INSTALLATION AND SERVICE MANUAL

HP 21MX COMPUTER SERIES

Manual part no. 02108-90006
Microfiche part no. 02108-90007

Printed: JULY 1975

HEWLETT PACKARD

HEWLETT hp PACKARD

CERTIFICATION

Products, materials, parts, and services furnished on this order have been provided in accordance with all applicable Hewlett-Packard specifications. Actual inspection and test data pertaining to this order is on file and available for examination.

Hewlett-Packard's calibration measurements are traceable to the National Bureau of Standards to the extent allowed by the Bureau's calibration facilities.

The Hewlett-Packard Quality Program satisfies the requirements of MIL-Q-9858, MIL-I-45208, and MIL-C-45662.

HEWLETT PACKARD

INSTALLATION AND SERVICE MANUAL

HP 21MX COMPUTER SERIES

Manual part no. 02108-90006
Microfiche part no. 02108-90007
Printed: JULY 1975

HEWLETT-PACKARD COMPANY
11000 WOLFE ROAD, CUPERTINO, CALIFORNIA, U.S.A.

LIST OF EFFECTIVE PAGES

Pages	Issue
Title	0
ii thru v	0
1-1 thru 1-13	0
2-1 thru 2-3	0
2-4 (blank)	0
2-5 thru 2-13	0
2-14 (blank)	0
2-15	0
2-16 (blank)	0
2-17	0
2-18 (blank)	0
2-19 thru 2-29	0
2-30 (blank)	0
2-31	0
2-32 (blank)	0
2-33	0
2-34 (blank)	0
2-35	0
2-36 (blank)	0
2-37	0
2-38 (blank)	0
2-39	0
2-40 (blank)	0
2-41	0
2-42 (blank)	0
2-43	0
2-44 (blank)	0
2-45	0
2-46 (blank)	0
2-47	0
2-48 (blank)	0
2-49	0
3-1 thru 3-8	0

PREFACE

This manual provides installation and field service instructions for the Hewlett-Packard 21MX Computer Series. The HP 21MX is a state-of-the art product and, because of the product design, a complete modular replacement philosophy has been implemented to minimize on-site repair time. Repair is assured through the use of a service tool which is, in itself, a complete and operational HP 21MX Computer. Thus, service personnel may replace any assembly within the HP 21MX mainframe.

Supporting documentation for the HP 21MX Computer Series are as follows:

a. *HP 21MXComputer Series Installation and Service Manual,* part no. 02108-90006.

b. *HP 21MX Computer Series Reference Manual,* part no. 02108-90002.

c. *HP 21MX Computer Series Operator's Manual,* part no. 02108-90004.

d. *Microprogramming HP 21MX Computers Operating and Reference Manual,* part no. 02108-90008.

e. *HP 12979A Input/Output Extender Operating and Reference Manual,* part no. 12979-90007.

f. *HP 12979A Input/Output Extender Installation and Service Manual,* part no. 12979-90006.

g. *HP 12990A Memory Extender Installation and Service Manual,* part no. 12990-90003.

An Engineering Supplement package, part no. 02108-90017, is also available to those who wish indepth knowledge about the architecture and logic elements of the HP 21MX Computer Series. Consult your local Hewlett-Packard Sales and Service Office for details regarding this package. A list of Sales and Service Offices is provided at the back of this manual.

CONTENTS

ILLUSTRATIONS

TABLES

INSTALLATION

SECTION I

This section provides installation instructions for the processor 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 processor mainframe includes environmental limitations, power requirements, and mounting considerations. If the processor is purchased as part of a computer system, disregard the contents of paragraphs 1-2 through 1-5 herein and refer instead to the *Hewlett-Packard 2000 Computer Systems Site Preparation Manual,* part no. 02000-90097.

1-2. ENVIRONMENTAL LIMITATIONS

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

Table 1-1. Processor Environmental Limitations

AMBIENT TEMPERATURE

Operating: 0° to 55°C (32° to 131°F)
Nonoperating: −40° to 75°C (−40° to 167°F)

ALTITUDE

Operating: 15,000 feet (4,573 meters)
Non operating: 25,000 feet (7,622 meters)

RELATIVE HUMIDITY

20 to 95% at 25° to 40°C (77° to 104°F) without condensation.

1-3. POWER REQUIREMMENTS

The processor is shipped with the power supply configured to operate from single-phase power mains of 110 ±20% volts (standard) or 220 ±20% volts (option 015) as specified in the purchase order. Maximum power consumption of the processor is as follows:

HP 2105A - 400 watts

HP 2108A - 525 watts

HP 2112A - 800 watts.

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 processor. The internal fans provide adequate ventilation when operated within the environmental limitations specified in table 1-1.

1-5. MOUNTING CONSIDERATIONS

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

Table 1-2. Rack-Mounting Dimensions

PROCESSOR	HEIGHT	WIDTH*	DEPTH**
HP 2105A	5-1/4 in. (133 mm)	16-3/4 in. (425 mm)	24-1/2 in. (622 mm)
HP 2108A	8-3/4 in. (223 mm)	16-3/4 in. (425 mm)	24-1/2 in. (622 mm)
HP 2112A	12-1/4 in. (311 mm)	16-3/4 in. (425 mm)	24-1/2 in. (622 mm)

*Behind rack mount.
**Required rack depth.

1-6. UNPACKING AND INSPECTION

The processor 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(s) and locate the envelope marked "CUSTOMER RECORDS." One of the items in this envelope 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 an HP 2108A or HP 2112A Processor is being installed and the processor includes a power fail recovery system, proceed as follows:

a. Loosen screw located in rear fold of top cover.

b. Slide top cover approximately 6 inches (15 centimeters) toward rear of processor to expose battery PCA(s). For HP 2108A Processor, see figure 3-2 indexes 14A, 14B, and 14C; for HP 2112A Processor, see figure 3-3 index 14A.

c. Remove foam-plastic shipping block from top of battery PCA(s).

d. Ensure that battery PCA(s) is seated fully into mating receptacle(s) on lower power supply PCA.

e. Slide top cover into place and tighten screw in rear fold.

If the visual examination reveals any damage to the processor or accessories, follow the damage claim procedure described in paragraph 1-34. 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 in the "CUSTOMER RECORDS" envelope have been received.

1-9. EQUIPMENT

1-10. PROCESSOR. The processor model number and serial number are stamped on an identification label affixed to the rear panel. Ensure that both the model number and serial number are identical with those specified in the "CUSTOMER RECORDS" envelope. A typical identification label is illustrated in figure 1-1.

All processor options specified in the purchase order are installed and tested at the factory. Each processor option installed at the factory is identified by a three-digit number (e.g., 004, 005, 014, . . .) stamped on the identification label. Check these numbers to ensure the inclusion of those options specified in the "CUSTOMER RECORDS" envelope.

