

Numeric Error Codes

Error Code/Explanation	Action
000 SCSI Adapter not enabled.	1. Verify adapter device and Bus Master fields are enabled in the PCI Configuration Program.
08X Check SCSI terminator installation.	1. SCSI Cable 2. SCSI Terminator 3. SCSI Device 4. SCSI Adapter
101 IBM SBC interrupt failure.	1. Processor Card
102 IBM SBC timer error.	1. Processor Card
106	1. IBM processor card
110 IBM SBC memory parity error.	1. Memory Module 2. Processor Card
111 I/O channel parity error.	1. Reseat adapters. 2. Any Adapter 3. Processor Card
114 Adapter ROM error.	1. Adapter Memory 2. Processor Card
129 Internal cache test error.	1. Processor 2. L2 Cache Memory 3. Processor Card
151 Real-time clock failure.	1. Processor Card
161 Bad battery.	1. Run Setup. 2. Battery (see page A-7) 3. Processor Card
162 Configuration mismatch.	1. Run Setup and verify configuration. 2. Device was added, removed, changed location? If not, suspect that device. 3. Power-on external devices first, then power-on the system unit. 4. Battery (see page A-7) 5. Processor Card
162 And unable to run diagnostic.	1. Diskette Drive 2. Processor Card 3. Diskette Drive Cable
163 Clock not updating or invalid time set.	1. Set/check time and date. 2. Battery (see page A-7) 3. Processor Card
164 POST detected a base memory or extended memory size mismatch error.	1. Run Setup and check System Summary menu for memory size change (see "Configuration/Setup Utility Program" on page 8-1). 2. Run the Extended Memory Diagnostic tests (Memory Test Group).
175	1. Processor Card
176	1. Replace covers removed from the system unit.

Error Code/Explanation	Action
177 Corrupted Administrator Password.	1. Processor Card
178	1. Processor Card
183	1. Enter the administrator password.
184 Password removed due to check-sum error.	1. Define new password.
185 Corrupted boot sequence.	1. Set configuration and reinstall the boot sequence.
186	1. Processor Card
189	1. More than three password attempts were made to access the system unit. Power-off and try again.
1XX Not listed previously.	1. Processor Card
201, 20X Memory data error.	1. Memory Module 2. Processor Card
225 Unsupported memory.	1. Replace memory.
229 External cache test error.	1. L2 Cache Memory 2. Processor Card
262 POST detected a base memory or extended memory type error.	1. Run Setup and Check System Summary menu for memory type change (see "Configuration/Setup Utility Program" on page 8-1). 2. Run the Extended Memory Diagnostic tests (Memory test group).
301	1. Keyboard 2. Keyboard Cable 3. Keyboard/Mouse Cable 4. Processor Card
303 With an 8603 error.	1. Mouse 2. Keyboard 3. Keyboard Cable 4. Keyboard/Mouse Cable 5. Processor Card
303 With no 8603 error.	1. Keyboard 2. Keyboard Cable 3. Keyboard/Mouse Cable 4. Processor Card
3XX Not listed previously.	1. Keyboard 2. Keyboard Cable 3. Keyboard/Mouse Cable 4. Processor Card
5XX	1. PMC Video Card 2. Processor Card
601	1. Diskette Drive A 2. Diskette Drive Cable 3. Processor Card
602	1. Diskette 2. Verify Diskette and retry.

Error Code/Explanation	Action
604 And able to run diagnostic.	<ol style="list-style-type: none"> 1. Run Setup and verify diskette configuration settings. 2. Diskette Drive B 3. Diskette Drive Cable 4. Processor Card
604 And unable to run diagnostic.	<ol style="list-style-type: none"> 1. Run Setup and verify diskette configuration settings. 2. Diskette Drive A 3. Diskette Drive Cable 4. Processor Card
605 POST cannot unlock the diskette drive.	<ol style="list-style-type: none"> 1. Diskette Drive 2. Diskette Drive Cable 3. Processor Card
662	<ol style="list-style-type: none"> 1. Diskette drive configuration error or wrong diskette drive type. Run Setup and verify diskette configuration.
6XX Not listed previously.	<ol style="list-style-type: none"> 1. Diskette Drive 2. Processor Card 3. External Drive Adapter 4. Diskette Drive Cable 5. Power Supply
962 Parallel port configuration error.	<ol style="list-style-type: none"> 1. Run Setup and verify parallel port configuration. 2. Parallel Adapter 3. Processor Card
9XX	<ol style="list-style-type: none"> 1. Printer 2. Processor Card
107X Check SCSI terminator installation.	<ol style="list-style-type: none"> 1. Check SCSI terminator installation. 2. SCSI Cable 3. SCSI Terminator 4. SCSI Device 5. SCSI Adapter
1101 Serial connector error or possible processor card failure.	<ol style="list-style-type: none"> 1. Processor Card 2. Any Serial Device
11XX Not listed previously.	<ol style="list-style-type: none"> 1. Processor Card
1692 Boot sequence error.	<ol style="list-style-type: none"> 1. Run FDISK to ensure at least one active partition is set active.
1762 Hard disk drive configuration error.	<ol style="list-style-type: none"> 1. Run Setup and verify hard disk drive configuration (see "Configuration/Setup Utility Program" on page 8-1).
1780 (Disk Drive 0) 1781 (Disk Drive 1) 1782 (Disk Drive 2) 1783 (Disk Drive 3)	<ol style="list-style-type: none"> 1. See "Power Supply" on page 8-13. 2. Hard Disk Drive 3. Processor Card 4. Hard Disk Cable 5. Power Supply

Error Code/Explanation	Action
180X PCI configuration or resource error.	<ol style="list-style-type: none"> 1. Run Setup and verify PCI/ISA configuration settings. 2. If necessary, set ISA adapters to "Not available" to allow PCI adapters to configure properly. 3. Remove any suspected ISA adapters. 4. Rerun diagnostics. 5. PCI Adapter
1962 Boot sequence error.	<ol style="list-style-type: none"> 1. Possible hard disk drive problem (see "Hard Disk Drive Boot Error" on page 8-28).
2401, 2402 If screen colors are OK.	<ol style="list-style-type: none"> 1. PMC Video Card 2. Processor Card 3. Display
2410	<ol style="list-style-type: none"> 1. PMC Video Card 2. Processor Card
2462 PMC video card memory configuration error.	<ol style="list-style-type: none"> 1. Check cable connections. 2. Run Setup and verify video configuration settings. 3. Video Memory Modules 4. PMC Video Card 5. Processor Card
8601, 8602	<ol style="list-style-type: none"> 1. Pointing Device (Mouse) 2. Keyboard/Mouse Cable 3. Processor Card
8603, 8604	<ol style="list-style-type: none"> 1. Processor Card 2. Keyboard/Mouse Cable 3. Pointing Device (Mouse)
86XX Not listed previously.	<ol style="list-style-type: none"> 1. Mouse 2. Keyboard/Mouse Cable 3. Processor Card

Error Messages

Error Message/Symptom	Action
Address Exceeds the Size of Your Memory An invalid memory address was entered. Diagnostic Tests display this message during the Locate Bad Chips option.	1. Enter the correct address. 2. Memory Module 3. Processor Card
Arithmetic Functions Failed An error was detected during the CPU Test.	1. Processor 2. Processor Card
Base Memory Test Failed An error was detected in base memory.	1. Memory Module 2. Processor Card
Boot Sector Unreadable A boot sector read error was detected on the hard disk drive.	1. Hard Disk Drive 2. Hard Disk Drive Cable 3. Hard Disk Drive Adapter 4. Processor Card
Bus Noise Test Failed RAM Test detected an error in the memory bus.	1. Memory Module 2. Processor Card
Butterfly Cylinder Access Test Failed Hard Disk Drive Test detected mismatch between the data read and the data stored on the drive.	1. Hard Disk Drive 2. Hard Disk Drive Cable 3. Hard Disk Drive Adapter 4. Processor Card
Clock Stopped Real-time clock has stopped working.	1. Battery (see page A-7) 2. Processor Card
CMOS Clock Test Failed Time and Date Settings for CMOS and DOS do not Match.	1. Battery (see page A-7) 2. Processor Card
Controller Diagnostic Test Failed An error was detected while testing the Hard Disk Controller (Adapter).	1. Hard Disk Drive Adapter 2. Hard Disk Drive 3. Processor Card
Cylinder 0 errors Test detected an error reading the first cylinder of the hard disk drive.	1. Hard Disk Drive 2. Hard Disk Drive Adapter 3. Processor Card
Device is Not Ready Ready the Device... or Press Any Key	1. Ensure the device is powered-on. 2. Replace failing device. 3. Device Adapter 4. Processor Card
Disk Error Encountered Opening Output File Press Any Key To Continue.	1. Hard Disk Drive 2. Hard Disk Drive Adapter 3. Processor Card
DMA #X Failed Main Components Test detected an error while testing the DMA controller.	1. Processor Card
DMA Page Register Failed DMA page register error	1. Processor Card
Drive (x) Media (y) Mismatch FAT ID mismatch with installed drive.	1. Check diskette and diskette drive capacity. 2. Diskette Drive 3. Processor Card
Error in video buffer. Bad bits. PMC video card memory test error.	1. PMC video card Adapter 2. Processor Card 3. Display

