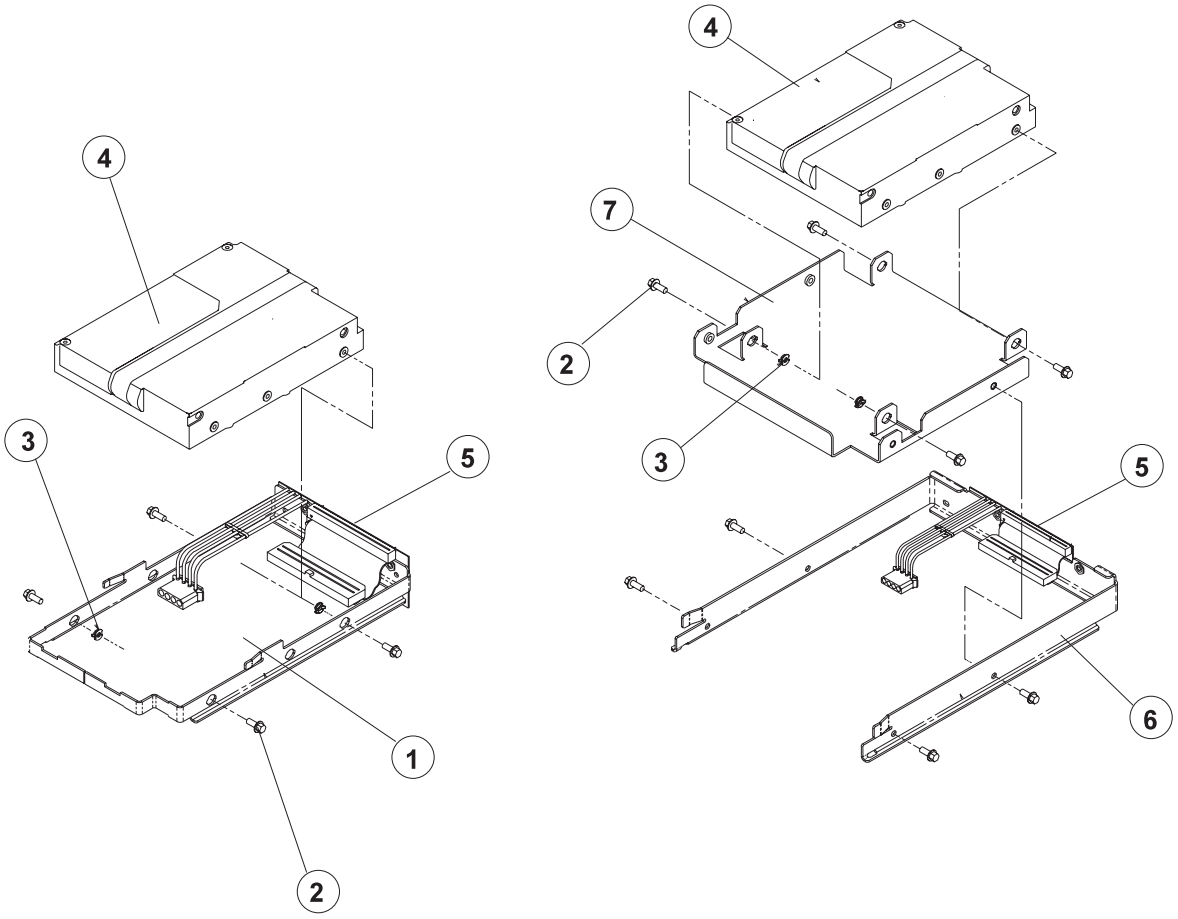
Asm–Index	Part Number	Units	Description
7–1			604 High Processor Node Assembly (F/C 2006) (reference only)
–1			604e High Processor Node Assembly (F/C 2009) (reference only)
–2	11J4778		• Assembly, Supervisor (reference only)
–	00G1268	1	• • Screw
–3	46H9736	1	• • Interposer Card, Supervisor
–4	46H9317	1	• • Cable, Supervisor Internal
–5	67G4989	1	• • Bus Card, Supervisor
–	31G9308	2	• • • Standoff
–6	46H9287	1	• • Chassis
–7	46H9802	2	• • Guide, Card
–8	05N5775	1	• • Card, Supervisor
–9	46H9777	1	• • Bezel
–	33F3258	2	• • • Screw
–10	46H9288	1	• • Cover
–	33F3258	2	• • • Screw
–11	40H0755	1	• Bracket, Retainer
–	00G1268	1	• • Screw
–12		AR	• DASD (See “DASD part numbers” on page 5-20.)
–13	00G1268	2	• Screw

Assembly 8: 604 or 604e High Node asm (F/C 2006/2009) (view 3)



Asm–Index	Part Number	Units	Description
8–			604 High Processor Node Assembly (F/C 2006) (reference only)
–			604e High Processor Node Assembly (F/C 2009) (reference only)
–1	46H9687	2	• Circuit Breaker, 40 Amp
–2	46G2677	4	• Screw, M3
–3	51H9738	4	• Screw
–	1622316	4	• • Lockwasher
–4	46G2677	2	• Screw, M3
–5	46H9759	1	• Cover, CB
–6	46H9760	1	• Cable, CB Asm

Assembly 9: 604 or 604e High Node asm (F/C 2006/2009) (view 4)



Asm–Index	Part Number	Units	Description
9–			604 High Processor Node Assembly (F/C 2006) (reference only)
–			604e High Processor Node Assembly (F/C 2009) (reference only)
–1	40H0847	1	• Bracket, Mounting
–2	0038442	4	• • Screw
–3	11H2704	AR	• Isolator, DASD
–4		AR	• DASD (See “DASD part numbers” on page 5-20.)
–5	40H7043	1	• Board Asm (604 high node 8-bit DASD) For 604 high node 16-bit DASD the following additional parts are required:
–	87G4587	1	• • Interposer Card
–	93H6991	1	• • Cable
–5	93H7487	1	• Board Asm (604e high node 8-bit DASD
–5	93H2482	1	• Board Asm (604e high node 16-bit DASD)
–	04G1559	2	• • Screw
–6	11H7317	1	• Bracket, Media
–7	46H9753	1	• Bracket, Mounting
–	0038442	4	• • Screw
–8	93H8599	1	• Cable, Media Bay SCSI (not shown)
–9	93H7479	1	• Card, DASD Receiver (not shown)
–10	93H7463	1	• Card, Media Receiver (not shown)
–11	93H7487	1	• Card, Interposer 8-bit (not shown)

DASD part numbers

Table 5-1. DASD part numbers

Feature Code	Part Number	Size (GB)	Type	Address Jumper
3046/2918 See note	5986923	18.2	Ultra	45G9800
3034	74G7008	4.5	Fast/Wide	45G9800
3033	74G7007	2.2	Fast/Wide	45G9800
3032	74G7006	1.1	Fast/Wide	45G9800
3031	74G6996	2.2	Fast	93X2452
3031	86G9099	2.2	Fast	93X2452
3010	93G2972	9.1	Fast/Wide	45G9800
3000	93G2970	4.5	Fast/Wide	45G9800
2908/2909 See note	59H6926	9.1	Ultra	45G9800
2900/2904 See note	83H7105	4.5	Ultra	45G9800
2580	90F0894	2	Fast	93X2452
2580	86F0118	2	Fast	45G9800
2555	36G6930	1	Fast	45G9800
2555	86G9049	1	Fast	45G9800
2555	45G9467	1	Fast	45G9800

Note: Feature codes 2909, 2904, and 2918 are DASD mirroring.

