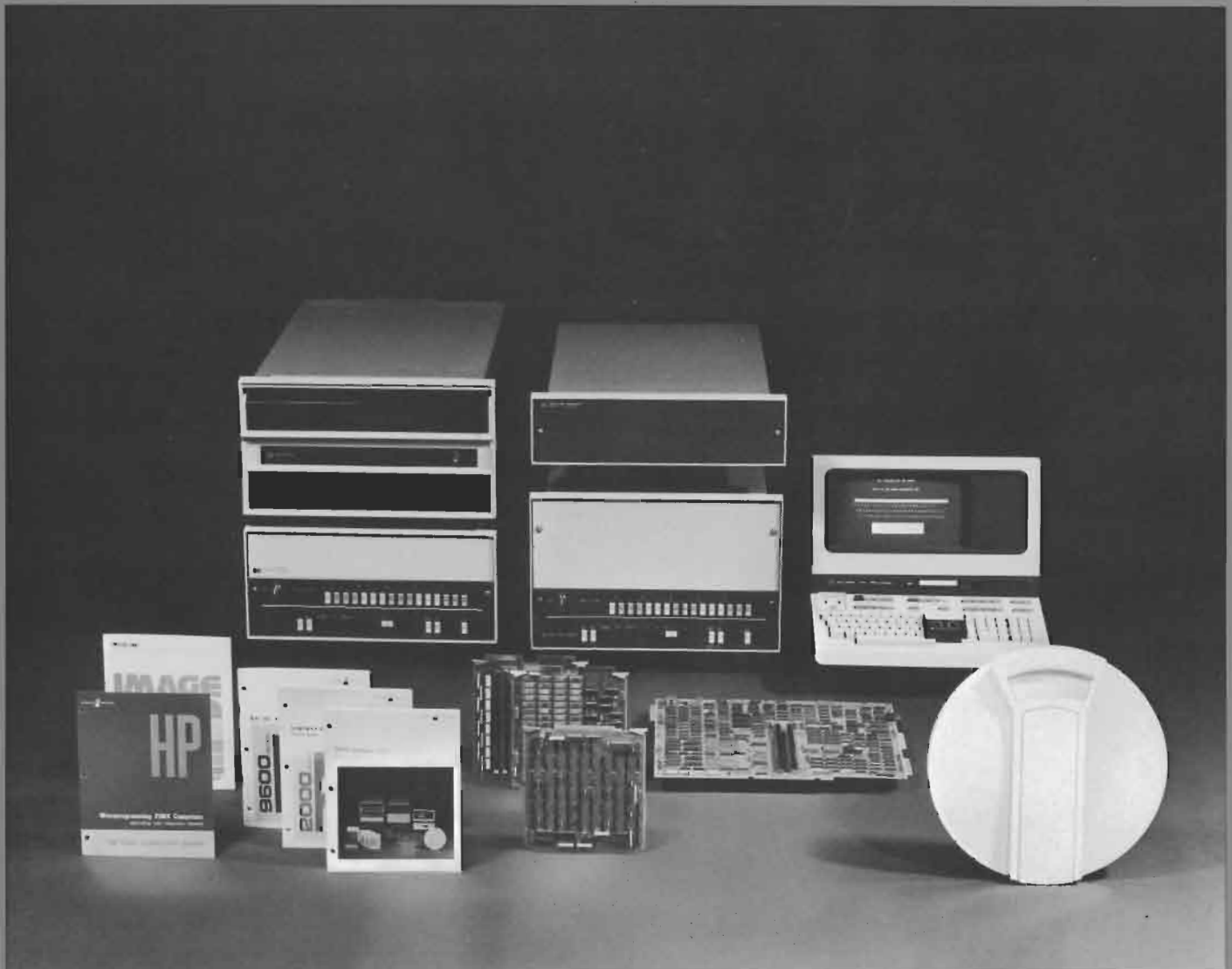


HP 1000 M-Series Computer HP 2108B and HP 2112B Installation and Service Manual





HP 1000 M-Series Computer HP 2108B and HP 2112B

Installation and Service Manual



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PRINTING HISTORY

The Printing History below identifies the Edition of this Manual and any Updates that are included. Periodically, Update packages are distributed which contain replacement pages to be merged into the manual, including an updated copy of this Printing History page. Also, the update may contain write-in instructions.

Each reprinting of this manual will incorporate all past Updates, however, no new information will be added. Thus, the reprinted copy will be identical in content to prior printings of the same edition with its user-inserted update information. New editions of this manual will contain new information, as well as all Updates.

To determine what manual edition and update is compatible with your current software revision code, refer to the appropriate Software Numbering Catalog, Software Product Catalog, or Diagnostic Configurator Manual.

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This manual provides installation and field service instructions for the Hewlett-Packard 1000 M-Series Computer. The HP 1000 M-Series Computer is a high technology product and, because of the product design, a modular replacement philosophy has been implemented to minimize on-site repair time.

Supporting documentation for the HP 1000 M-Series Computer is as follows:

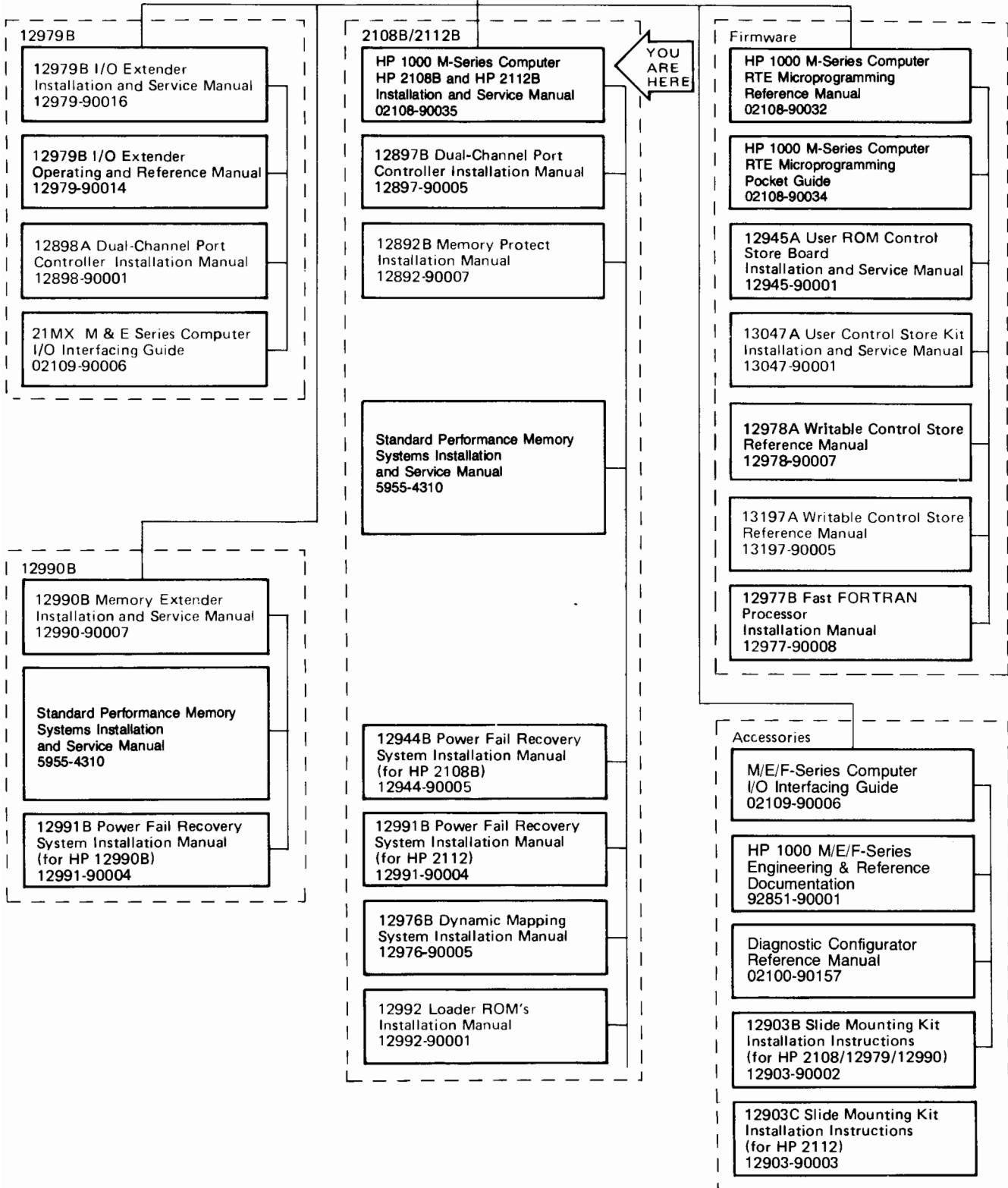
NOTE

In your HP 1000 M-Series Computer documentation, the terms "HP 1000" and "HP 21MX" are synonymous.

- a. *HP 1000 M-Series Computer HP 2108B and HP 2112B Operating and Reference Manual*, part no. 02108-90037.
- b. *HP 1000 M-Series Computer HP 2108B and HP 2112B Installation and Service Manual*, part no. 02108-90035.
- c. *Standard Performance Memory Systems Installation and Service Manual*, part no. 5955-4310.
- d. *HP 1000 M-Series Computer RTE Microprogramming Reference Manual*, part no. 02108-90032.
- e. *HP 12979B Input/Output Extender Installation and Service Manual*, part no. 12979-90016.
- f. *HP 12979B Input/Output Extender Operating and Reference Manual*, part no. 12979-90014.
- g. *HP 12990B Memory Extender Installation and Service Manual*, part no. 12990-90007.
- h. *HP 1000 Firmware Installation Manual*, part no. 12791-90001.
- i. *Diagnostic Configurator Reference Manual*, part no. 02100-90157.

DOCUMENTATION MAP

**HP 1000 M-Series Computer
 HP 2108B/HP 2112B
 Operating and Reference Manual I
 02108-90037**



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SAFETY CONSIDERATIONS



GENERAL - This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation.

SAFETY SYMBOLS



Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the product against damage.



Indicates hazardous voltages.



Indicates earth (ground) terminal (sometimes used in manual to indicate circuit common connected to grounded chassis).

WARNING

The **WARNING** sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in injury. Do not proceed beyond a **WARNING** sign until the indicated conditions are fully understood and met.

CAUTION

The **CAUTION** sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product. Do not proceed beyond a **CAUTION** sign until the indicated conditions are fully understood and met.

CAUTION

STATIC SENSITIVE DEVICES

Some of the semiconductor devices used in this equipment are susceptible to damage by static discharge. Depending on the magnitude of the charge, device substrates can be punctured or destroyed by contact or mere proximity to a static charge. These charges are generated in numerous ways such as simple contact, separation of materials, and normal motions of persons working with static sensitive devices.

When handling or servicing equipment containing static sensitive devices, adequate precautions must be taken to prevent device damage or destruction. Only those who are thoroughly familiar with industry accepted techniques for handling static sensitive devices should attempt to service the cards with these devices. In all instances, measures must be taken to prevent static charge buildup on work surfaces and persons handling the devices. Cautions are included through this manual where handling and maintenance involve static sensitive devices.

SAFETY EARTH GROUND - This is a safety class I product and is provided with a protective earthing terminal. An interruptible safety earth ground must be provided from the main power source to the product input wiring terminals, power cord, or supplied power cord set. Whenever it is likely that the protection has been impaired, the product must be made inoperative and be secured against any unintended operation.

BEFORE APPLYING POWER - Verify that the product is configured to match the available main power source per the input power configuration instructions provided in this manual.

If this product is to be energized via an auto-transformer (for voltage reduction) make sure the common terminal is connected to the earth terminal of the main power source.

SERVICING

WARNING

Any servicing, adjustment, maintenance, or repair of this product must be performed only by qualified personnel.

Adjustments described in this manual may be performed with power supplied to the product while protective covers are removed. Energy available at many points may, if contacted, result in personal injury.

Capacitors inside this product may still be charged even when disconnected from its power source.

To avoid a fire hazard, only fuses with the required current rating and of the specified type (normal blow, time delay, etc.) are to be used for replacement.

WARNING

EYE HAZARD

Eye protection must be worn when removing or inserting integrated circuits held in place with retaining clips.

INSTALLATION

SECTION

I

This section provides installation instructions for the computer mainframe. Included in these instructions are site preparation data, unpacking and inspection, configuration requirements, installation procedures, performance verification, and recommended packing and shipping methods.

1-1. SITE PREPARATION

Site preparation information for the computer mainframe includes environmental limitations, power requirements, and mounting considerations. If the computer is purchased as part of a computer system, disregard the contents of paragraphs 1-2 through 1-5 herein and refer instead to the Configuration and Site Preparation Guide for your system.

1-2. ENVIRONMENTAL LIMITATIONS

Environmental limitations for operating and non-operating conditions of the computer are specified in table 1-1. The environmental limitations imposed by peripheral devices and associated components must be taken into consideration when the computer is located in the same area.

Table 1-1. Computer Environmental Limitations

AMBIENT TEMPERATURE Operating: 0° to 55°C (32° to 131°F) Nonoperating: -40° to 75°C (-40° to 167°F)
ALTITUDE Operating: 4,570 metres (15,000 feet) Nonoperating: 12,190 metres (40,000 feet)
RELATIVE HUMIDITY 20 to 95% at 25° to 40°C (77° to 104°F) without condensation.

1-3. POWER REQUIREMENTS

The computer is shipped with the power supply configured to operate from a single-phase power source of 110 ±20% volts (standard) or 220 ±20% volts (option 015) as specified in the purchase order. Maximum power consumption of the HP 2108B and HP 2112B is 770 watts. Reconfiguring from 110V ac operation to 220V ac operation (or vice versa) is described in paragraph 2-59.

Various safety codes require that instrument chassis, panels, and housings be grounded to protect operating and service personnel. A grounded three-conductor female power outlet must be made available to satisfy this requirement.

1-4. COOLING REQUIREMENTS

There are no external cooling requirements for the computer. The internal fans provide adequate ventilation when operated within the environmental limitations specified in table 1-1. Adequate space must be allowed on each side to ensure full intake and exhaust of ventilating air.

1-5. MOUNTING CONSIDERATIONS

The computer may be used either as a freestanding device or mounted in a standard 483-millimeter (19-inch) equipment rack. When used in a mobile environment, the computer should be installed in a shock-mounted equipment rack. Rack-mounting dimensions for the computer are specified in table 1-2.

Table 1-2. Rack-Mounting Dimensions

COMPUTER	HEIGHT	WIDTH*	DEPTH**
HP 2108B	222 mm (8-3/4 in.)	426 mm (16-3/4 in.)	622 mm (24-1/2 in.)
HP 2112B	311 mm (12-1/4 in.)	426 mm (16-3/4 in.)	622 mm (24-1/2 in.)

*Behind rack mount.
**Required rack depth.

1-6. UNPACKING AND INSPECTION

The computer and accessories may be shipped in more than one container. When the shipment arrives, check to ensure the receipt of all containers as specified by the carrier's papers. Inspect each shipping container immediately upon receipt for evidence of mishandling during transit. If any container is damaged, or if any container is waterstained, request the carrier's agent be present when that container is opened.

Open the shipping container marked "MANUALS AND ACCESSORIES". One of the items in this package is a list of equipment supplied. Compare this list against the purchase order to verify that the shipment is correct. Unpack the shipping container(s) and inspect each item for external damage. Look for damage such as broken controls and connectors, dented corners, bent panels, scratches, and loose components. Check also the rigid foam-plastic cushioning (if used) for signs of deformation which could be indicative of rough handling during transit.

If the visual examination reveals any damage to the computer or accessories, follow the damage claim procedure described in paragraph 1-35. Retain the shipping container(s) and packing material for examination in the settlement of claims or for future reuse.

1-7. PHYSICAL INVENTORY

1-8. MANUALS

Check to ensure that all manuals listed on the list of materials have been received.

1-9. EQUIPMENT

1-10. COMPUTER. The computer model number and serial number are written on an identification label affixed to the lower front frame and covered by the Operator panel when closed. Ensure that both the model number and serial number are identical with those specified in the Installation Record. Typical identification and information labels are illustrated in figure 1-1.

If the computer 220V ac option is specified in the purchase order, it is installed and tested at the factory, and identified by the three-digit number, 015, written on the identification label and by the current/voltage rating on the metal tag attached to the rear panel of the power supply. Ensure that this number is identical with that specified in the Installation Record.

1-11. MEMORY SYSTEMS. The memory system and memory accessories specified in the purchase order are installed at the factory. The memory configuration is identified by the memory system model number and one or more accessory product numbers as illustrated in figure 1-1. Check these numbers to ensure the inclusion of the proper memory configuration specified in the Installation Record. Turn the key on the operator panel clockwise, lower the panel assembly to the memory access position, and remove the two screws and lockwashers holding the memory PCA cage cover. Remove the memory PCA cage cover and notice that the memory slot numbers are listed on the right-hand side of the memory PCA cage as shown in figure 1-2. These slot numbers are allocated to the functions listed in table 1-3, which shows that the memory controller PCA must be installed in slot 118 for an HP 2108B or in slot 123 for an HP 2112B.

1-2

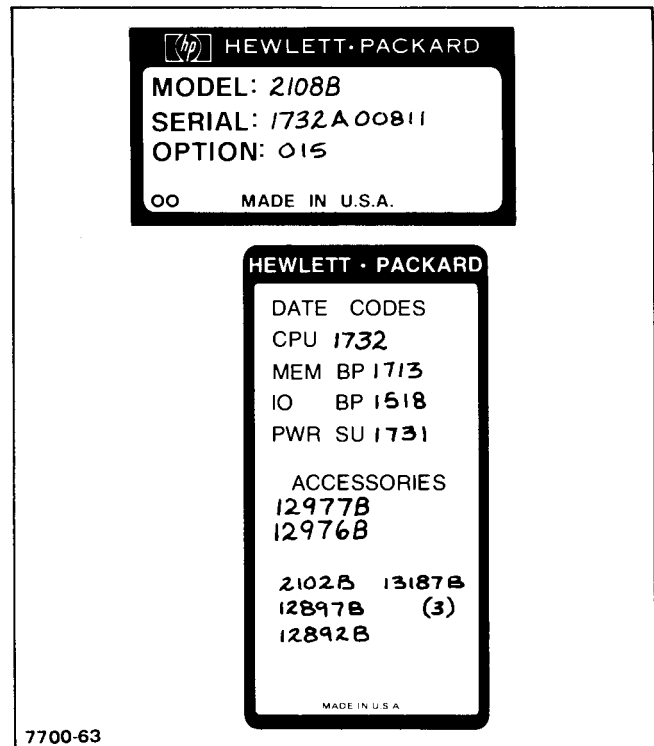
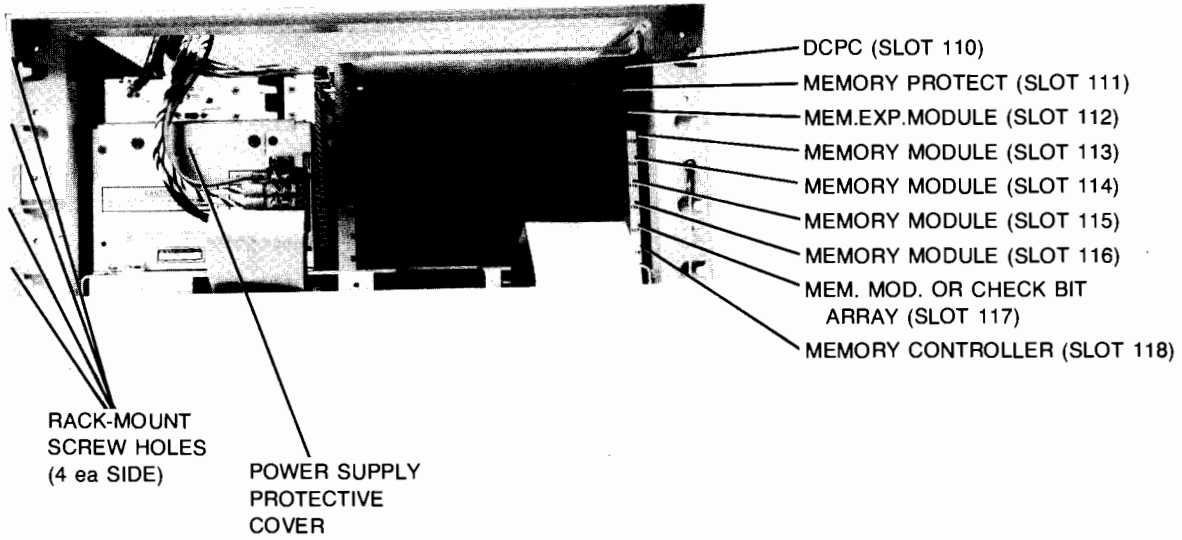


Figure 1-1. Typical Identification and Information Labels

Each memory module PCA may be either 16k, 32k, or 128k bytes (8k, 16k, or 64k words) of memory. With 128k byte memory modules, dynamic mapping in the computer, and a HP 12990B memory extender, main memory can be expanded to 1792k bytes in the HP 2108B and 2048k bytes in the HP 2112B computer. The memory modules may also be used with the Fault Control Memory Controller and Check Bit Array boards to provide a ten-fold or greater MTBF of the memory system. The Fault Control Memory system which consists of a controller and one or more check bit array boards, along with the appropriate number of memory modules, is capable of correcting all single-bit memory errors and of detecting all double-bit and most multiple bit errors. The fault control system is particularly valuable in computer systems with large amounts of memory, or where fault-secure operation is essential. Verify that all connectors are seated firmly onto the PCA's front edge connectors. Replace the memory PCA cage cover and secure the operator panel after closing by turning the key counter-clockwise until the panel is locked in place.

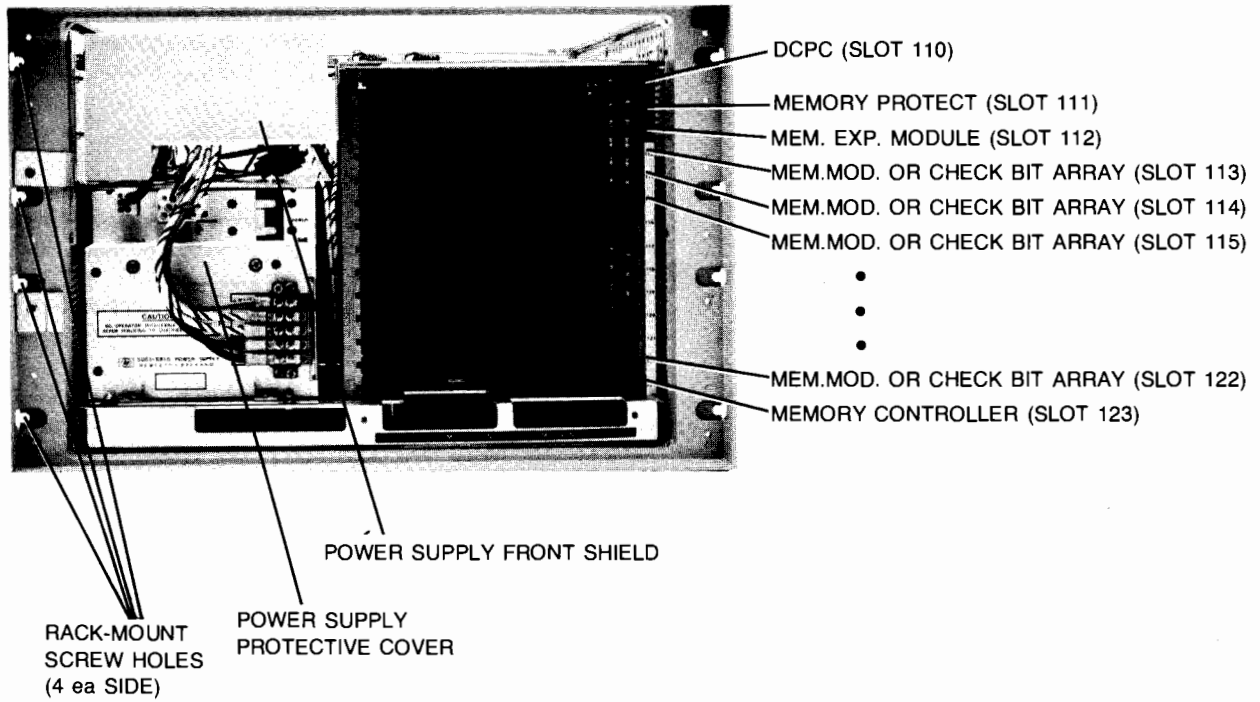
1-12. INPUT/OUTPUT INTERFACES. If input/output (I/O) interface PCA's have been ordered and are integrated into the computer system, loosen the captive screws holding the I/O cage cover in place at the rear of the computer as shown in figure 1-3. Verify that the proper I/O interface PCA's have been furnished in accordance with the purchase order and as specified in the Installation Record. Replace the I/O PCA cage cover.