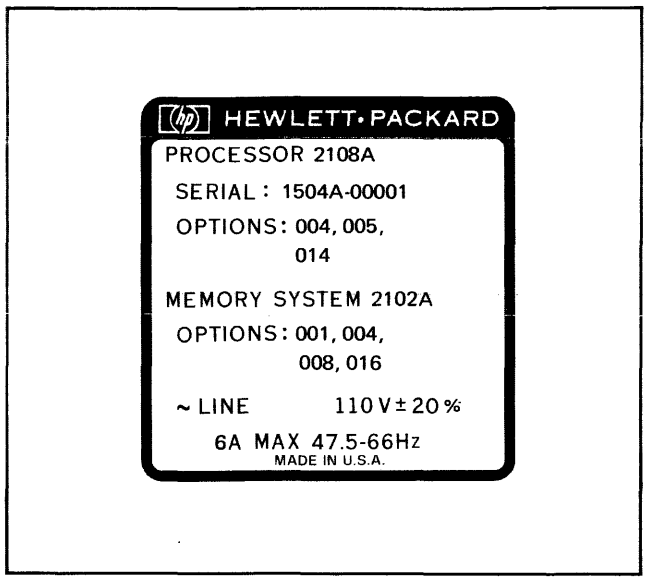


Figure 1-1. Typical Identification Label

1-11. MEMORY SYSTEM. The memory system and memory options specified in the purchase order are installed and tested at the factory. As shown in figure 1-1, the memory configuration is identified by the memory system model number and one or more three-digit option numbers (e.g., 001, 004, 008, ...). Check these numbers to ensure the inclusion of the proper memory configuration specified in the "CUSTOMER RECORDS" envelope.

Loosen the quarter-turn fasteners on the operator panel, lower the panel assembly to the memory access position, and remove the two memory PCA cage cover retaining screws and lockwashers. Remove the memory PCA cage cover and notice that the memory slot numbers are stamped on the right-hand side of the memory PCA cage. (See figure 1-2.) These slot numbers are allocated to the functions listed in table 1-3, which shows that the memory controller PCA can be installed in any slot from 113 upward. If an HP 2102A Memory System is installed, the memory module PCA's may be configured for either 4K, 8K, or 16K or memory. Verify that all connectors are seated firmly onto the PCA front edge connectors. Replace the memory PCA cage cover and operator panel assembly and tighten the quarter-turn fasteners.

1-12. INPUT/OUTPUT INTERFACES. At the rear of the processor, remove the input/output PCA cage cover. (Figure 1-3 shows the rear panel of the processor with the I/O PCA cage cover removed.) Verify that the proper input/output interface PCA's have been furnished in accordance with the purchase order and as specified in the "CUSTOMER RECORDS" envelope. Replace the I/O PCA cage cover.

Note: An I/O terminator, part no. 02100-60060, must be installed in the HP 2108A and HP 2112A I/O PCA cage if the cage is not fully loaded.

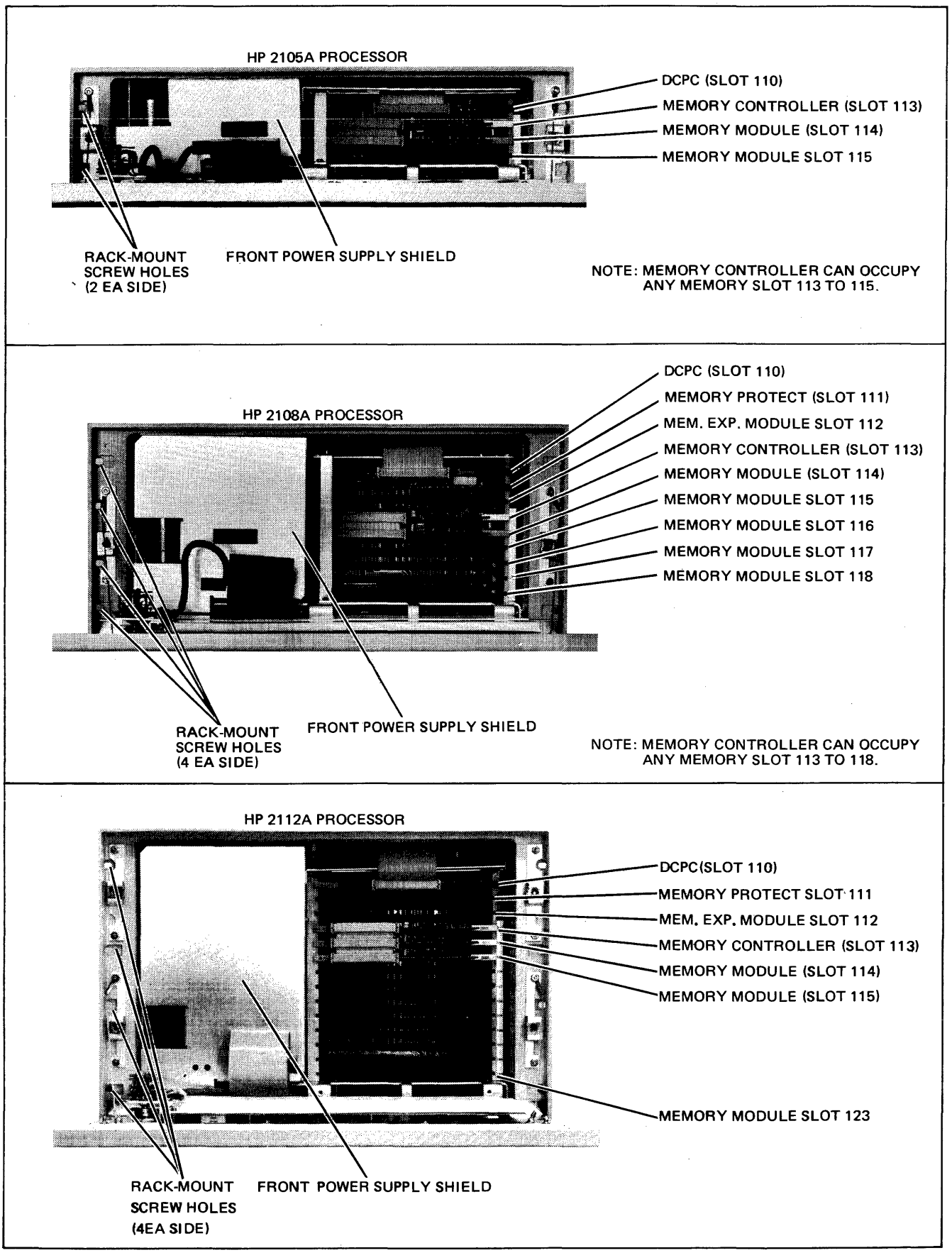


Figure 1-2. Processor Memory PCA Cage (Cage Cover Removed)

Table 1-3. Memory Slot Assignments

HP 2105A SLOT	HP 2108A SLOT	HP 2112A SLOT	ASSIGNMENT
110	110	110	Dual-Channel Port Controller
—	111	111	Memory Protect PCA
—	112	112	Memory Expansion Module
113	113	113	Memory Module or Memory Controller
114	114	114	Memory Module or Memory Controller
115	115	115	Memory Module or Memory Controller
—	116	116	Memory Module or Memory Controller
—	117	117	Memory Module or Memory Controller
—	118*	118	Memory Module or Memory Controller
—	—	119	Memory Module or Memory Controller
—	—	120	Memory Module or Memory Controller
—	—	121	Memory Module or Memory Controller
—	—	122	Memory Module or Memory Controller
—	—	123*	Memory Module or Memory Controller

*Install Memory Controller in highest numbered slot when the installation is to include an HP 12990A Memory Extender.

1-13. PROGRAM TAPES

Check the punched tapes received with the shipment to ensure that all tapes listed in the "CUSTOMER RECORDS" envelope are present.