RS/6000 SP memory part numbers

Table 5-2. Memory part numbers/S4.6 cards. **MEM part numbers - 8 SIMMs per card**

Card Size	F/C	SIMMless card FRU #	SIMM FRU #	SIMM Size
32 MB	4053 4067	52G4801	70F9973	4 MB
64 MB	4054 4069 5064	52G4801	70F9976	8 MB
128 MB	4055 4090 5129	52G4801	43G1796	16 MB
256 MB	4056 4095	88G3680	07L8500	32 MB
256 MB	4056 4095	52G4801	39H8312	32 MB

Table 5-3. Memory part numbers/S5.0 cards. **MEM part numbers - 8 SIMMs per card**				
Card Size	**F/C**	**SIMMless Card FRU #**	**SIMM FRU #**	**SIMM Size**
32 MB	4076	12H1331	39H8924	4 MB
64MB	4077	12H1331	39H8925	8 MB
128 MB	4078	12H1331	43G1796	16 MB
256 MB	4079	12H1331	39H8312	32 MB

Table 5-4. Memory DIMM/DIMMless S.60 cards. **(For 604 High Processor Node)**				
Card Size	**F/C**	**DIMMless Card FRU #**	**DIMM FRU #**	**DIMM Size**
64 MB	4155	93H4357	19H0287	8 MB
128 MB	4156	93H4357	19H0288	16 MB
256 MB	4157	93H4357	19H0289	32 MB
512 MB	4158	93H4357	35H8751	64 MB

Table 5-5. Memory DIMM/DIMMless S.60 cards. **(For 604e High Processor Node)**				
Card Size	**F/C**	**DIMMless Card FRU #**	**DIMM FRU #**	**DIMM Size**
256 MB	4029	93H4357	07L6696	64 MB
512 MB	4154	93H4357	07L6696	64 MB
1 GB	4030	93H4357	07L6696	64 MB

Appendix A. Messages and codes

Offline diagnostic error codes

Note: The Failure Percent value is calculated on a system model base. As some Failing Function Codes are system model specific but are associated with the same Error Number, it may happen that the sum of the Failure Percent values in one single box exceeds 100.

Find the error in the following tables then go to the Start MAPs in the *RS/6000 SP: System Service Guide*, unless otherwise instructed in the Description column.

Table A-1 (Page 1 of 11). 604 /604e High Node firmware error codes (401–XXX errors)

Error Number	Failing Function Codes	Failure Percent (%)	Description
401-000	C59	100	S1 asynchronous line internal registers error.
401-001	C59	100	S1 asynchronous line buffer exchange error.
401-002	C59	100	S1 asynchronous line junction signal error (initial test).
401-003	C59	100	S1 asynchronous line junction signal error (DTR to DSR link).
401-004	C59	100	S1 asynchronous line junction signal error (RTS to CTS link).
401-005	C59	100	S1 asynchronous line junction signal error (OUT2 to DCD link).
401-006	C59	100	S1 asynchronous line junction signal error (OUT1 to RL link).
401-007	C59	100	S1 asynchronous line buffer exchange error. External loop-back mode.
401-008	C59	100	S1 asynchronous line junction signal error (RTS to CTS link). External loop-back mode.
401-009	C59	100	S1 asynchronous line junction signal error (DTR to DSR link). External loop-back mode.
401-010	C59	100	S1 asynchronous line speed error. External loop-back mode.
401-020	C59	100	S2 asynchronous line internal registers error.
401-021	C59	100	S2 asynchronous line buffer exchange error.
401-022	C59	100	S2 asynchronous line junction signal error (initial test).
401-023	C59	100	S2 asynchronous line junction signal error (DTR to DSR link).
401-024	C59	100	S2 asynchronous line junction signal error (RTS to CTS link).
401-025	C59	100	S2 asynchronous line junction signal error (OUT2 to DCD link).
401-026	C59	100	S2 asynchronous line junction signal error (OUT1 to RL link).
401-027	C59	100	S2 asynchronous line buffer exchange error. External loop-back mode.
401-028	C59	100	S2 asynchronous line junction signal error (RTS to CTS link). External loop-back mode.
401-029	C59	100	S2 asynchronous line junction signal error (DTR to DSR link). External loop-back mode.
401-030	C59	100	S2 asynchronous line speed error. External loop-back mode.
401-040	C59	100	S3 asynchronous line internal registers error.

Table A-1 (Page 2 of 11). 604 /604e High Node firmware error codes (401–XXX errors)			
Error Number	**Failing Function Codes**	**Failure Percent (%)**	**Description**
401-041	C59	100	S3 asynchronous line buffer exchange error.
401-042	C59	100	S3 asynchronous line junction signal error (initial test).
401-043	C59	100	S3 asynchronous line junction signal error (DTR to DSR link).
401-044	C59	100	S3 asynchronous line junction signal error (RTS to CTS link).
401-045	C59	100	S3 asynchronous line junction signal error (OUT2 to DCD link).
401-046	C59	100	S3 asynchronous line junction signal error (OUT1 to RL link).
401-047	C59	100	S3 asynchronous line buffer exchange error. External loop-back mode.
401-048	C59	100	S3 asynchronous line junction signal error (RTS to CTS link). External loop-back mode.
401-049	C59	100	S3 asynchronous line junction signal error (DTR to DSR link). External loop-back mode.
401-050	C59	100	S3 asynchronous line speed error. External loop-back mode.
401-060	C59	100	Flash EPROM standard area checksum error.
401-061	C59	100	Flash EPROM IPL area checksum error.
401-070	C59	100	NVRAM error 1.
401-071	C59	100	NVRAM error 2.
401-080	C59	100	EPROM standard area checksum error.
401-081	C59	100	EPROM IPL area checksum error.
401-090	C59	100	TOD MSR register error.
401-091	C59	100	TOD internal RAM error.
401-092	C59	100	TOD wake-up mechanism error.
401-100	C59	100	Floppy disk controller DOR register error.
401-110	C59	100	BPP address register error.
401-111	C59	100	BPP DTR register error.
401-112	C59	100	BPP CTR register error.
401-120	C59	100	Miscellaneous PGCR register error.
401-121	C59	100	Miscellaneous DTR register error.
401-130	C59 C61 C63	50 25 25	CPU accessibility. Checkstop error.
401-131	C59 C61 C63	50 25 25	CPU accessibility. Single error.
401-132	C59 C61 C63	50 25 25	CPU accessibility. CPU not started.
401-140	all boards		Bad VPD Board.
401-141	all boards		No board present.
401-142	all boards		No coherent configuration on board.