HP 2108B COMPUTER



8300-14

HP 2112B COMPUTER



8300-11

Figure 1-2. Computer Memory PCA Cage (Cage Cover Removed)

Table 1-3. Memory Slot Assignments

MEMORY SLOT	2108B ASSIGNMENTS	2112B ASSIGNMENTS
110	Dual Channel Port Controller	Dual Channel Port Controller
111	Memory Protect PCA	Memory Protect PCA
112	Memory Expansion Module	Memory Expansion Module
113	Memory Module	Memory Module
114	Memory Module	Memory Module
115	Memory Module or Check Bit Array	Memory Module
116	Memory Module or Check Bit Array	Memory Module
117	Memory Module or Check Bit Array	Memory Module
118	Memory Controller*	Memory Module
119	—	Memory Module or Check Bit Array
120	—	Memory Module or Check Bit Array
121	—	Memory Module or Check Bit Array
122	—	Memory Module or Check Bit Array
123	—	Memory Controller*

*Memory Controller must be installed in highest numbered slot (slot 118 for HP 2108B and slot 123 for HP 2112B).

If I/O interface PCA's have been ordered separately, ensure that they have been furnished with the shipment and in accordance with the purchase order and as specified in the Installation Record.

When installing the I/O cables, ensure that the cables are connected with the cable-end on the right-hand side of the I/O Cage (nearest the power supply) as viewed from the rear of the computer. The I/O Cage Cover has an opening on this side to allow room for the cables.

1-13. I/O CABLES. Verify that all required cables for the interface PCAs have been furnished.

1-14. CONFIGURATION REQUIREMENTS

1-15. INTERNAL SWITCH SETTINGS

Remove the I/O PCA cage cover and locate the two toggle switches (A1S1 and A1S2) mounted on the rear of the central processor unit PCA. (See figures 1-3 and 1-4.) The position of switch A1S1 determines the action that the computer will take in the event of a parity error (or memory protect violation assuming that a memory protect PCA is installed) and the position of switch A1S2 will enable or disable the power fail/automatic restart capability. The proper setting of each switch depends on whether or not a user-written subroutine will be included to accommodate the required computer action. Therefore, refer to paragraphs 1-16 and 1-17 and then consult with the system programmer to determine the proper switch settings. Programming considerations concerning these switches are given in the *HP 21MX M-Series Computer HP 2108B and HP 2112B Operating and Reference Manual*, part no. 02108-90037.

1-16. PARITY ERROR SWITCH A1S1. The action that the computer will take when a parity error occurs is determined by the following alternative switch settings:

NOTE

Memory protect is an accessory available with the HP 2108B and HP 2112B Computers. As shown in table 1-3, the memory protect PCA is dedicated to memory slot 111.

- a. **HALT PE.** When switch A1S1 is in the HALT PE position and a parity error is detected during a read cycle, the computer will halt and light the PARITY indicator on the operator panel. The PARITY indicator will remain lighted until the PRESET switch is pressed.
- b. **INT/IGNORE.** When switch A1S1 is in the INT/IGNORE position and a parity error occurs, the computer will take one of the following two actions depending on whether or not the memory protect PCA is installed:
 - (1) If the memory protect PCA is installed and parity error interrupt has not been disabled by a CLF 05 instruction, an interrupt to memory location 00005 is generated.
 - (2) If the memory protect PCA is not installed, or if the memory protect PCA is installed but the parity error logic has been disabled by a CLF 05 instruction, the parity error will be ignored and the PARITY indicator will light and remain lighted until the PRESET switch is pressed.

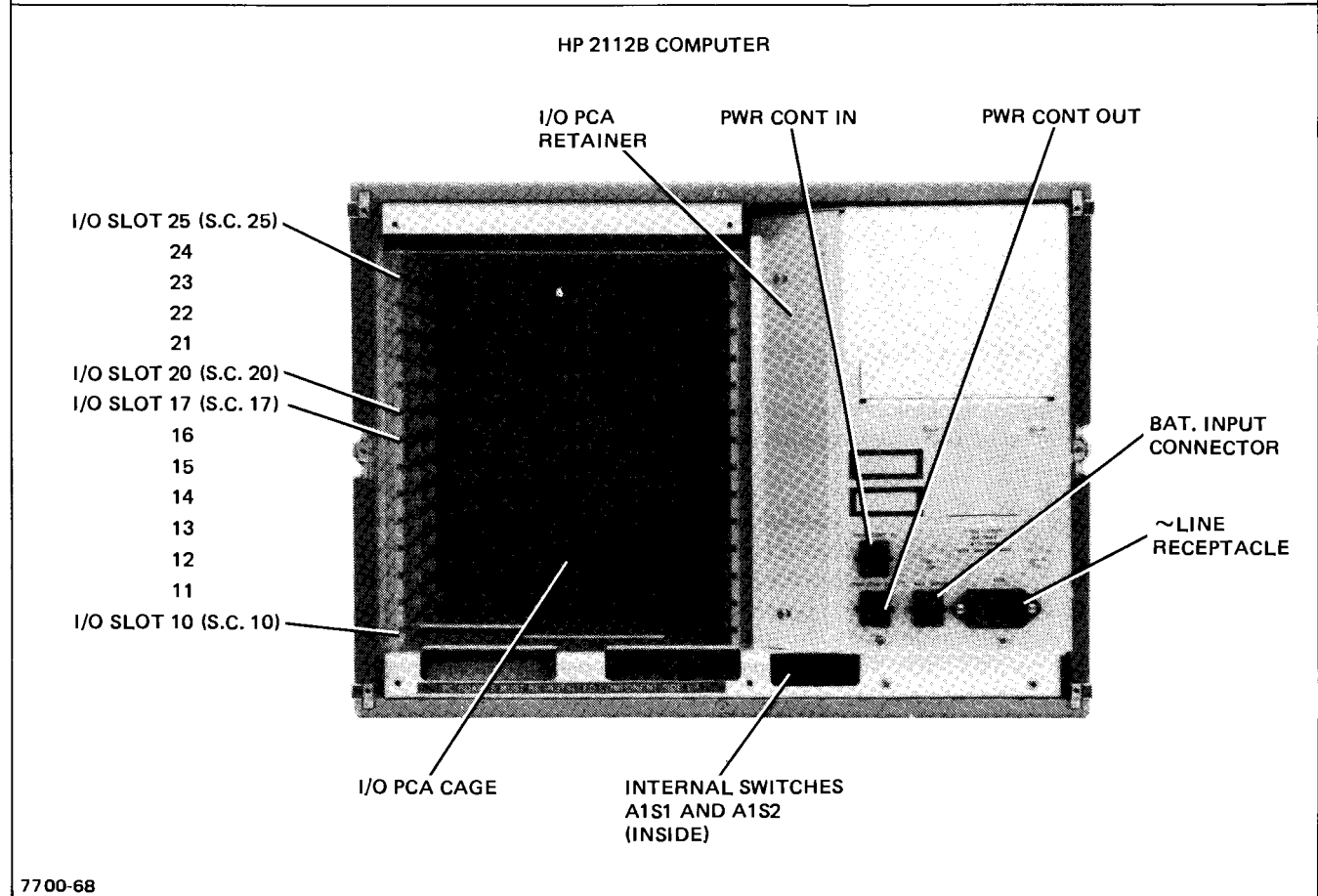
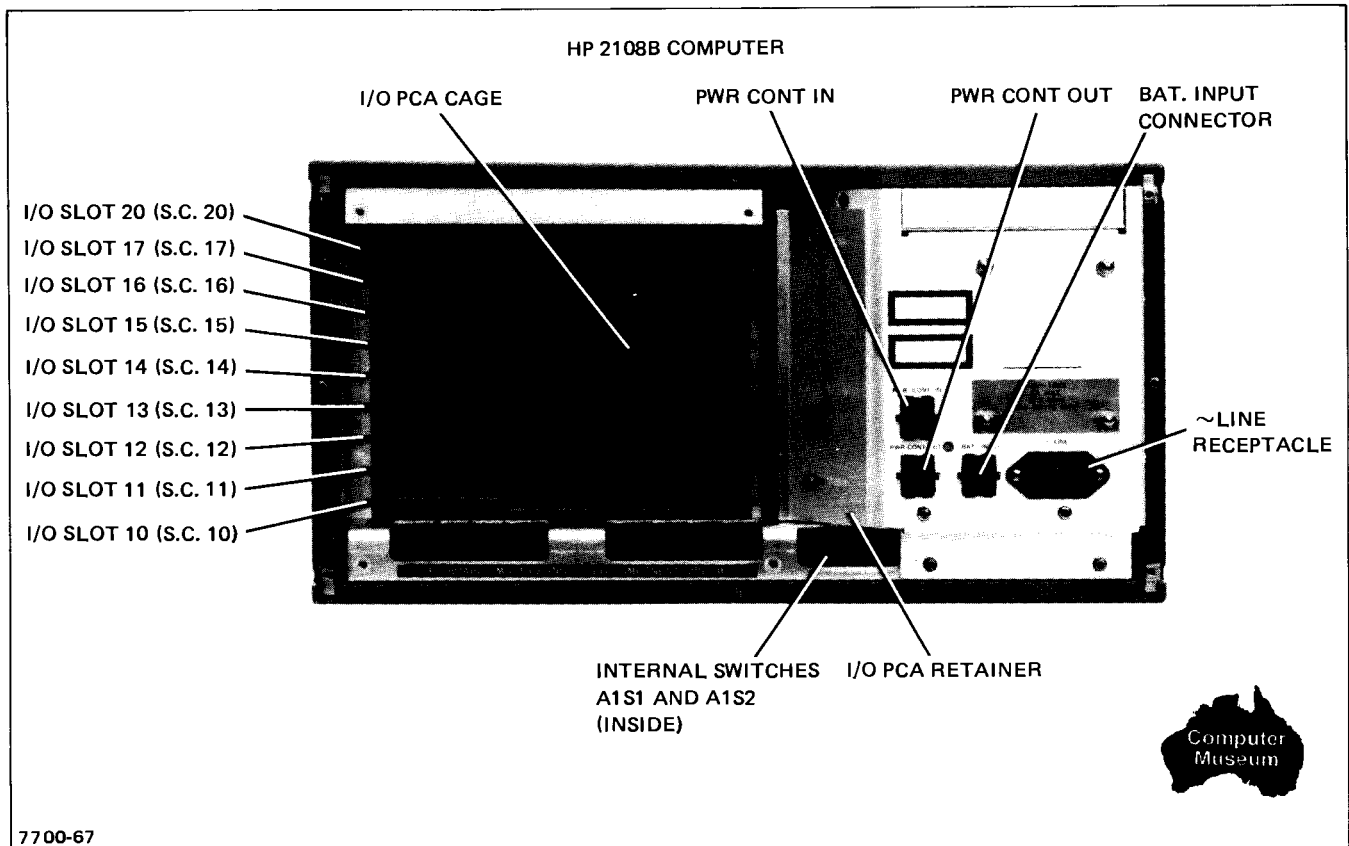


Figure 1-3. Computer I/O PCA Cage and Rear Panel

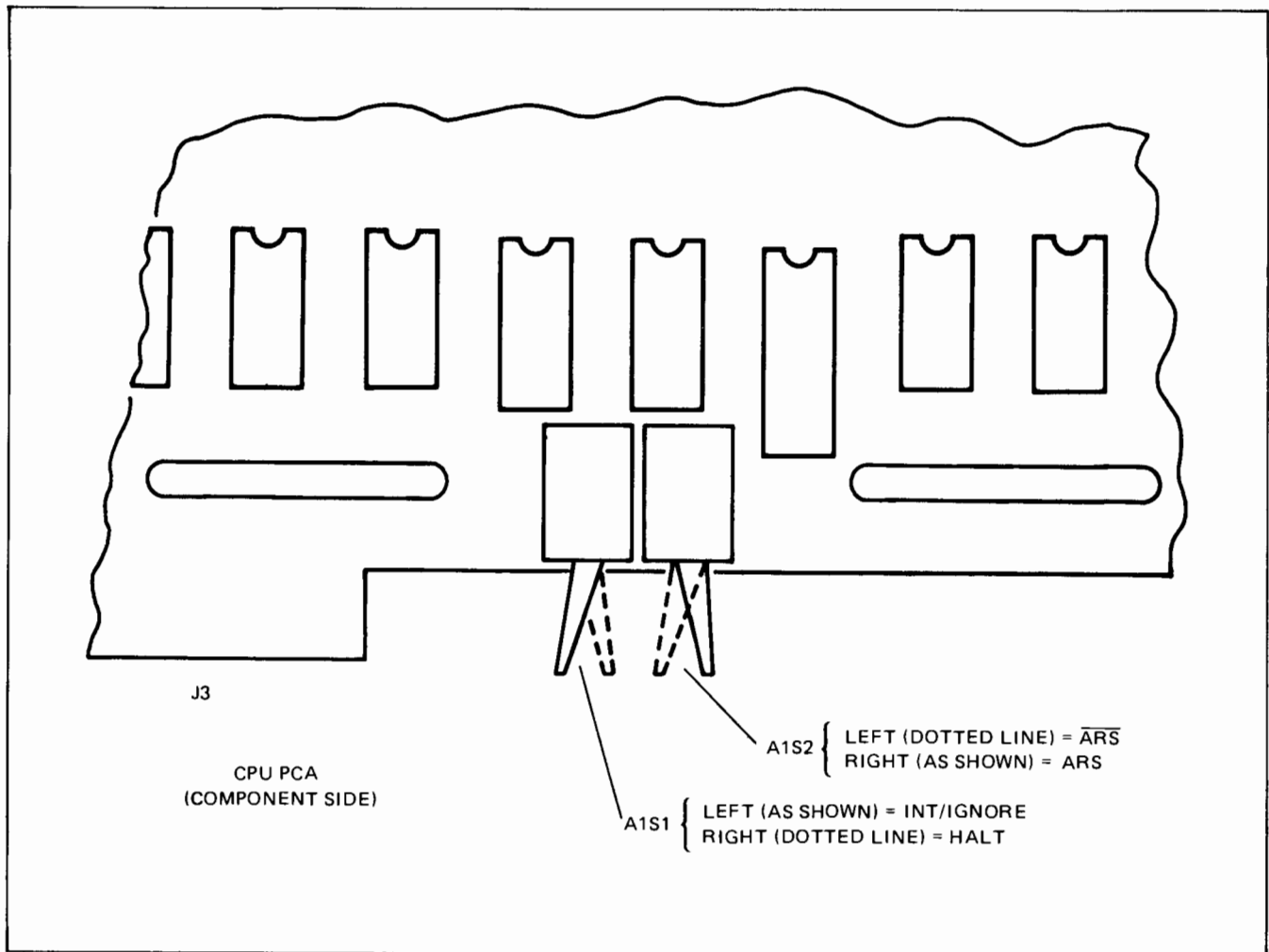


Figure 1-4. Internal Switch Configuration

1-17. AUTOMATIC RESTART SWITCH A1S2. The action that the computer will take upon the restoration of primary power (following a momentary or prolonged power failure) is determined by the following alternative switch settings:

- a. **ARS.** The automatic restart feature is enabled when switch A1S2 is in the ARS position. After a built-in time delay of about half a second following the return to normal power levels, the computer will interrupt to memory location 00004₈ provided that the memory was sustained. This permits entry into a restart program. If memory was not sustained, the computer will halt. The POWER FAIL indicator will light when power is restored regardless of whether or not memory was sustained.
- b. $\overline{\text{ARS}}$. The automatic restart feature is disabled when switch A1S2 is in the $\overline{\text{ARS}}$ position. The computer is halted immediately regardless of whether the computer was running or halted when the power failure occurred.

1-18. I/O PRIORITY ASSIGNMENT

Each peripheral device in the system must be connected to the computer through an interface PCA installed in the I/O PCA cage. A priority chain connects all interface PCA's in series to prevent simultaneous interrupt requests from two or more peripherals. The priority of the interface PCA is determined by the I/O slot that the PCA occupies, with slot 10 (select code 10₈) having the highest priority; the highest numbered I/O slot has the lowest priority. (See figure 1-3.) Interrupts from a higher priority device inhibit lower priority interrupts by breaking the priority chain. If the interrupt mode is used, there can be no vacant slots from select code 10₈ to the highest select code used due to the priority chaining scheme.

From a standpoint of time, it is more economical to assign the higher priorities to high-speed devices. However, if a subsystem could suffer catastrophic information loss if not serviced immediately, then that subsystem should be assigned the highest priority regardless of speed.

Refer to the individual interface or subsystem documentation for installation details concerning I/O PCA jumper assignments (if any) and priority considerations. Then confer with the system programmer to establish the desired I/O device priority and configure the I/O PCA cage accordingly.

1-19. INSTALLATION PROCEDURE

1-20. MANUAL UPDATING

Before installing the computer, perform any updating that may be required for the HP 21MX M-Series HP 2108B and HP 2112B Computer documentation. (A list of directly related hardware and software documentation is provided in the preface to this manual.) Updating instructions (if any) are provided in a supplement supplied with the appropriate document.

1-21. TOOLS AND TEST EQUIPMENT REQUIRED

1-22. TOOLS. No installation tools other than ordinary handtools are required.

1-23. TEST EQUIPMENT. Test equipment required to verify the adequacy of the ac power outlet and the proper adjustments of the computer power supply are listed in table 1-4.

1-24. AC POWER OUTLET AND EXTERNAL GROUND

The female power outlet to be used to supply ac power to the computer must be checked by a qualified electrician to ensure that it furnishes the proper voltage for which the computer is configured. The outlet and its associated wiring and fuses (or circuit breakers) must be capable of carrying the current specified on the label on the computer rear panel. (See paragraph 1-10.)

Figures 1-5 and 1-6 illustrate and provide the necessary details of the various ac power cord configurations. If the computer is to be installed in a building, make sure that the local electrical code permits the use of the type of power cord furnished with the computer.

Have a qualified electrician check the power outlet with an ac voltmeter to ensure that the required single-phase voltage is present. If the computer is configured for 110-volt operation, the line voltage must be in the range of 88 to 132 volts ac (rms); for 220-volt operation, the line voltage must be in the range of 176 to 264 volts ac (rms). Bear in mind that the electrical load imposed by the computer and its accessories may reduce the line voltage below the no-load value.

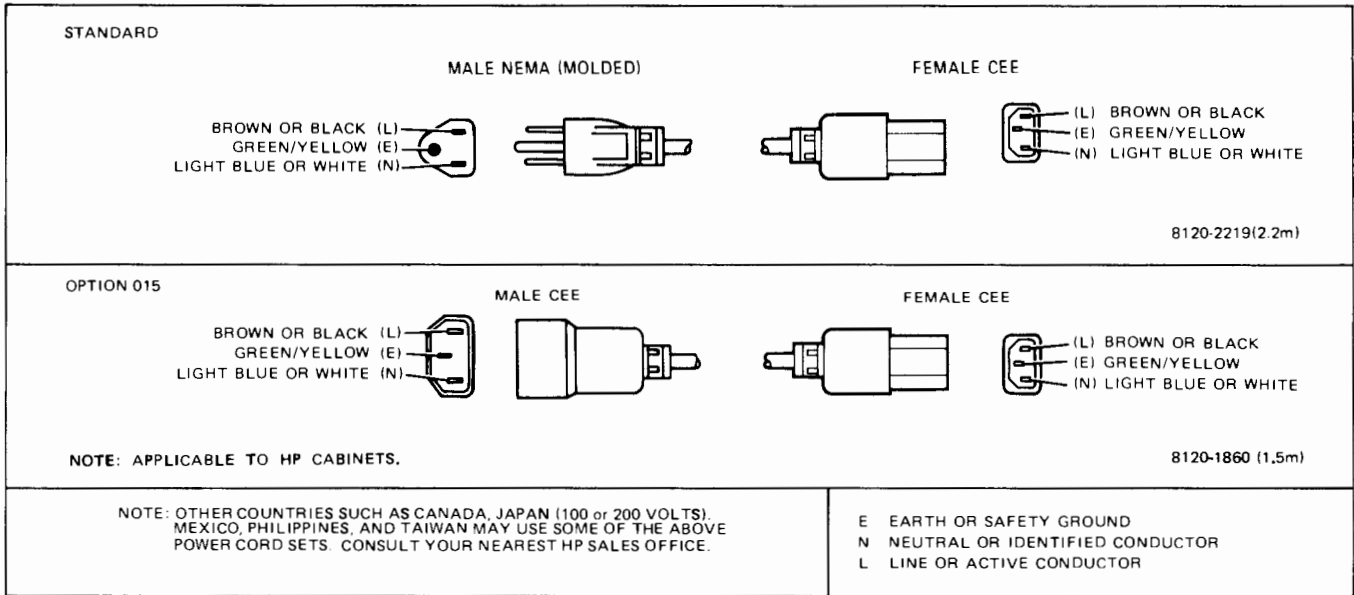
If the line voltage is in the correct range, have the electrician also check the power outlet to ensure that it is wired correctly with respect to ac high potential, ac neutral, and earth ground. If the outlet is wired improperly, correction must be made by a qualified electrician. Local electrical codes must be observed if the installation is inside a building.

For safety reasons, it is *mandatory* that a connection be made between the computer chassis and earth ground. For installation in a mobile environment (e.g., ship, aircraft, or train), the earth ground wire in the computer ac power cord must be connected to the hull or metal frame of the vehicle.

An uninterruptible safety earth ground connection of no more than 6 ohms resistance must be provided to the computer via the power cables from the service entrance ground bus in accordance with local electrical code requirements. In addition, the voltage differential between neutral and earth ground shall not exceed 1-volt when measured at the computer power line input terminals. The fluctuation of this value must not exceed 25 millivolts peak-to-peak.