Error Message/Symptom	Action
Exception Interrupt In Protected Mode Diags Cannot Continue Server error, remove one adapter at a time until the symptom goes away.	1. Any Adapter 2. Processor Card 3. Processor
Extended Memory Test Failed Extended memory error.	1. Memory Module 2. Processor Card
Floppy Drive Failed Diskette drive(s) failed.	1. Diskette Drive 2. Processor Card 3. Diskette Drive Cable
General Function Failed Remove one adapter at a time until the symptom goes away.	1. Any Adapter 2. Processor Card 3. Processor
Hard Drives Failed Hard Disk Drive test error.	1. Hard Disk Drive 2. Hard Disk Drive Adapter 3. Processor Card
Incorrect DOS version	1. Ensure you are using DOS version 3.0 or higher.
INT Mask Register Failed INT Mask Register error.	1. Processor 2. Processor Card
Invalid Date Clock/DOS date mismatch.	1. CMOS Backup Battery (see "Safety Notice 4" on page A-7) 2. Processor Card
Invalid Time Clock/DOS time mismatch. Back-up clock and DOS time of day settings do not match.	1. CMOS Backup Battery (see "Safety Notice 4" on page A-7) 2. Processor Card
Linear Cylinder Access Test Failed Hard disk drive error.	1. Hard Disk Drive 2. Hard Disk Drive Cable 3. Hard Disk Drive Adapter 4. Processor Card
Logic Function Failed CPU Logic test error.	1. Processor 2. Processor Card
Loopback Error COM Port Test or Parallel Port error. A wrap plug must be installed to successfully complete these tests.	1. Processor Card 2. Wrap Plug
Main Components Failed processor card error.	1. Processor Card 2. Processor
Memory test cannot run at this location in memory Not enough free memory available to start the memory test.	1. Memory Module 2. Processor Card
Missing QAPIus/PRO Files(s) One or more diagnostic support files are missing.	1. Diagnostic Diskette
NO LOOPBACK PLUG. Skipping External loopback test No wrap plug installed.	1. Install the wrap plug on the serial port; then rerun the test. 2. Internal Serial Cable 3. Processor Card
Not ready Printer not on-line or not ready.	1. Ready Printer 2. Printer 3. Printer Cable 4. Processor Card

Error Message/Symptom	Action
No 'type-amatic' repeat At least one repeat key must be tested during this test or an error will occur. Typematic test error.	1. Keyboard 2. Keyboard/Mouse Cable 3. Processor Card
Not used by any standard device IRQ is not currently being used by a non-standard device.	1. Processor Card
Numeric Proc Failed NPU test error.	1. Processor 2. Processor Card
Parallel Ports Failed Test Report Summary message.	1. Processor Card
Pass (N): ** Errors ** Drive (X) Failed Diskette drive read/write test error.	1. Diskette Drive 2. Processor Card 3. Diskette Drive Cable
Pass (N) Drive Not Ready Diskette drive door is open or defective.	1. Ensure diskette drive is ready. 2. Diskette Drive 3. Processor Card 4. Diskette Drive Cable
Pass (N): Drive (X) Write Protected or Unformatted	1. Insert a non-write protected, formatted diskette into the diskette drive; then rerun the test. 2. Diskette Drive 3. Processor Card 4. Diskette Drive Cable
Pass (N): Unknown Media Drive (X) Diskette Drive Test error.	1. Diskette 2. Diskette Drive 3. Processor Card 4. Diskette Drive Cable
Place Hi-density Media in Drive Media/drive mismatch.	1. Diskette 2. Diskette Drive 3. Processor Card 4. Diskette Drive Cable
Printer Failed Printer powered-on and ready?	1. Printer 2. Printer Cable 3. Processor Card
Printer Fault Printer powered-on and ready?	1. Printer 2. Printer Cable 3. Processor Card
Printer Not Selected Ensure the printer is powered-on and ready.	1. Printer 2. Printer Cable 3. Processor Card
Program or File Not Found Press Any Key Diagnostics cannot find the USER(N).COM file.	1. Diagnostic Diskette 2. Diskette Drive 3. Processor Card
Program Too Big To Fit In Memory Too many Terminate and Stay Resident programs in memory.	1. Reboot the system unit from the Diagnostic Diskette.
QAPLus/PRO Cannot Be Re-run because of Error in Relocating Program Diagnostics failed to relocate the Diagnostic Test programs so the memory space it resides in was not tested.	1. Diagnostic Diskette 2. Memory Module 3. Processor Card

Error Message/Symptom	Action
RAM Memory Error in Block n. Bad bits n Memory error.	<ol style="list-style-type: none"> 1. Memory Module 2. Processor Card
RAM Test Failed Memory error.	<ol style="list-style-type: none"> 1. Memory Module 2. Processor Card
Read error on cylinder n Hard disk drive format error.	<ol style="list-style-type: none"> 1. Hard Disk Drive 2. Hard Disk Drive Adapter 3. Processor Card
Read Errors Diskette drive read error.	<ol style="list-style-type: none"> 1. Diskette 2. Diskette Drive 3. Processor Card 4. Diskette Drive Cable
Receive Error Serial Port loopback test error.	<ol style="list-style-type: none"> 1. Serial Port Cable 2. Processor Card
Refresh Failure Diagnostic Test detected an error while testing the DMA controller's RAM refresh cycle.	<ol style="list-style-type: none"> 1. Memory Module 2. Processor Card
RTC Interrupt Failure Diagnostic Test cannot detect the Real-Time clock interrupt.	<ol style="list-style-type: none"> 1. Processor Card
Serial Chip Error COM Port error, general.	<ol style="list-style-type: none"> 1. Serial Port Cable 2. Processor Card
Serial Compare Error COM Port error; information transmitted is not the same as information received.	<ol style="list-style-type: none"> 1. Serial Port Cable 2. Processor Card
Serial Time-out Error COM Port error; time interval is too long between transmitted and received data.	<ol style="list-style-type: none"> 1. Serial Port Cable 2. Processor Card
Serious Memory Error — Diags Cannot Continue Memory Test error.	<ol style="list-style-type: none"> 1. Memory Module 2. Processor Card
Sorry, You Need A Mouse Mouse or mouse driver was not detected.	<ol style="list-style-type: none"> 1. Mouse 2. Processor Card
System Hangs Go to "Undetermined Problem" on page 8-28.	<ol style="list-style-type: none"> 1. Any device 2. Any adapter 3. Processor Card
The Address Exceeds the Size of Your Memory An invalid memory address was entered. The Diagnostic Tests display this message during the Locate Bad Chips option under the interact menu if an invalid memory address was entered at the "Enter Memory Address Of Bad Chip" prompt.	<ol style="list-style-type: none"> 1. Enter the correct address. 2. Memory Module 3. Processor Card
That Number Is Out of Range An invalid bit number was entered. Diagnostic Tests display this message during the Locate Bad Chips option.	<ol style="list-style-type: none"> 1. Enter the correct number. 2. Memory Module 3. Processor Card
Too Many Errors — Test Aborted Too many errors; the Diagnostic Test cannot continue.	<ol style="list-style-type: none"> 1. Processor 2. Processor Card
Transmit Error Internal or external serial port loopback test failure.	<ol style="list-style-type: none"> 1. Serial Port Cable 2. Processor Card

Error Message/Symptom	Action
<p>PMC video card Adapter Failed Test Result Summary displayed if "Fail" was at the Quit/Fail/Pass menu of any video test.</p>	<ol style="list-style-type: none"> 1. PMC Video Card 2. Processor Card 3. Display
<p>Write error on cylinder n Hard disk drive write error.</p>	<ol style="list-style-type: none"> 1. Hard Disk Drive 2. Hard Disk Drive Adapter
<p>Write Errors Diskette drive write error.</p>	<ol style="list-style-type: none"> 1. Diskette 2. Diskette Drive 3. Processor Card 4. Diskette Drive Cable
<p>Write Protected or Unformatted Diskette is write protected or is not formatted.</p>	<ol style="list-style-type: none"> 1. Insert a non-write-protected, formatted diskette into the diskette drive; then rerun the test. 2. Diskette Drive 3. Processor Card 4. Diskette Drive Cable
<p>You Cannot Delete the Motherboard "Remove Board" option was selected. The Diagnostic Tests display this message during the Locate Bad Chips option.</p>	<ol style="list-style-type: none"> 1. Make the correct selection. 2. Memory Module 3. Processor Card 4. Processor

Miscellaneous Symptoms

Symptom	Action
Changing colors.	1. Display
System unit will not power-off. See "Power Supply" on page 8-13.	1. Power Switch 2. Processor Card
System unit will not power-on. See "Power Supply" on page 8-13.	1. Power Switch 2. Power Supply 3. Processor Card
Diskette drive in-use light remains on or does not light when drive is active.	1. Diskette Drive 2. Processor Card 3. Diskette Drive Cable
Flashing cursor with an otherwise blank display.	1. Processor Card 2. Primary Hard Disk Drive 3. Hard Disk Drive Cable
Incorrect memory size during POST.	1. Run the memory tests. 2. Memory Module 3. Processor Card
"Insert a Diskette" icon appears with a known-good diagnostic diskette in the first 3.5-inch diskette drive.	1. Diskette Drive 2. Processor Card 3. Diskette Drive Cable 4. Network Adapter
Intensity or color varies from left to right of characters and color bars.	1. Display 2. PMC video card
No power, or fan not running.	1. See "Power Supply" on page 8-13.
Nonsystem disk or disk error-type message with a known-good diagnostic diskette.	1. Diskette Drive 2. Processor Card 3. Diskette Drive Cable
Other display symptoms not listed previously (including blank or illegible display).	1. See "Display" on page 8-14. 2. Processor Card 3. Display
Power-on indicator or hard disk drive in-use light not on, but system unit works correctly.	1. Power Supply 2. Processor Card 3. LED Cables
Printer problems.	1. See "Printer" on page 8-12.
Program loads from the hard disk with a known-good diagnostic diskette in the first 3.5-inch diskette drive.	1. Run Setup. 2. Diskette Drive 3. Diskette Drive Cable 4. Processor Card 5. Power Supply
Serial or parallel port device failure (port on processor card)	1. Check external device self-test. 2. External Device 3. Device Cable 4. Processor Card
Serial or parallel port device failure (adapter port)	1. Check external device self-test. 2. External Device 3. Device Cable 4. Alternate Adapter 5. Processor Card

Symptom	Action
Some or all keys on the keyboard do not work.	<ol style="list-style-type: none">1. Keyboard2. Keyboard Cable3. Keyboard/Mouse Cable4. Processor Card
Battery inaccurate.	<ol style="list-style-type: none">1. Battery (see page A-7)2. Processor Card

Hard Disk Drive Boot Error

A hard disk drive boot error (error codes 1962 and I999030X) can be caused by the following.