Table A-1 (Page 3 of 11). 604 /604e High Node firmware error codes (401–XXX errors)

Error Number	Failing Function Codes	Failure Percent (%)	Description
401-150	C59 C61 C63 C88	40 20 20 20	Asynchronous lines access. Line Sx: register error.
401-151	C59 C61 C63 C88	40 20 20 20	Asynchronous lines access. Line Sx: status register error.
401-152	C59 C61 C63 C88	40 20 20 20	Asynchronous lines access. Asynchronous line buffer exchange error.
401-153	C59 C61 C63 C88	40 20 20 20	Asynchronous lines access. Line Sx: register error on bit i.
401-160	C59 C61 C63 C88	40 20 20 20	BPP ext. Loop back. Status register error
401-161	C59 C61 C63 C88	40 20 20 20	BPP ext. Loop back. Error bit i#0.
401-162	C59 C61 C63 C88	40 20 20 20	BPP ext. Loop back. Error bit i#1.
401-170	C59 C61 C63 C88	40 20 20 20	Printer error: not selected.
401-171	C59 C61 C63 C88	40 20 20 20	Printer error: end of paper.
401-172	C59 C61 C63 C88	40 20 20 20	Printer on error.
401-173	C59 C61 C63 C88	40 20 20 20	Printer time out, always busy.
401-180	C59 Modem	20 80	DIAL-OUT test. Dial out not authorized.
401-181	C59 Modem	20 80	DIAL-OUT test. Quick on Call Service not subscribed.

Table A-1 (Page 4 of 11). 604 /604e High Node firmware error codes (401–XXX errors)			
Error Number	**Failing Function Codes**	**Failure Percent (%)**	**Description**
401-182	C59 Modem	20 80	DIAL-OUT test. No customer Hub or Service Center phone Dial-Out.
401-183	C59 Modem	20 80	DIAL-OUT test. Modem parameters failed.
401-184	C59 Modem	20 80	DIAL-OUT test. Line busy.
401-185	C59 Modem	20 80	DIAL-OUT test. Connection time-out.
401-186	C59 Modem	20 80	DIAL-OUT test. Modem answer failed.
401-187	C59 Modem	20 80	DIAL-OUT test. Data time-out.
401-188	C59 Modem	20 80	DIAL-OUT test. Data Carrier detect junction failed.
401-189	C59 Modem	20 80	DIAL-OUT test. No data acknowledge.
401-190	C59	100	BPP external Loop back. Data register error.
401-191	C59	100	BP external Loop back. Status register error.
401-400	C59	100	JTAG chain integrity. Read IR failed.
401-401	C59	100	JTAG chain integrity. Read DR failed: chip #.
401-501	C59 C63 C61	50 25 25	Direct IO: IONIAN-SSGA. Map register error.
401-502	C59 C63 C61	50 25 25	Direct IO: IONIAN-SSGA. CONFIGURATION register error.
401-503	C59 C63 C61	50 25 25	Direct IO: IONIAN-SSGA. PERSONALIZE register error.
401-509	C59 C63 C61	50 25 25	Direct IO: IONIAN-SSGA. POS3 register error.
401-510	C59 C63 C61	50 25 25	Direct IO: IONIAN-SSGA. XIVR register error.
401-511	C59 C63 C61	50 25 25	Direct IO: IONIAN-SSGA. DSIER register error.
401-512	C59 C63 C61	50 25 25	Direct IO: IONIAN-SSGA. MFRR register error.
401-513	C59 C63 C61	50 25 25	Direct IO: IONIAN-SSGA. BUID register error.

Table A-1 (Page 5 of 11). 604 /604e High Node firmware error codes (401–XXX errors)

Error Number	Failing Function Codes	Failure Percent (%)	Description
401-514	C59 C63 C61	50 25 25	Direct IO: IONIAN-SSGA. APR register error.
401-515	C59 C63 C61	50 25 25	Direct IO: IONIAN-SSGA. BSR register error.
401-516	C59 C63 C61	50 25 25	Direct IO: IONIAN-SSGA. MD0 register error.
401-517	C59 C63 C61	50 25 25	Direct IO: IONIAN-SSGA. MD1 register error.
401-518	C59 C63 C61	50 25 25	Direct IO: IONIAN-SSGA. XIVR6 init value.
401-519	C59 C63 C61	50 25 25	Direct IO: IONIAN-SSGA. DSIER init value.
401-520	C59	100	Direct IO: IONIAN register access error.
401-521	C59 C61	80 20	Direct IO: SSGA POS register error.
401-522	C59 C61	80 20	Direct IO: SSGA interrupt register error.
401-523	C59 C90 MCA adapters	25 25 50	Direct IO: IONIAN-SSGA.IER register error on Base Unit.
401-524	C59 C90 MCA adapters	25 25 50	Direct IO: IONIAN-SSGA.IER register error on Base Unit.
401-530	C59 C61	80 20	Direct IO: NVRAM data lines access error.
401-531	C59 C61	80 20	Direct IO: NVRAM address lines access error. Walking 1 phase.
401-532	C59 C61	80 20	Direct IO: NVRAM address lines access error. Walking 0 phase.
401-540	C59 C61	80 20	Direct IO: Super IO UART1 access error.
401-541	C59 C61	80 20	Direct IO: Super IO UART2 access error.
401-542	C59 C61	80 20	Direct IO: 16550 UART access error.
401-543	C59 C61	80 20	Direct IO: Floppy disk access error.

Table A-1 (Page 6 of 11). 604 /604e High Node firmware error codes (401–XXX errors)			
Error Number	**Failing Function Codes**	**Failure Percent (%)**	**Description**
401-544	C59 C61	80 20	Direct IO: BPP register access error.
401-550	C59 C61 C90 C91	60 20 10 10	Direct IO: Flash EPROM access error.
401-560	C59 C61	80 20	Direct IO: EPROM access error.
401-570	C59 C61	80 20	Direct IO: TOD imbedded RAM access error.
401-571	C59 C61	80 20	Direct IO: TOD registers access error.
401-58A	C59 C90 MCA adapters	25 25 50	Direct IO: IONIAN2. IER register error on Expansion Unit.
401-58B	C59 C90 MCA adapters	25 25 50	Direct IO: IONIAN2. IER register error on Expansion Unit.
401-580	C59 C63 C61	50 25 25	Direct IO: IONIAN2. TCE register error.
401-581	C59 C63 C61	50 25 25	Direct IO: IONIAN2. MAP register error.
401-582	C59 C63 C61	50 25 25	Direct IO: IONIAN2. CONFIGURATION register error.
401-583	C59 C63 C61	50 25 25	Direct IO: IONIAN2. PERSONALIZE register error.
401-584	C59 C63 C61	50 25 25	Direct IO: IONIAN2. DSC register error.
401-585	C59 C63 C61	50 25 25	Direct IO: IONIAN2. CSR register error.
401-586	C59 C63 C61	50 25 25	Direct IO: IONIaN2. BSR init value.
401-587	C59 C63 C61	50 25 25	Direct IO: IONIAN2. MD0 init value.
401-588	C59 C63 C61	50 25 25	Direct IO: IONIAN2. MD1 init value.

Table A-1 (Page 7 of 11). 604 /604e High Node firmware error codes (401–XXX errors)

Error Number	Failing Function Codes	Failure Percent (%)	Description
401-589	C59 C63 C61	50 25 25	Direct IO: IONIAN2. Not present.
401-590	C59 C63 C61	50 25 25	Diskette drive access. Error on lock command.
401-591	C59 C63 C61	50 25 25	Diskette drive access. Error on sense interrupt command.
401-592	C59 C63 C61	50 25 25	Diskette drive access. Error on write command.
401-593	C59 C63 C61	50 25 25	Diskette drive access. Error on read command.
401-594	C59 C63 C61	50 25 25	Diskette drive access. Buffer exchange error.
401-595	C59 C63 C61	50 25 25	Diskette drive access. Time-out error.
401-800	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. POS3 register error.
401-801	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. POS4 register error.
401-802	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. POS2 register error.
401-803	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. NCR SCRATCH A register error.
401-804	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. SCSI Bus control lines error.