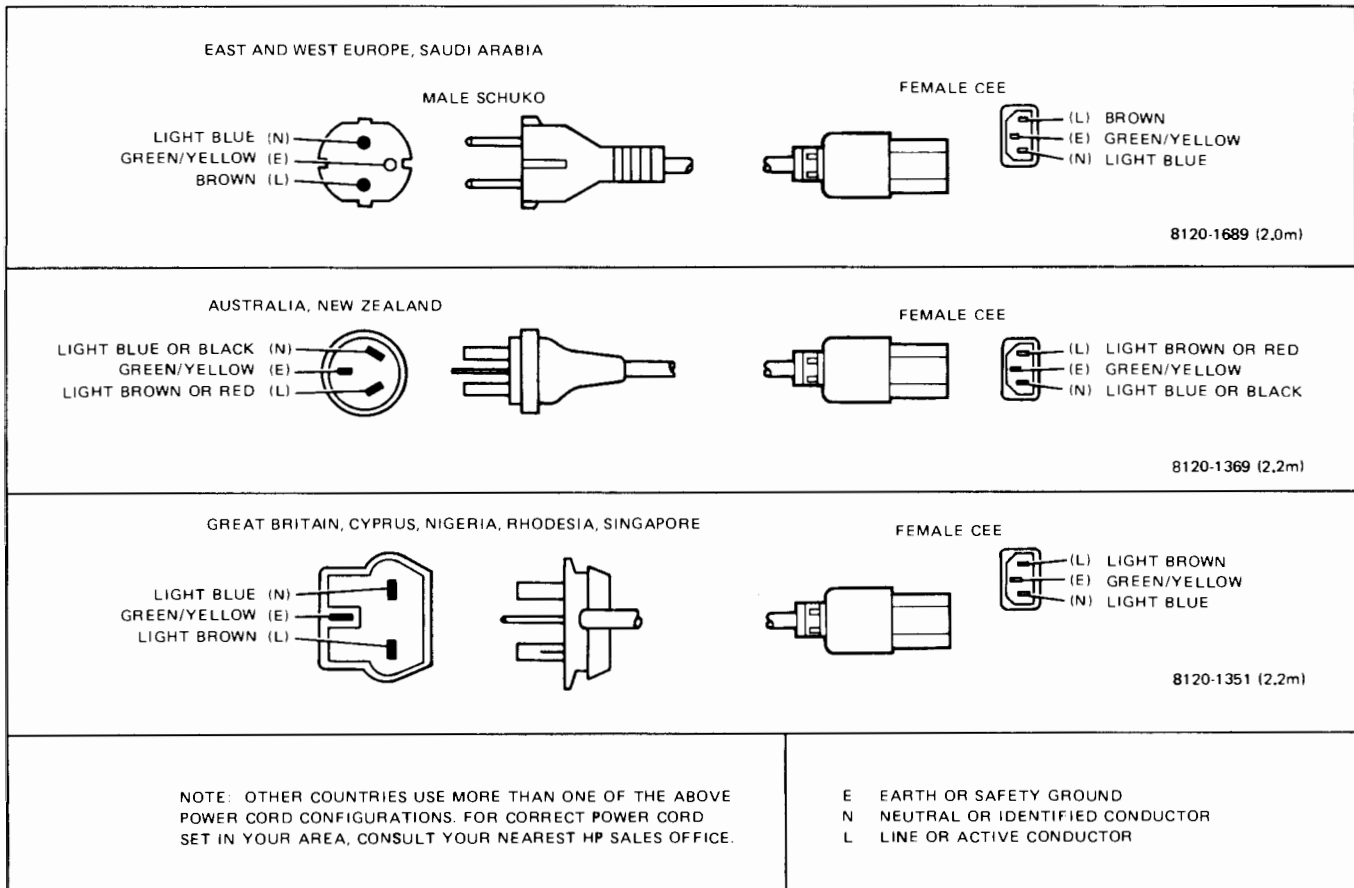
Table 1-4. Installation Test Equipment

INSTRUMENT	CRITICAL SPECIFICATIONS	RECOMMENDED MODEL
Digital Voltmeter	dc: At least four-digit readout. Minimum input impedance 10 megohms; full-scale ranges of 1.0000 and 100.00 volts dc. ac: Readout capable of measuring ac line voltage to $\pm 1.0\%$. Voltage range must be from 88 to 132 volts ac (standard) or 176 to 264 volts ac (option 015).	HP 34740A 4-digit display HP 34702A Multimeter Plug-In
Variable Autotransformer	Capable of reducing computer input line voltage to 80 volts ac (standard) or 160 volts ac (option 015); rated at least 1100 voltamperes.	None



7113.7

Figure 1-5. AC Power Cord Set (USA)



7113.8

Figure 1-6. AC Power Cord Sets (Non-USA)

1-25. COMPUTER MOUNTING

1-26. BENCH MOUNTING. As stated in paragraph 1-5, the computer may be used as a freestanding instrument in a land-based environment. The only consideration here is that adequate space be allowed on each side to ensure full intake and exhaust of ventilating air and that all covers are installed. Bear also in mind that a minimum 30.5 centimeters (12 inches) of clearance behind the computer rear panel is required when removing and installing input/output interface PCA's.

1-27. RACK MOUNTING. The following chassis slide kits are available for rack mounting the computers:

COMPUTER	CHASSIS SLIDE KIT
HP 2108B	HP 12903B
HP 2112B	HP 12903C

If a chassis slide kit has been ordered, mount the components to the sides of the computer and to the inside of the rack according to the instructions furnished with the kit. Then install the computer in the rack and secure the computer in place with screws inserted through the mounting holes identified in figure 1-2. The HP 2108B is light enough to allow installation in the rack without being supported by any means other than the rack-mounting screws; however, it is strongly recommended that additional support be provided by chassis slides or slide rails. It is recommended that the HP 2112B be supported by chassis slides or slide rails.

WARNING

Ensure cabinet or system stability before extending computer on its chassis slides.

1-28. POWER SUPPLY CHECK

Verify the tolerances of the various power supply voltages as described in the following paragraphs. The power supply should be checked with all memory and I/O PCA's installed in the computer.

1-29. POWER SUPPLY ACCURACY. Energize the digital voltmeter and allow sufficient warm-up to reach its rated accuracy. Proceed as follows:

WARNING

Hazardous voltages are present inside the computer mainframe!! Only qualified service personnel should perform the power supply accuracy checks. Before performing the power supply accuracy checks, set ~POWER switch to OFF and DISCONNECT THE POWER CORD!! Failure to observe this precaution can result in serious injury.

- a. Turn the key on the operator panel fully clockwise and lower the panel to the access position.
- b. Plug computer power cord into the power outlet and set computer ~POWER switch to ON. Set the LOCK/OPERATE switch to OPERATE.
- c. Check the fault status LED on the front of the power supply. The LED is visible through the hole indicated in figure 1-7.

NOTE

If the fault status LED is ON or FLASHING, a fault condition exists. Notify the nearest Hewlett-Packard Sales and Service Office. A list of Sales and Service Offices is provided at the rear of this manual.

- d. If the fault status LED is OFF, proceed and check the tolerances of all output voltages at the crossover test points. Test points are shown in figure 1-8 and tolerances are listed in table 1-5.

NOTE

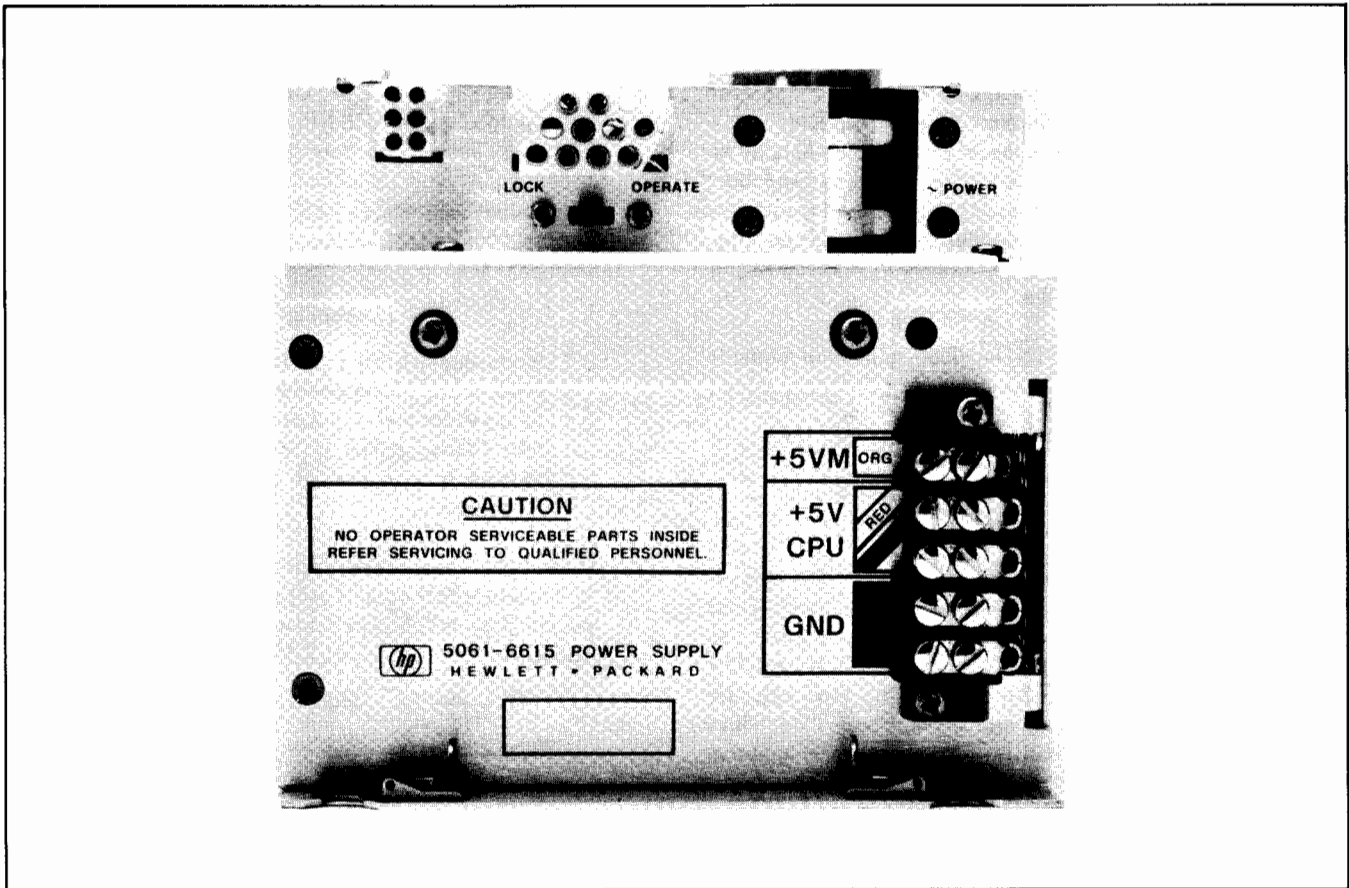
If one or more voltages are out of tolerance, notify the nearest Hewlett-Packard Sales and Service Office. A list of Sales and Service Offices is provided at the rear of this manual.

1-30. POWER-UP THRESHOLD. The power-up threshold is below the lower limit of the mains voltage configuration, 88 volts rms (standard) or 176 volts rms (option 015). This threshold is non-adjustable.

Table 1-5. Computer Power Supply Voltages and Tolerances

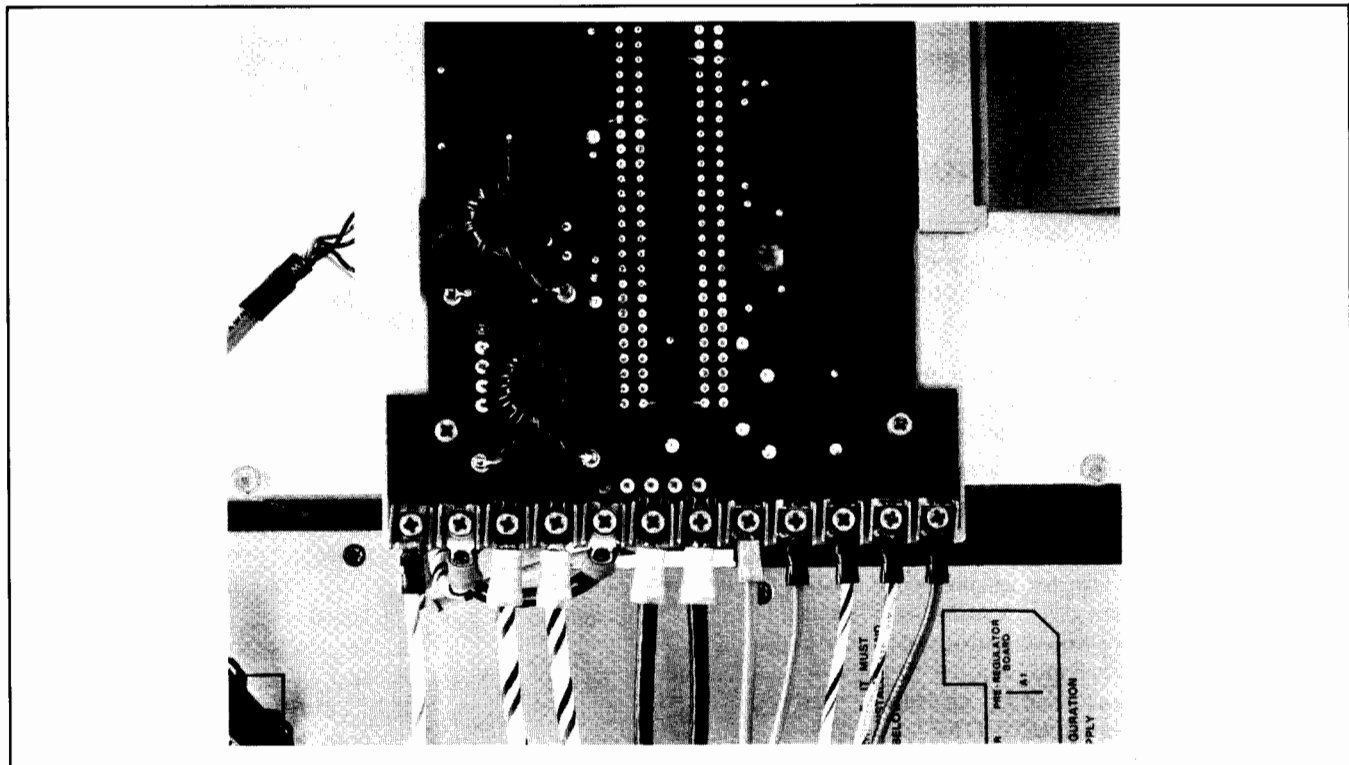
SUPPLY VOLTAGE	MAXIMUM CURRENT	SUPPLY VOLTAGE		TEST POINT
		UPPER LIMIT	LOWER LIMIT	
+5V I/O	50A	+5.25Vdc	+5.00Vdc	A6 Crossover Assy +5V
+5V M	4.5A	+5.25Vdc	+5.00Vdc	A6 Crossover Assy +5M
+12V* I/O	2.5A	+12.6Vdc	+11.4Vdc	A6 Crossover Assy +12V
+12V M	2.0A	+12.6Vdc	+11.4Vdc	A6 Crossover Assy +12 M
-2V I/O	4.0A	-2.2Vdc	-1.8Vdc	A6 Crossover Assy -2V
-12V I/O	2.0A	-12.6Vdc	-11.4V	A6 Crossover Assy -12V
-12V M	250mA	-16Vdc (Unregulated)	-9Vdc	A6 Crossover Assy -12M
+30V I/O	250mA	+42Vdc (Unregulated)	+22Vdc	A6 Crossover Assy J2 Pin 4

*Recommended setting is + 12.5Vdc.



8300-13

Figure 1-7. Power Supply Fault Status LED



8300-12

Figure 1-8. Crossover PCA Voltage Test Points

1-31. INTERFACE PCA

1-32. INTERFACING CABLING. Cable requirements to interconnect interface PCA's and associated peripherals are specified in the appropriate interface kit or subsystem documentation. After all interface cables have been assembled, lower the operator panel to the access position, set the ~ POWER switch to OFF, disconnect the battery cable, if present, and remove the input/output PCA cage cover. Install the hooded connector of each cable onto the edge connector of the interface PCA's from the right-hand side, as viewed from the rear of the computer. Connect the opposite end of each cable to the appropriate peripheral device, replace the I/O PCA cage cover. Ensure that the BATTERY switch is OFF and connect the battery cable, if present, to the BAT INPUT connector.

NOTE

If the power fail recovery system boards (A3A3 and A3A4) are installed in the power supply, the computer *will not* start if the battery cable is not connected or connector 12991-60002 is not connected to the BAT INPUT connector.

Set the LOCK/OPERATE switch to OPERATE and the ~ POWER switch to ON, and if a power fail recovery system is installed, set the BATTERY switch to INT.

1-33. PERFORMANCE VERIFICATION CHECK

Verify the system installation and operation by running the diagnostic programs outlined in figure 2-1 sheet 2 of this manual. The following hardware is required for the diagnostic:

- a. At least 8k bytes of memory.
- b. A diagnostic input device.

1-34. CLAIMS PROCEDURE

If the shipment is incomplete or if the equipment is damaged or fails to meet specifications, notify the nearest Hewlett-Packard Sales and Service Office. If damage occurred in transit, notify the carrier also. Hewlett-Packard will arrange for replacement or repair without waiting for settlement of claims against the carrier. In the event of damage in transit, retain the packing carton and packing materials for inspection.

1-35. REPACKAGING FOR SHIPMENT

CAUTION

When shipping the computer with a power fail recovery system installed, the following procedure must be followed:

- a. The battery box must be securely fastened to the computer.
- b. Set the BATTERY switch to OFF, disconnect the battery cable from the BAT INPUT connector and place protective sleeving or masking tape over the battery connector.
- c. Place protective sleeving or masking tape over the BAT INPUT connector.

When shipping a power fail recovery system that is not installed in the computer, follow steps b and c above.

1-36. SHIPMENT USING ORIGINAL PACKAGING

The same containers and materials used in factory packaging can be used for reshipment of the computer. Alternatively, containers and packing materials may be obtained from Hewlett-Packard Sales and Service Offices. If the computer is being returned for servicing, attach a tag to the computer specifying the type of service required together with the computer model number and full serial number. Mark the container "FRAGILE" to ensure careful handling. In any subsequent correspondence, refer to the computer by model number and full serial number.

1-37. SHIPMENT USING NEW PACKAGING

The following instructions should be used as a guide when packaging the computer with commercially available materials:

- a. Wrap the computer in heavy paper or sheet plastic. If shipping the computer back to Hewlett-Packard, first attach a tag to the computer with the return address and indicating the type of service required. Include the computer model number and full serial number.
- b. Use a strong shipping container. A double-wall carton constructed of 2.41 MPa (350-psi) test material is adequate.
- c. Use sufficient shock-absorbing material on all sides of the computer to provide a firm cushion and to prevent movement inside the container. Use particular care to protect the computer corners and front and rear panels.
- d. Seal the shipping container securely and mark it "FRAGILE".
- e. In any subsequent correspondence with Hewlett-Packard refer to the computer by model number and full serial number.

This section includes preventive maintenance; a troubleshooting flowchart for isolating malfunctions to the subassembly level; procedures for removing and replacing the various computer subassemblies; and a listing of the backplane signal sources and destinations, signal mnemonics, and mnemonic definitions. Also included are a simplified block diagram and a power distribution diagram.

2-1. PREVENTIVE MAINTENANCE

The preventive maintenance outlined in table 2-1 should be performed on a semiannual basis under normally clean operating conditions. If the adverse conditions are more severe, perform the preventive maintenance as often as necessary.

Table 2-1. Preventive Maintenance

1. Clean equipment exterior and interior.
2. Using digital voltmeter (table 1-4), check power supply voltages as specified in paragraph 1-29.
3. Check fans for proper operation.
4. Check operation of all operator panel switches and indicators.
5. If installed, perform Fault Control Preventive Maintenance as specified in paragraph 2-56.
6. Perform the verification check as specified in paragraph 1-34.

2-2. TROUBLESHOOTING

2-3. SUBASSEMBLY LEVEL

Computer malfunctions can be isolated to the subassembly level by performing in sequence the procedure presented in figure 2-1. When a malfunction is encountered, replace the first suspect subassembly and repeat that portion of the procedure where the malfunction occurred. (Subassembly removal and replacement procedures are given in following paragraphs.) If the malfunction persists, reinstall the original subassembly, replace the next suspect subassembly, and again repeat the procedure. After the malfunction is cleared, contact the nearest Hewlett-Packard Sales and Service Office for instructions regarding shipment of the defective subassembly.

2-4. SOFTWARE DIAGNOSTIC. The Semiconductor Memory Diagnostic binary tape, part no. 24395-16001, and *Semiconductor Memory Diagnostic Reference Manual*, part no. 24395-90001, are required if testing of computer memory is desired. Procedures for loading and running the diagnostic are given in the reference manual. Included also in the reference manual is a list of error and information halts. To isolate memory failures, perform the diagnostic procedures as outlined in the reference manual.

2-5. SUBASSEMBLY REMOVAL AND REPLACEMENT

WARNING



Hazardous voltages are present inside the computer mainframe. Use extreme care when working around the power supply area. Heed all WARNING — HAZARDOUS VOLTAGE labels.

CAUTION

All contents of memory will be lost when the mains (line) and battery voltages are both off. Therefore, before proceeding, ensure that any contents of memory to be saved are stored in another medium for later retrieval.

The following paragraphs, which describe procedures for removing and replacing the various computer and memory system subassemblies shown in figures 3-1, 3-2, and 3-3 assume that the computer is installed as a freestanding device. If the computer is rack mounted, read the entire subassembly removal procedure and refer to figures 3-1, 3-2 or 3-3 as appropriate. When it is obvious that the procedure cannot be performed with the computer in the rack, proceed as follows:

- a. Set BATTERY and ~ POWER switches to OFF; disconnect power cord.
- b. Disconnect all I/O cables, including the I/O extender cable if present.
- c. Remove computer from rack.

2-6. TOP, SIDE, AND BOTTOM COVERS**WARNING**

Hazardous voltages are exposed when the covers are removed and ac power applied.

2-7. REMOVAL. Remove the top, side, and bottom cover as follows:

- a. Loosen screw located in rear fold of top (or bottom) cover. Slide top (or bottom) cover toward rear and remove.
- b. Remove chassis slide(s), if present. On an HP 2108B, loosen screw in rear fold of side cover; slide cover toward rear and remove. On an HP 2112B, remove the two screws and washers from center of side cover; slide cover toward rear and remove.

2-8. REPLACEMENT. Replace covers in the reverse order of the removal procedure.

2-9. CONTROL STORE ROM PCA'S

2-10. REMOVAL. Set the POWER and BATTERY switches to OFF, remove the bottom cover, and proceed as follows:

- a. Remove the three screws and lockwashers securing ROM PCA 3 to CPU PCA. Carefully disconnect ROM PCA 3 from ROM PCA 2 and remove.
- b. Remove the three screws and lockwashers securing ROM PCA 2 to CPU PCA. Carefully disconnect ROM PCA 2 from ROM PCA 1 and remove.
- c. Disconnect ROM connector assembly from ROM PCA 1 and CPU PCA. Remove the three screws and lockwashers securing ROM PCA 1 to CPU PCA and remove.

2-11. REPLACEMENT. Replace control store ROM PCA's in reverse order of the removal procedure.

2-12. CENTRAL PROCESSOR UNIT PCA

2-13. REMOVAL. Set the ~ POWER and BATTERY switches to OFF, remove the bottom cover, and proceed as follows:

- a. Disconnect operator panel cable assembly from CPU PCA front edge connector; remove Control Store ROM PCA's (if installed) and connector assembly.
- b. Remove the 12 screws and lockwashers securing CPU PCA to bottom of computer mainframe.

- c. Remove the three nuts and six washers from power terminals located in center of CPU PCA. (See figure 2-2.)
- d. Carefully disengage CPU PCA from memory and I/O backplanes.

2-14. REPLACEMENT. Install CPU PCA in the computer mainframe as follows:

- a. Carefully insert power terminals in center of CPU PCA as shown in figure 2-2. Secure power terminals to CPU PCA with the three nuts and six washers.
- b. Position CPU PCA with receptacles A1XA4 and A1XA5 in contact with I/O backplane and memory backplane connectors.
- c. Press inward on back of A1XA4 and A1XA5 to seat backplanes fully into CPU PCA receptacles.
- d. Replace the 12 screws and lockwashers securing CPU PCA to bottom of computer mainframe.
- e. Replace the Control Store ROM PCA's (if installed) and connector assembly, and connect operator panel cable assembly to CPU PCA front edge connector. Replace bottom cover.
- f. Set ~ POWER switch to ON and BATTERY switch to INT.

2-15. OPTIONAL LOADER ROM'S

Optional loader ROM's, if installed, are mounted in 16-pin IC sockets on the component side of the CPU PCA. (See figure 2-3.) Therefore, the CPU PCA must be removed from the processor mainframe when removing or installing the optional loaders.

2-16. OPERATOR PANEL PCA

2-17. REMOVAL. Turn the key clockwise on the operator panel and lower it to the access position.

- a. Disconnect operator panel cable assembly from CPU PCA front edge connector.
- b. Remove the four screws, flatwashers, and lockwashers from operator panel PCA cover; remove operator panel PCA cover.
- c. Remove the seven screws and lockwashers securing operator panel PCA to operator panel; remove operator panel PCA.