Cause	Actions
The start-up drive is not in the boot sequence in the configuration.	Check the configuration and ensure the start-up drive is in the boot sequence.
No operating system is installed on the boot drive.	Install an operating system on the boot drive.
The boot sector on the start-up drive is corrupted.	The drive must be formatted. Do the following. <ol style="list-style-type: none">1. Attempt to access and recover (back up) the failing hard disk drive.2. Using the operating systems programs, format the hard disk drive.
The drive is defective.	Replace the hard disk drive.

Undetermined Problem

Check the power supply voltages. See "Power Supply" on page 1-4. If the voltages are correct, return here and continue with the following steps.

1. Power-off the system unit.
2. Remove or disconnect the following, one at a time:
 - a. Non-IBM devices
 - b. External devices (modem, printer, or mouse)
 - c. Any adapters
 - d. Memory modules
Before removing or replacing memory modules, see "Removing and Replacing the Processor Card" on page 8-35.
 - e. Extended video memory
 - f. External Cache
 - g. External Cache RAM
 - h. Hard disk drive
 - i. Diskette drive
3. Power-on the system unit to re-test it.
4. Repeat steps 1 through 3 until you find the failing device or adapter.

If all devices and adapters have been removed, and the problem continues, replace the processor card. See "Removing and Replacing the Processor Card" on page 8-35.

Removal and Replacement Procedures

This section describes the step-by-step procedures for removing and replacing features and parts in the 7588 Industrial Computer. ***These procedures should be performed only by trained service personnel, because performing steps incorrectly could lead to personal injury or system unit damage.***

Before performing any removal and replacement procedures, be sure to read and understand the information in “Safety Information” on page A-10 and in “Handling Electrostatic-Discharge-Sensitive Devices” on page A-15.

CAUTION:

- **Power must always be switched off before performing any removal/replacement procedures; if possible, electrical power and any backup power source should also be unplugged or otherwise disconnected. To assure that power is switched off and disconnected in the correct order, start every removal and replacement procedure with “Removing Power and Disconnecting Cables.”**
- **Depending on the options installed, this system unit could weigh more than one person can comfortably lift. Do not attempt to lift it by yourself if you think it is too heavy for you.**

Attention:

Whenever handling electronic components, use precautions to prevent component damage due to electrostatic discharge. See “Handling Electrostatic-Discharge-Sensitive Devices” on page A-15 for a list of those precautions.

Reference Note

When performing any of the procedures that follow, refer to Figure 1-1 on page 1-1 and Figure 1-2 on page 1-2.

Removing Power and Disconnecting Cables

Use the following procedure to power-off the system unit and disconnect all cables before beginning any removal/replacement procedure. If it is necessary to remove the system unit from its mounting place, use this procedure before removing the system unit.

1. Remove any data media (diskettes, CDs, and so forth) from the system unit.
2. Switch off all power to the system unit and any attached devices.
3. Tag all cables connected to the system unit or somehow note their respective connectors to prevent confusing them when they are unplugged.
4. If you have a modem or fax machine attached, disconnect the telephone line from the wall outlet and then from the system unit.
5. Unplug or otherwise disconnect all electrical power and any backup power source.
6. Unplug all other cables connected to the system unit. Where applicable, unplug all cables at the receptacle end first, and then at the device end. (For D-shell connectors, remove the two screws that secure each cable to its D-shell connector, and then unplug the cable.)

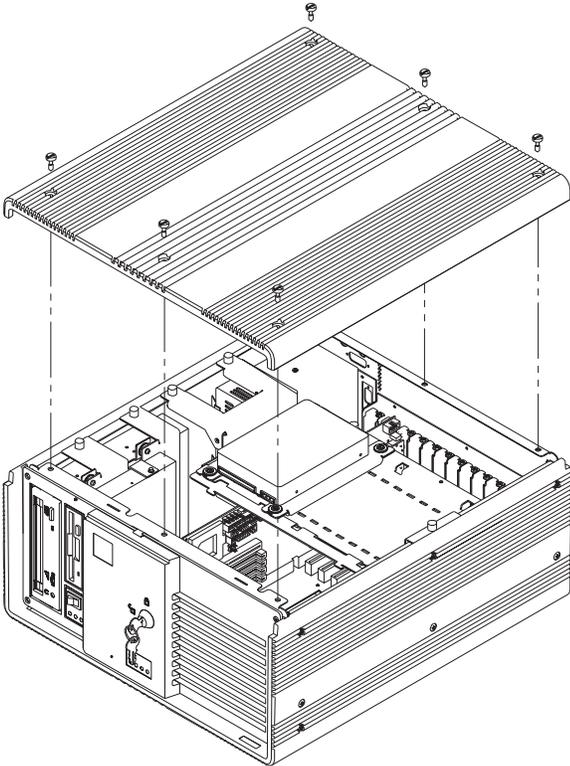
When reassembling the system unit, reverse these steps.

You now are ready to proceed.

- For installations in which the mounting does not impede access, go directly to “Removing the System Unit Cover.”
- For installations in which the mounting does impede access, remove the system unit from its mounting before beginning any removal or replacement procedure. The steps to removing the system unit from its mounting depend on the particular mounting method.

Removing the System Unit Cover

Loosen the six cover screws and lift off the cover.



Removing and Replacing Feature Cards

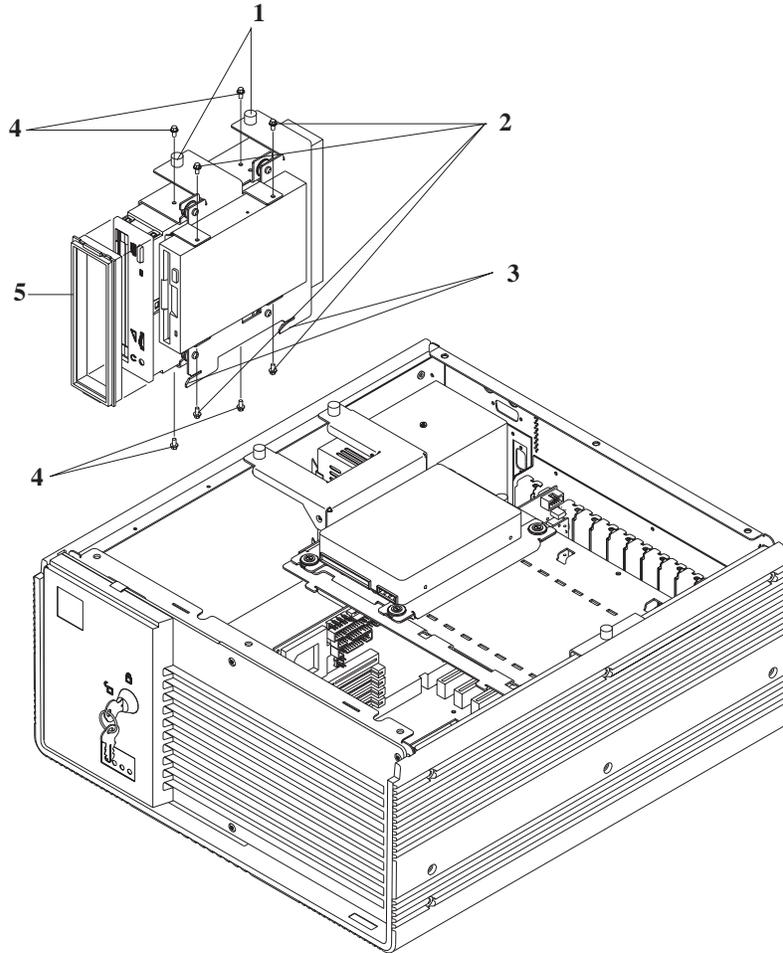
All feature cards are removed and replaced in the same way. The feature cards are secured by card retainers installed in the top cover. These retainers are adjusted to the height of the cards. If you remove a card, ensure you reinstall it in the same slot. If you change the position of a card in the backplane or install a different card, see “Installing the Card Hold-Down Spacers” on page 3-9 for information on installing the spacers. Longer feature cards are held additionally by slots in the front fan guard, while shorter cards do not reach that far.

1. Remove power from the computer and disconnect all cables (refer to page 8-29).
2. Remove the cover (refer to page 8-30).
3. Disconnect the power and signal cables from the hard disk drives.
4. Loosen the three captive thumb screws that secure the hard disk drive assembly, and remove the assembly.
5. Unscrew the retaining screw for the feature card to be removed.
6. Disconnect any cables going to that feature card.
7. Remove the feature card.

When reassembling the system unit, reverse these steps. Be sure that the feature card retainer properly captures all feature cards.

Removing and Replacing a Diskette or CD-ROM Drive

1. Remove power from the computer and disconnect all cables (refer to page 8-29).
2. Remove the cover (refer to page 8-30).
3. Disconnect the signal cable from the rear of the diskette drive.
4. Disconnect the power and signal cables from the hard disk drive.
5. Using the illustration, remove the 2 screws **1** that secure the diskette/CD-ROM drive assembly.



6. Carefully rotate the diskette/CD-ROM drive assembly slightly away from the side frame and slide it to the rear until the hooks on the bottom of the assembly disengage from the chassis.
7. Remove the diskette/hard disk drive assembly from the 7588 Industrial Computer and place it on a flat surface.
8. Set any jumpers, switches, or terminators on the new drive just as they were set on the old drive.
9. If you are replacing the diskette drive, remove the four screws securing the diskette drive and replace the drive.