Table A-1 (Page 8 of 11). 604 /604e High Node firmware error codes (401–XXX errors)			
Error Number	**Failing Function Codes**	**Failure Percent (%)**	**Description**
401-805	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. Missing ACK signal error.
401-806	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. Pending ACK signal error.
401-807	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. Missing DMA interrupt error during transfer.
401-808	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. DMA status error.
401-809	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. Missing DMA interrupt error after transfer.
401-810	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. DFE or SSI signal not asserted.
401-811	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. Buffer exchange error.
401-812	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. LSA board not responding.
401-820	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. POS3 register error.
401-821	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. POS4 register error.

Table A-1 (Page 9 of 11). 604 /604e High Node firmware error codes (401–XXX errors)

Error Number	Failing Function Codes	Failure Percent (%)	Description
401-822	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. POS2 register error.
401-823	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. NCR SCRATCH A register error.
401-824	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. SCSI Byus control lines error.
401-825	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. Missing ACK signal error.
401-826	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. Pending ACK signal error.
401-827	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. Missing DMA interrupt error during transfer.
401-828	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. DMA status error.
401-829	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. Missing DMA interrupt after transfer.
401-830	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. DFE or SSI signal not asserted.
401-831	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. Buffer exchange error.

Table A-1 (Page 10 of 11). 604 /604e High Node firmware error codes (401–XXX errors)			
Error Number	**Failing Function Codes**	**Failure Percent (%)**	**Description**
401-832	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. LSA board not responding.
401-840	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. POS3 register error.
401-841	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. POS4 register error.
401-842	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. POS2 register error.
401-843	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. NCR SCRATCH A register error.
401-844	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. SCSI Bus control lines error.
401-845	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. Missing ACK signal error.
401-846	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. Pending ACK signal error.
401-847	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. Missing DMA interrupt error during transfer.
401-848	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. DMA status error.

Table A-1 (Page 11 of 11). 604 /604e High Node firmware error codes (401–XXX errors)

Error Number	Failing Function Codes	Failure Percent (%)	Description
401-849	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. Missing DMA interrupt after transfer.
401-850	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. DFE or SSI signal not asserted.
401-851	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. Buffer exchange error.
401-852	LSA C59 C90 C61 C63	40 20 20 10 10	Channel reset and POS. LSA board not responding.

Table A-2 (Page 1 of 3). 604 /604e High Node firmware error codes (402–XXX errors)

Error Number	Failing Function Codes	Failure Percent (%)	Description
402-000	C63	100	CPU processor error.
402-010	C63	100	Main memory addressing mechanism error.
402-011	C63	100	Main memory addressing mechanism. Bat translation error.
402-012	C63	100	Main memory addressing mechanism. Swap context PTE1 error.
402-013	C63	100	Main memory addressing mechanism. Swap context PTE2 error.
402-020	C63	100	Level 1 cache. HID0.31 value error.
402-030	C63	100	Level 2 cache. Accessibility test error.
402-031	C63	100	Level 2 cache. Data test error.
402-032	C63	100	Level 2 cache. TAG test error.
402-033	C63	100	Level 2 cache. Interrupt error.
402-040	C62 C63 C65	100 100 100	EEPROM compatibility error.
402-100	C63 C61	50 50	Atomic instructions error. Memory reservation by slave processor lack.
402-101	C63 C61	50 50	Atomic instructions error. Memory reservation by master processor lack.
402-102	C63 C61	50 50	Atomic instructions error. Comparison error.

Table A-2 (Page 2 of 3). 604 /604e High Node firmware error codes (402–XXX errors)

Error Number	Failing Function Codes	Failure Percent (%)	Description
402-103	C62 C63 C65	100 100 100	Atomic instructions error. Swap mechanism not available.
402-110	C63 C61	50 50	Caches coherencies. Concurrent coherent write accesses error.
402-111	C63 C61	50 50	Caches coherencies. Concurrent not coherent write accesses error.
402-112	C63 C61	50 50	Caches coherencies. DCBST from line owner error.
402-113	C63 C61	50 50	Caches coherencies. DCBF from line owner error.
402-114	C63 C61	50 50	Caches coherencies. DCBI from line owner error (Ph.1).
402-115	C63 C61	50 50	Caches coherencies. DCBI from line owner error (Ph.2).
402-116	C63 C61	50 50	Paradox detection. DCBST not from line owner.
402-117	C63 C61	50 50	Paradox detection. DCBF not from line owner.
402-118	C63 C61	50 50	Paradox detection. DCBI not from line owner (ph.1)..
402-119	C63 C61	50 50	Paradox detection. DCBT not from line owner (Ph.2)..
402-120	C63 C61	50 50	Caches coherencies. Test aborted by one CPU.
402-121	C63 C61	50 50	Caches coherencies. CPUs dialogue Time Out.
402-130	C63 C61	50 50	DCB ports arbitration error. Memory not updated error.
402-131	C63 C61	50 50	DCB ports arbitration error. Caches coherency or global memory coherency error.
402-132	C63 C61	50 50	DCB ports arbitration error. Memory coherency error.
402-133	C63 C61	50 50	DCB ports arbitration error. Odd processor DCBF or even processor read error.
402-134	C63 C61	50 50	DCB ports arbitration error. Cache write/read error.
402-135	C63 C61	50 50	DCB ports arbitration error. Test aborted by one CPU error.
402-136	C63 C61	50 50	DCB ports arbitration error. CPUs dialog time out.
402-140	C63 C61	50 50	System IO sharing. NVRAM access error.

Table A-2 (Page 3 of 3). 604 /604e High Node firmware error codes (402–XXX errors)

Error Number	Failing Function Codes	Failure Percent (%)	Description
402-150	C63 C61	50 50	Main memory sharing error. MM access error.
402-160	C63 C61	50 50	Multi-resource sharing error. NVRAM access error.
402-161	C63 C61	50 50	Multi-resource sharing error. MM access error.
402-170	C63 C61	50 50	Multi-processor Full. Private counter error.
402-171	C63 C61	50 50	Multi-processor Full. Shared counter error.
402-172	C63 C61	50 50	Multi-processor Full. Lock mechanism error.
402-173	C63 C61	50 50	Multi-processor FullReservation instruction error.
402-174	C63 C61	50 50	Multi-processor Full. Link coherency error.
402-500	C59 C61	50 25 25	BUMP to CPUs interrupt error.
402-510	C59 C61	50 25 25	CPUs to BUMP interrupt error.
402-520	C59 C61	50 25 25	UART to CPUs interrupt error.
402-530	C59 C61	50 25 25	CPUs to CPUs interrupt error. Even processors auto interrupt.
402-531	C59 C61	50 25 25	CPUs to CPUs interrupt error. Odd processors auto interrupt.
402-532	C59 C61	50 25 25	CPUs to CPUs interrupt error. Even to Odd processors interrupt.
402-533	C59 C61	50 25 25	CPUs to CPUs interrupt error. Odd to Even processors interrupt.
402-540	C59	100	TOD to BUMP interrupt error.
402-550	C59	100	Internal interrupt management error.
402-560	C59	100	System error interrupt management.