2-18. ROCKER SWITCH CONTACTS. Defective rocker switch contacts on the operator panel PCA are replaced as follows:

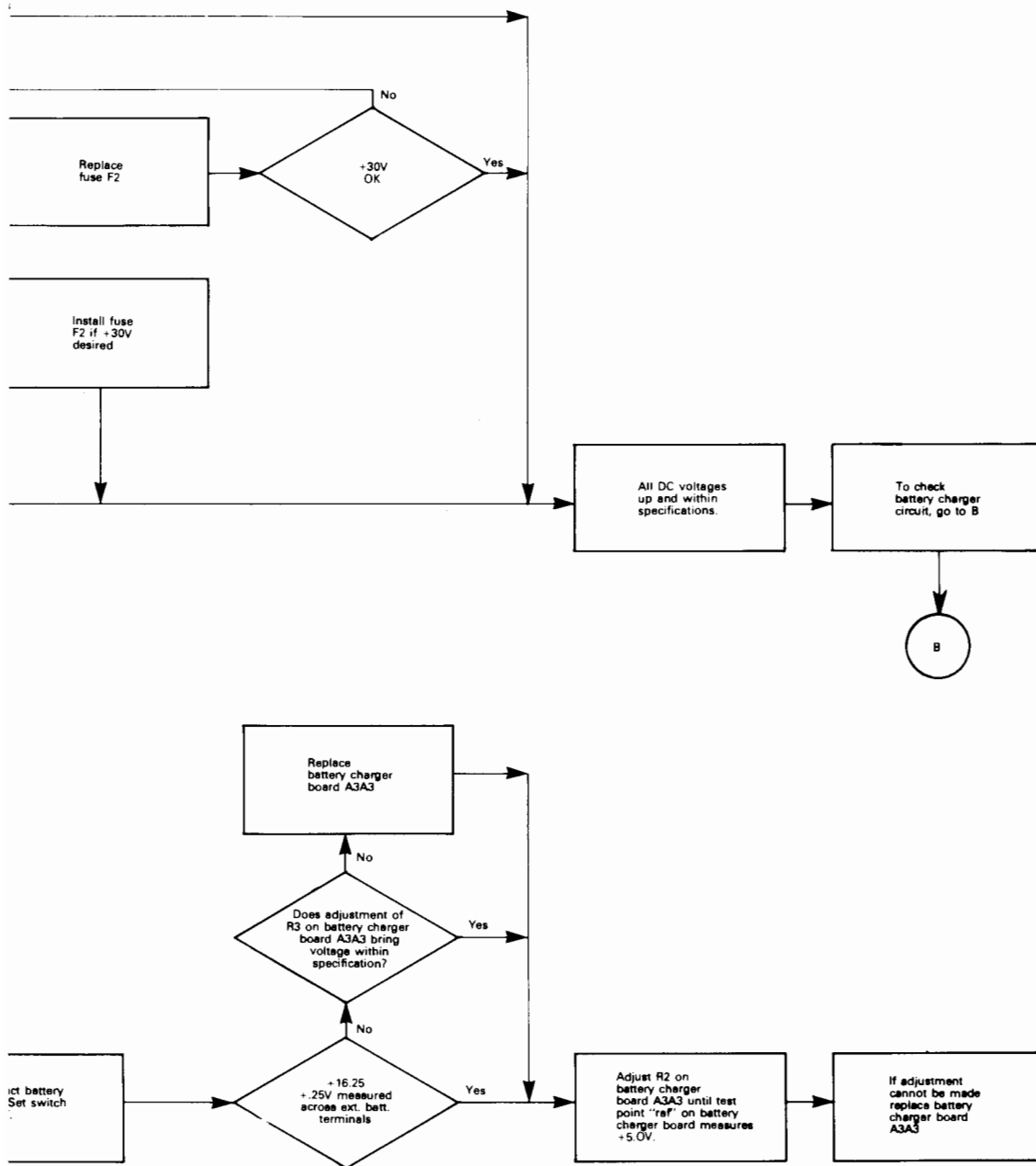
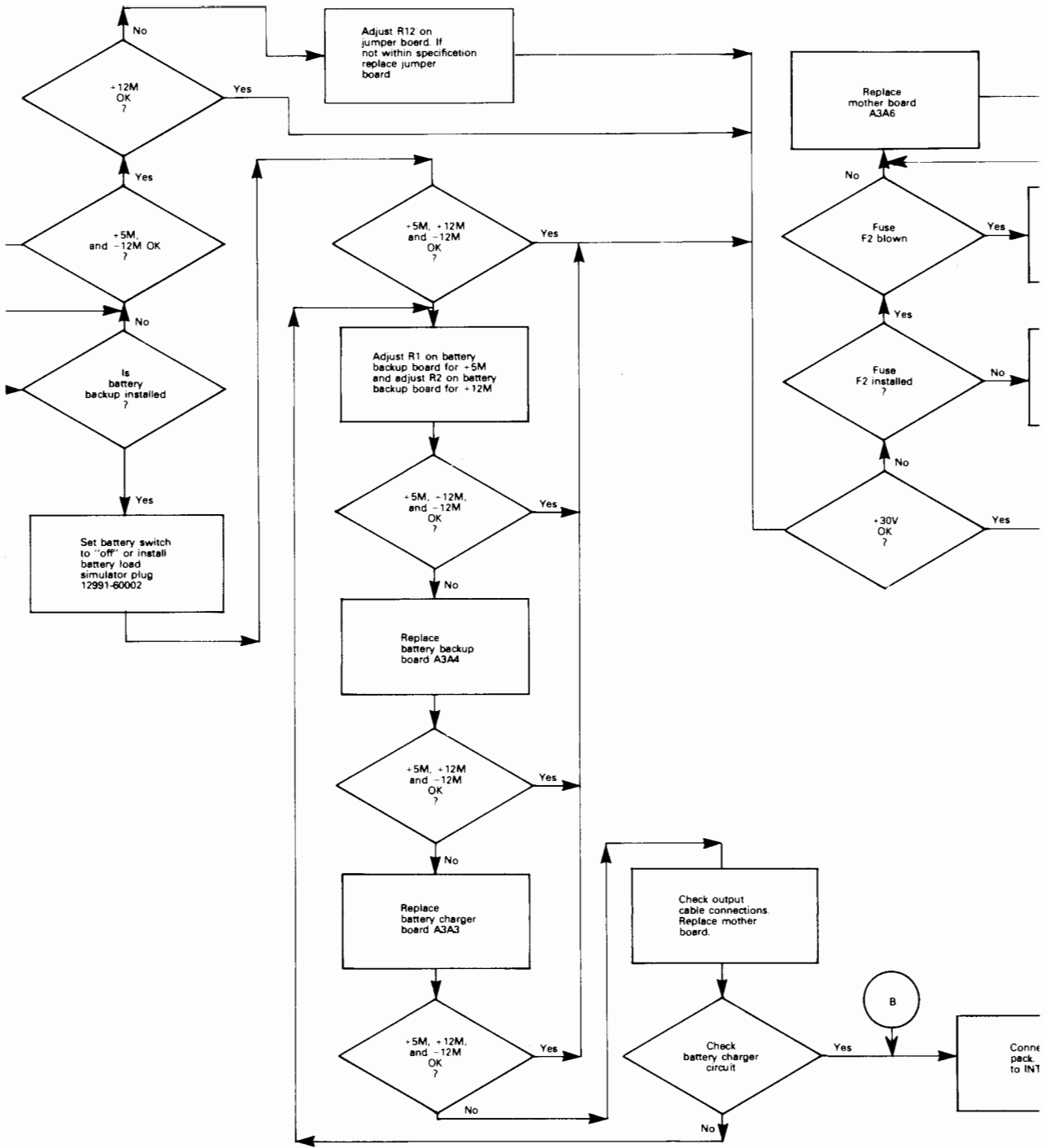
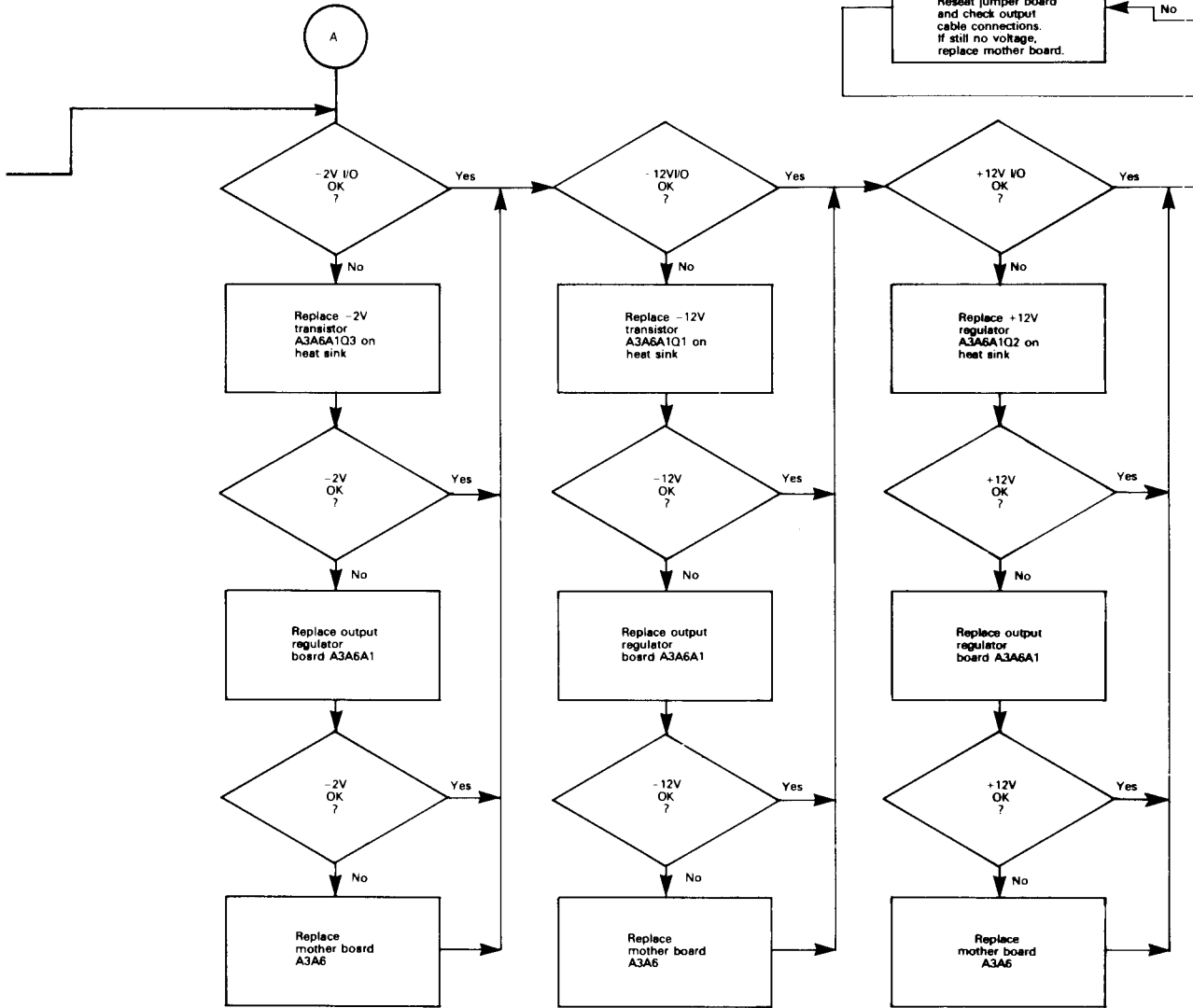


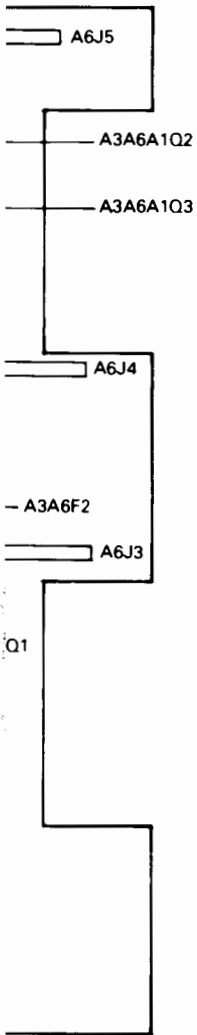
Figure 2-1. Troubleshooting Flowchart (Sheet 1 of 2)
Power Supply Operation



Yes
 Excessive inrush current.
 Check for shorted DC output
 voltage, or internal power
 supply short, replace CB1
 if necessary.

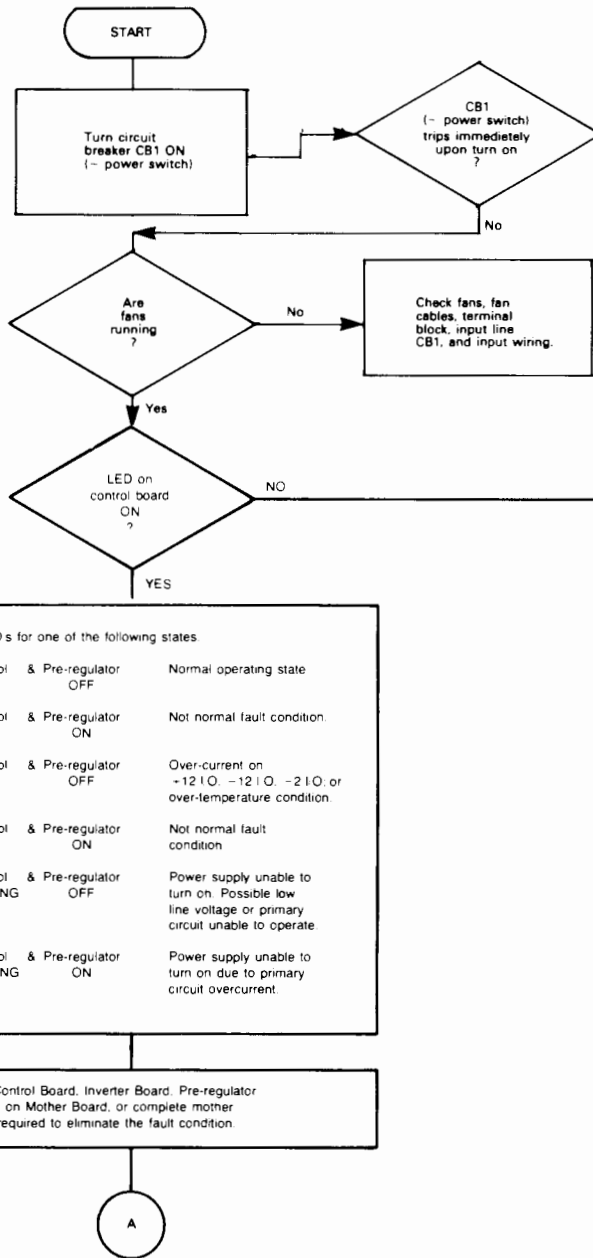
No
 These voltages are
 direct connections to
 +5 CPU and -12 I/O.
 Reset jumper board
 and check output
 cable connections.
 If still no voltage,
 replace mother board.





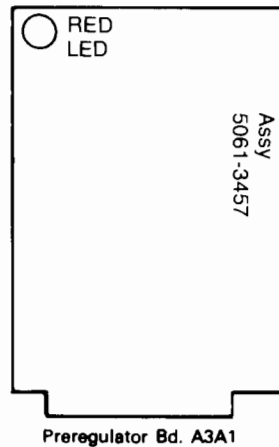
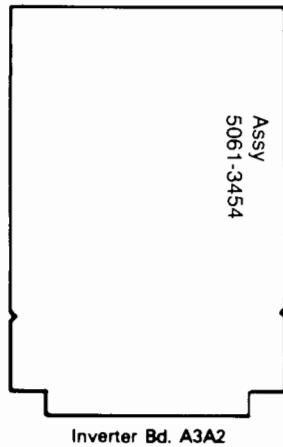
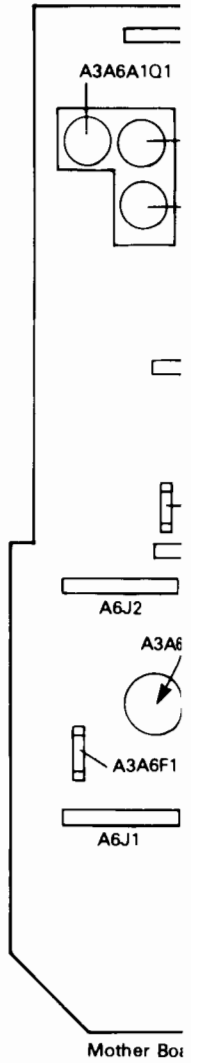
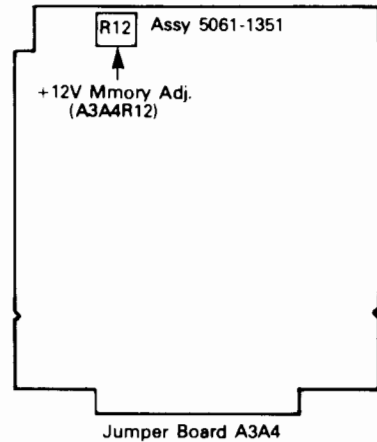
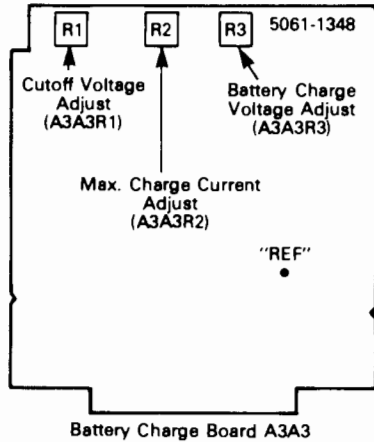
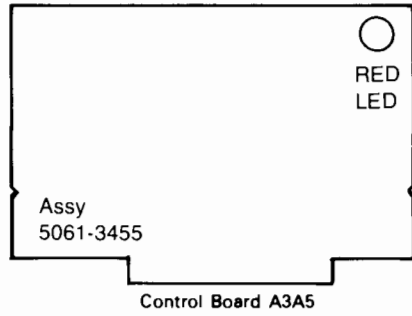
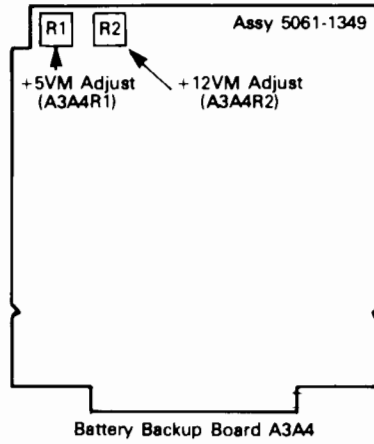
rd A3A6

ower
upply A3.
061-3476

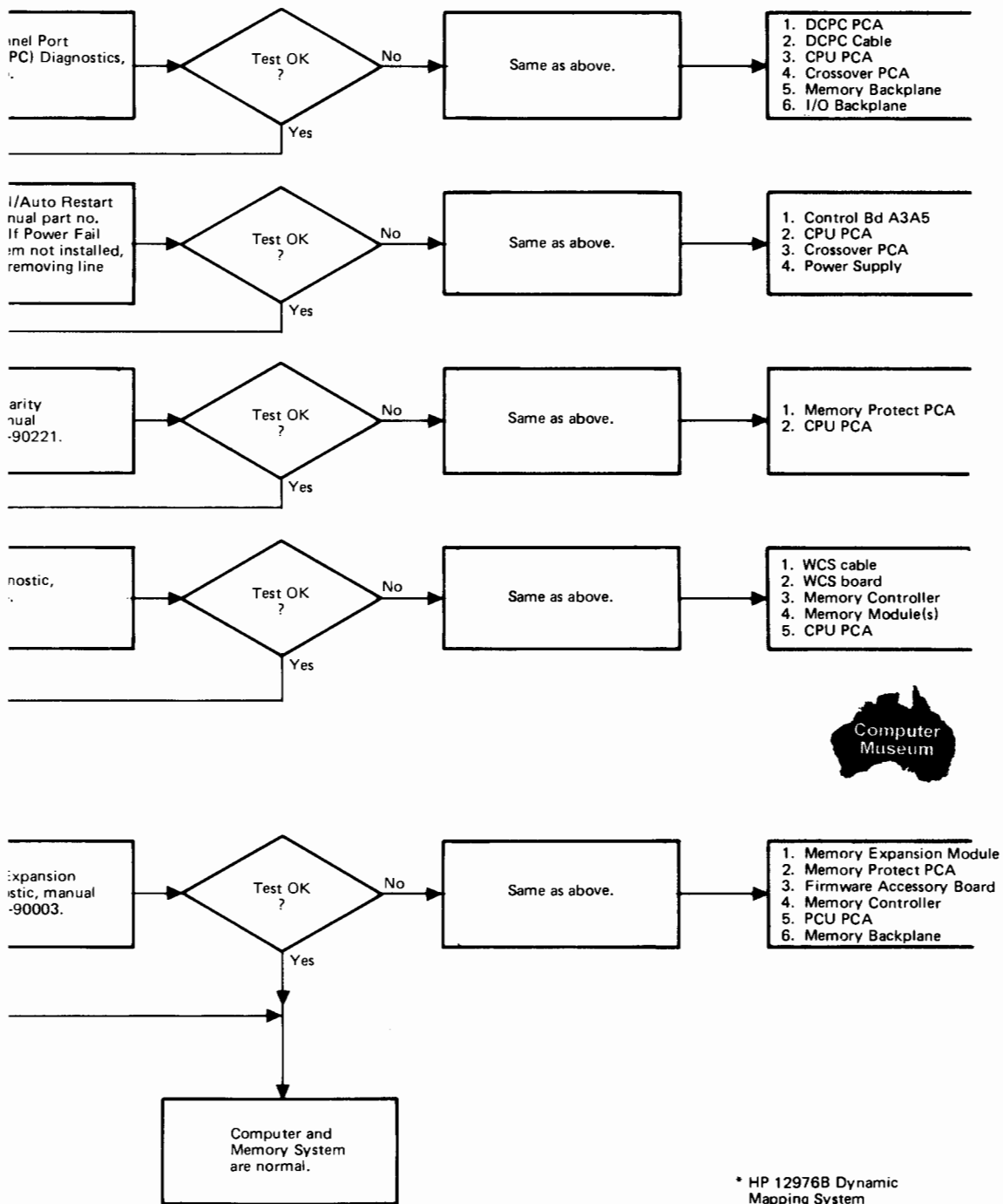


Power
Fail
12991B

PARTS LOCATION FOR THE POWER SUPPLY



Description	New Part #
Preregulator Bd, A3A1	5061-3457
Inverter Bd, A3A2	5061-3454
Jumper Bd, A3A4	5061-1351
Control Bd, A3A5	5061-3455
Mother Bd, A3A6	5061-1371
Output Regulator Bd, A3A6A1 (Mother Bd subassembly)	5061-3403
A3A6A1Q3 - 2V I/O Transistor	1854-0063
A3A6A1Q1-12V I/O Transistor	1854-0611
A3A6A1Q2 +12V Regulator	1813-0093
Battery Charge Bd, A3A3	5061-1348
Battery Backup Bd, A3A4	5061-1349



* HP 12976B Dynamic Mapping System

Figure 2-1. Troubleshooting Flowchart (Sheet 2 of 2)
Computer Operation

Replace the following sub-assemblies one at a time. Repeat diagnostic after each until malfunction is corrected.

- 1. CPU PCA

Same as above.

- 1. Memory Module (s)
- 2. Memory Controller
- 3. Memory Cable
- 4. CPU PCA
- 5. Memory Backplane

Same as above.

- 1. CPU PCA

Same as above.

- 1. Memory Protect PCA
- 2. CPU PCA
- 3. Memory Controller
- 4. Memory Backplane
- 5. I/O Backplane

Same as above.