If you are replacing the CD-ROM drive, remove the four screws and remove the CD-ROM drive from the bracket.
10. Move the rubber bezel to the new drive.

When reassembling the system unit, reverse these steps.

Removing and Replacing a Hard Disk Drive

To remove and replace a hard disk drive, see “Installing an Internal Hard Drive” on page 3-11.

Removing and Replacing the Power Supply

CAUTION:

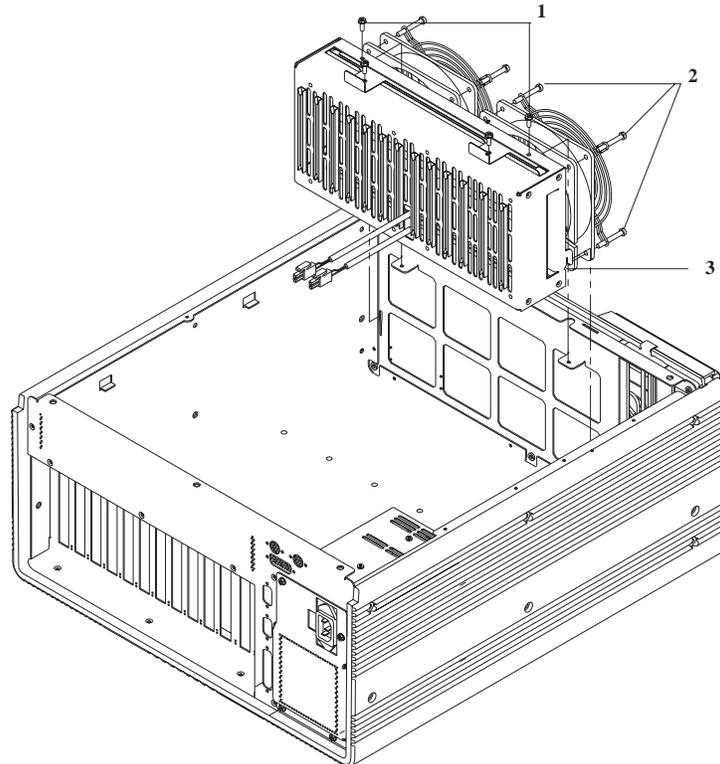
Never remove the cover on the power supply. If you have a problem with the power supply, you must replace the power supply or have it serviced by a qualified technician.

1. Remove power from the computer and disconnect all cables (refer to page 8-29).
2. Remove the cover (refer to page 8-30).
3. Unplug the power cables to all drives within the system unit.
4. Unplug the four power cables to the backplane.
5. Remove the four screws that secure the power supply to the rear mounting bracket.
6. Slide the power supply forward slightly to release it from its side bracket, and lift it out.

When reassembling the system unit, reverse these steps. Note that all connectors from the power supply are keyed; they can be attached only one way.

Removing and Replacing a Front Fan

1. Remove power from the computer and disconnect all cables (refer to page 8-29).
2. Remove the cover (refer to page 8-30).
3. Disconnect the fan power connectors.
4. Remove the air filter assembly as described in “Cleaning Air Filters” on page 4-2.
5. Note the slot position of any adapter cards and the processor card.
6. See “Removing and Replacing Feature Cards” on page 8-31 and remove the processor card and any full-length adapter cards that reach the rear card guide.
7. Using the following figure, remove the two mounting screws.



8. Remove the fan/card guide assembly from the unit by lifting the assembly up and to the rear until the hooks are free of the frame.
9. Place the fan/card guide assembly on a flat surface.
10. Remove the four screws for the failing fan and remove the fan.
11. Replace the fan and reassemble the fan/card guide assembly, making sure the arrow on the fan showing the airflow direction is pointing into the unit. (Refer to the figure to make sure you have assembled the fan/card guide assembly correctly.)

When reassembling the system unit, reverse these steps.

Removing and Replacing the LED Assembly

1. Remove power from the computer and disconnect all cables (refer to page 8-29).
2. Remove the cover (refer to page 8-30).
3. Remove the diskette-drive assembly.
4. Disconnect the two LED connectors from the LED board.
5. Remove the screw from the LED board and replace the LED board.

When reassembling the system unit, reverse these steps.

Removing and Replacing the Power Switch

1. Remove power from the computer and disconnect all cables (refer to page 8-29).
2. Remove the cover (refer to page 8-30).
3. Disconnect the switch cable from the backplane.
4. Remove the diskette-drive assembly.
5. Press the retaining clips on each side of the power switch, and slide the switch out of the frame.
6. Install the new switch.

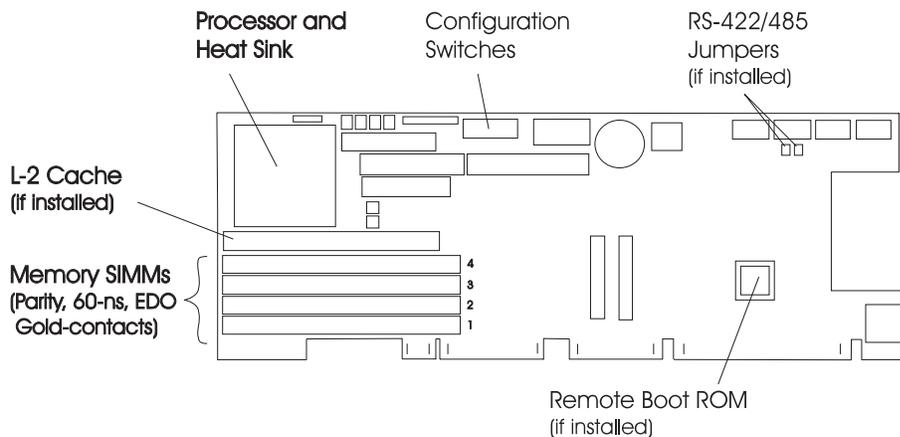
When reassembling the system unit, reverse these steps.

Removing and Replacing the Processor Card

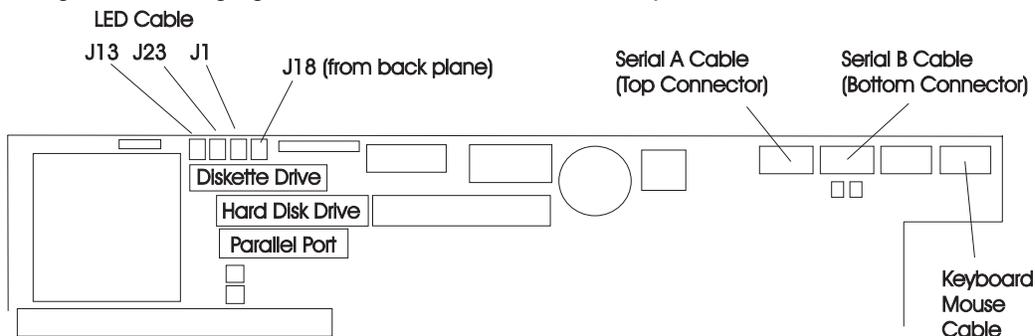
Before You Begin

- Make sure the latest level of BIOS is installed on the processor card. A down-level BIOS can cause false errors and unnecessary replacement of the processor card.
- If the new processor card does not correct the problem, reinstall the options on the old processor card, reinstall the old processor card, then replace the processor.

1. Remove power from the computer and disconnect all cables (see page 8-29).
2. Remove the cover (see page 8-30).
3. Disconnect the power and signal cables from the hard disk drives.
4. Loosen the four retaining screws for the card hold-down bracket and remove the bracket and hard drives.
5. Disconnect all cables from the processor card.
6. Remove the screw on the retaining bracket for the processor card.
7. Lift the processor card straight up and out of the system unit.
8. Remove the processor (see page 8-37) and all options from the old processor card. Install them on the new card and set the configuration switches to the same as the old card. Use the following figure as a check list.



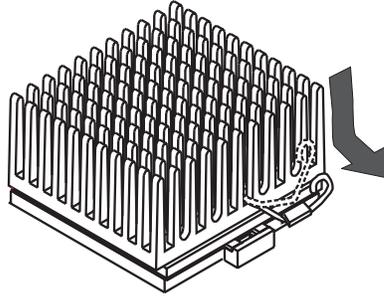
9. Install the new processor card in the system unit. Make sure it is fully seated in the connector.
10. Reinstall the screw in the retaining bracket.
11. Using the following figure, reconnect the cables to the processor card.



12. Reinstall the hard disk assembly and reconnect the power and signal cables.
13. Reinstall the covers and all external cables you disconnected.
14. Update the Flash and VPD. To do this, **you must run the Flash Update program using the Flash Update diskette**. See "BIOS Levels" on page 8-2, "Vital Product Data" on page 8-2, and "Flash (BIOS/VPD) Update Procedure" on page 8-2.

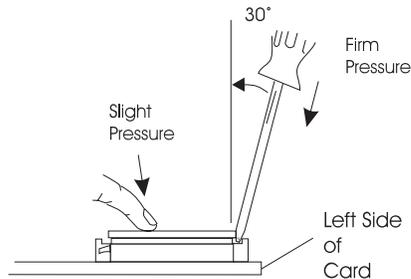
Replacing the Processor Chip

1. With the processor card on a clean, static-free work area (refer to “Removing and Replacing the Processor Card” on page 8-35), remove the heat sink clip and the heat sink, as shown in the following figure.