1-14. CONFIGURATION REQUIREMENTS

1-15. INTERNAL SWITCH SETTINGS

WARNING

Hazardous voltages are exposed when the bottom cover is removed and ac power is applied.

Remove the bottom cover of the processor and locate the two toggle switches (A1S1 and A1S2) mounted on the rear of the central processor unit PCA. (See figure 1-4.) The position of switch A1S1 determines the action that the processor 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 processor 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 Computer Series Reference Manual*, part no. 02108-90002.

1-16. PARITY ERROR/MEMORY PROTECT SWITCH A1S1. The action that the processor will take when a parity error or a memory protect violation occurs is determined by the following alternative switch settings:

Note: Memory protect is an option available only with the HP 2108A and HP 2112A Processors. 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 processor 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 or a memory protect violation 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 enabled by an STF 05 instruction, an interrupt to memory location 00005 is generated when a memory protect violation occurs.

(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.

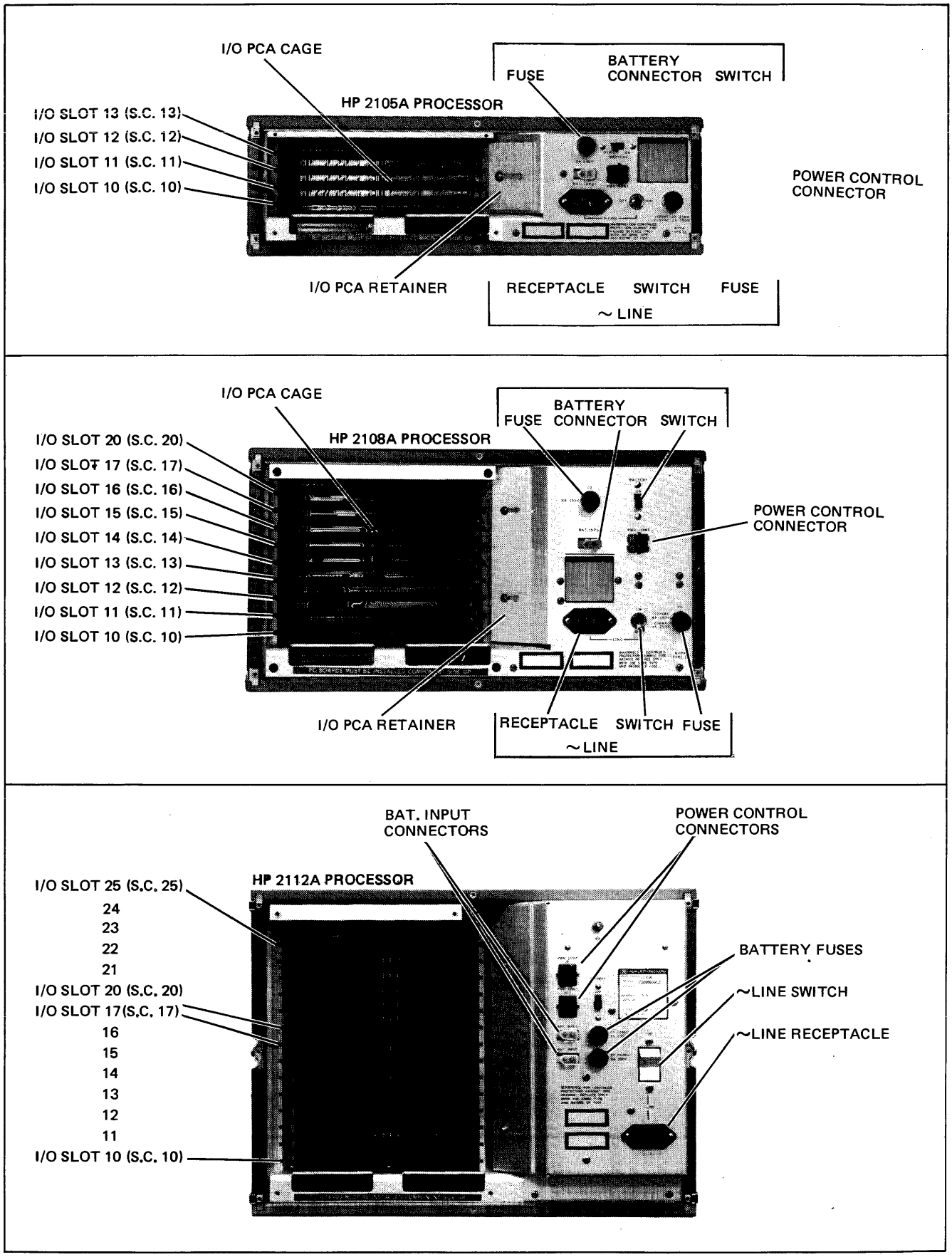


Figure 1-3. Processor I/O PCA Cage and Rear Panel

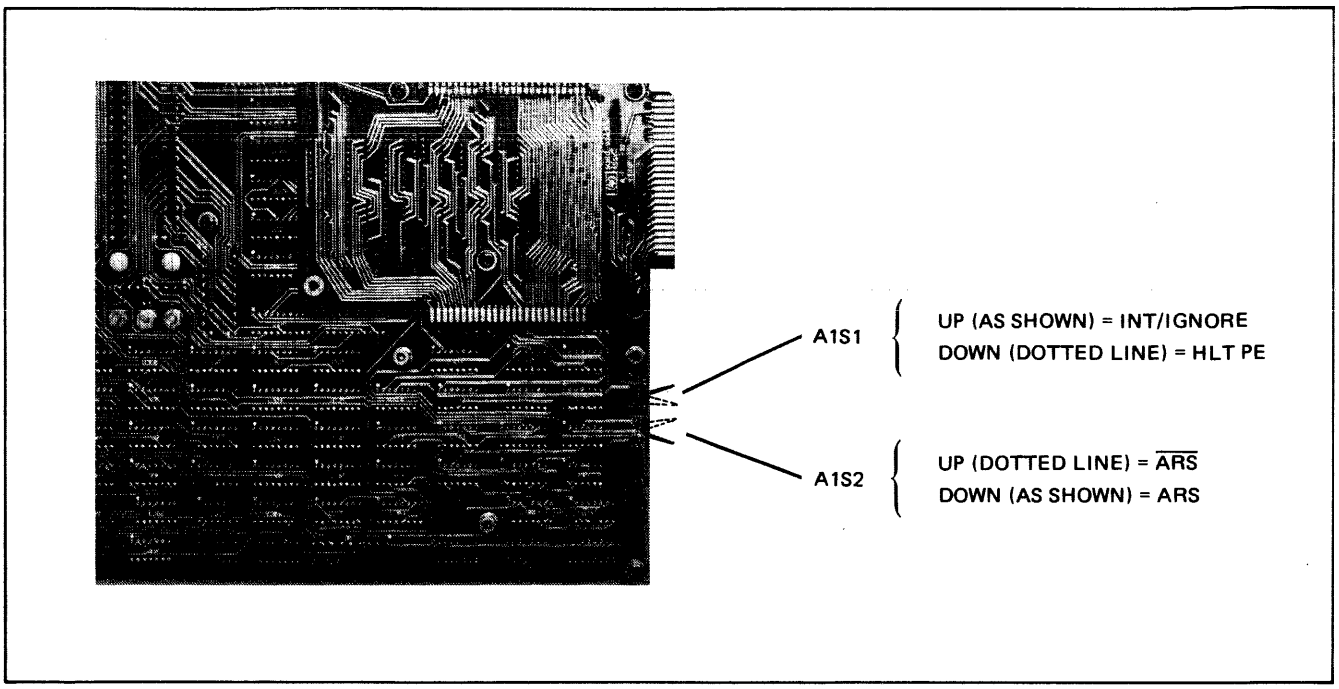


Figure 1-4. Internal Switch Configuration

1-17. AUTOMATIC RESTART SWITCH A1S2. The action that the processor 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 time delay of about half a second following the return to normal power levels, the processor will interrupt to memory location 00004_8 provided that the memory was sustained. This permits entry into a restart program. The POWER FAIL/BATTERY 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 processor is halted immediately regardless of whether the processor 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 processor 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 10_8) having the highest priority; the highest nummbered 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 10_8 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.