Table A-3 (Page 1 of 6). 604 /604e High Node firmware error codes (403–XXX errors)

Error Number	Failing Function Codes	Failure Percent (%)	Description
403-000	B94 C61 C63	40 30 30	Main Memory data lines accessibility error. Write all 0 and 1 error.
403-001	B94 C61 C63	40 30 30	Main Memory data lines accessibility error. CPU bus error, walking 1 among 0.
403-002	B94 C61 C63	40 30 30	Main Memory data lines accessibility error. Main memory bus error, walking 1 among 0.
403-003	C61 C63 C61	40 30 30	Main Memory data lines accessibility error. CPU bus error, walking 0 among 1.
403-004	B94 C61 C63	40 30 30	Main Memory data lines accessibility error. Main memory bus error, walking 0 among 1.
403-005	B94 C61 C63	40 30 30	1, 2 ... 8 bytes bus transfer error.
403-010	B94 C61 C63	40 30 30	Main Memory address lines accessibility error. Write all 0 and 1 error.
403-011	B94 C61 C63	40 30 30	Main Memory address lines accessibility error. Walking 1 among 0 error.
403-012	B94 C61 C63	40 30 30	Main Memory address lines accessibility error. Walking 0 among 1 error.
403-013	B94 C61 C63	40 30 30	Main Memory address lines accessibility error. Unexpected interrupt.
403-020	B94 C61 C63	40 30 30	Main Memory board address accessibility error. Write all 0 and 1 error.
403-021	B94 C61 C63	40 30 30	Main Memory board address accessibility error. Board Nb i. 1x decoding error.
403-022	B94 C61 C63	40 30 30	Main Memory board address accessibility error. Data storage interrupt error.
403-030	B94 C61 C63	40 30 30	Main Memory basic tests error. Byte write error.
403-031	B94 C61 C63	40 30 30	Main Memory basic tests error. Aligned half-word write error.

Table A-3 (Page 2 of 6). 604 /604e High Node firmware error codes (403–XXX errors)

Error Number	Failing Function Codes	Failure Percent (%)	Description
403-032	B94 C61 C63	40 30 30	Main Memory basic tests error. Unaligned half-word write error.
403-033	B94 C61 C63	40 30 30	Main Memory basic tests error. Aligned word write error.
403-034	B94 C61 C63	40 30 30	Main Memory basic tests error. Unaligned word write error.
403-035	B94 C61 C63	40 30 30	Main Memory basic tests error. Aligned double-word write error. (floating double)
403-036	B94 C61 C63	40 30 30	Main Memory basic tests error. Aligned double-word write error. (floating simple)
403-037	B94 C61 C63	40 30 30	Main Memory basic tests error. Unaligned double-word write error. (floating double)
403-038	B94 C61 C63	40 30 30	Main Memory basic tests error. Work mode main memory addressing error.
403-039	B94 C61 C63	40 30 30	Main Memory basic tests error. Aligned multi-store error.
403-040	B94 C61 C63	40 30 30	Main Memory basic tests error. Aligned multi-load error.
403-041	B94 C61 C63	40 30 30	Main Memory basic tests error. Unaligned multi-store or multi-load error.
403-050	B94 B96 or B97	50 50	Main Memory components error. Address into address test error.
403-051	B94 B96 or B97	50 50	Main Memory components error. Invert address into address test error.
403-052	B94 B96 or B97	50 50	Main Memory components error. Bitmap elaboration mode warnings.
403-060	B94 B96 or B97	50 50	Main Memory ECC components check error. Address into address test error.
403-061	B94 B96 or B97	50 50	Main Memory ECC components check error. Invert address into address test error.

Table A-3 (Page 3 of 6). 604 /604e High Node firmware error codes (403–XXX errors)

Error Number	Failing Function Codes	Failure Percent (%)	Description
403-062	B94 B96 or B97	50 50	Main Memory ECC components check error. Bitmap elaboration mode ECC warnings.
403-070	B94 B96 or B97	50 50	Error correction code mechanism. Syndrome generation error.
403-071	B94 B96 or B97	50 50	Error correction code mechanism. BUMP time out.
403-072	B94 B96 or B97	50 50	Error correction code mechanism. CPU time out.
403-073	B94 B96 or B97	50 50	Error correction code mechanism. Single Error generation error.
403-074	B94 B96 or B97	50 50	Error correction code mechanism. Multiple Error generation error.
403-075	B94 C64 D28 B96 B97 D33	50 50 50 50 50 50	DCB or SMC error. Multiple Error generation error.
403-080	B94 B96 or B97	50 50	Main memory refresh mechanism. Main memory read error.
403-081	B94 B96 or B97	50 50	Main memory refresh mechanism. Main memory refresh error.
403-090	B94 B96 or B97	50 50	Main memory full test. Phase number i error.
403-100	B48 C61 C62 C63 C65	40 30 30 30 30	ECC Data lines accessibility error. Write all 0 and 1 error.
403-101	B48 C61 C62 C63 C65	40 30 30 30 30	ECC Data lines accessibility error. Walking 1 among 0 error.
403-102	B48 C61 C62 C63 C65	40 30 30 30 30	ECC Data lines accessibility error. Walking 0 among 1 error.

Table A-3 (Page 4 of 6). 604 /604e High Node firmware error codes (403–XXX errors)

Error Number	Failing Function Codes	Failure Percent (%)	Description
403-103	B48 C61 C62 C63 C65	40 30 30 30 30	ECC Data lines accessibility error. RAM bus error.
403-500	C59 C61 C63	50 25 25	BUMP to CPU interrupt error. IOD-HW-STS error, bit i#1.
403-501	C59 C61 C63	50 25 25	BUMP to CPU interrupt error. IOD-HW-STS error, bit i#0.
403-502	C59 C61 C63	50 25 25	BUMP to CPU interrupt error. CPU error.
403-505	C59 C61 C63	50 25 25	BUMP to CPU interrupt error. MIR register error.
403-506	C59 C61 C63	50 25 25	BUMP to CPU interrupt error. IOD-HW-STS register error.
403-507	C59 C61 C63	50 25 25	BUMP to CPU interrupt error. IRR register error.
403-508	C59 C61 C63	50 25 25	BUMP to CPU interrupt error. No external interrupt.
403-509	C59 C61 C63	50 25 25	BUMP to CPU interrupt error. External interrupt return error.
403-510	C59 C61 C63	50 25 25	BUMP to CPU interrupt error. Target processor error.
403-511	C59 169 C62 C63	50 25 25 25	BUMP to CPU interrupt error. Not responding BUMP error.
403-512	C59 C61 C63	50 25 25	BUMP to CPU interrupt error. IRR4 register error.
403-513	C59 C61 C63	50 25 25	BUMP to CPU interrupt error. IOD-HW-STS register error.
403-514	C59 C61 C63	50 25 25	BUMP to CPU interrupt error. XIRR0 register error.