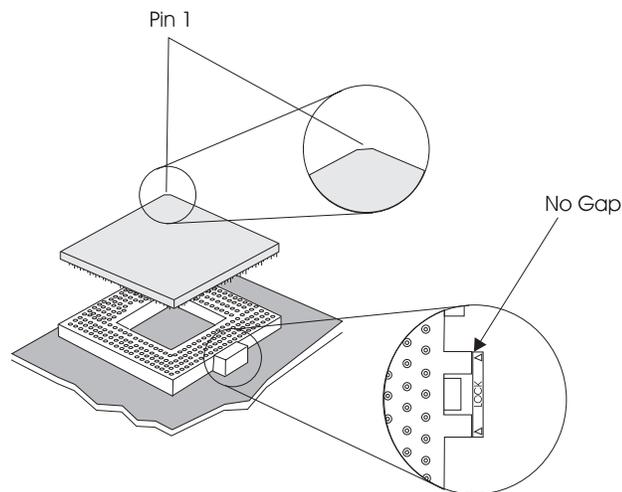


2. Insert the blade of a flat-blade screwdriver into the slot on the processor socket marked OPEN; then move the screwdriver to vertical, as shown in the following figure. The processor chip will move to the side approximately .040 inches (1 millimeter).

Caution: *Moving the screwdriver past vertical can damage the processor socket.*

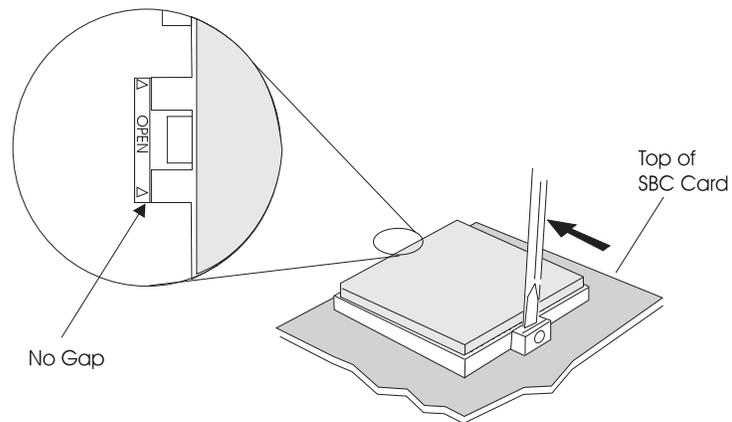


3. Remove the processor chip.
4. Make sure the processor socket is fully open (no gap, as shown in the following figure).

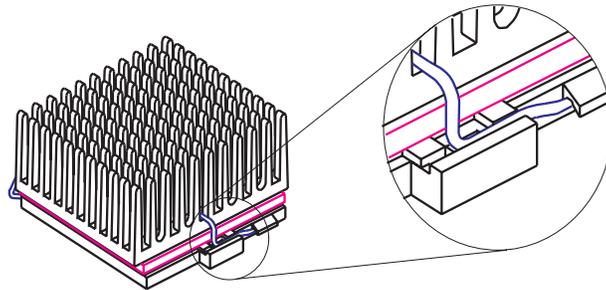


5. Locate pin 1 on the chip (pin 1 is indicated by a cut corner on the chip). Using pin 1 as a reference, align the processor and socket as shown in the previous figure; then install the new processor chip in the socket.

6. Insert the blade of a flat-blade screwdriver into the slot on the processor socket marked LOCK; then move the screwdriver to vertical, as shown in the following figure. The processor chip will move approximately .040 inches (1 millimeter), and there should not be a gap on the OPEN side of the processor socket.



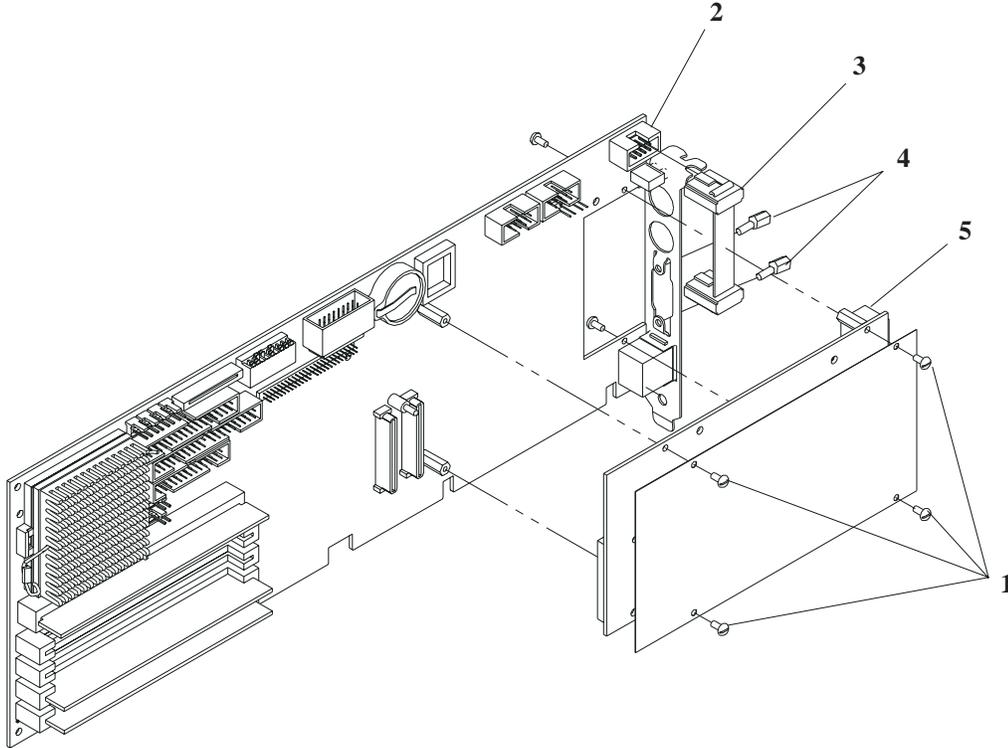
7. Install the heat sink and heat sink clip. Make sure that the clip is fully seated in the connector (refer to the following figure).



8. Reinstall the processor card and run the diagnostic tests.

Replacing a PMC Video Card or Keyboard/Mouse Cable

1. Remove power from the computer and disconnect all cables (refer to page 8-29).
2. Remove the cover (refer to page 8-30).
3. Remove the two screws from the video connector.



4. Remove the four retaining screws from the back of the processor card.
5. Carefully separate the PMC video card from the processor card.
6. Disconnect the keyboard/mouse cable from the PMC video card. This cable plugs into the connectors on the processor card and the PMC video card. You do not need to unplug the cable from the processor card unless you are replacing the cable.

Removing and Replacing the Backplane

1. Remove power from the computer and disconnect all cables (refer to page 8-29).
2. Remove the cover (refer to page 8-30).
3. Remove all cards plugged into the backplane (refer to pages 8-31 and 8-35).
4. Disconnect the six cables that plug into the backplane (refer to “Removing Power and Disconnecting Cables” on page 8-29 and
5. Remove the screws securing the backplane to the system unit; then remove the backplane. The 7588-001 backplane has 15 screws; the 7588-101 has 17 screws.

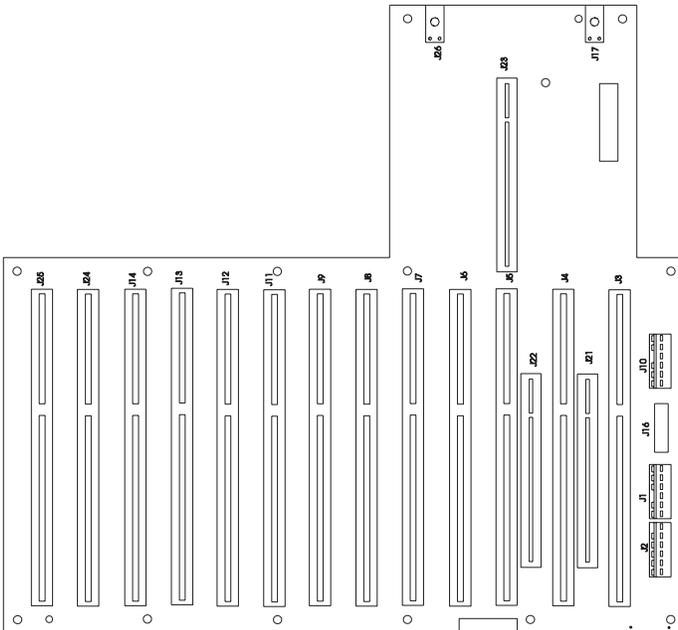
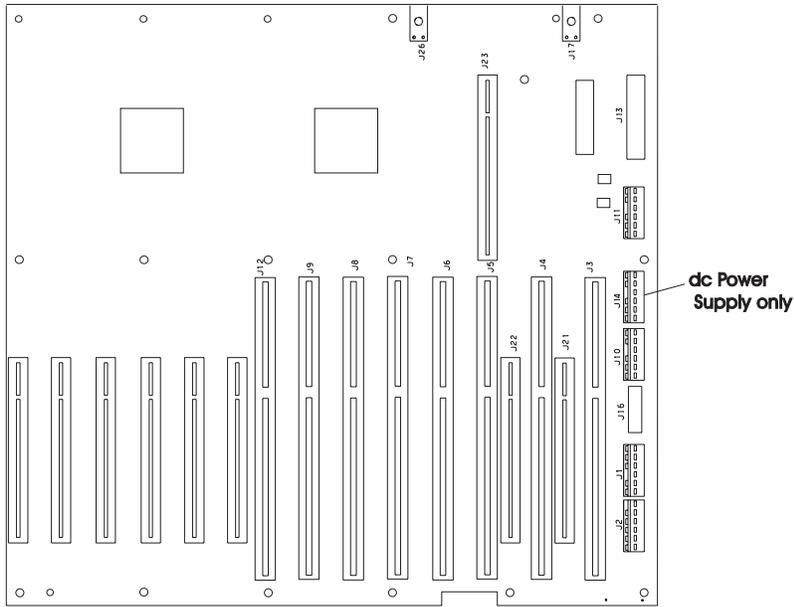


Figure 8-1. 7588-001 Backplane



Note: For Model 101 systems with a dc power supply, connect P12 to connector J14.