Note: The HP 2108A and HP 2112A require that an I/O terminator, part no. 02100-60060, be installed in the I/O PCA cage if the cage is not fully loaded. The I/O terminator can occupy any unused I/O slot.

1-19. INSTALLATION PROCEDURE

1-20. MANUAL UPDATING

Before installing the processor, perform any updating that may be required for the HP 21MX Computer Series 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 inside the front cover of 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 mains voltage and the proper adjustments of the processor power supply are listed in table 1-4.

1-24. AC POWER MAINS OUTLET AND EXTERNAL GROUND

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

Figures 1-5 and 1-6 illustrate and provide the necessary details of the various ac power cord configurations. If the processor 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 processor.

Have a qualified electrician check the power outlet with an ac voltmeter to ensure that the required single-phase voltage is present. If the processor is configured for 110-volt operation, the mains voltage must be in the range of 88 to 132 volts ac (rms); for 220-volt operation, the mains voltage must be in the range of 176 to 264 volts ac (rms). Bear in mind that the electrical load imposed by the processor and its options and 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 observed if the installation is inside a building.

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

1-25. PROCESSOR MOUNTING

1-26. BENCH MOUNTING. As stated in paragraph 1-5, the processor 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. Bear also in mind that a minimum 12 inches (30.5 centimeters) of clearance behind the processor rear panel is required when removing and installing input/output interface PCA's.

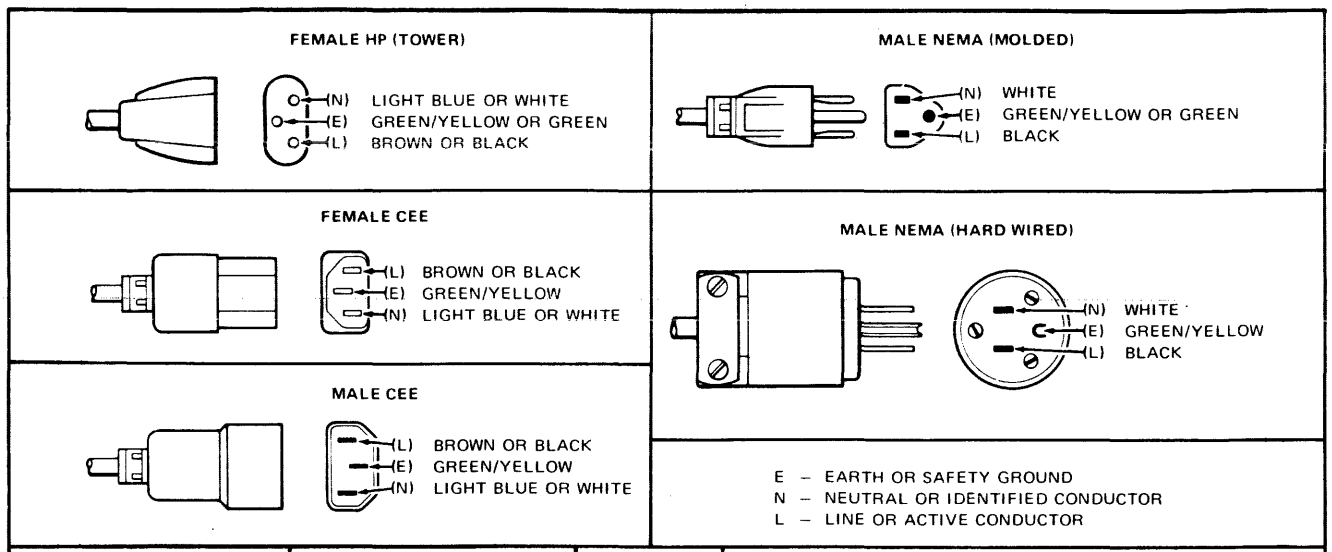
1-27. RACK MOUNTING. The following chassis slide kits are available for rack mounting the processors:

PROCESSOR	CHASSIS SLIDE KIT
HP 2105A	HP 12903A
HP 2108A	HP 12903B
HP 2112A	HP 12903C

If a chassis slide kit has been ordered, mount the components to the sides of the processor and to the inside of the rack according to the instructions furnished with the kit. Then install the processsor in the rack and secure the processor in place with screws inserted through the mounting holes identified in figure 1-2. The processor 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.

Table 1-4. Installation Test Equipment

INSTRUMENT	CRITICAL SPECIFICATIONS	RECOMMENDED HP MODEL
Digital Voltmeter	At least four-digit readout. Minimum input impedance 10 megohms; full-scale ranges of 0.999 and 99.99 volts dc.	HP 3439A Digital Voltmeter with HP 3441A Range Selector.
AC Voltmeter	Expanded-scale or digital-readout type capable of measuring ac power mains to ±1.0%. Voltage range must be from 88 to 132 volts ac (standard) or 176 to 264 volts ac (option 015).	HP 3445 AC/DC Range Unit. (Also performs functions of HP 3441A Range Selector listed above. Requires an HP 3449A Digital Voltmeter.)
Variable Autotransformer	Capable of reducing ac mains input to processor to 80 volts ac (standard) or 160 volts ac (option 015); rated at least 1100 volt-amperes.	None.



HP PART NUMBER	POWER CORD LENGTH		WIRE SIZE	CONNECTORS
8120-1406	2 1/2 ft.	(76 cm)	18/3	FEMALE HP (TOWER) to MALE CEE
8120-1396*	2 1/2 ft.	(76 cm)	18/3	FEMALE CEE to MALE CEE
8120-1900*	2 1/2 ft.	(76 cm)	16/3	FEMALE CEE to MALE CEE
8120-1625*	8.0 ft.	(2.4 m)	18/3	FEMALE CEE to MALE CEE
*USA OR NON-USA				
8120-1405	2 1/2 ft.	(76 cm)	18/3	FEMALE CEE to MALE NEMA (MOLDED)
8120-1348	7 1/2 ft.	(2.2 m)	18/3	FEMALE CEE to MALE NEMA (MOLDED)
8120-1395	8.0 ft.	(2.4.m)	18/3	FEMALE CEE to MALE NEMA (MOLDED)
8120-1407	15.0 ft.	(4.5 m)	18/3	FEMALE CEE to MALE NEMA (MOLDED)
8120-1933	2 1/2 ft.	(76 cm)	16/3	STRIPPED ENDS to MALE CEE
8120-1755	4.0 ft.	(1.22 m)	18/3	STRIPPED ENDS to MALE CEE
8120-1934	4.0 ft.	(1.22 m)	16/3	STRIPPED ENDS to MALE CEE
8120-1706	15.0 ft.	(4.5 m)	14/3	STRIPPED ENDS to MALE NEMA (HARD WIRED)
8120-1935	12.0 ft.	(3.6 m)	16/3	STRIPPED ENDS to MALE NEMA (HARD WIRED)
8120-1796	8.0 ft.	(2.4 m)	18/3	FEMALE CEE to MALE NEMA (HARD WIRED)
8120-1931	8.0 ft.	(2.4 m)	16/3	FEMALE CEE to MALE NEMA (HARD WIRED)
8120-1932	12.0 ft.	(3.6 m)	16/3	FEMALE CEE to MALE NEMA (HARD WIRED)