Table A-3 (Page 5 of 6). 604 /604e High Node firmware error codes (403–XXX errors)

Error Number	Failing Function Codes	Failure Percent (%)	Description
403-515	C59 C61 C63	50 25 25	BUMP to CPU interrupt error. XIRR4 register error.
403-516	C59 C61 C63	50 25 25	BUMP to CPU interrupt error. IRR register error.
403-520	C59 C61 C63	50 25 25	CPU to BUMP interrupt. IOD-HW-STS register error, bit i#1.
403-521	C59 C61 C63	50 25 25	CPU to BUMP interrupt. IOD-HW-STS register error, bit i#0.
403-522	C59 C61 C63	50 25 25	CPU to BUMP interrupt. CPU not responding.
403-523	C59 C61 C62 C63 C65	50 25 25 25 25	CPU to BUMP interrupt. No External interrupt.
403-525	C59 C61 C63	50 25 25	CPU to BUMP interrupt. IOD-HW-STS register error.
403-527	C59 C61 C63	50 25 25	CPU to BUMP interrupt. XIRR4 register error.
403-528	C59 C61 C63	50 25 25	CPU to BUMP interrupt. IOD-HW-STS register error.
403-529	C59 C61 C63	50 25 25	CPU to BUMP interrupt. XIRR0 register error.
403-530	C59 C61 C63	50 25 25	CPU to BUMP interrupt. XIRR4 register error.
403-531	C59 C61 C63	50 25 25	CPU to BUMP interrupt.. IRR register error.
403-540	C59 C61 C63	50 25 25	UART to CPU interrupt. IRR register error, bit i#1.
403-541	C59 C61 C63	50 25 25	UART to CPU interrupt. IRR register error, bit i#0.
403-542	C59 C61 C63	50 25 25	UART to CPU interrupt. No external interrupt.

Table A-3 (Page 6 of 6). 604 /604e High Node firmware error codes (403–XXX errors)

Error Number	Failing Function Codes	Failure Percent (%)	Description
403-543	C59 C61 C63	50 25 25	UART to CPU interrupt. External interrupt return error.
403-544	not available resource		UART to CPU interrupt. Target processor error.
403-545	C59 C61 C63	50 25 25	UART to CPU interrupt. XIRR4 register error.
403-546	C59 C61 C63	50 25 25	UART to CPU interrupt. IRR register error.
403-550	C59 C61 C63	50 25 25	CPU to CPU interrupt. MFRR register error.
403-551	C59 C61 C63	50 25 25	CPU to CPU interrupt. External interrupt return error.
403-552	C59 C61 C63	50 25 25	CPU to CPU interrupt. No external interrupt.
403-553	C59 C61 C63	50 25 25	CPU to CPU interrupt. Target processor error.
403-555	C59 C61 C63	50 25 25	CPU to CPU interrupt. XIRR register error.
403-560	C59 C61 C63	50 25 25	TOD to BUMP interrupt. Unexpected interrupt error.
403-561	C59 C61 C63	50 25 25	TOD to BUMP interrupt. No trap interrupt.
403-563	C59 C61 C62 C63 C65	50 25 25 25 25	TOD to BUMP interrupt. MSR register error. BUMP interrupt management.
403-565			MCA to CPU interrupt. All slots plugged with MCA boards.
403-566	909	100	MCA to CPU interrupt. LSA board not responding. No interrupt on a PIO STORE with buid # on slot #.
403-567	909	100	MCA to CPU interrupt. LSA board not responding. No interrupt on a PIO STORE with buid # on slot #.

Table A-4. 604 /604e High Node firmware error codes (404–XXX errors)

Error Number	Failing Function Codes	Failure Percent (%)	Description
404-000	C63 C61	80 20	Atomic instructions error.
404-010	C63 C61	80 20	Caches coherencies. Concurrent coherent write accesses error.
404-011	C63 C61	80 20	Caches coherencies. Concurrent not coherent write accesses error.
404-012	C63 C61	80 20	Caches coherencies. DCBST from line owner error.
404-013	C63 C61	80 20	Caches coherencies. DCBF from line owner error.
404-014	C63 C61	80 20	Caches coherencies. ConcurrDCBI from line owner error.
404-015	C63 C61	80 20	Caches coherencies. Concurrent not coherent write accesses error.
404-016	C63 C61	80 20	Caches coherencies. DCBST not from line owner error.
404-017	C63 C61	80 20	Caches coherencies. DCBF not from line owner error.
404-018	C63 C61	80 20	Caches coherencies. DCBI not from line owner error.
404-019	C63 C61	80 20	Caches coherencies. DCBT not from line owner error.
404-020	C63 C61	80 20	DCB arbitration mechanism error.
404-030	C63 C61	80 20	TLB mechanism error.
404-040	C63 C61	80 20	Direct IO sharing error.
404-050	C63 B96 or B97 C61	50 30 20	Main memory sharing error.
404-060	C63 C61 C59 B96 or B97	30 30 20 20	Multi-resources sharing error.

Table A-5 (Page 1 of 3). 604 /604e High Node firmware error codes (407–XXX errors)

Error Number	Failing Function Codes	Failure Percent (%)	Description
407-000	C59 C61 C63	40 30 30	No active processor.

Table A-5 (Page 2 of 3). 604 /604e High Node firmware error codes (407–XXX errors)

Error Number	Failing Function Codes	Failure Percent (%)	Description
407-001	C59 C61 C63	40 30 30	BUMP and one processor active.
407-002	C59 C61 C63	40 30 30	More than one active processor for a mono-processor test.
407-003	C59 C61 C63	40 30 30	Un-coherent test parameters.
407-004	C59 C61 C63	40 30 30	ÁGx. Tx test: not defined.
407-011	C59 C61 C63	40 30 30	General test manager launching T-O.
407-012	C59 C61 C62 C63 C65	40 30 30 30 30	CPU/LSA test manager launching T-O.
407-013	C59 C61 C62 C63 C65	40 30 30 30 30	CPU/LSA test manager stopping T-O.
407-014	C59 C61 C63	40 30 30	CPU interrupt test manager launching T-O.
407-015	C59 C61 C63	40 30 30	CPU interrupt test manager stopping T-O.
407-016	C59 C61 C63	40 30 30	CPU multi-processor test manager launching T-O.
407-017	C59 C61 C63	40 30 30	CPU imulti-processor test manager stopping T-O.
407-018	C59 C61 C62 C63 C65	40 30 30 30 30	CPU test performing T-O.
407-019	C59 C61 C63	40 30 30	Operator test abort.

Table A-5 (Page 3 of 3). 604 /604e High Node firmware error codes (407–XXX errors)			
Error Number	**Failing Function Codes**	**Failure Percent (%)**	**Description**
407-020	C59 C61 C62 C63 C65	40 30 30 30 30	Checkstop error.
407-021	C59 C61 C62 C63 C65	40 30 30 30 30	Checkstop error, reset failing.
407-022	B48 C59 C61	60 20 20	Single error.
407-023	C59 C61 C62 C63 C65	40 30 30 30 30	CPU-NVRAM dialogue not OK.
407-024	C59 C61 C62 C63 C65	40 30 30 30 30	CPUi launching not OK.
407-030			Not defined parameter.

Table A-6. 604 /604e High Node firmware error codes (408–XXX errors)			
Error Number	**Failing Function Codes**	**Failure Percent (%)**	**Description**
408-000	C59 C60 C61 C63	60 20 10 10	Floppy disk peripheral accesses error.
408-060	B94 B96 or B97	50 50	Main memory Knaizuk-Hartmann test error.
408-080	C63 C61	90 10	Multi-resources full test error.

Table A-7 (Page 1 of 3). 604 /604e High Node firmware error codes (409–XXX errors)			
Error Number	**Failing Function Codes**	**Failure Percent (%)**	**Description**
409-000		100	Planar vital part FATAL ERROR.
409-008	B94 or C64 or D28	100	No 2MB available in MM. All memory banks FATAL ERROR.