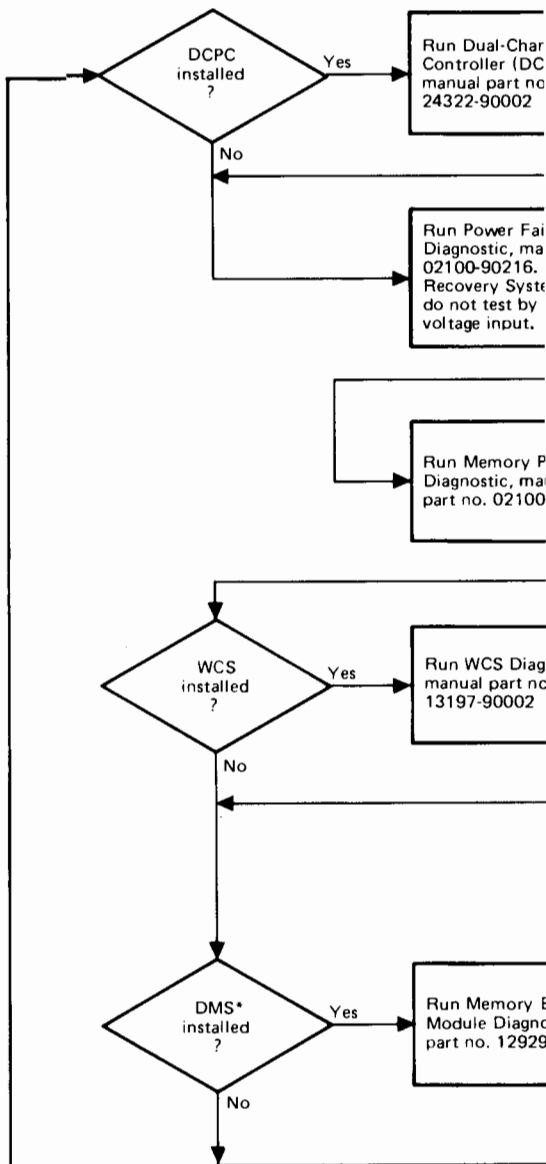
- 1. CPU PCA

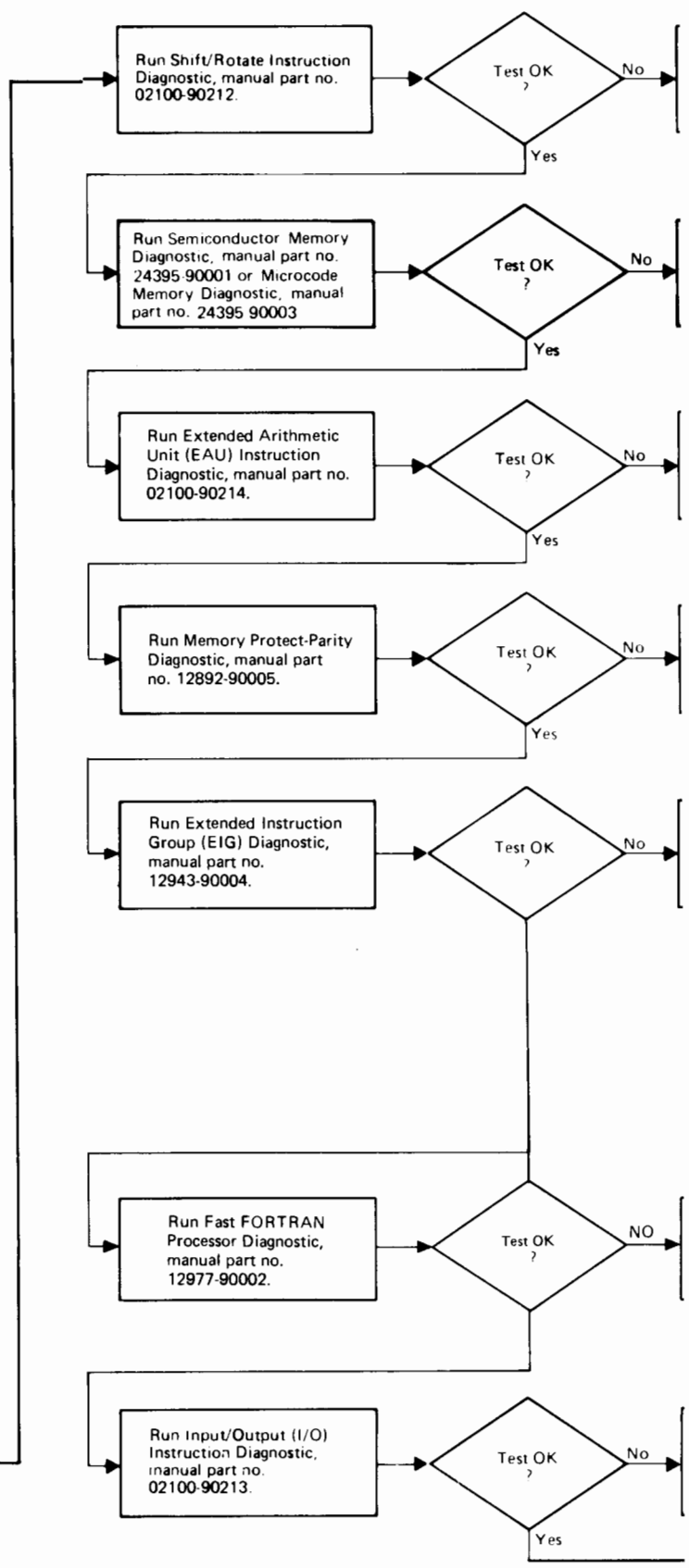
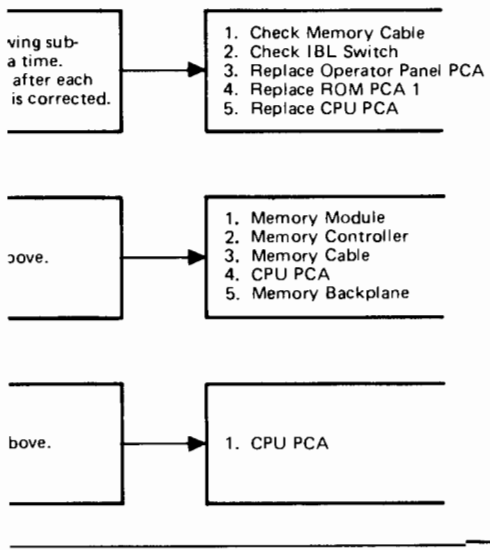
Same as above.

- 1. Firmware Accessory Board
- 2. FFP ROMs on FAB

Same as above.

- 1. CPU PCA
- 2. I/O Backplane
- 3. Crossover PCA
- 4. Memory Backplane





f s c

No → Operator Panel PCA malfunction. Check and replace any defective switches or indicators. If none are found, replace the Operator Panel PCA.

f s c

No →
1. Replace Control Bd A3A5
2. Replace Jumper Bd A3A4
3. Replace Battery Charger Bd A3A3 if Power Fail Recovery System installed.
4. Replace CPU PCA

f s c

Yes → Load and Configure Diagnostic Configurator, manual part no. 02100-90157. → Run Configurator Pretest. → Test OK ?

No → Replace the following assemblies one at a time. Repeat diagnostic until malfunction.

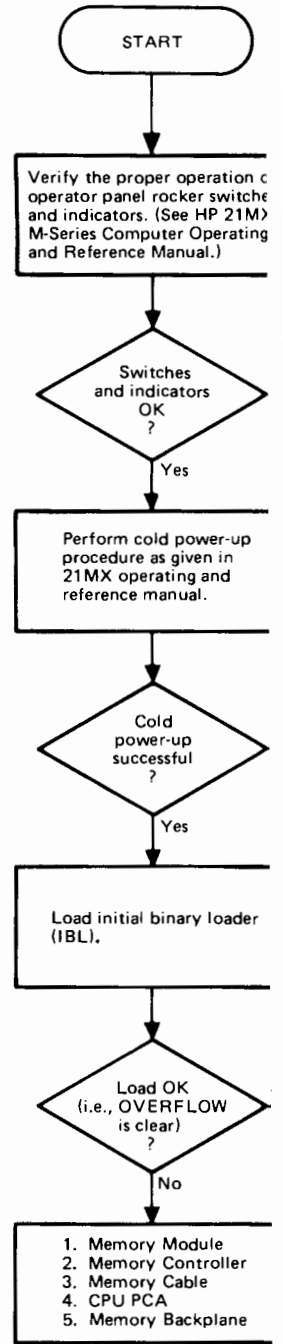
f s c

→ Run Memory Reference Instruction Diagnostic, manual part no. 02100-90218. → Test OK ?

No → Same as above

→ Run Alter/Skip Instruction Diagnostic, manual part no. 02100-90211. → Test OK ?

No → Same as above



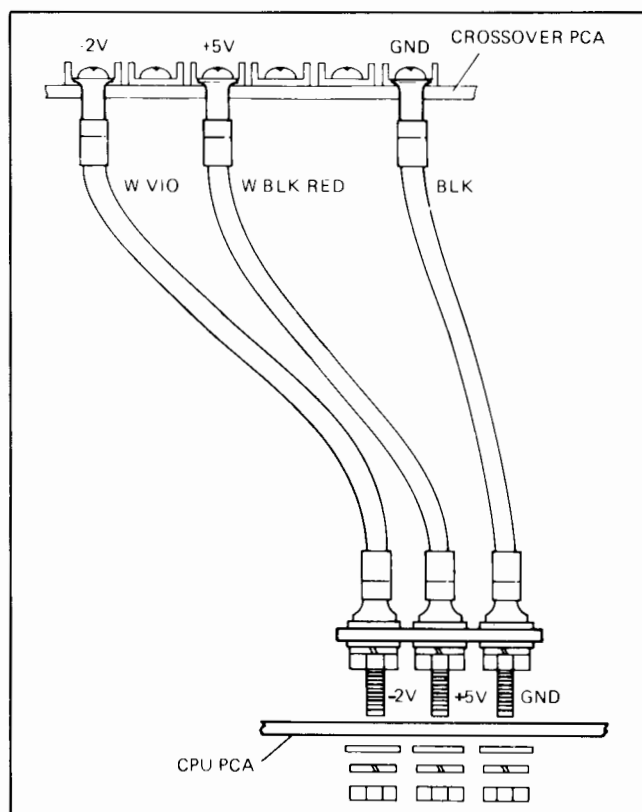


Figure 2-2. CPU Power Connections

- a. Remove the plastic material on the circuit side of operator panel PCA securing the rocker switch assembly to the operator panel PCA.
- b. Grasp rocker switch assembly and pull straight out from operator panel PCA.
- c. Separate defective spring contacts from rocker switch assembly.

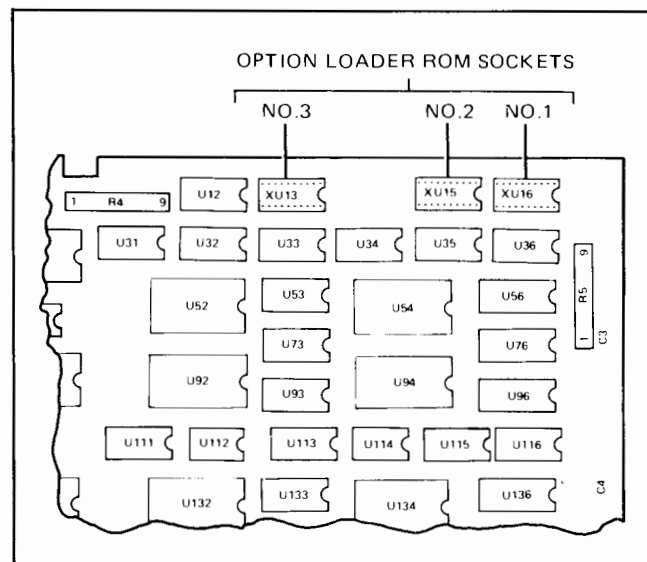


Figure 2-3. Optional Loader ROM Sockets

- d. Clean replacement spring contacts with the Freon TF Degreaser (or equivalent) and position replacement spring contacts onto operator panel PCA.
- e. Using a new rocker switch frame, place the rocker switch assembly over the spring contacts; press inward on the rocker switch assembly until it snaps into place.
- f. Apply a hot soldering iron with a broad tip or a similar device and melt the plastic tip protruding through the circuit side of the PCA to secure the switch assembly in place.

2-19. REPLACEMENT. Install the operator panel PCA as follows:

- a. Carefully place operator panel PCA into position and replace the seven screws and lockwashers.
- b. Place operator panel PCA cover over operator panel PCA and secure in place with the four screws, flatwashers, and lockwashers.
- c. Connect operator panel cable assembly to CPU PCA front edge connector.
- d. Set LOCK/OPERATE switch to OPERATE.
- e. Close operator panel and turn key fully counter clockwise to secure the panel in place.



2-20. MEMORY CAGE PCA'S

2-21. REMOVAL. Remove the printed-circuit assemblies (PCA's) from the memory cage as follows:

- a. Set ~ POWER and BATTERY switches to OFF.
- b. Remove the two memory PCA cage cover retaining screws and lockwashers; remove memory PCA cage cover.
- c. Disconnect cable assembly(ies) from front edge connector(s). (The memory protect PCA does not have a front edge connector.) If removing the DCPC, do not disconnect the cable assembly from the crossover PCA; if removing the memory controller or memory module, disconnect the cable assembly from all PCA's.
- d. Remove PCA by pulling outward on extractor levers.

2-22. REPLACEMENT. Replace memory cage PCA's in the reverse order of the removal procedure. When installing a replacement memory module, be sure to configure the memory module address jumpers correctly.

2-23. I/O INTERFACE PCA'S

2-24. REMOVAL. Remove an I/O interface PCA from the I/O PCA cage as follows:

- a. Turn key clockwise and lower operator panel to access position. Set ~ POWER switch to OFF.
- b. If power fail recovery system is installed, set BATTERY switch to OFF and disconnect battery cable from BAT. INPUT connector.
- c. Remove I/O PCA cage cover and loosen the screw(s) securing I/O PCA retainer. Slide retainer to the right.
- d. Remove I/O cable connector hood from I/O interface PCA. Remove I/O interface PCA by pulling outward on the PCA extractor levers.

2-25. REPLACEMENT. Replace I/O interface PCA in reverse order of the removal procedure. Be sure to configure the I/O interface PCA jumpers (if used) if a replacement PCA is being installed.

2-26. CROSSOVER PCA

2-27. REMOVAL. Remove the crossover PCA from the computer mainframe as follows:

- a. Set ~ POWER and BATTERY switches to OFF.
- b. Remove computer top cover and disconnect DCPC cable assembly (if used) from edge connector J1. (See figure 2-9). Disconnect power supply cable assembly from edge connector J2.
- c. Disconnect connector going to power supply plug (P9). (See figure 2-9.)
- d. Remove the four screws and lockwashers securing crossover PCA to PCA cage covers.
- e. Carefully lift crossover PCA to free it from backplane edge connectors.

2-28. REPLACEMENT. Install the crossover PCA as follows:

- a. Position crossover PCA with receptacles A6XA4 and A6XA5 in contact with I/O and memory backplane connectors.
- b. Press downward on back of A6XA4 and A6XA5 to seat backplanes fully into crossover PCA receptacles. Secure crossover PCA to PCA cage covers using the four screws and lockwashers.
- c. Connect connector to power supply plug (P7). (See figure 2-9.)

- d. Connect DCPC cable assembly (if used) to edge connector J1. Connect power supply cable assembly to J2.
- e. Replace computer top cover and set ~ POWER switch to ON and BATTERY switch to INT.

2-29. MEMORY AND I/O BACKPLANES

2-30. REMOVAL. Remove the memory and I/O backplanes from the computer mainframe as follows:

- a. Set ~ POWER and BATTERY switches to OFF.
- b. Remove top cover and disconnect DCPC cable assembly (if used) from crossover PCA edge connector J1.
- c. Withdraw all memory PCA's approximately 5 cm (2 inches) to clear rear connectors from memory backplane receptacles.
- d. Withdraw all I/O interface PCA's approximately 5 cm (2 inches) to clear rear connectors from I/O backplane receptacles.
- e. Remove the four screws and lockwashers securing crossover PCA to PCA cage covers. Carefully lift crossover PCA to free it from backplane edge connectors.
- f. Grasp memory backplane and lift up and out of memory PCA cage assembly.
- g. Grasp I/O backplane and lift up and out of I/O PCA cage assembly.

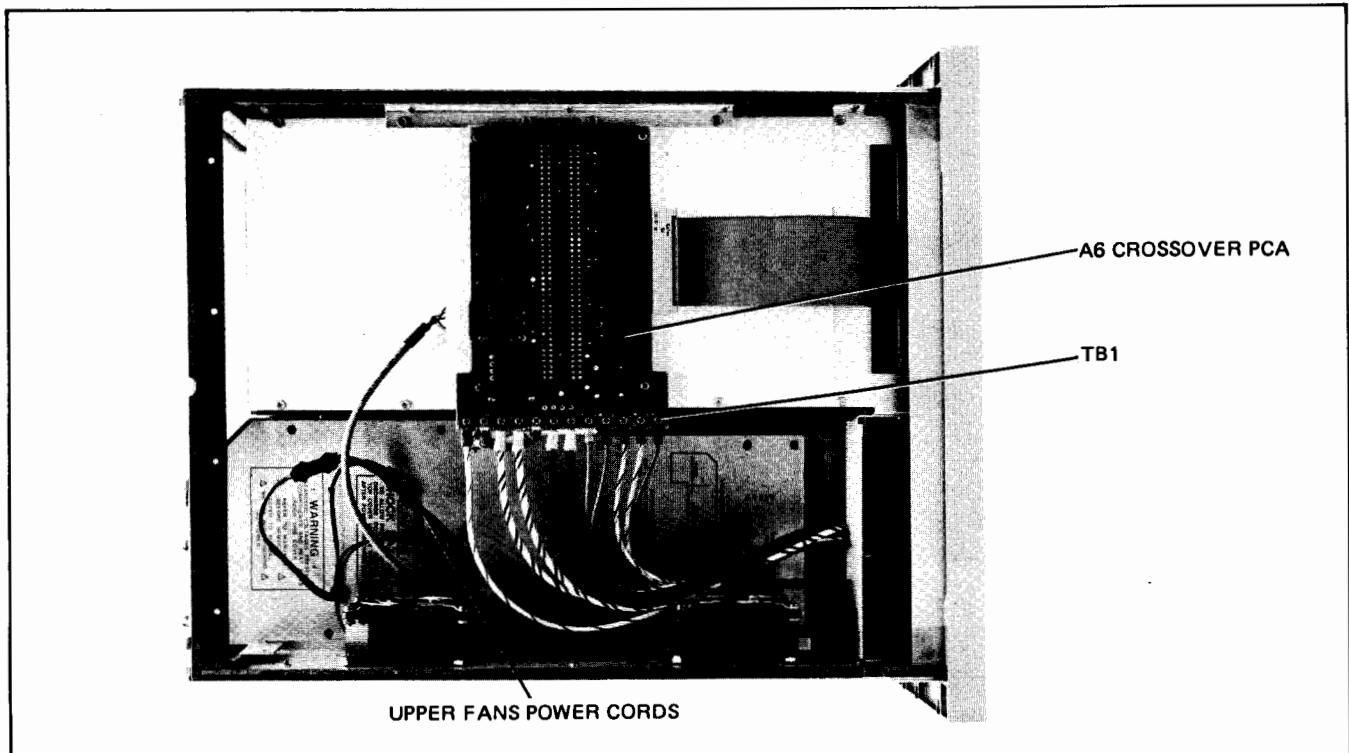
2-31. REPLACEMENT. Replace the memory and I/O backplanes in reverse order of the removal procedure. Be sure to reconnect DCPC cable assembly (if used) after all PCA's have been seated firmly into their mating receptacles.

CAUTION

Note markings on backplanes to ensure proper orientation. Improper orientation can damage the computer.

2-32. POWER FAIL RECOVERY SYSTEM FOR HP 2108B AND HP 2112B

2-33. BATTERY REMOVAL. Set the BATTERY switch to OFF and disconnect the battery cable from the BAT. INPUT connector. Remove the four captive screws securing the I/O cage cover to the computer frame. Remove the four flat head screws securing the I/O cage cover to the battery assembly. Lay the battery assembly with the side mounted to the I/O cage cover on the bottom and remove the four screws holding the battery cover in place. Remove the four screws holding the battery pack(s). Remove the battery pack(s) by disconnecting the connector(s).



8300-10

Figure 2-9. Crossover PCA Power Connections and Upper Fan Power Cords

WARNING

Hazardous voltages are present with the ac power cord connected. Ensure that the ac power cord is disconnected before proceeding.

2-34. BATTERY PCA REMOVAL. Lower the operator panel to the access position. Unfasten the two clips holding the power supply by pushing them towards each other. Disconnect the two connectors at the front of the power supply. Remove the two screws from the rear of the power supply securing it to the rear frame. Slide the power supply part way out of the computer, if it is an HP 2112B, and disconnect the upper fan power cords. Remove the power supply from the computer. Remove the 10 screws from the top of the supply. Lift the top cover off the supply. Figure 2-10 shows the location of the two battery PCA's. A3 is the Battery Charger Board and A4 is the Battery Backup Board. Grasp the Battery Backup Board and pull upward out of the board guides. Remove the Battery Charger Board in the same manner as the Battery Backup Board.

2-35. REPLACEMENT. Replace the battery(s) and the battery PCA's in the reverse order of the removal procedures.

2-36. POWER SUPPLY FOR HP 2108B AND HP 2112B**WARNING**

Hazardous voltages are present with the ac power cord connected. Ensure that ac power cord is disconnected before proceeding.

2-37. REMOVAL. Proceed as follows:

- a. Turn the key in the operator panel clockwise and lower the operator panel to the access position.
- b. Disconnect the two plastic cable connectors from front of the power supply.
- c. Remove the plastic protective cover from the barrier block of the power supply front panel.
- d. Loosen the five slotted screws on the left side of the barrier block and remove the +5VM, +5V CPU and GND wires.
- e. Unfasten the two clips holding the power supply at the front by pushing them towards the center line of the power supply.
- f. If a power recovery system is installed, set the BATTERY switch to OFF and disconnect the battery cable from the BAT INPUT connector. Loosen the two screws holding the I/O PCA retainer and slide the retainer to the right.

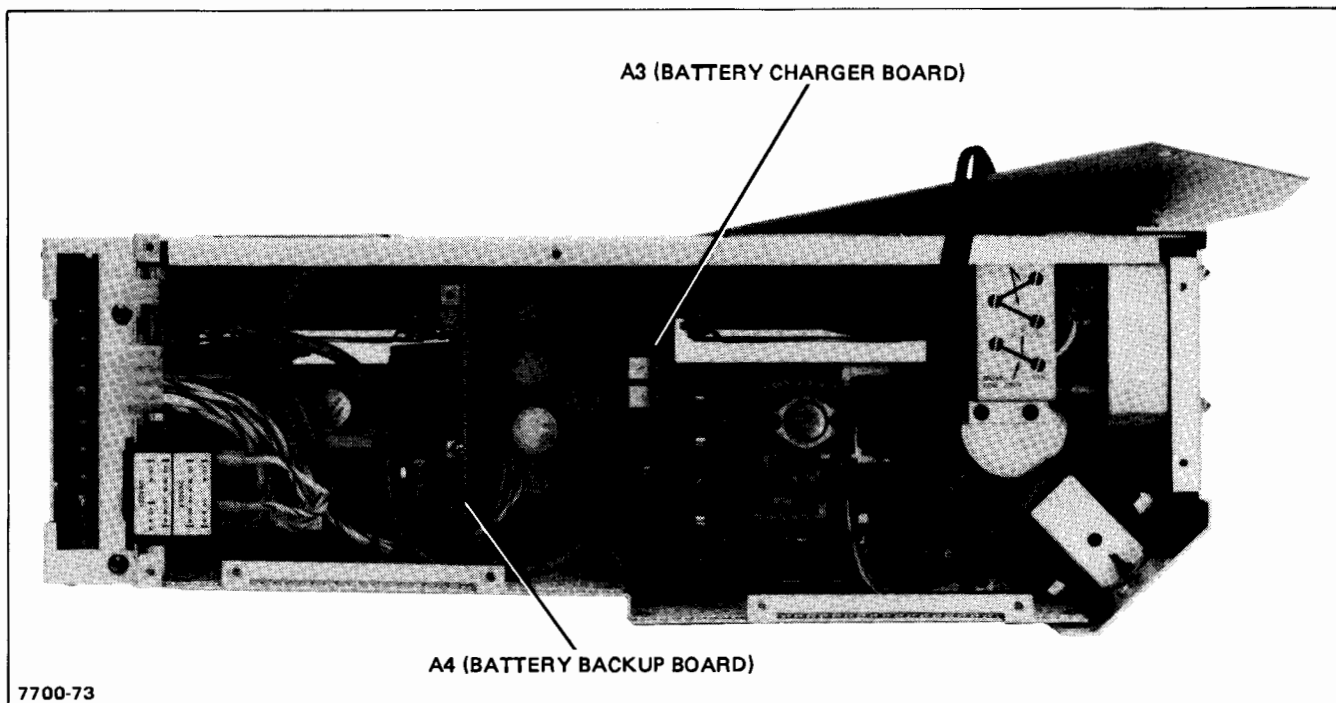


Figure 2-10. Power Fail Recovery PCAs Locations in the Power Supply

- g. Remove the two screws and lockwashers located at the bottom of the rear panel of the power supply securing the power supply to the rear frame of the computer.