NOTE: OTHER COUNTRIES SUCH AS CANADA, JAPAN (100 or 200 VOLTS), MEXICO, PHILIPPINES, AND TAIWAN MAY USE SOME OF THE ABOVE SETS. CONSULT YOUR NEAREST HP SALES OFFICE.

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

1-28. POWER SUPPLY CHECK

Verify the tolerances of the various power supply voltages and the setting of the power fail threshold as described in the following paragraphs.

1-29. HP 2105A/2108A POWER SUPPLY ACCURACY. Energize the digital voltmmeter and allow sufficient warmup to reach its rated accuracy. Plug the processor power cord into the power outlet and proceed as follows:

a. Loosen the two quarter-turn fasteners on operator panel and lower it to the access position. Remove memory PCA cage cover.

WARNING

Hazardous voltages are exposed when the front power supply shield is removed.

b. Remove the three screws and lockwashers securing front power supply shield to processor mainframe.

c. Disconnect key-operated switch assembly cable from lower power supply PCA connector and remove front power supply shield. Reconnect key-operated switch assembly cable.

d. On processor rear panel, set ~ LINE switch to ON.

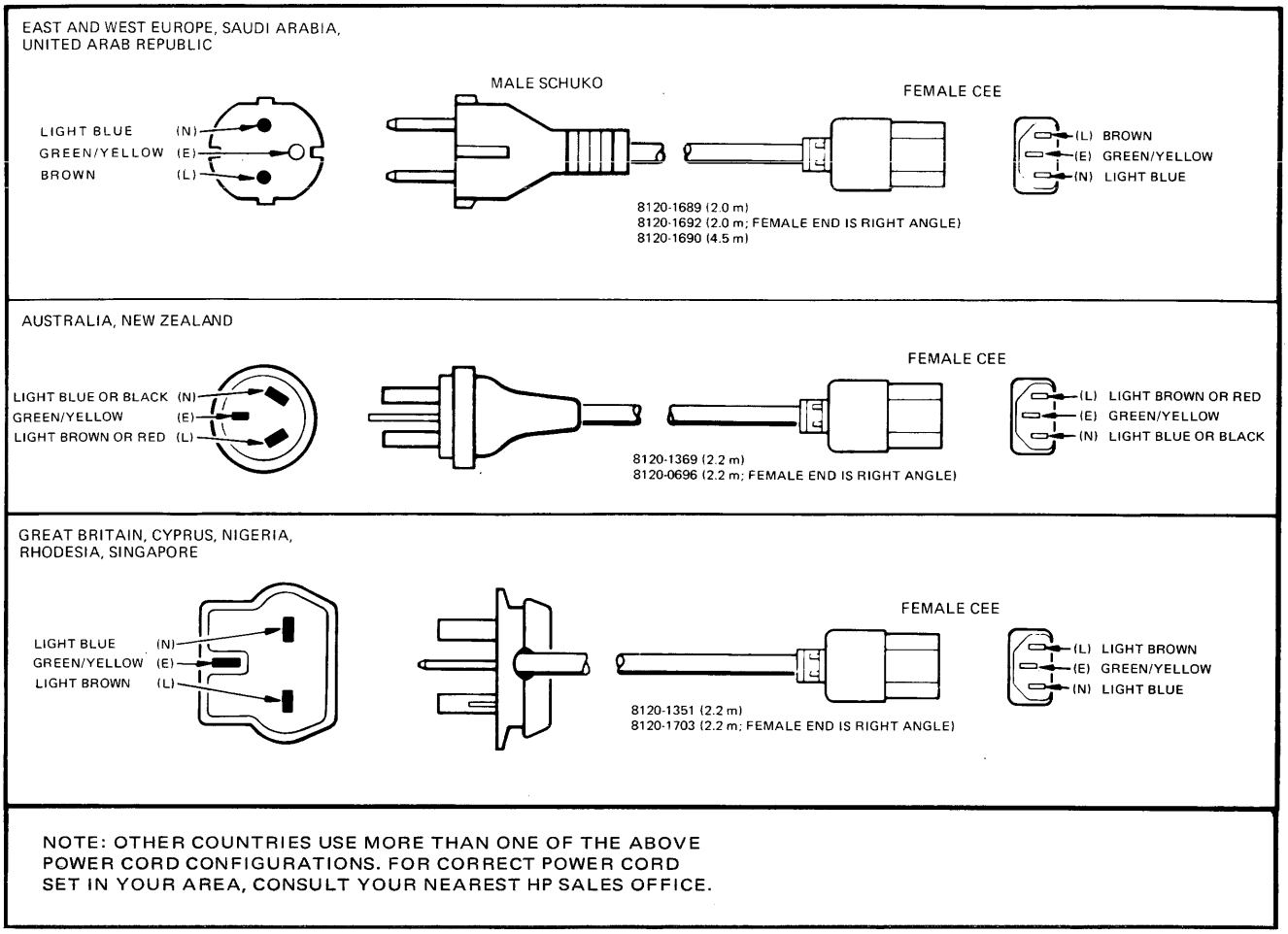


Figure 1-6. AC Power Cord Sets (Non-USA)

e. On operator panel, rotate key-operated switch to R (reset) and then to OPERATE.

f. Connect positive lead of digital voltmmeter to J8-5 (+5V test point) and connect common lead to J8-2 (common test point). (See figure 1-7.)

g. Adjust +5V ADJ potentiometer to obtain voltmeter indication of +5.00 ±0.05 volts.

h. Check tolerances of the remaining supplies; test points and tolerances are listed in table 1-5.

i. Set key-operated switch to STANDBY and set ~ LINE switch to OFF.

j. Disconnect voltmeter and key-operated switch assembly cable. Replace front power supply shield and reconnect key-operated switch assembly cable.

k. Replace memory PCA cage cover.

l. Replace operator panel assembly and tighten the two quarter-turn screws.

Note: If one or more power supplies 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. HP 2112A POWER SUPPLY ACCURACY. Energize the digital voltmeter and allow sufficient warmup to reach its rated accuracy. Plug the processor power cord into the power outlet and proceed as follows:

a. Loosen the four quarter turn fasteners on operator panel and lower it to the access position. Remove memory PCA cage cover.

WARNING

Hazardous voltages are exposed when the front power supply shield is removed.

b. Remove the three screws and lockwashers securing front power supply shield to processor mainframe. Remove the one screw and lockwasher attaching shield to battery PCA guide.