Table A-7 (Page 2 of 3). 604 /604e High Node firmware error codes (409–XXX errors)

Error Number	Failing Function Codes	Failure Percent (%)	Description
409-050	None	None	This is not an error. This code indicates a change in configuration, that NV-RAM has been reset, etc. No parts should be replaced for this code.
409-051	None	None	This is not an error. This code indicates a change in configuration, that NV-RAM has been reset, etc. No parts should be replaced for this code.
409-052 T1 x	Firmware	100	-12 stand-by VOLT error. **x** is the unit number.
409-052 T2 x	Firmware	100	+12 stand-by VOLT error. **x** is the unit number.
409-053 T1 x	Firmware	100	485RX protocol error (lengths). **x** is the unit number.
409-053 T2 x	Firmware	100	485RX protocol error (time-out). **x** is the unit number.
409-053 T3 x	Firmware	100	485RX protocol error (checksum error). **x** is the unit number.
409-054 T1	Firmware	100	Marginature error (ASIC VOLT)
409-054 T2	Firmware	100	Marginature error (CPU VOLT)
409-054 T3 x	Firmware	100	Marginature error (+5 VOLT). **x** is the unit number.
409-055 T1	Firmware	100	VPD command error (read VPD).
409-055 T2	Firmware	100	VPD command error (write VPD).
409-056	Firmware	100	Marginature command error.
409-057	Firmware	100	Checksum logging not valid.
409-058	Firmware	100	Environment over temperature.
409-059 T1	Firmware	100	I2C bus error (wrong interrupt frame).
409-059 T2 x	Firmware	100	I2C bus error (unknown SIB interrupt). **x** is the unit number.
409-059 T3 x	Firmware	100	I2C bus error (unknown interrupt source). **x** is the unit number.
409-059 T4 x	Firmware	100	I2C bus error (unknown operator panel interrupt). **x** is the unit number.
409-080	C59 C60 C88 or C89	33 33 33	BUMP access to OPP or OPP access to SIF failed.
409-081	C59 C88 or C89	50 50	BUMP access to SIF failed.
409-082	C59 C60	80 20	Operator panel cannot access the BUMP. **Note:** This problem can be caused by an incorrectly installed CEC.
409-083	C60	100	OP microcontroller not working.
409-087	C63	100	MvRnot compatible with the CPU boards.
409-088	C63	100	Different cycle time between the present CPU boards.
409-089	C63	100	Different cycle time between CPU boards and MPB.
409-090	C88 or C89	100	No SIF reply on power-on command.
409-091	C88 or C89	100	SIF failure status on power-on command.
409-092	C59	100	No valid Flash EPROM/EPROM.
409-093	D19	100	MVR fan failed.

Table A-7 (Page 3 of 3). 604 /604e High Node firmware error codes (409–XXX errors)			
Error Number	**Failing Function Codes**	**Failure Percent (%)**	**Description**
409-094	D16	100	CPU fan failed.
409-095		100	Disk fan failed.
409-096	D17	100	MCA fan failed.
409-097	C92	100	Power supply failed.
409-098	152	100	Power supply hot. Go to "604 or 604e High Node minimum configuration (MAP 0280)" on page 1-23.
409-Axy	152	100	Power supply internal failure. Go to "604 or 604e High Node minimum configuration (MAP 0280)" on page 1-23.
F/W FATAL ERROR	Firmware	100	Firmware Panic: System restart from PON.

Power/keylock status register (PKSR)

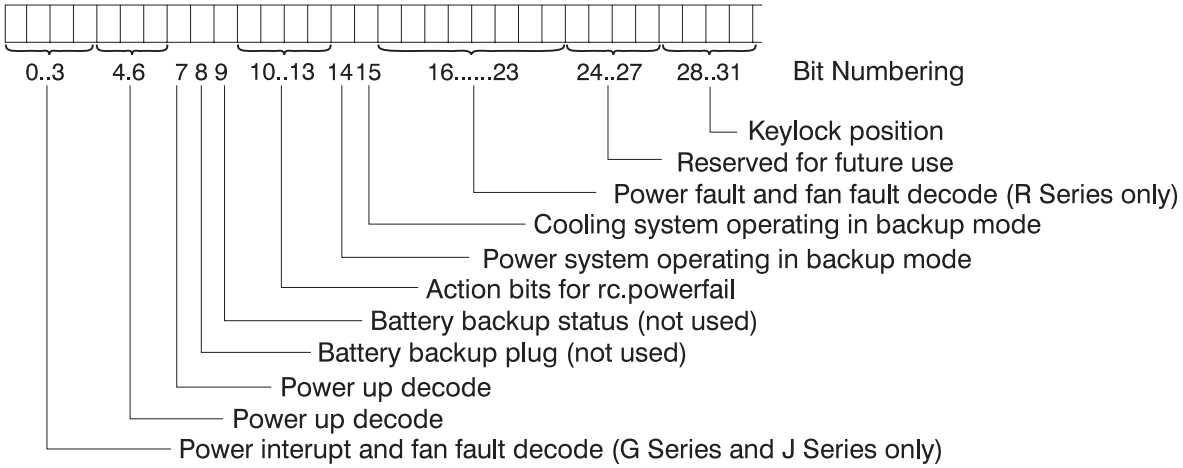
When a failure occurs on a fan or on a power supply, the system produces a logging report for this event. The logging report can be viewed using **errpt**.

An errpt report about power and fan is the following:

```
LABEL:                EPOW_SUS
Description:          LOSS OF ELECTRICAL POWER
Probable Causes:      POWER SUBSYSTEM
                      INTERNAL POWER UNIT
Failure Causes:       POWER SUBSYSTEM
RECOMMENDED ACTIONS:  CHECK POWER
POWER STATUS REGISTER:  9005 0007
```

The Power/Keylock Status Register has the following format:

PKSR Layout



Understanding PKSR

The PKSR status is logged in hexadecimal value: 8 digits are logged. Each hexadecimal digit must be converted in 4 binary digits: 32 bits are obtained. Divide the bits as indicated in the PKSR layout and check the bit values to understand the meaning of the register.

Example: Suppose you receive an error message whose PKSR content in hex is:

```
9005 007
```

converted to binary:

```
1001 000 0 0 0 0001 0 1 00000000 0000 0111
0  3 4 6 7 8 9 10 13    16    23 24   28 31 = Bit Numbering
```

This means that the following events occurred:

- fan 1 fault
- a warning cooling message is displayed on the console
- the cooling system is operating in backup mode
- the key is in normal position.