Figure 8-2. 7588-101 Backplane

6. When reassembling the system unit, reverse these steps.

Chapter 9. Parts Catalog

Service replacement parts must be ordered by their part numbers. This chapter contains the part numbers for all available replacement parts for the basic 7588 Industrial Computer. For those adapters, drives, and other optional features not listed, the part number should be obtained from the actual component or from the feature kit in which it was provided.

Unless otherwise indicated, part numbers apply to all models.

IBM Service Parts Warranty

For IBM service parts warranty information, see "Statement of Limited Warranty" on page iv.

Electrical and Electronic

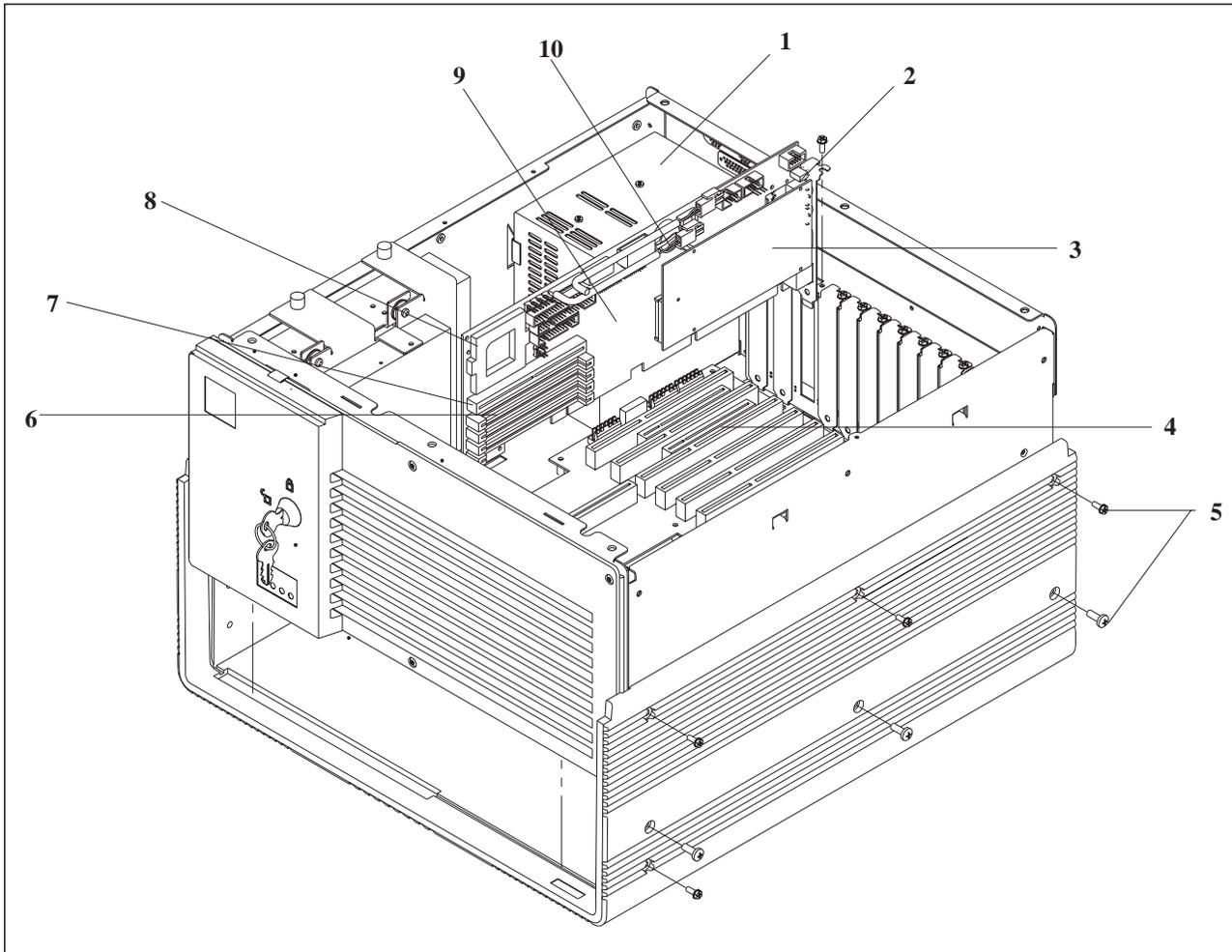


Figure 9-1. Electrical and Electronic

Table 9-1. Electrical and Electronic

Index	Part Number	Description
1	40H7566 02K1377	Power supply 250 Watt 110/220 V ac Power supply -48 V dc
2	76H4384	SBC keyboard/mouse cable
3	76H4383	Analog Video PCI Mezzanine Card (PMC) Form Factor Card
Not shown	76H5374	PMC video card mounting (bill-of-materials without Ethernet)
Not shown	76H4379	PMC video card mounting (bill-of-materials with Ethernet)
4	76H4355 12J2727	Backplane, 7588-001 (12 ISA, 2 PCI—2 shared) Backplane, 7588-101 (7 ISA, 8 PCI—3 shared)
5	12J2739	Mounting screws (contained in miscellaneous package)
6	76H4386 76H4387 76H4388 76H4389	4 MB memory SIMM, 60-ns EDO, parity, gold tab 8 MB memory SIMM, 60-ns EDO, parity, gold tab 16 MB memory SIMM, 60-ns EDO, parity, gold tab 32 MB memory SIMM, 60-ns EDO, parity, gold tab
7	76H4390 76H4391	256 KB cache memory module 512 KB cache memory module
8	76H4380 76H4381 76H4382 02K1879	Processor 100 MHz with heat sink and clip Processor 133 MHz with heat sink and clip Processor 166 MHz with heat sink and clip Processor 200 MHz with heat sink and clip
9	76H4841 76H4378	IBM 586 SBC card (without Ethernet) IBM 586E SBC card (with Ethernet)
10	33F8354	Memory-backup battery (lithium)
Not shown	76H4385	Remote-IPL kit (for FC 4375)
Not shown	06H4247	Card hold-down spacers
Not shown	02K1386	Parallel cable

Removable Media Drives

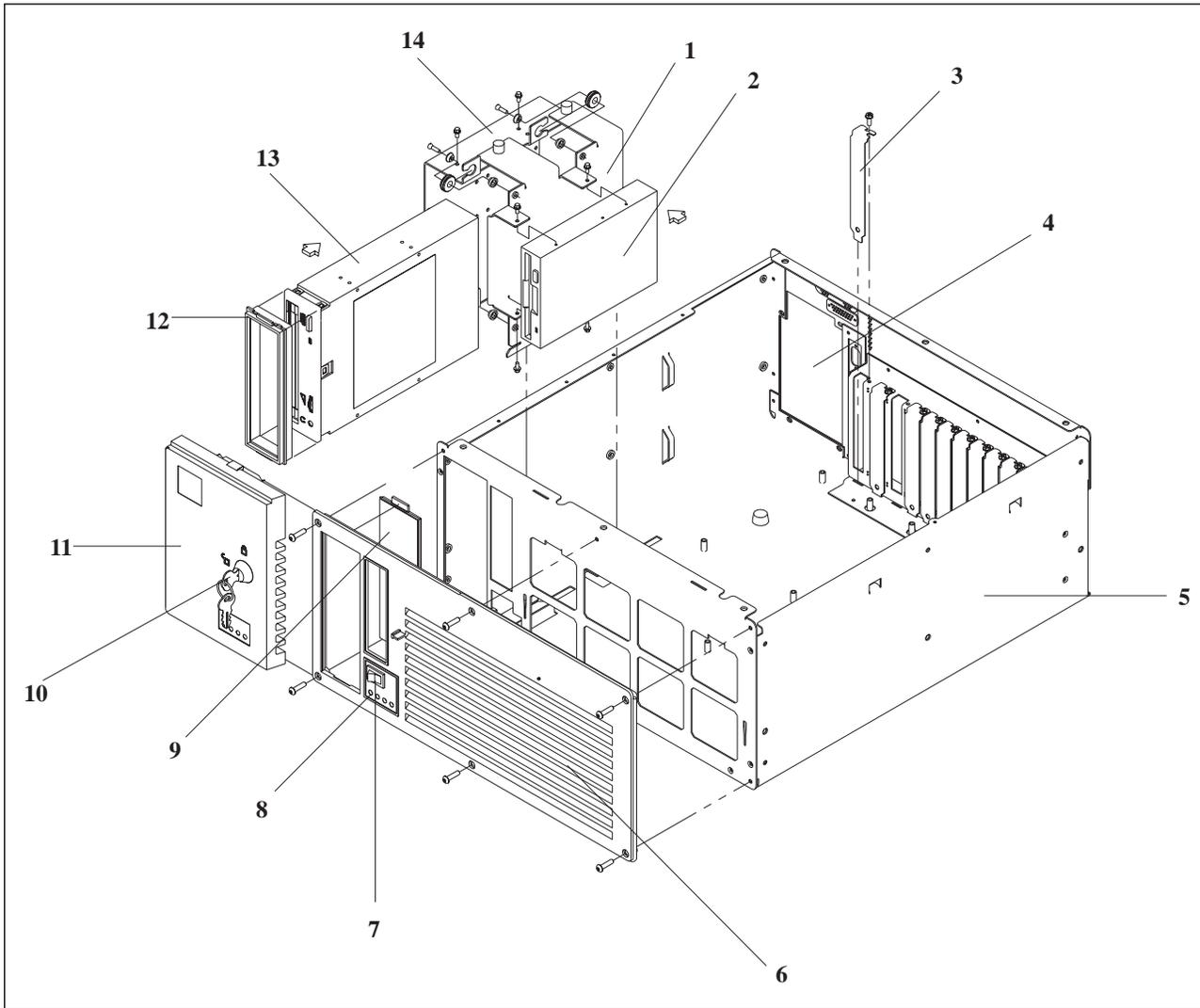


Figure 9-2. Removable Media Drives

Table 9-2. Removable Media Drives

Index	Part Number	Description
1	76H4364	Diskette drive mounting bracket
2	06H8161	1.44 MB diskette drive
3	12J2739	ISA filler panel (four included in miscellaneous parts package)
4	76H6809	Power supply cover (actual cover not shown)
5	76H4361	Chassis
6	76H5765 76H4356	Front bezel kit (contains On/Off switch, LED board, icon/label, six screws) Black Gray
7	06H4268	On/Off switch
8	76H5682	LED board
9	76H6813	5.25-inch filler panel (contains one black and one gray)
10	33F4822	Lock kit with keys
11	76H5766 76H5681	Sliding door (with lock and icon/label) Black Gray
12	06H4246	CD-ROM drive mounting bezel
13	06H9431 76H6109	CD-ROM drive 16xMAX CD-ROM drive
14	76H4365	CD-ROM drive mounting bracket
Not shown	12J2739	Rubber foot (included in miscellaneous package)