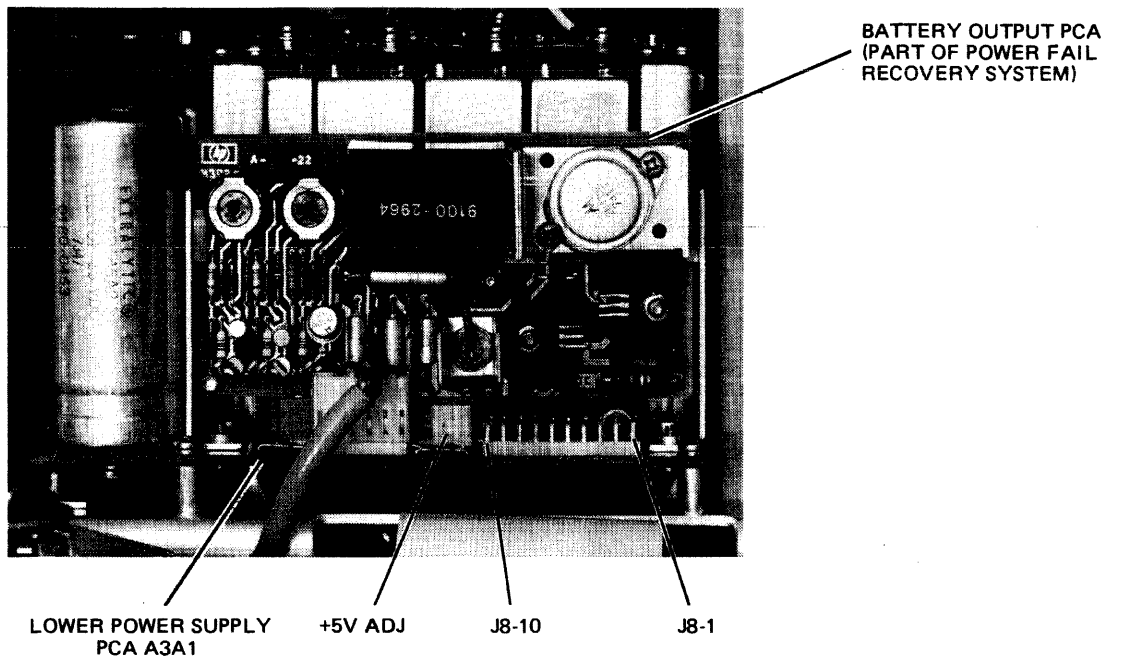


Figure 1-7. HP 2105A/HP 2108A Processor Power Supply Field Adjustment and Test Points

c. Disconnect key-operated switch assembly cable from lower power supply PCA connector and remove front power supply shield. Reconnect key-operated switch assembly cable.

d. On processor rear panel, set ~ LINE switch to on.

e. On operator panel, rotate key-operated switch to R (reset) and then to OPERATE.

f. Connect positive lead of digital voltmeter to J6-5 (+5V test point) and connect common lead to J6-2 (common test point). (See figure 1-8.)

g. Adjust +5V ADJ potentiometer to obtain voltmeter indication of +5.00 ±0.05 volts.

h. Connect positive lead of digital voltmeter to J6-6 (+5VM test point). Adjust +5VM ADJ potentiometer to obtain voltmeter indication of +5.00 ±0.05 volts.

i. Check tolerances or remaining supplies; test points and tolerances are listed in table 1-6.

j. Set key-operated switch to STANDBY and set ~ LINE switch to OFF.

k. Disconnect voltmeter and key-operated switch assembly. Replace front power supply shield and reconnect key-operated switch assembly cable.

l. Replace memory PCA cage cover.

m. Replace operator panel assembly and tighten the four quarter-turn screws.

Note: If one or more power supplies 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.

1-31. POWER-UP THRESHOLD. The processor is shipped with the power-up threshold set at the lower limit of the mains voltage configuration. That is, if the processor is configured for 110-volt operation, the power-up threshold is set at 88 volts rms; if the processor is configured for 220-volt operation, the power-up threshold is set at 176 volts rms. If one or more peripheral devices in the computer system will not operate properly when the mains voltage drops below say 100 volts rms (standard) or 200 volts rms (option 015), it may be necessary to raise the power-up threshold to this level. Verify and, if desired, re-adjust the power-up threshold as follows:

WARNING

Hazardous voltages are exposed when the top cover is removed and ac power is applied.

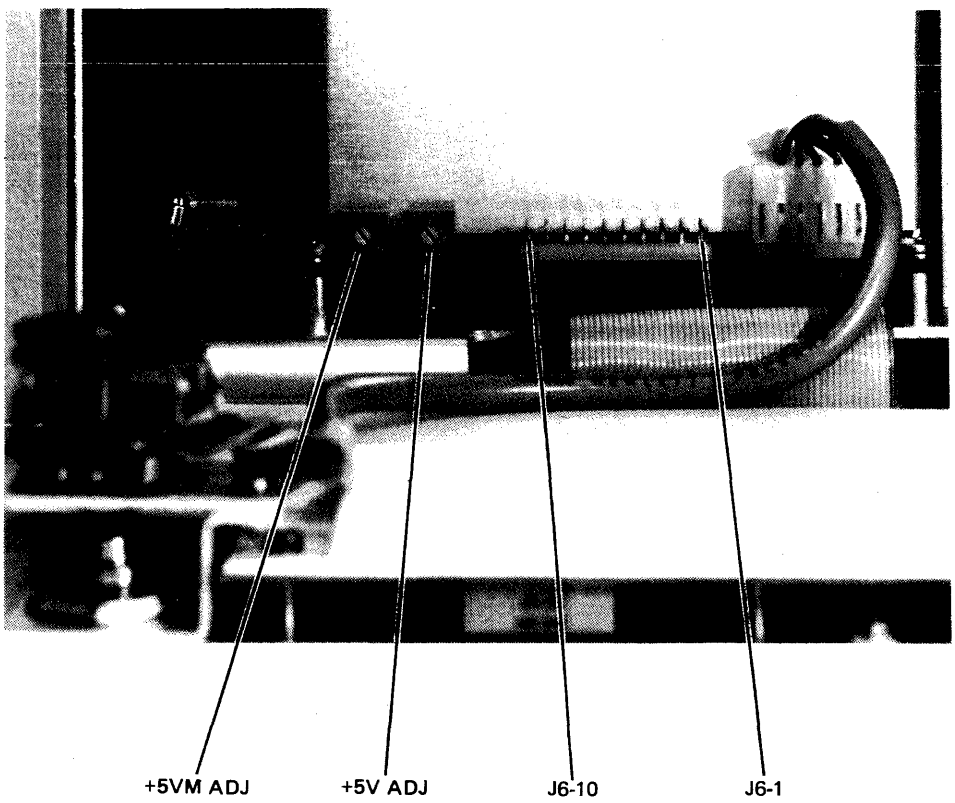


Figure 1-8. HP 2112A Processor Power Supply Field Adjustments and Test Points

a. Loosen the screw in the rear center fold of the top cover. Slide top cover rearward approximately 6 inches (15 centimeters) to access the power-up threshold potentiometer. (See detail A in figure 3-1, 3-2, or 3-3 as appropriate.)

b. Energize ac voltmeter and allow sufficient warmup to reach its rated accuracy.

c. Connect ac voltmeter leads across autotransformer output. Plug autotransformer power cord into power outlet and set its output to approximately 110 volts rms (standard) or 220 volts rms (option 015).

d. Plug processor power cord into autotransformer power output receptacle. Set processor ~LINE switch to ON and rotate key-operated switch to R (reset) and then to OPERATE.

e. Slowly reduce autotransformer output until all operator panel indicators extinguish, indicating that the processor has switched automatically to the standby mode. The voltmeter should indicate 75 ±5 volts rms (standard) or 150 ±10 volts rms (option 015).

f. If a power fail recovery system is installed, omit this step. If a power fail recovery system is not installed:

(1) Set autotransformer output to 85 ±0.1 volts rms (standard) or 170 ±0.2 volts rms (option 015). Rotate key-operated switch to R (reset) and then to OPERATE. Operator panel indicators should remain extinguished.