PKSR values

Power interrupt and fan fault (G Series and J Series only)

Bits 0-3 Values	Description
0000	No Interrupt
0001	Running on battery
0010	Programmed Power Off
0011	Manual switch off
0100	Remote power off
0101	Over temperature level 1
0110	Internal power supply failure
0111	Power supply overload
1000	Loss of Primary power (EPOW)
1001	Fan 1 fault
1010	Fan 2 fault
1011	Fan 3 fault
1100	Fan 4 fault
1100	Fan 5 fault
1100	Fan 6 fault
1111	Reserved

Power up

Bits 4-6 Values	Description
000	Manual On button pushed
001	Remote On signal from external
010	Timed power on from TOD clock
011	Remote on signal from power control interface
100	Automatic restart

Power up

Bit 7 Values	Description
0	No thermal warning
1	Thermal warning

Battery status

Bit 8 Values	Description
0	Backup battery not installed
1	Backup battery installed

Battery status

Bit 9 Values	Description
0	Backup battery OK (if installed)
1	Backup battery discharged or failing

Power interrupt (action for rc.powerfail)

Bits 10-13 Values	Description
0000	No action
0001	WARN_COOLING no reaction
0010	WARN_POWER error logging
0011	Severe cooling problem, SLOW_SHUTDOWN 10 minutes to shutdown
0100	Very severe cooling problem, FAST_SHUTDOWN 20 sec to shutdown
0101	IMMED_SHUTDOWN immediate power down

Power system operating in backup mode

Bit 14 Values	Description
0	No power warning
1	Power system operating in backup mode warning

Cooling system operating in backup mode

Bit 15 Values	Description
0	No cooling warning
1	Cooling system operating in backup mode warning

Power fault and fan fault (R30, R40, and R50)

Bits 16-23 Values	Description
00000000	No Interrupt
00000001	Over temperature level 1 on power supply #1
00000010	Over temperature level 2 on power supply #1
00000011	Internal power supply failure on power supply #1
00000100	Power supply #1 overload
00000101	Loss of primary power on power supply #1
00000110	Over temperature level 1 on power supply #2
00000111	Over temperature level 2 on power supply #2
00001000	Internal power supply failure on power supply #2
00001001	Power supply #2 overload
00001010	Loss of primary power on power supply #2
00010000	Fan 1 fault
00100000	Fan 2 fault
00110000	Fan 3 fault
01000000	Fan 4 fault
01010000	Fan 5 fault
01100000	Fan 6 fault
01110000	Fan 7 fault
10000000	Fan 8 fault
10010000	Fan 9 fault
10100000	Fan 10 fault

Keylock position

Bits 28-31 Values	Description
0101	Secure
0110	Service
0111	Normal

Notices

This information was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area.

References in this publication to IBM products, programs, or services do not imply that IBM intends to make these available in all countries in which IBM operates. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
U.S.A

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law: INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Trademarks

The following terms are trademarks of the International Business Machines Corporation in the United States or other countries or both:

AIX
ESCON
IBM
IBMLink
LoadLeveler
Micro Channel
POWERparallel
POWERserver
POWERstation
RS/6000
RS/6000 Scalable POWERparallel Systems
Scalable POWERparallel Systems
SP

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States and other countries.

UNIX is a registered trademark in the United States and other countries licensed exclusively through X/Open Company Limited.

Adobe, Acrobat, Acrobat Reader, and PostScript are trademarks of Adobe Systems, Incorporated.

Netscape is a registered trademark of Netscape Communications Corporation in the United States and other countries.

Other company, product and service names may be the trademarks or service marks of others.

Electronic emissions notices

Federal Communications Commission (FCC) statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

European Union (EU) statement

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. The manufacturer cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of option cards supplied by third parties. Consult with your dealer or sales representative for details on your specific hardware.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22 / European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

United Kingdom telecommunications safety requirements

Notice to customers: This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connection to public telecommunications systems in the United Kingdom.

Industry Canada compliance statement

This Class A digital apparatus meets the requirements of the Canadien Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

For installations in Japan:

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

The following is a summary of the VCCI Japanese statement in the box above. This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

Electromagnetic interference (EMI) statement - Taiwan

警告使用者:

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

The following is a summary of the EMI Taiwan statement above.

Warning: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user will be required to take adequate measures.

Radio protection for Germany

Dieses Gerät ist berechtigt in Übereinstimmung mit Dem deutschen EMVG vom 9.Nov.92 das EG–Konformitätszeichen zu führen.

Der Aussteller der Konformitätserklärung ist die IBM Germany.

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse A. Für diese von Geräten gilt folgende Bestimmung nach dem EMVG:

Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministers für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind.

(Auszug aus dem EMVG vom 9.Nov.92, Para.3, Abs.4)

Hinweis

Dieses Genehmigungsverfahren ist von der Deutschen Bundespost noch nicht veröffentlicht worden.

Index

Special Characters

Numerics

A

B

C

D

E

F

H

I

K

L

M

N

P

R

S

T

U

V

W

Part Number Index

Part Number	Asm–Index	Page
93H8599	9–8	5-19
94H0616	3–17	5-7

Communicating Your Comments to IBM

RS/6000 SP
604 and 604e SMP
High Node
Service Guide

Publication No. GA22-7446-00

If you especially like or dislike anything about this book, please use one of the methods listed below to send your comments to IBM. Whichever method you choose, make sure you send your name, address, and telephone number if you would like a reply.

Feel free to comment on specific errors or omissions, accuracy, organization, subject matter, or completeness of this book. However, the comments you send should pertain to only the information in this manual and the way in which the information is presented. To request additional publications, or to ask questions or make comments about the functions of IBM products or systems, you should talk to your IBM representative or to your IBM authorized remarketer.

When you send comments to IBM, you grant IBM a nonexclusive right to use or distribute your comments in any way it believes appropriate without incurring any obligation to you.

If you are mailing a reader's comment form (RCF) from a country other than the United States, you can give the RCF to the local IBM branch office or IBM representative for postage-paid mailing.

- If you prefer to send comments by mail, use the RCF at the back of this book.
- If you prefer to send comments by FAX, use this number:
  - FAX: (International Access Code)+1+914+432-9405
- If you prefer to send comments electronically, use one of these network IDs:
  - IBM Mail Exchange: USIB6TC9 at IBMMAIL
  - Internet e-mail: mhvrcfs@us.ibm.com

Make sure to include the following in your note:

- Title and publication number of this book
- Page number or topic to which your comment applies

Optionally, if you include your telephone number, we will be able to respond to your comments by phone.

Reader's Comments — We'd Like to Hear from You

RS/6000 SP
604 and 604e SMP
High Node
Service Guide

Publication No. GA22-7446-00

You may use this form to communicate your comments about this publication, its organization, or subject matter, with the understanding that IBM may use or distribute whatever information you supply in any way it believes appropriate without incurring any obligation to you. Your comments will be sent to the author's department for whatever review and action, if any, are deemed appropriate.

Note: Copies of IBM publications are not stocked at the location to which this form is addressed. Please direct any requests for copies of publications, or for assistance in using your IBM system, to your IBM representative or to the IBM branch office serving your locality.

Today's date: _____

What is your occupation?

Newsletter number of latest Technical Newsletter (if any) concerning this publication:

How did you use this publication?

[ ]	As an introduction	[ ]	As a text (student)
[ ]	As a reference manual	[ ]	As a text (instructor)
[ ]	For another purpose (explain)		

_____

_____

Is there anything you especially like or dislike about the organization, presentation, or writing in this manual? Helpful comments include general usefulness of the book; possible additions, deletions, and clarifications; specific errors and omissions.

Page Number: Comment:

Name	Address
Company or Organization	
Phone No.	

Reader's Comments — We'd Like to Hear from You
GA22-7446-00

Cut or Fold
Along Line

Fold and Tape | **Please do not staple** | Fold and Tape

NO POSTAGE
NECESSARY
IF MAILED IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO. 40 ARMONK, NEW YORK

POSTAGE WILL BE PAID BY ADDRESSEE

IBM Corporation
Department 55JA, Mail Station P384
522 South Road
Poughkeepsie NY 12601-5400

Fold and Tape | **Please do not staple** | Fold and Tape

Cut or Fold
Along Line

Part Number: 12K0236

Printed in the United States of America
on recycled paper containing 10%
recovered post-consumer fiber.