Step h is necessary only for the HP 2112B.

- h. Slide the power supply out from the computer about 50 mm (2 in.) and stop. The two fan cables for the top fans must be disconnected before proceeding.

Grasp the connector and squeeze the latching sides to free the connector. Do this for both connectors.

- i. Slide the power supply out and remove it from the computer.

2-38. REPLACEMENT. Replace the power supply in the reverse order of the removal procedure.

2-39. POWER SUPPLY VENTILATING FANS FOR THE HP 2108B AND HP 2112B

2-40. REMOVAL. Remove the computer top cover and proceed as follows:

WARNING

Hazardous voltages are present with the ac power cord connected. Ensure that ac power cord is disconnected before proceeding.

- a. Remove the power supply from the computer.
- b. Remove the ten screws securing the top cover of the power supply and lift off the top cover.
- c. Disconnect the fan power cords from the terminal board (TB1) in the power supply. (See figure 2-11.)
- d. Remove the four screws securing each fan to the right side of the power supply. Move the cables as necessary to remove the fans.

2-41. REPLACEMENT. Replace the ventilating fan(s) in reverse order of the removal procedure.

2-42. UPPER VENTILATING FANS FOR THE HP 2112B

WARNING

Hazardous voltages are present with the ac power cord connected. Ensure that ac power cord is disconnected before proceeding.

2-43. REMOVAL. Remove the computer top cover and proceed as follows:

- a. Disconnect the fan(s) power cord(s). (See figures 2-9 and 2-11.)
- b. Remove the two screws securing the computer's right side panel.

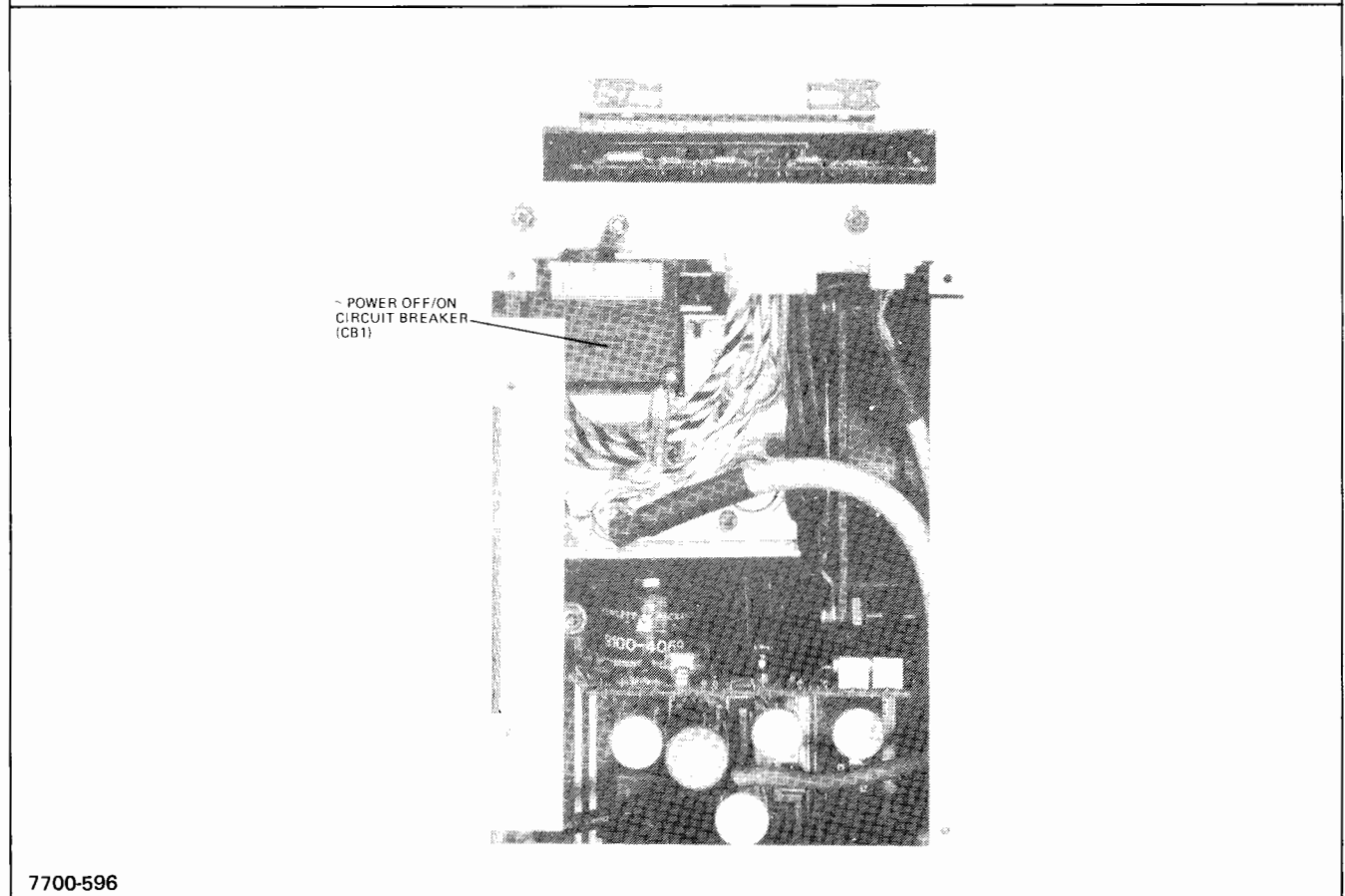
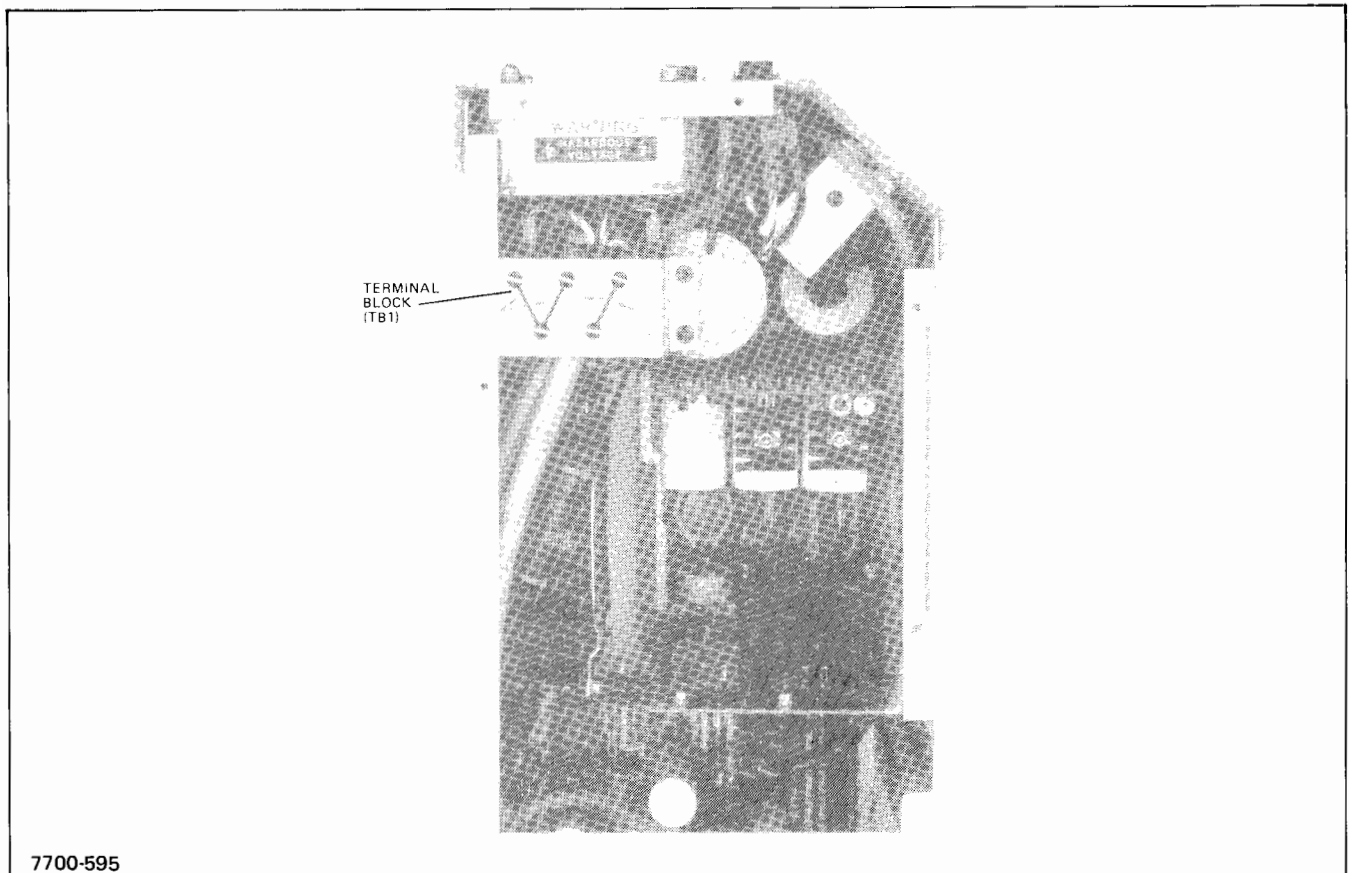


Figure 2-11. Power Supply Circuit Breaker and Terminal Block

- c. Remove the three screws securing the power supply's front shield.
- d. Remove the six screws securing the upper fan panel to the computer.
- e. Pull the fan panel toward the front frame until the lip at the rear of the fan panel clears the rear frame. Then lift the fan panel up and out of the computer.
- f. Remove the four screws securing each fan.

2-44. REPLACEMENT. Replace the ventilating fan(s) in the reverse order of the removal procedure.

2-45. POWER SUPPLY VOLTAGE ADJUSTMENTS

WARNING

Hazardous voltages are present with the ac power cord connected. Ensure that the ac power cord is disconnected before proceeding.

2-46. ADJUSTMENTS. The adjustments should be made with the same number of I/O and Memory modules in the computer as will be used for normal operation. The adjustments will be given for operation with and without the power fail option.

NOTE

The adjustments are necessary only if the power supply check procedure given in paragraph 1-28 shows that a power supply voltage is out of tolerance.

2-47. VOLTAGE ADJUSTMENTS WITHOUT THE POWER FAIL OPTION. Proceed as follows:

- a. Set the ~ POWER switch to the ON position and the LOCK/OPERATE switch to OPERATE.
- b. Connect the DVM to the +12 Vdc M (+12 M) on the Crossover Assy (A6).
- c. Adjust A4R12 on the Jumper Board (A4) (see figure 3-3) for an indication of $+12.5 \pm 0.6$ Vdc. This is accessible through the cutout in the top cover.
- d. There is no adjustment for any other voltage supply. If any voltage remains out of the stated specifications, refer to the troubleshooting flowchart in figure 2-1 sheet 1.

2-48. REPLACEMENT. Replace the covers of the computer and the power supply in the reverse order of the removal.

2-49. VOLTAGE ADJUSTMENTS WITH THE POWER FAIL OPTION. Proceed as follows:

- a. Disconnect the power cord from the line (mains) power and remove the power supply from the computer.
- b. Remove the protective cover and the top cover from the power supply and the top cover from the computer.
- c. Install the power supply in the computer and reconnect all cables.
- d. Set the BATTERY switch to the OFF position.
- e. Set the ~ POWER switch to the OFF position and connect the power cord to the line (mains) power.
- f. Set the ~ POWER switch to the ON position and the LOCK/OPERATE switch to OPERATE.
- g. Connect the DVM to the +5 Vdc M (+5 M) test point on the Crossover Assy (A6).
- h. Adjust A4R1 on the Battery Charger Board (A4) (see figure 3-3) until the DVM indicates $+5.15 \pm 0.10$, -0.15 Vdc.
- i. Connect the DVM to the +12 Vdc M (+12 M) test point on the Crossover Assy (A6).
- j. Adjust A4R2 on the Battery Charger Board (A4) (see figure 3-3) until the DVM indicates $+12.0 \pm 0.6$ Vdc.
- k. Connect the DVM to REF terminal on the Battery Charger Board (A3).
- l. Adjust A3R2 on the Battery Charger Board (A3) (see figure 3-3) until the DVM indicates $+5.0 \pm 0.25$ Vdc.
- m. Connect the DVM to the anode of CR4 (yellow wire) on the Battery Charger Board.
- n. Adjust A3R3 on the Battery Charger Board (A3) (see figure 3-3) until the DVM indicates approximately $+16.25 \pm 0.25$ Vdc.

NOTE

All other voltages should be within specifications as stated in table 1-5. If any of the voltages cannot be adjusted to within the stated specifications, refer to the troubleshooting flow chart in figure 2-1, sheet 1.

2-50. REPLACEMENT. Replace the covers of the computer and power supply in the reverse order of the removal.

2-51. RECONFIGURATION

2-52. MEMORY RECONFIGURATION

If desired or necessary, the HP 2102B and HP 2102C Memory Systems may be reconfigured. Reconfiguration requires assigning memory module numbers, reconfiguring module address jumpers, reinstallation, and verification. Complete information on installing and servicing the memory systems is given in the Standard Performance Memory Systems Installation and Service Manual, part no. 5955-4310.

The information previously contained in paragraph 2-53 to 2-58, figures 2-12 to 2-15, and tables 2-2, 2-3 can be found in the above Memory Systems Installation and Service manual.

2-53. 110/220 VAC RECONFIGURATION FOR HP 2108B AND HP 2112B

To reconfigure the HP 2108B or the HP 2112B to operate from a 220-volt power source instead of a 110-volt power source (or vice versa), refer to figures 2-11 and 2-16 and proceed as follows:

WARNING

Hazardous voltages are present inside the power supply!! Before changing from 110V ac to 220V ac configuration, or vice versa, set ~ POWER and BATTERY switches to OFF and disconnect the power cord!! Failure to observe this precaution can result in serious injury.

- a. Set the ~ POWER and BATTERY switches to OFF and remove the power cord.
- b. Remove the top cover from the computer and disconnect the top ventilating fans power cords from the power supply (HP 2112B only).
- c. Remove the power supply from the computer.
- d. Remove the top cover from the power supply and the protective cover from TB1 (see figure 2-11).
- e. For 110 Vac operation, connect jumpers and wires as shown in figures 2-11 and 2-16.
- f. For 220 Vac operation, connect the jumpers and wires as shown in figures 2-11 and 2-16.
- g. Replace the protective cover over TB1, replace the power supply top cover, and replace the power supply into the computer.
- h. On rear of power supply, remove metal plate showing line voltage data; reverse plate and reinstall to show line data as reconfigured.
- i. Ensure that the correct power cord set is used in the new configuration (see figure 1-5 or 1-6).

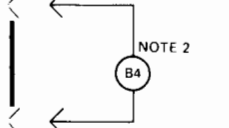
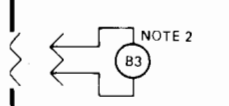
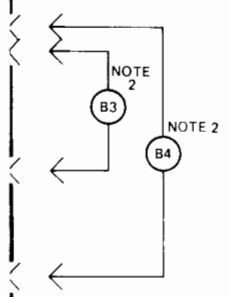
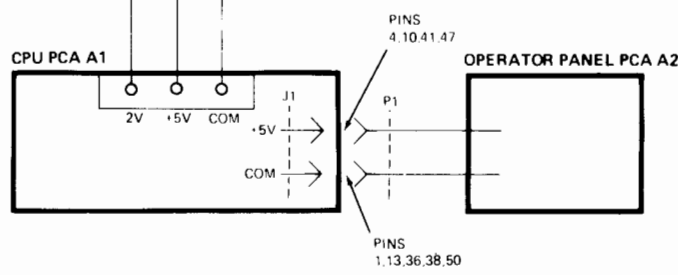
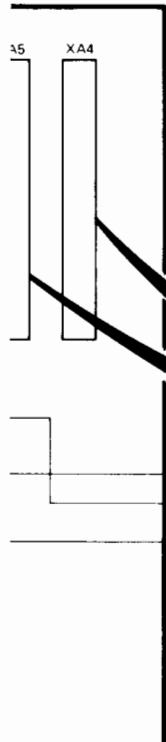
2-54. DIAGRAMS

Figure 2-17 is a simplified block diagram of the HP 21MX M-Series Computer. The power distribution diagram is provided in figure 2-16.



BACKPLANE DC POWER DISTRIBUTION						
DC VOLTAGE	CROSS OVER PCA A6		INPUT/OUTPUT BACKPLANE A4 XA10-XA25 XA10-XA20	MEMORY BACKPLANE A5		
	XA4	XA5		XA110	XA111	XA112-XA123 (HP 2112B) XA112-XA118 (HP 2108B)
-2V	47-52	47-52	47-48	47-48	47-48	47-48
+5V	15-18, 27-30, 35-40	33-41	39,40	39, 40, 41	39, 40, 41	39,40,41
+5V(M)	-	25-32	-	-	-	29,30
+12V	41-44	-	43,44	-	-	-
+12V(M)	-	43-46	-	43,44	43,44	43,44
-12V	69,71,72	-	69,70	-	-	-
-12V(M)	-	69-72	-	69,70	69,70	69,70
+30V	33,34	-	36	-	-	-
COMMON	1,2,4 73-86	1-14 83,85,86	1,2,85,86	1,2,85, 86	1,2,85, 86	1,2,85,86

SSY. A6 5060-8345



- NOTES:
- DENOTES REAR PANEL NOMENCLATURE
 DENOTES OPERATOR PANEL NOMENCLATURE
 - FAN B3 AND B4 REQUIRED ONLY FOR HP 2113B

WARNING

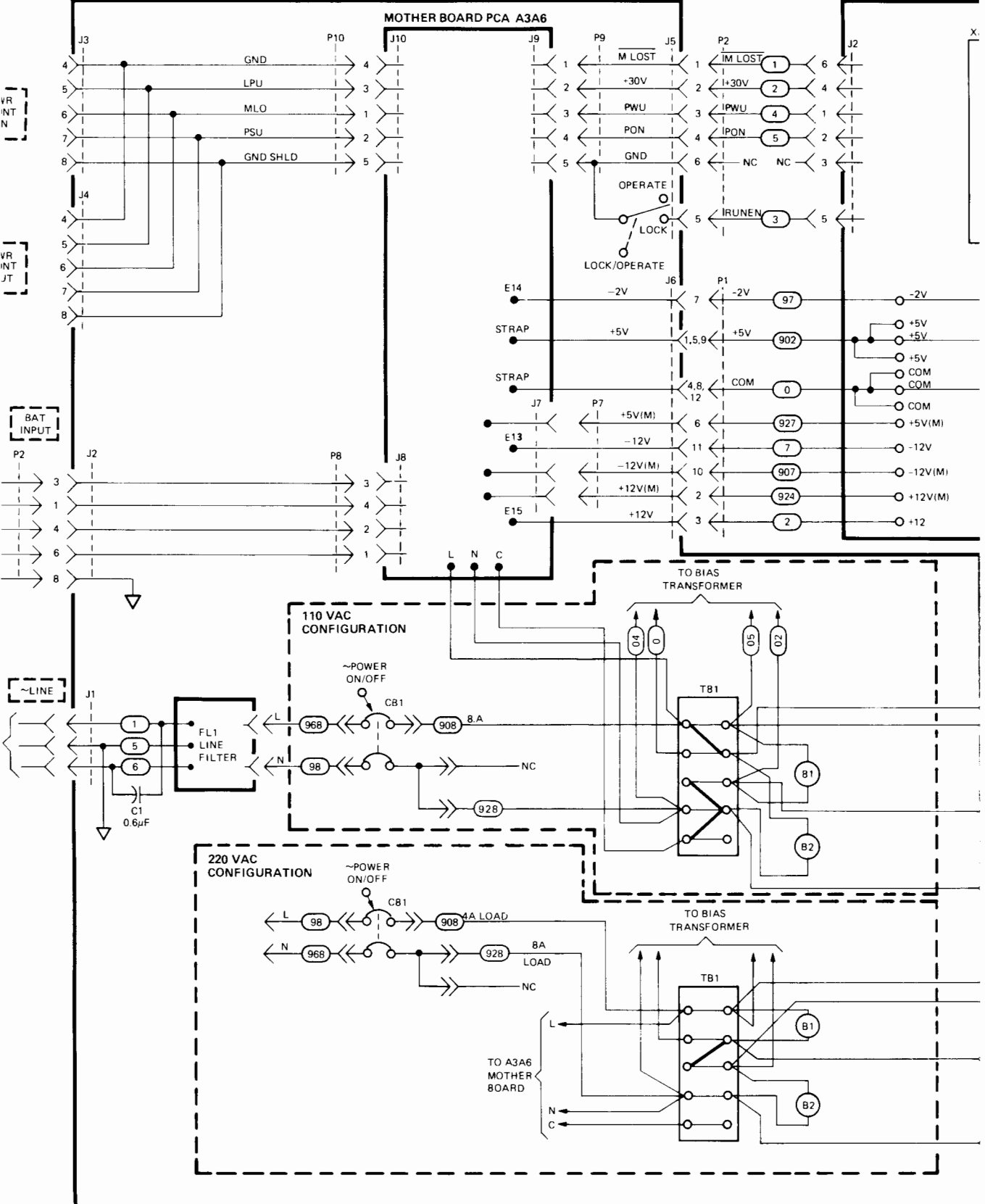
HAZARDOUS VOLTAGES ARE PRESENT INSIDE THE POWER SUPPLY!! BEFORE CHANGING FROM 110 VAC TO 220 VAC CONFIGURATION, OR VICE VERSA, SET ~ POWER SWITCH TO OFF AND DISCONNECT THE POWER CORD!! FAILURE TO OBSERVE THIS PRECAUTION CAN RESULT IN SERIOUS INJURY.

- ENCLOSURES WIRE COLOR CODE. CODE USED IS THE SAME AS THE RESISTOR COLOR CODE. FIRST NUMBER IDENTIFIES THE BASE COLOR, SECOND NUMBER IDENTIFIES THE WIDER STRIPE, AND THE THIRD NUMBER IDENTIFIES THE NARROWER STRIPE, E.G., DENOTES WHITE BASE, YELLOW WIDE STRIPE, VIOLET NARROW STRIPE.