(2) Set autotransformer output to 87 ±0.1 volts rms (standard) or 174 ±0.2 volts rms (option 015). Rotate key-operated switch to R (reset) and then to OPERATE. Operator panel indicators should light. Proceed with step h.

Note: There is up to a 1-second delay from the time that the upper threshold is detected until the operator panel indicators light. Perform the following step very carefully.

g. *Slowly* increase autotransformer output until the operator panel indicators light. The voltmeter should indicate 87 ±0.5 volts rms (standard) or 174 ±1.0 volts rms (option 015).

Table 1-5. HP 2105A/2108A Processor Power Supply Tolerances

SUPPLY	TEST POINT*	TOLERANCE
−12V	J8-1	±0.6V
Common	J8-2	—
+12V	J8-3	±0.6V
−2V	J8-4	±0.1V
+5V	J8-5	±0.25V
+5V(M)	J8-6	±0.25V
V+(BAT)	J8-7	—
$\overline{\text{PWU}}$	J8-8	—
(12V(M)	J8-9	±0.6V
−12V(M)	J8-10	±0.6V

*J8 is mounted on lower power supply PCA.

Table 1-6. HP 2112A Processor Power Supply Voltage Tolerances

SUPPLY	TEST POINT*	TOLERANCE
$\overline{\text{PUUP}}$	J6-1	—
Common	J6-2	—
+28V‡	J6-3	±2.8V
−2V	J6-4	±0.1V
+5V	J6-6	±0.25V
+5VM	J6-7	±0.25V
−12VI/O	J6-8	±0.6V
+12VM	J6-9	±0.6V
−12VM	J6-10	±0.6V

*J6 is mounted on lower power supply PCA.

‡+28V is present if jumper is installed on upper power supply PCA.

h. If the upper threshold is not within tolerance, or if it is desired to adjust both thresholds to a higher voltage, continue with step i. Otherwise, disconnect the test setup and continue with the installation.

i. Reduce autotransformer output until operator panel indicators extinguish. Set power-up threshold potentiometer fully clockwise.

j. Set autotransformer output to the desired upper threshold. Adjust power-up threshold potentiometer *slowly* counterclockwise until operator panel indicators light.

k. *Slowly* decrease autotransformer output until operator panel indicators extinguish. The ac voltmeter should indicate 10 to 20 volts lower than the desired upper threshold.

After verifying that the power-up threshold has been properly adjusted, disconnect the test setup, set the ~ LINE switch to OFF, and close the top panel.

Note: The difference between the upper and lower thresholds varies with the computer configuration. A more heavily loaded computer configuration will change to standby at a higher line voltage than a less heavily loaded configuration, even though both configurations change from standby to operate at the same line voltage.

1-32. INTERFACE 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, set the key-operated switch to STANDBY and remove the input/output PCA cage cover. Install the hooded connector of each cable onto the edge connector of the interface PCA's. Connect the opposite end of each cable to the appropriate peripheral device, replace the I/O PCA cage cover, and connect the battery cable(s), if present, to the BAT. INPUT connector(s). Set the key-operated switch to OPERATE and, if a power fail recovery system is installed, set the BATTERY switch to ON.

Note: Batteries are completely discharged before shipment. Upon initial application of charging voltage or after a prolonged-power failure, the POWER FAIL/BATTERY indicator will flash on and off for approximately 16 hours until the battery is known to contain a sufficient charge to sustain memory.

1-33. PERFORMANCE VERIFICATION CHECK

Verify the system installation and operation by running the diagnostic program as described in the *Long Diagnostic Reference Manual,* part no. 24390-90001. The following hardware is required for the diagnostic:

a. An HP 21MX with at least 4K of memory.

b. A paper tape reader.

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 packaging materials for inspection.

1-35. REPACKAGING FOR SHIPMENT

CAUTION

When shipping an HP 21MX with a power fail recovery system installed, the following procedure must be follows:

a. The battery box cover must be securely fastened to the processor.

b. The battery must be discharged before shipment. This can best be accomplished by disconnecting the power cord, setting the BATTERY switch to ON, and allowing the battery to discharge into memory for approximately 3 hours.

c. After the battery is discharged, disconnect the battery cable(s) from the BAT. INPUT connector(s) and place protective sleeving or masking tape over the battery leads.

d. Place protective sleeving or masking tape over the BAT. INPUT connector(s).

e. Secure the battery PCA(s) in place with either a foam plastic shipping block or with masking tape.

When shipping a power fail recovery system that is not installed in the processor, 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 processor. Alternatively, containers and packing materials may be obtained from Hewlett-Packard Sales and Service Offices. If the processor is being sent to the factory for servicing, attach a tag to the processor specifying the type of service required together with the processor model number and full serial number. Mark the container "FRAGILE" to ensure careful handling. In any subsequent correspondence, refer to the processor 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 processor with commercially available materals:

a. Wrap processor in heavy paper or sheet plastic. If shipping the processor back to the factory, first attach a tag to the processor with the return address and indicating the type of service required. Include the processor model number and full serial number.

b. Use a strong shipping container. A double-wall carton constructed of 350-pound test material is adequate.

c. Use sufficient shock-absorbing material on all sides of the processor to provide a firm cushion and to prevent movement inside the container. Use particular care to protect the processor corners and front and rear panels.

d. Seal the shipping container securely and mark it "FRAGILE".

e. In any subsequent correspondence with the factory, refer to the processor by model number and full serial number.

SERVICE

SECTION II

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 an input/output timing diagram, 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 bimonthly basis.

Table 2-1. Preventive Maintenance

1. Clean equipment exterior.
2. Using digital voltmeter (table 1-4), check power supply voltages as specified in paragraph 1-29 (2105/2108) or paragraph 1-30 (2112).
3. Check fans for proper operation.
4. Check operation of all front panel switches and indicators.
5. Perform verification check a specified in paragraph 1-33.

2-2. TROUBLESHOOTING

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.

2-3. SUBASSEMBLY REMOVAL AND REPLACEMENT

WARNING

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

The following paragraphs, which describe procedures for removing and replacing the various processor and memory system subassemblies shown in figures 3-1, 3-2, and 3-3, assume that the processor is installed as a freestanding device. If the processor 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 processor in the rack, proceed as follows:

a. On the rear panel, set BATTERY and ~ LINE switches of OFF; disconnect power cord.

b. Disconnect all I/O cables, including the I/O extender cable if present.

c. Remove processor from rack.