Fans and Filters

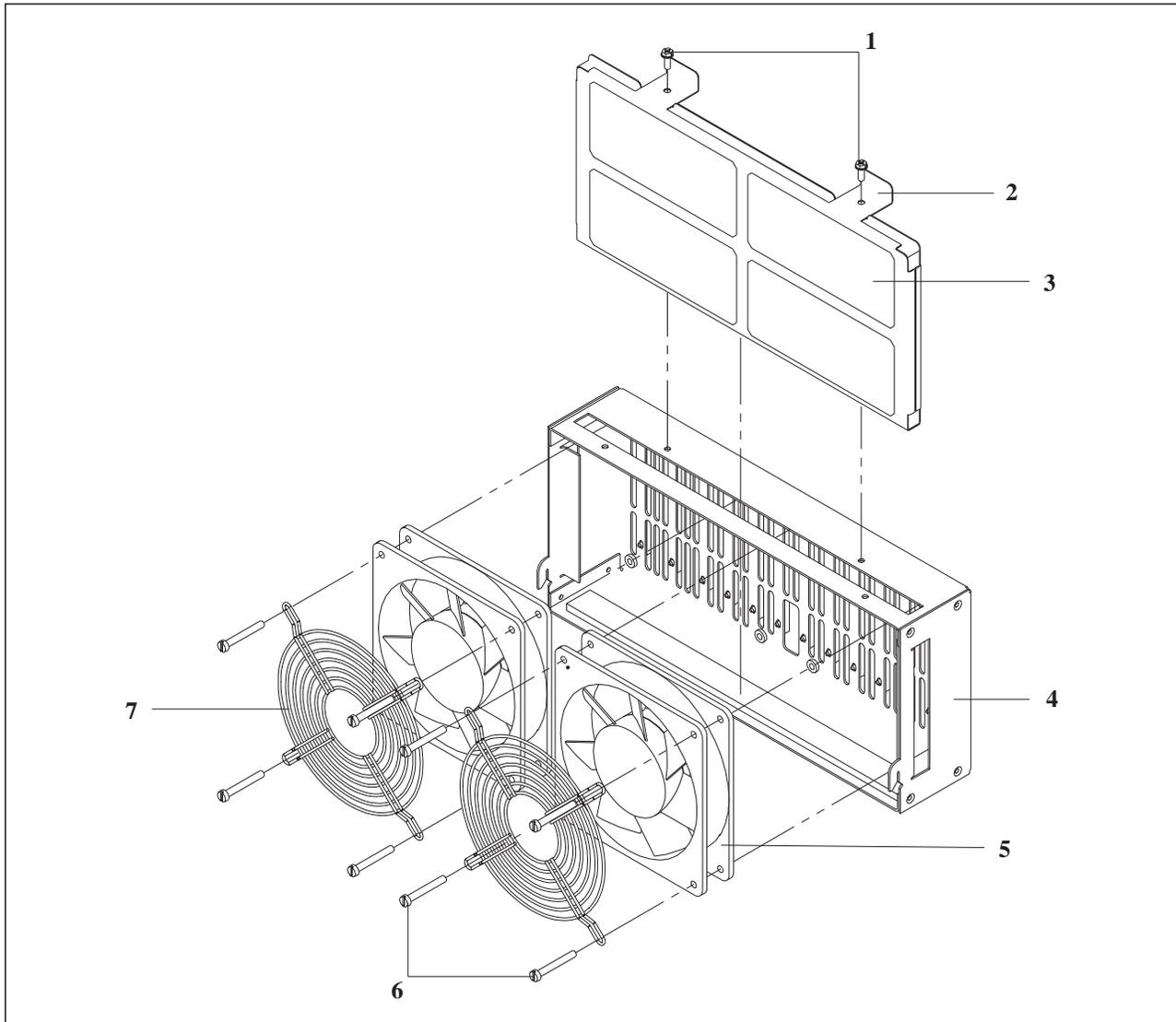


Figure 9-3. Fans and Filters

Table 9-3. Fans and Filters

Index	Part Number	Description
1	12J2739	Mounting screws (included in miscellaneous package)
2	76H5679	Filter bracket
3	76H5678	Filter element (contains three filters)
4	76H5677	Fan bracket
5	06H4283	Fan assembly
6	12J2739	Mounting screws (included in miscellaneous package)
7	06H4971	Fan guard
Not shown	12J2736	3.3 V power card (7588-101)

Hard Disk Drives and Covers

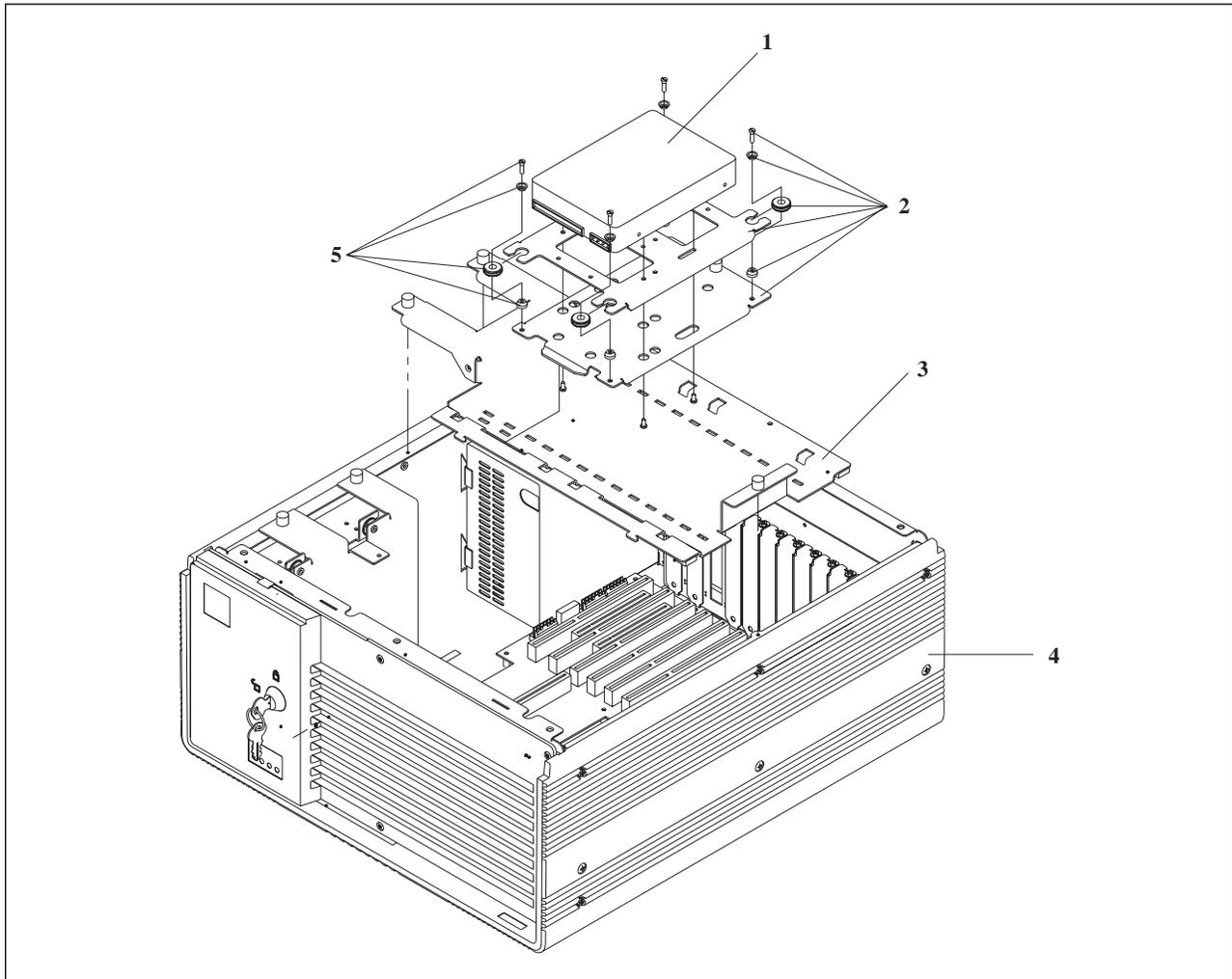


Figure 9-4. Hard Disk Drives and Covers

Index	Part Number	Description
1	42H1816 06H8419 07H0383 75H7497 76H4608	Hard disk drive IDE (drive only) 850 MB drive 850 MB drive 1.2 GB drive 1.6 GB drive 3.2 GB drive
2	76H4357	Hard disk shock mount assembly (includes four shock mounts and two plates)
3	76H4360	Mounting bracket
4	76H5680 76H4359	Cover set Black Gray
5	78H5498	Shock mount kit (includes four shock mounts)
Not shown	76H4362	Hard drive cable