Figure 2-16. HP 2108B and HP 2112B Power Distribution Diagram

POWER SUPPLY ASSY. A3 5061-3476

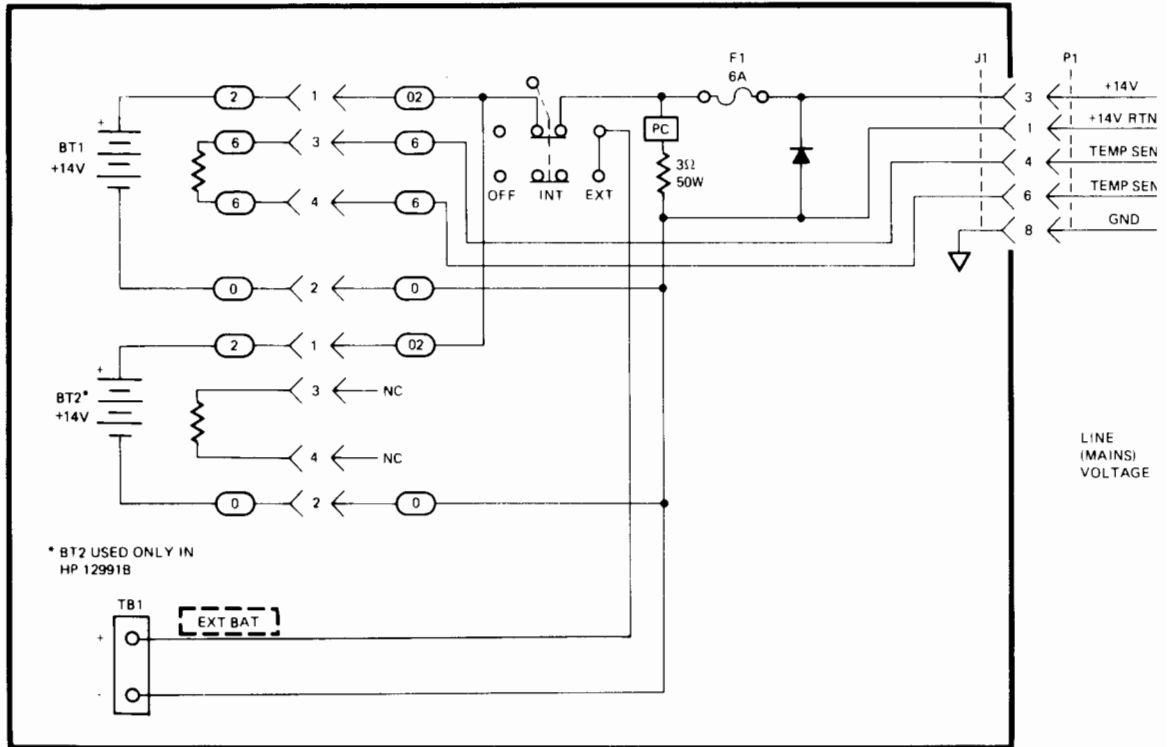
CROSS OVER BOARD A



P
C
C
I

P
C
C
O

HP 12991B or HP 12944B



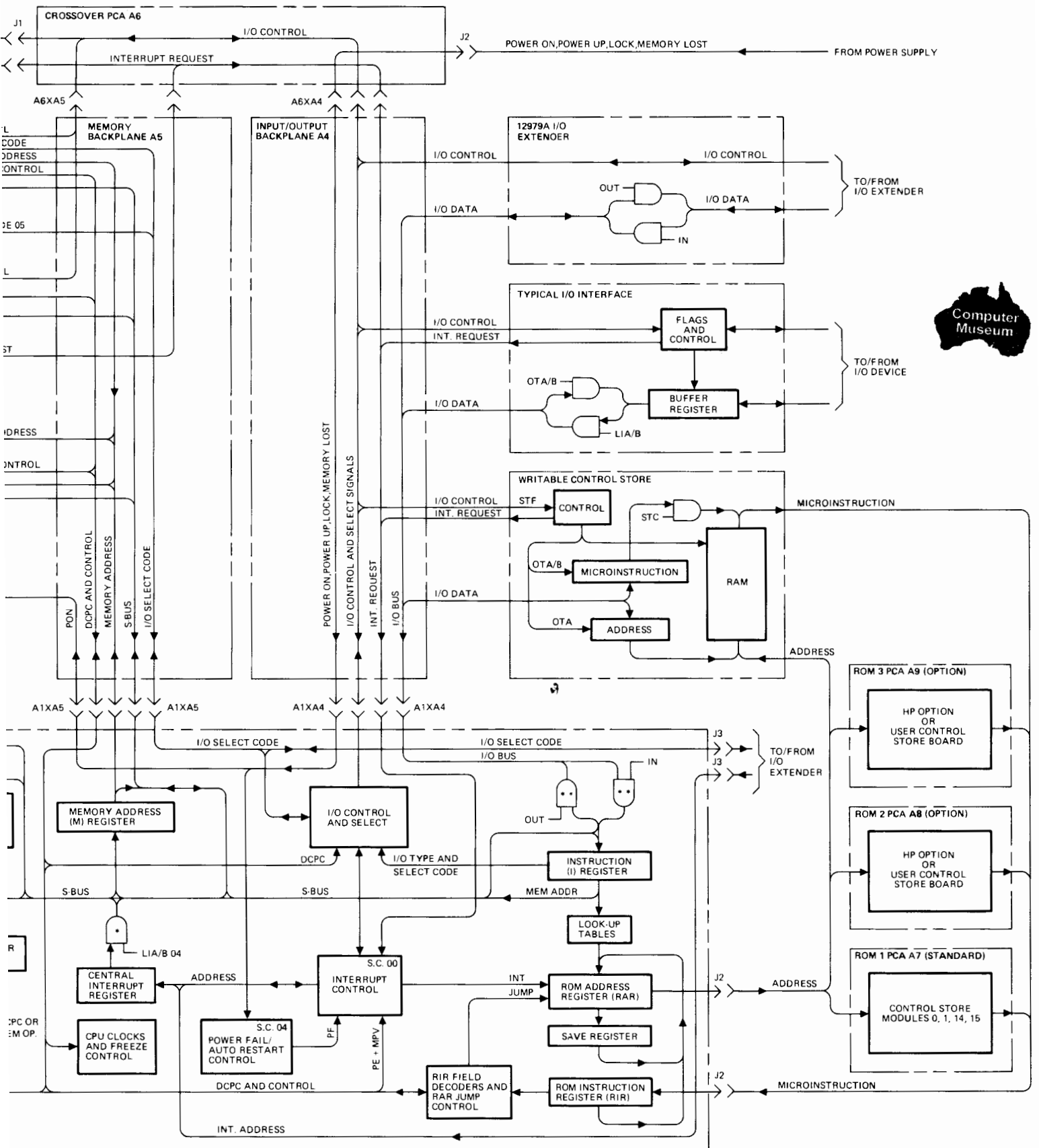
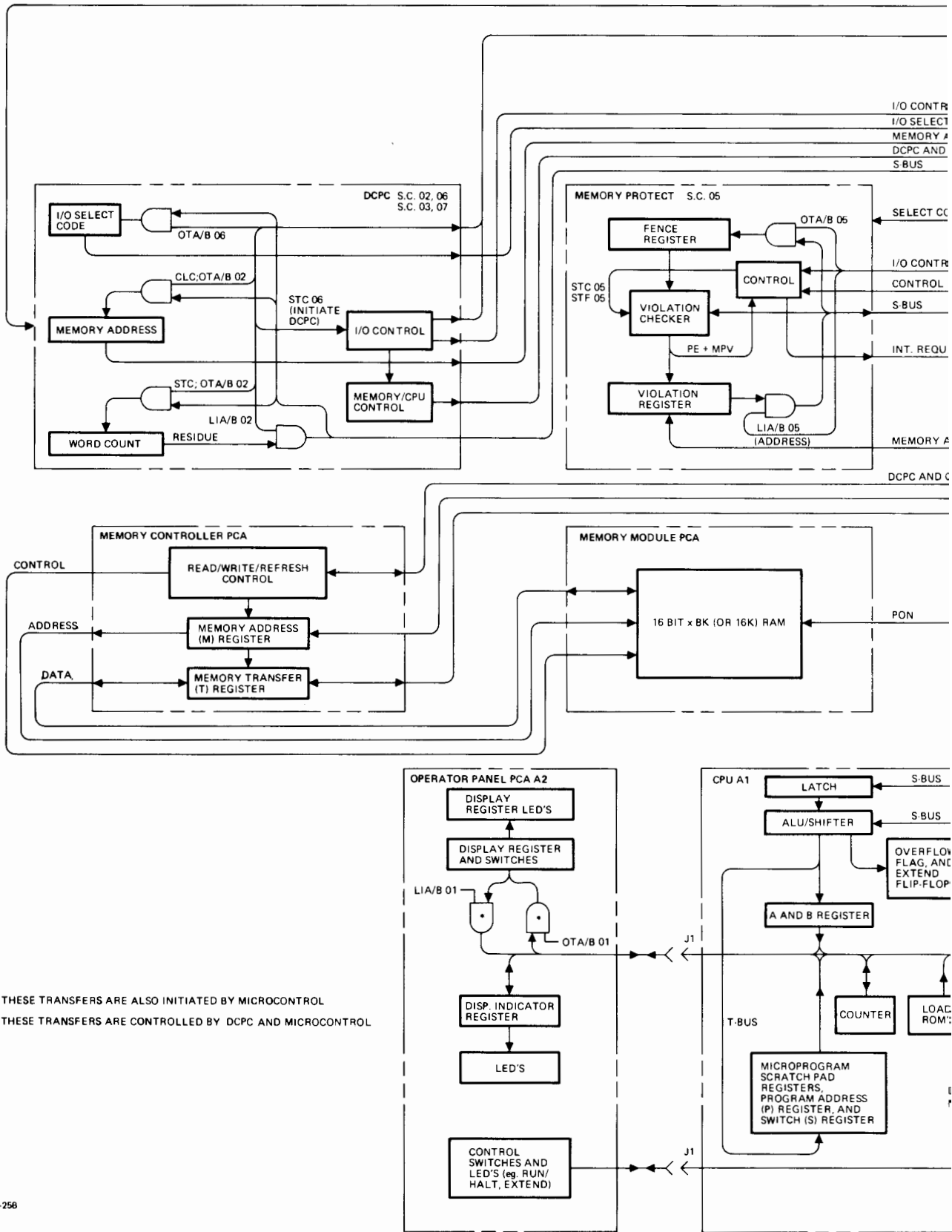


Figure 2-9. HP 21MX Computer Simplified Block Diagram



REPLACEABLE PARTS

SECTION

III

This section provides a field-replaceable parts listing and an illustrated parts breakdown of the HP 2108B and HP 2112B Microprogrammable Computers. Component parts of most printed-circuit assemblies (PCA's) are not included, since these parts are considered replaceable only at the factory or a depot. Included in this section is a listing of subassemblies that comprise the Standard Performance and Fault Control Memory Systems and the power supply.

3-1. COMPUTER REPLACEABLE PARTS

Tables 3-1 and 3-2 and figures 3-1 and 3-2 list and illustrate the field-replaceable parts of the HP 2108B and HP 2112B Microprogrammable Computers. The replaceable parts are referenced to the exploded views by index numbers. The columns in the index numbered lists provide the following information for each part:

- a. FIG & INDEX NO. The figure and index number where the replaceable parts are shown in an exploded view.
- b. HP PART NO. The HP part number for each replaceable part.
- c. DESCRIPTION. The description of each replaceable part and its applicable reference designation.
- d. MFR CODE. A five digit code that denotes the manufacturer of the part. Refer to table 3-5 for a listing of the manufacturers that correspond to the codes.
- e. MFR PART NO. The manufacturer's part number for each replaceable part. Commercially obtainable parts are designated OBD (order by description).
- f. UNITS PER ASSY. The total quantity of each replaceable part of the computer or memory system.

3-2. POWER SUPPLY REPLACEABLE PARTS

Figure 3-3 and table 3-3 illustrates and lists the field-replaceable parts of the power supply.

3-3. MEMORY SYSTEM REPLACEABLE PARTS

Table 3-4 lists the field-replaceable parts of the Memory and Fault Control Systems.

3-4. ORDERING INFORMATION

To order replaceable parts, address the order to the local Hewlett-Packard Sales and Service Office listed at the end of this manual. (For I/O interface PCA or I/O device ordering information, refer to their respective manuals.) The following information should be included in the order for each replaceable parts:

- a. Complete model number (including options and accessories) and serial number.
- b. Hewlett-Packard part number for each part.
- c. Complete description for each part as provided in the replaceable parts lists.



Table 3-1. HP 2108B Computer Replaceable Parts

INDEX NO.	HP PART NO.	DESCRIPTION	MFR. CODE	MFR. PART NO.	UNITS/ ASSY.
1	02108-00036	Memory PCA Cage Cover	28480	02108-00034	1
2	5060-8352	Central Processor Unit A1	28480	5061-1341	1
**3	—	Memory PCA Cage Assembly	28480	—	1
4	5060-8400	Control Store ROM Board A7	28480	5060-8400	1
5	5061-1945	Bottom Cover	28480	5061-1945	1
6	5020-8838	Corner Struts	28480	5020-8838	4
7	5061-1336	Connector Assembly	28480	5061-1336	1
8	5000-8087	Universal Deck	28480	5000-8087	1
**9	—	I/O PCA Cage Assembly	28480	—	1
10	5020-8808	Rear Frame	28480	5020-8808	1
11	02108-00017	Side Cover	28480	02108-00017	2
12	5000-8094	Rear Cover (Battery)	28480	5000-8094	1
*13	12944-60001	Battery Box Assembly	28480	12944-60001	1
14	5001-2627	Mounting Bracket	28480	5001-2627	1
15	5061-1945	Top Cover	28480	5061-1945	1
16	5001-2602	Card Retainer	28480	5001-2602	1
17	5001-2608	Top Bracket	28480	5001-2608	1
18	5061-6615	Power Supply Assembly A3	28480	5061-6615	1
19	5061-1388	Crossover Board Assembly A6	28480	5061-1388	1
20	5001-2604	Card Cage Shield	28480	5001-2604	1
21	5001-2696	Protective Cover (p/o 18)	28480	5001-2696	—
22	9220-2078	Foam Pad	02900	—	2
23	5020-7335	Front Frame	28480	5020-7335	1
24	5001-2612	Lock Retainer	28480	5001-2612	1
25	4040-0572	Operator Panel PCA Cover	28480	4040-0572	1
26	5060-8343	Operator Panel PCA A2	28480	5060-8343	1
26A	1990-0529	Light Emitting Diode	28480	1990-0529	28
26B	02108-00014	Spring Contact	28480	02108-00014	22
26C	5040-6076	Switch (Mint Gray)	28480	5040-6076	13
26C	5040-6077	Switch (Jade Gray)	28480	5040-6077	9
27	5001-2638	Lock Latch	28480	5001-2638	1
28	02109-00002	Extended Front Panel	28480	02109-00002	1
29	1390-0344	Lock Assembly	02694	15748/4T1427 (SPECIAL)	1
30	1390-0345	Key 4T1427 (p/o 29)	02694	8632C-R1/ 4T1427	2
31	5040-6301	Sub Front Panel	28480	5040-6301	1
32	8300-0013	Front Panel Cable	28480	8300-0013	1
33	0570-0528	Press-In Stud	01836	—	2
34A	5001-2640	Hinge Plate (Right)	28480	5001-2640	1
34B	5001-2641	Hinge Plate (Left)	28480	5001-2641	1
35	5061-1382	Memory Backplane A5	28480	5061-1382	1
36	02108-60007	I/O Backplane A4	28480	02108-60007	1
*37	12897-60002	DCPC Cable Assembly	28480	12897-60002	1
38	5061-6612	Crossover Cable Assembly	28480	5061-6612	1
39	5061-1364	Status Cable Assembly	28480	5061-1364	1
40	7120-7602	Overlay	28480	7120-7602	1
41	5040-6309	Safety Cover	28480	5040-6309	1

*HP accessory; shown only for reference.

**Not field replaceable; shown for reference only.

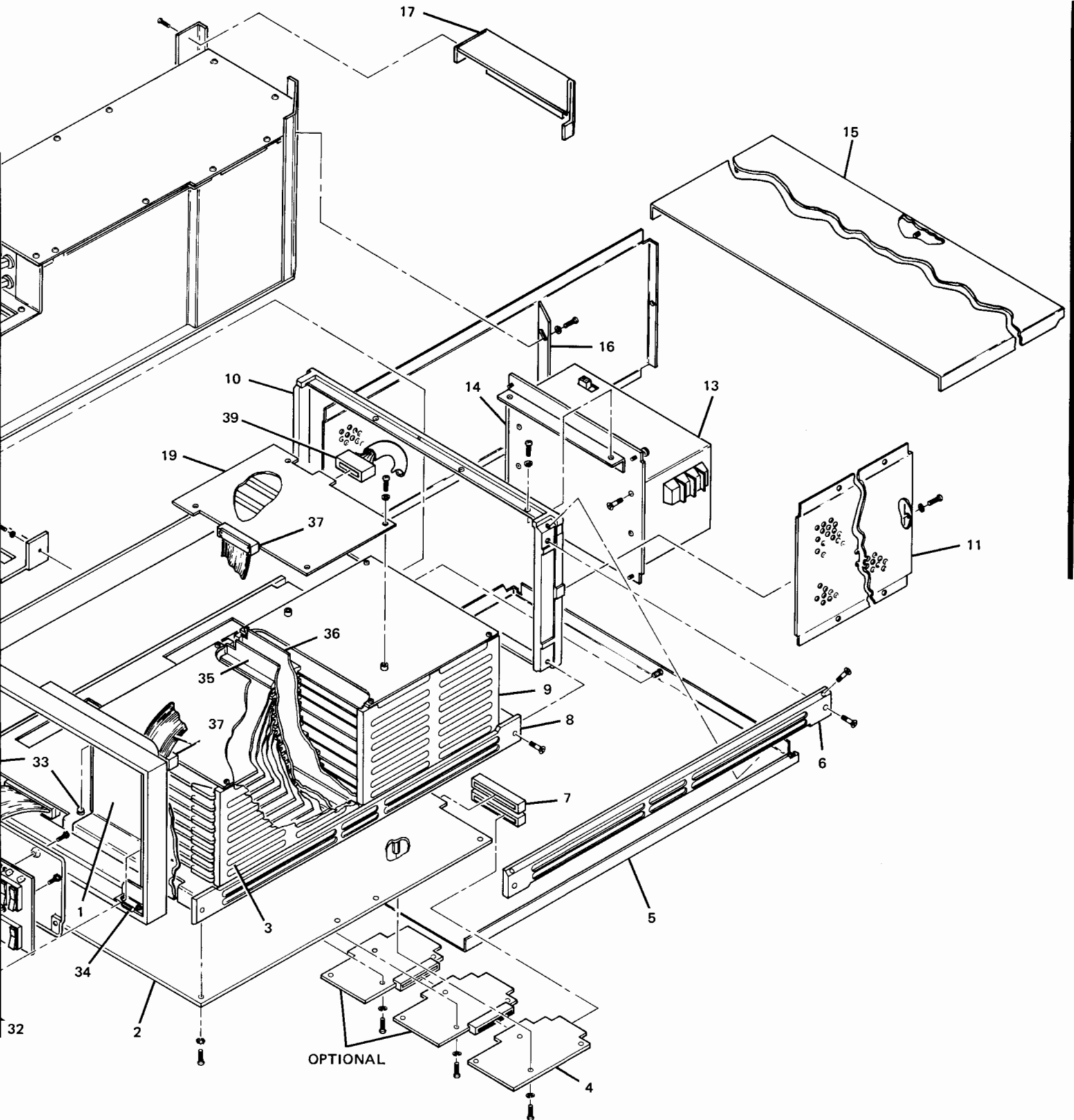
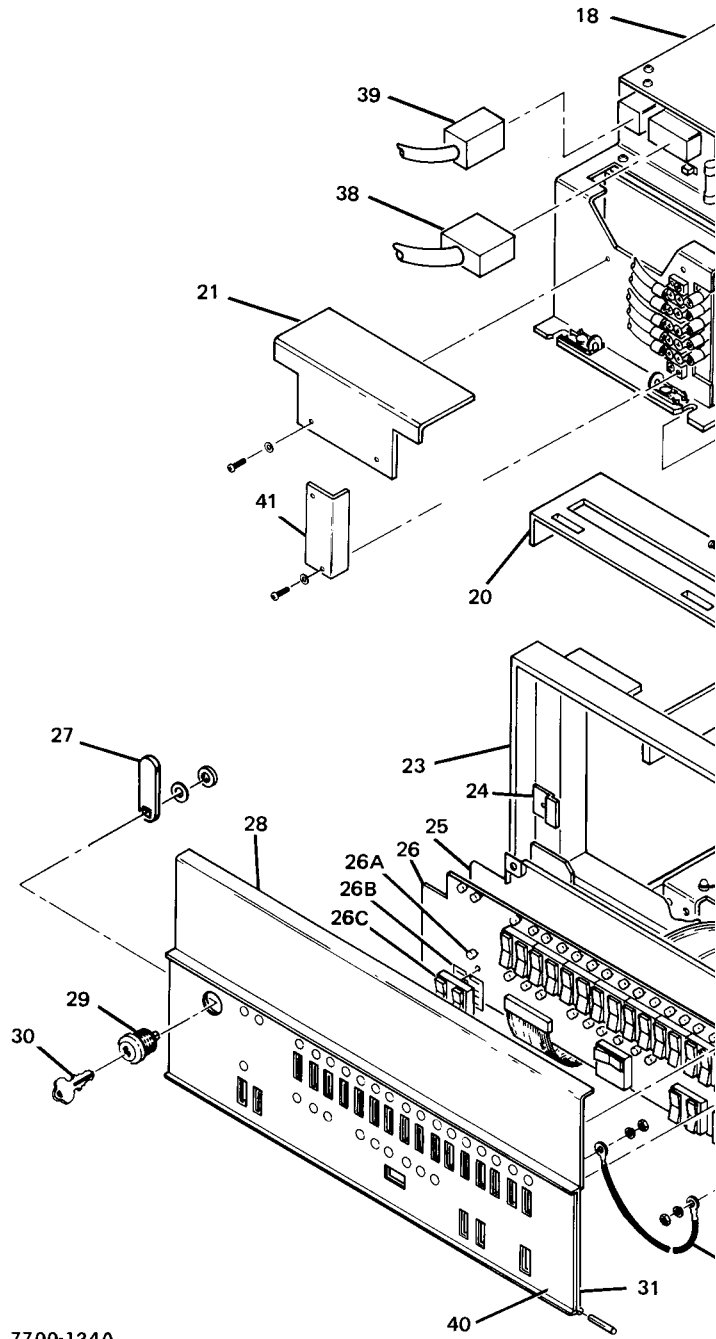


Figure 3-1. HP 2108B Computer
Exploded View



7700-124A

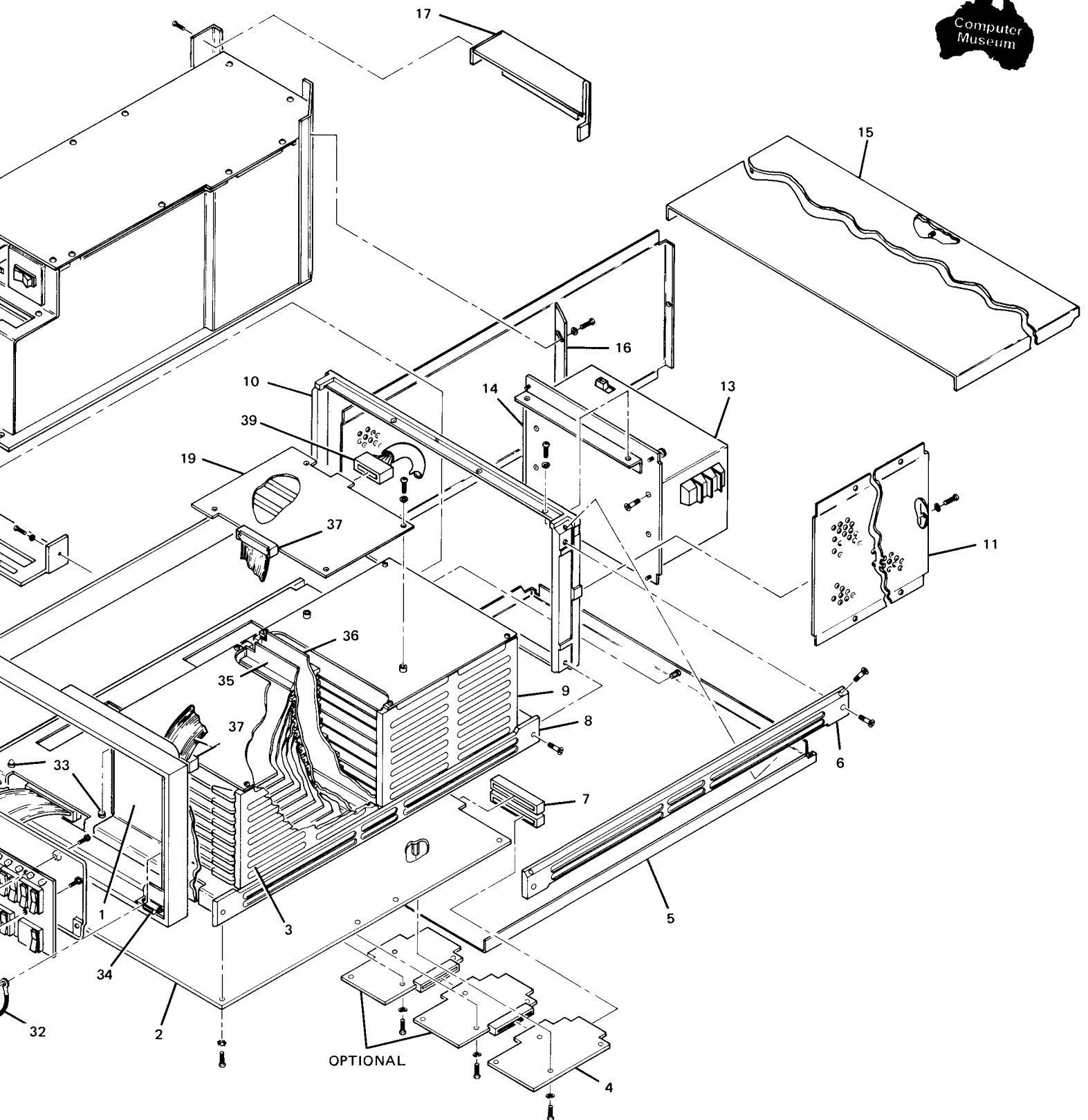
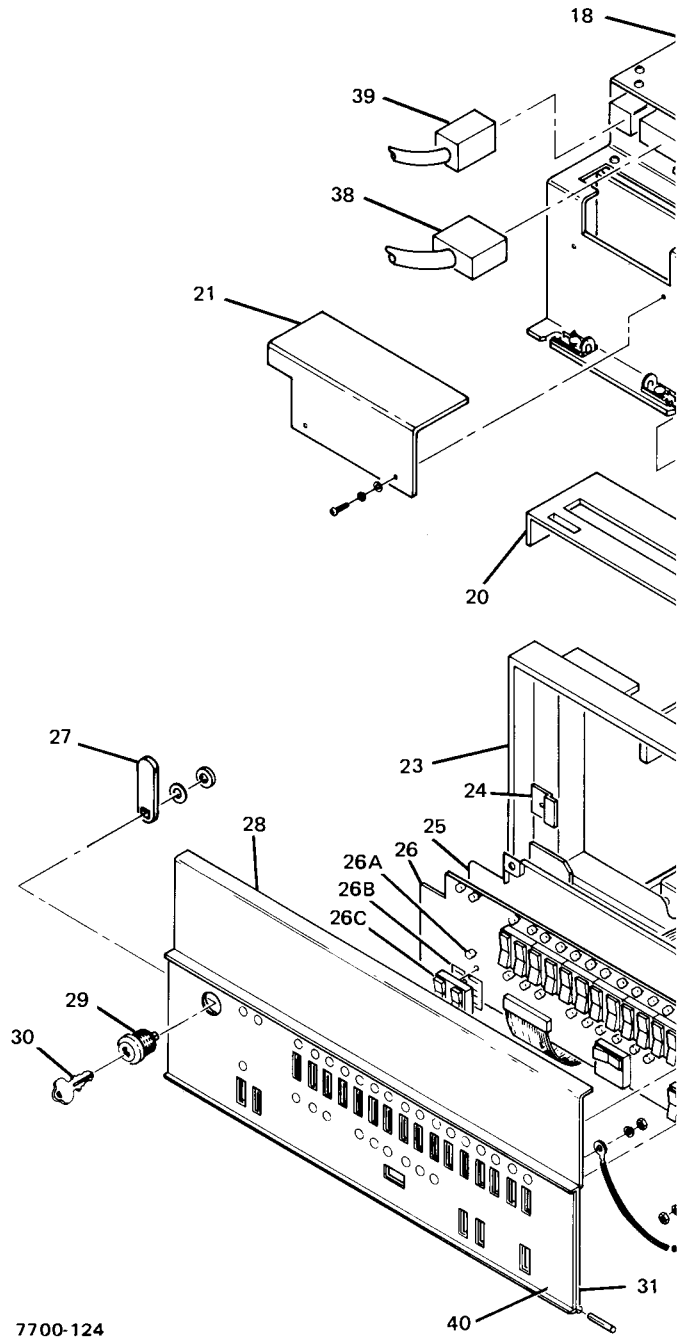


Figure 3-1. HP 2108B Computer Exploded View



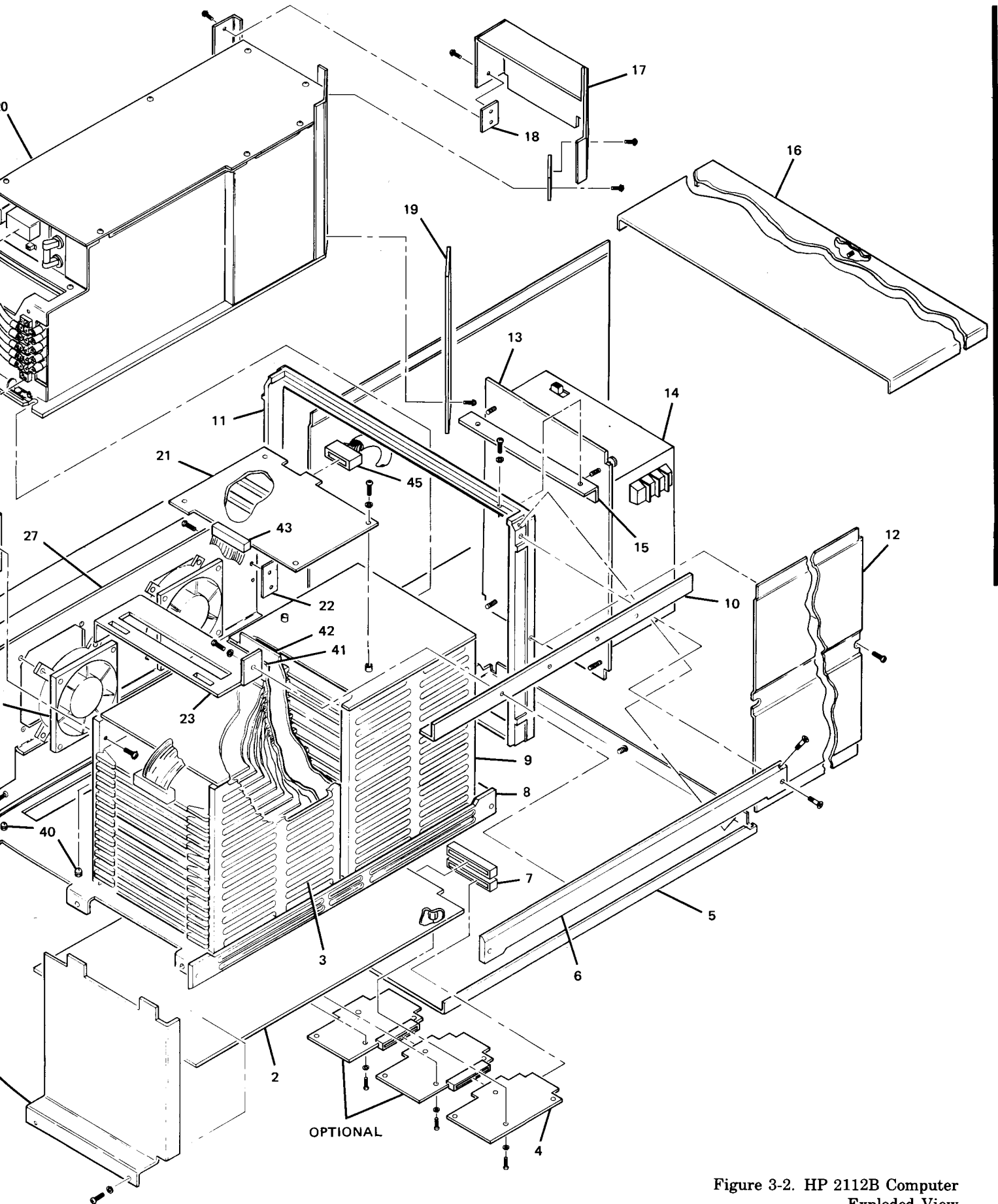


Figure 3-2. HP 2112B Computer
Exploded View

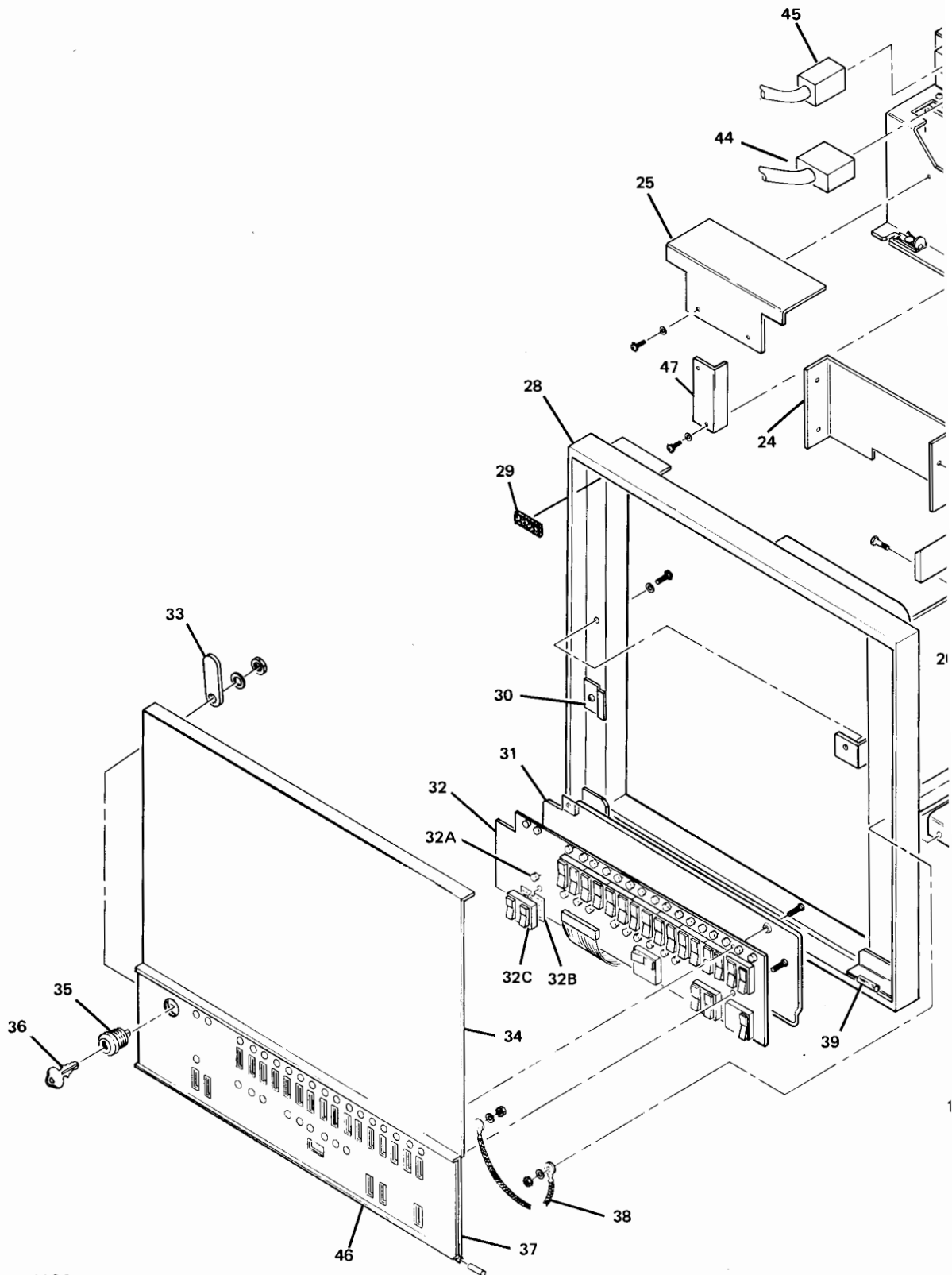


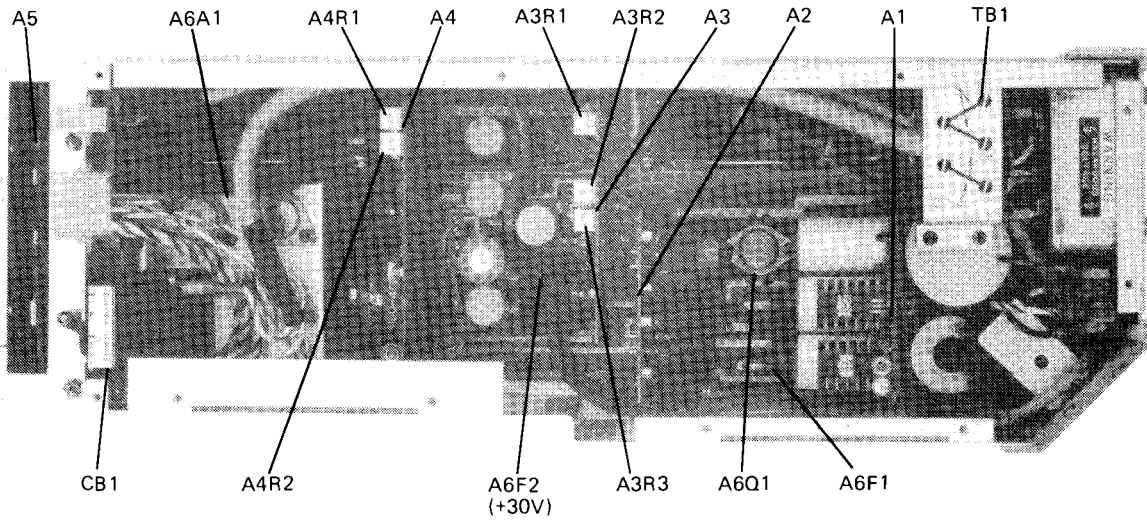
Table 3-2. HP 2112B Computer Replaceable Parts

INDEX NO.	HP PART NO.	DESCRIPTION	MFR. CODE	MFR. PART NO.	UNITS/ ASSY.
1	02112-00018	Memory PCA Cage Cover	28480	02112-00018	1
2	5060-8352	Central Processor Unit A1	28480	5060-8352	1
**3	—	Memory PCA Cage Assembly	28480	—	1
4	5060-8400	Control Store ROM Board A7	28480	5060-8400	1
5	5061-1945	Bottom Cover	28480	5061-1945	1
6	5020-8838	Corner Struts	28480	5020-8838	4
7	5061-1336	Connector Assembly	28480	5061-1336	1
8	5000-8087	Universal Deck	28480	5000-8087	1
9	—	I/O PCA Cage Assembly	28480	—	1
10	02112-00017	Support Bracket	28480	02112-00017	1
11	5020-8812	Rear Frame	28480	5020-8812	1
12	5060-9958	Side Cover	28480	5060-9958	2
13	02112-00029	Rear Cover (Battery)	28480	02112-00029	1
*14	12991-60001	Dual Battery Box Assembly	28480	12991-60001	1
15	5001-2627	Mounting Bracket	28480	5001-2627	1
16	5061-1945	Top Cover	28480	5061-1945	1
17	5000-8093	Rear Panel Extension	28480	5000-8093	1
18	5001-2636	Rear Panel Extension Bracket	28480	5001-2636	2
19	5001-2637	Card Retainer	28480	5001-2637	1
20	5061-3476	Power Supply Assembly A3	28480	5061-3476	1
21	5061-1388	Cross-over Board Assembly A6	28480	5061-1388	1
22	02112-00031	Fan Assembly Retainer	28480	02112-00031	1
23	02112-00016	Card Cage Shield	28480	02112-00016	1
24	5001-2639	Upper Level Shield	28480	5001-2639	1
25	—	Protective Cover (p/o 20)	28480	—	—
26	02112-60019	Upper Ventilating Fan w/cable	28480	02112-60019	2
27	02112-60007	Upper Ventilating Fan Assy	28480	02112-60007	1
28	5020-7333	Front Frame	28480	5020-7333	1
29	9220-2078	Foam Pad	02900	—	2
30	5001-2612	Lock Retainer	28480	5001-2612	1
31	4040-0572	Operator Panel PCA Cover	28480	4040-0572	1
32	5060-8343	Operator Panel PCA A2	28480	5060-8343	1
32A	1990-0529	Light Emitting Diode	28480	1990-0529	28
32B	02108-00014	Spring Contact	28480	02108-00014	22
32C	5040-6076	Switch (Mint Gray)	28480	5040-6076	13
32C	5040-6077	Switch (Jade Gray)	28480	5040-6077	9
33	5001-2638	Lock Latch	28480	5001-2638	1
34	02113-00002	Extended Front Panel	28480	02113-00002	1
35	1390-0344	Lock Assembly	02694	15748/4T1427 (SPECIAL)	1
36	1390-0345	Key 4T1427 (p/o 35)	02694	8632C-R1/ 4T1427	1
37	5001-2635	Sub Front Panel	28480	5001-2635	1
38	8300-0013	Front Panel Cable	28480	8300-0013	1
39A	5001-2640	Hinge Plate (Right)	28480	5001-2640	1
39B	5001-2641	Hinge Plate (Left)	28480	5001-2641	1
40	0570-0528	Press-In Stud	01836	—	2
41	02112-60002	Memory Backplane A5	28480	02112-60002	1
42	02112-60001	I/O Backplane A4	28480	02112-60001	1
*43	12897-60002	DCPC Cable Assembly	28480	12897-60002	1
44	5061-1363	Crossover Cable Assembly	28480	5061-1363	2
45	5061-1364	Status Cable Assembly	28480	5061-1364	1
46	7120-7602	Front Panel Overlay	28480	7120-7602	1

*HP accessory; shown only for reference.
 **Not field replaceable; shown only for reference.

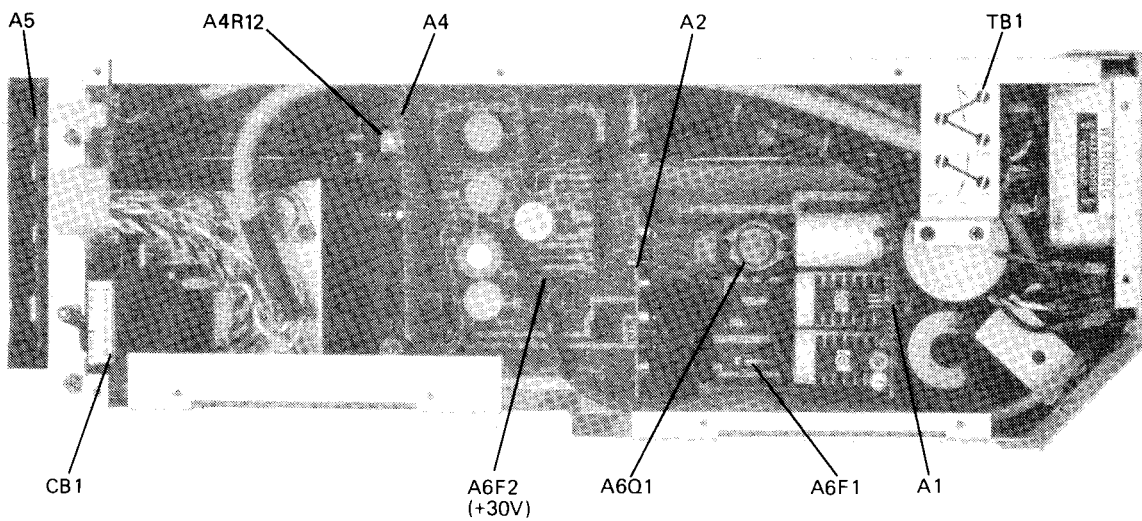


WITH BATTERY BACKUP



7700-597

WITHOUT BATTERY BACKUP



NOTE: Reference designations are shown without assembly A3 prefix (e.g., A5 is A3A5)

7700-598

Figure 3-3. Power Supply Interior View, With and Without Battery Backup Boards

Table 3-4. Memory Systems and Accessories Replaceable Parts

HP PART NO.	DESCRIPTION	MFR. CODE	MFR. PART NO.	UNITS/ ASSY.
2102B	MOS STANDARD PERFORMANCE MEMORY SYSTEM	28480	2102B	1
5060-8360	Memory Controller PCA	28480	5060-8360	1
12747A	128k Byte Memory Module	28480	12747A	Note 1
13187B	32k Byte Memory Module	28480	13187B	Note 1
12998A	16k Byte Memory Module	28480	12998A	Note 1
02112-60016	Memory System Cable	28480	02112-60016	1
2102C	FAULT CONTROL MEMORY SYSTEM	28480	2102C	1
02102-60001	Fault Control Memory Controller PCA	28480	02102-60001	1
12779A	Fault Control Check Bit Array	28480	12779A	Note 1
12780A	Fault Control Check Bit Array	28480	12780A	Note 1
02108-60041	Memory System Cable	28480	02108-60041	1
02108-60016	Memory System Cable	28480	02112-60016	1
	ACCESSORIES			
12892B	Memory Protect	28480	12892-60003	1
12897A	Dual-Channel Port Controller	28480	12897-60001	1
12897-60002	DCPC Cable Assembly	28480	12897-60002	1

Note 1: Depends on particular installations.

Table 3-5. Code List of Manufacturers

The following code numbers are from the Federal Supply Code for Manufactures Cataloging Handbooks H4-1 and H4-2 and their latest supplements.					
CODE NO.	MANUFACTURER	ADDRESS	CODE NO.	MANUFACTURER	ADDRESS
01836	Asco Screw Co.	San Carlos, Ca.	04713	Motorola Inc.	
02694	Corbin Cabinet Lock Div.			Semiconductor Prod. Div.	Phoenix, Az.
	Emhart Corp.	Berlin, Ct.	05008	AirPax Electronics Inc.	Cambridge, Mo.
02900	Wilshire Foam Products Inc.	Torrance, Ca.	07263	Fairchild Camera and Instrument Corp.	
03038	International Rectifier			Semiconductor Div.	Mt. View, Ca.
	Semicon Div.	El Segundo, Ca.	71400	Bussman Manufacturing Div.	
03495	IMC Magnetics Corp. NH Div.	Rochester, N.H.		McGraw-Edison Co.	St. Louis, Mo.



Product Line Sales/Support Key

Key Product Line

- A** Analytical
- CM** Components
- C** Computer Systems
- CP** Computer Systems Primary Service Responsible Office (SRO)
- CS** Computer Systems Secondary SRO
- E** Electronic Instruments & Measurement Systems
- M** Medical Products
- MP** Medical Products Primary SRO
- MS** Medical Products Secondary SRO
- P** Personal Computing Products
- * Sales only for specific product line
- ** Support only for specific product line

IMPORTANT: These symbols designate general product line capability. They do not insure sales or support availability for all products within a line, at all locations. Contact your local sales office for information regarding locations where HP support is available for specific products.

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CM,C*,E

Yokogawa-Hewlett-Packard Ltd.
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Yokogawa-Hewlett-Packard Ltd.
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4759 Shinkil, 6 Dong
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E

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Modern Electronic Establishment
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Hewlett-Packard South Africa (Pty.) Ltd.
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E
Sawah & Co.
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E

EMA, Muhendislik Kolektif Sirketi
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