Rack-Mount, Floor-Stand, and Panel-Mount Kits

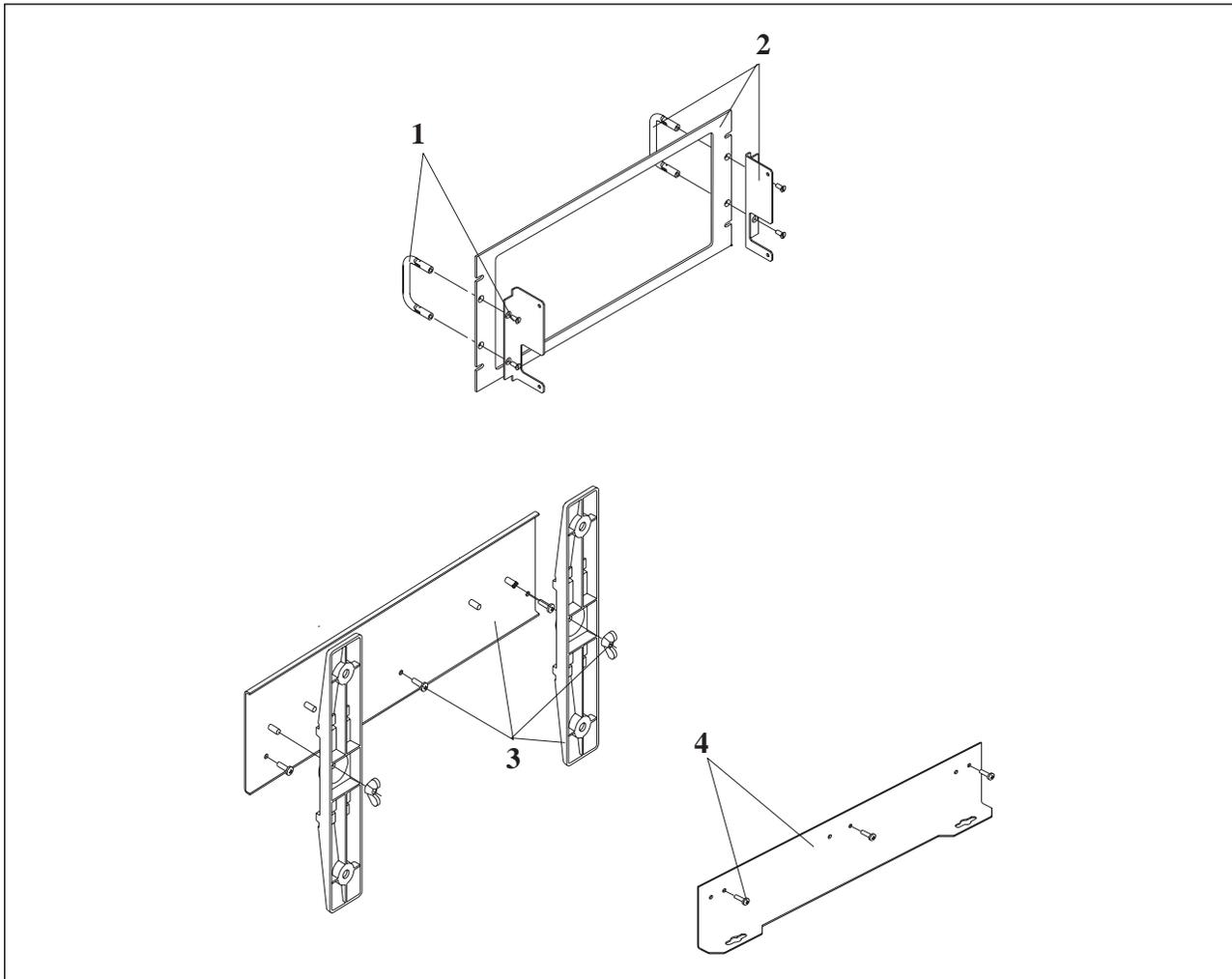


Figure 9-5. Panel-Mount and Floor-Stand Kits

Table 9-5. Panel-Mount and Floor-Stand Kits

Index	Part Number	Description
1	04G2083	Rack-mount handles (includes two handles and four screws)
2	76H5697	Rack-mount kit (includes one plate, two handles, four screws, and two mounting brackets in gray only)
3	76H5704 76H5696	Floor-stand kit (includes two feet, two wing nuts, three mounting screws, one plate, and one logo) black gray
4	76H5698	Panel-mount bracket (includes 2 brackets and 6 screws in gray only)

Cables

<i>Table 9-6. Cables</i>	
Part Number	Description
78H5500	SBC to external serial port cable
78H5501	SBC to external parallel port cable, 7588-001 (12 ISA, 2 PCI)
02K1386	SBC to external parallel port cable, 7588-101 (7 ISA, 8 PCI)
78H5486	SBC to LED board cable
78H5487	SBC to backplane J18 cable
76H4363	SBC to diskette drive cable
76H6810	SBC to external keyboard/mouse connect cable
76H4384	SBC-to-PMC keyboard/mouse cable

Mouse

<i>Table 9-7. Enhanced Mouse</i>	
Part Number	Description
06H4595	Enhanced Mouse II

Keyboards

Note: Keyboards do not include the keyboard cable, unless otherwise indicated.

<i>Table 9-8. Enhanced Industrial Keyboards (101 and 102 keys)</i>	
Part Number	Description
1394976	French (ID 189)
1394978	German
1394979	Italian (ID 141)
1394972	U.S. English

<i>Table 9-9. Keyboards with TrackPoint® II</i>	
Part Number	Description
06H4842	Enhanced, U.S. English (includes cable)
84G8529	Quiet Touch SS Keyboard, U.S. English

<i>Table 9-10. Keyboard Cable</i>	
Part Number	Description
72X8537	Keyboard cable

Power Cords

This product is equipped with a 3-wire power cord and plug for the user's safety. Use this power cord in conjunction with a properly grounded electrical outlet to avoid electrical shock.

Table 9-11 (Page 1 of 2). Power Cords

Part Number	Description	Part Number	Description
13F9979	Afghanistan	13F9979	Lebanon
13F9979	Angola	62X1045	Liberia
14F0033	Antigua	14F0069	Libya
72X8508	Argentina	13F9979	Luxembourg
72X8508	Australia	14F0033	Malaysia
13F9979	Austria	14F0033	Malawi
62X1045	Bahamas	14F0033	Malta
14F0033	Bahrain	13F9979	Martinique
14F0015	Bangladesh	13F9979	Mauritius
62X1045	Barbados	62X1045	Mexico
13F9979	Belgium	13F9979	Mozambique
62X1045	Bermuda	14F0033	Nepal
62X1045	Bolivia	13F9979	Netherlands
62X1045	Brazil	62X1045	Netherlands Antilles
14F0033	Brunei	72X8508	New Zealand
13F9979	Bulgaria	62X1045	Nicaragua
14F0015	Burma	14F0033	Nigeria
16F2258	Canada	13F9979	Norway
62X1045	Cayman Islands	14F0033	Oman
14F0069	Chile	14F0015	Pakistan
62X1045	Colombia	62X1045	Panama
62X1045	Costa Rica	72X8508	Paraguay
14F0033	Cyprus	14F0033	Peoples Republic of China
13F9979	Czechoslovakia	62X1045	Peru
13F9997	Denmark	62X1045	Philippines
62X1045	Dominican Republic	13F9979	Poland
14F0033	Dubia (UAE)	13F9979	Portugal
62X1045	Ecuador	14F0033	Qatar
13F9979	Egypt	13F9979	Romania
62X1045	El Salvador	13F9979	Russia
14F0069	Ethiopia	62X1045	Saudi Arabia
13F9979	Finland	14F0033	Sierra Leone
13F9979	France	14F0033	Singapore
13F9979	Germany	14F0033	Somalia
14F0033	Ghana	14F0015	South Africa
13F9979	Greece	13F9979	Spain

Table 9-11 (Page 2 of 2). Power Cords

Part Number	Description	Part Number	Description
62X1045	Guatemala	14F0015	Sri Lanka
62X1045	Guyana	13F9979	Sudan
62X1045	Haiti	62X1045	Surinam
62X1045	Honduras	13F9979	Sweden
13F9979	Hungary	14F0051	Switzerland
14F0033	Hong Kong	13F9979	Syria
13F9979	Iceland	62X1045	Taiwan
14F0033	India	14F0033	Tanzania
13F9979	Indonesia	16F2258	Thailand
13F9979	Iran	62X1045	Trinidad
14F0033	Iraq	13F9979	Turkey
14F0033	Ireland	14F0033	Uganda
14F0087	Israel	14F0033	United Kingdom
14F0069	Italy	62X1045	United States
62X1045	Jamaica	72X8508	Uruguay
62X1045	Japan	62X1045	Venezuela
13F9979	Jordan	13F9979	Zaire
14F0033	Kenya	14F0033	Zambia
62X1045	Korea (South)	13F9979	Zimbabwe
14F0033	Kuwait		

Part 4. Appendixes

The Appendixes contain safety information and supplemental information that is generally not required by the user or service person. Much of the information in the appendixes is useful in planning the computer configuration and the physical site.

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Appendix A. Notices

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 can be used. Subject to IBM's valid intellectual property or other legally protectable rights, any functionally equivalent product, program, or service can be used instead of the IBM product, program, or service. The evaluation and verification of operation in conjunction with other products, except those expressly designated by IBM, are the responsibility of the user.

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