2-4. TOP, SIDE, AND BOTTOM COVERS

WARNING

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

2-5. REMOVAL. Remove the top, side, and bottom cover as follows:

a. Loosen screw located in rear fold of top cover. Slide top cover toward rear and remove.

b. Remove chassis slide(s), if present. On HP 2105A or HP 2108A, loosen screw in rear fold of side cover; slide cover toward rear and remove. On HP 2112A, remove the two screws and washers from center of side cover; slide cover toward rear and remove.

c. Remove all I/O cables, including I/O extender cable if present. Loosen screw located in rear fold of bottom cover and slide cover toward rear and remove.

2-6. REPLACEMENT. Replace covers in the reverse order of the removal procedure.

2-7. CONTROL STORE ROM PCA'S

2-8. REMOVAL. Set the ~LINE 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 ROMPCA 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.

2-9. REPLACEMENT. Replace control store ROM PCA's in reverse order of the removal procedure.

2-10. CENTRAL PROCESSOR UNIT PCA

2-11. REMOVAL. Set the ~LINE 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.

b. Remove the 12 screws and lockwashers securing CPU PCA to bottom of processor 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.

2-12. REPLACEMENT. Install CPU PCA in the processor 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 processor mainframe.

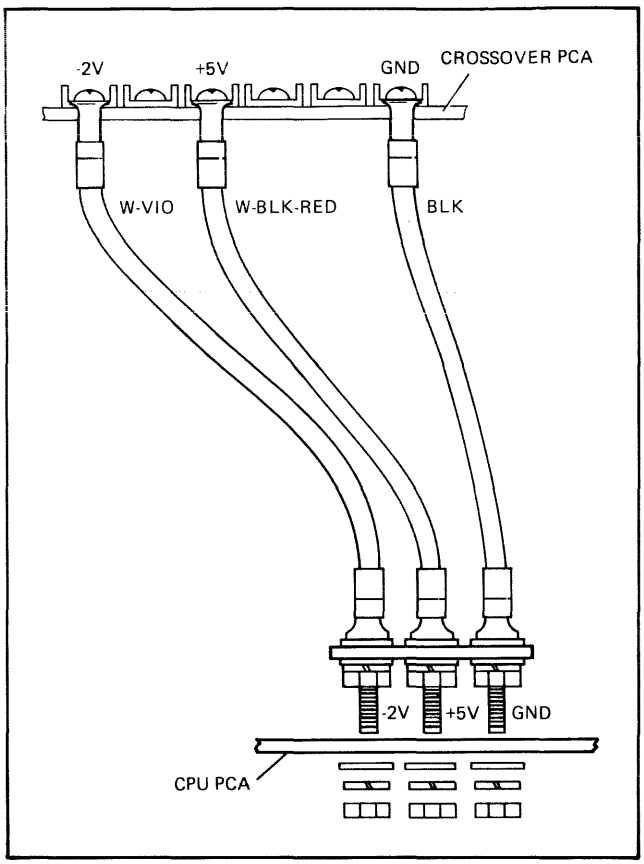


Figure 2-2. CPU Power Connections

e. Replace the control store ROM PCA's and connect operator panel cable assembly to CPU PCA front edge connector. Replace bottom cover.

f. Set ~ LINE and BATTERY switches to ON.

2-13. 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.

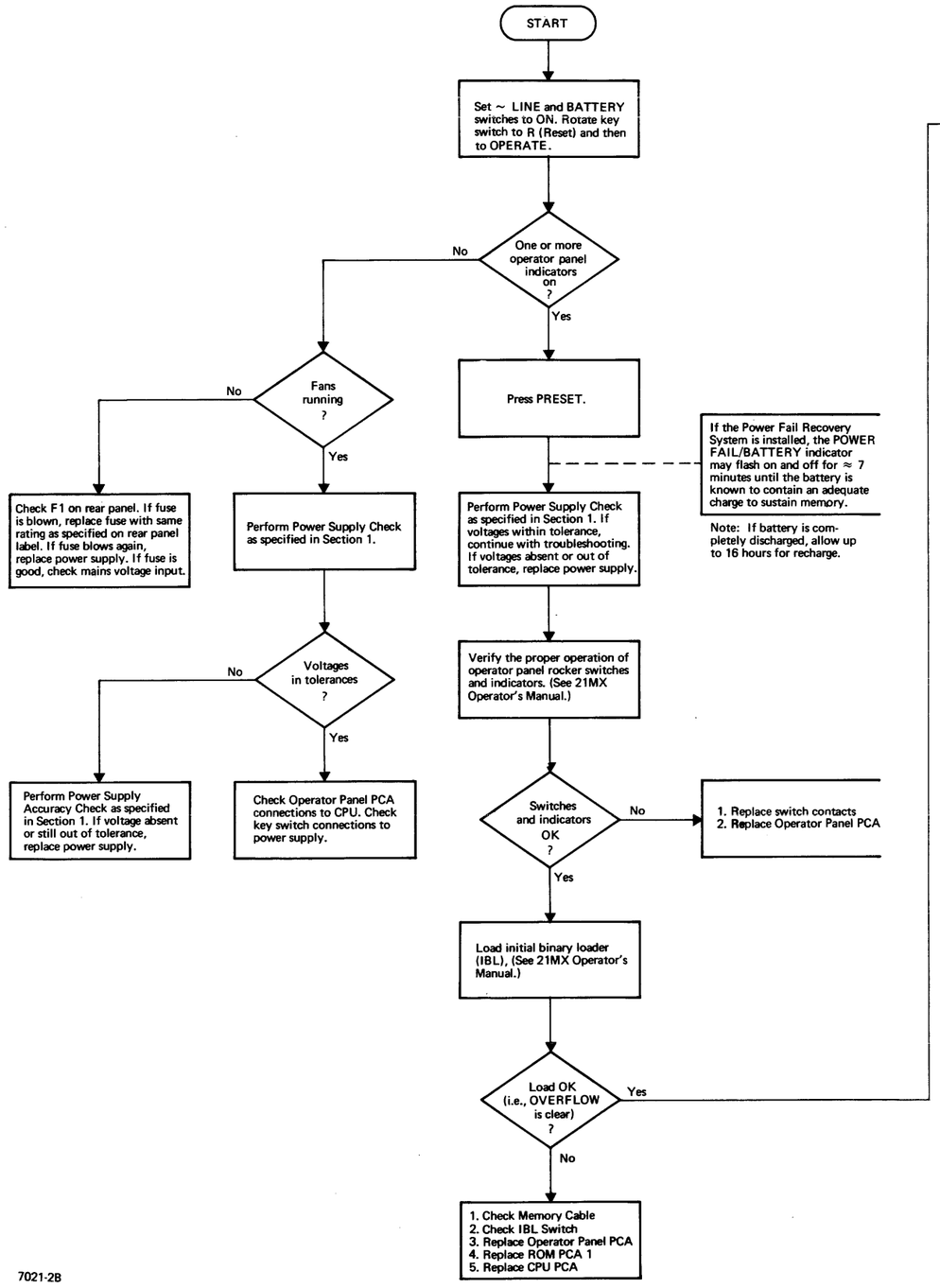
2-14. OPERATOR PANEL PCA

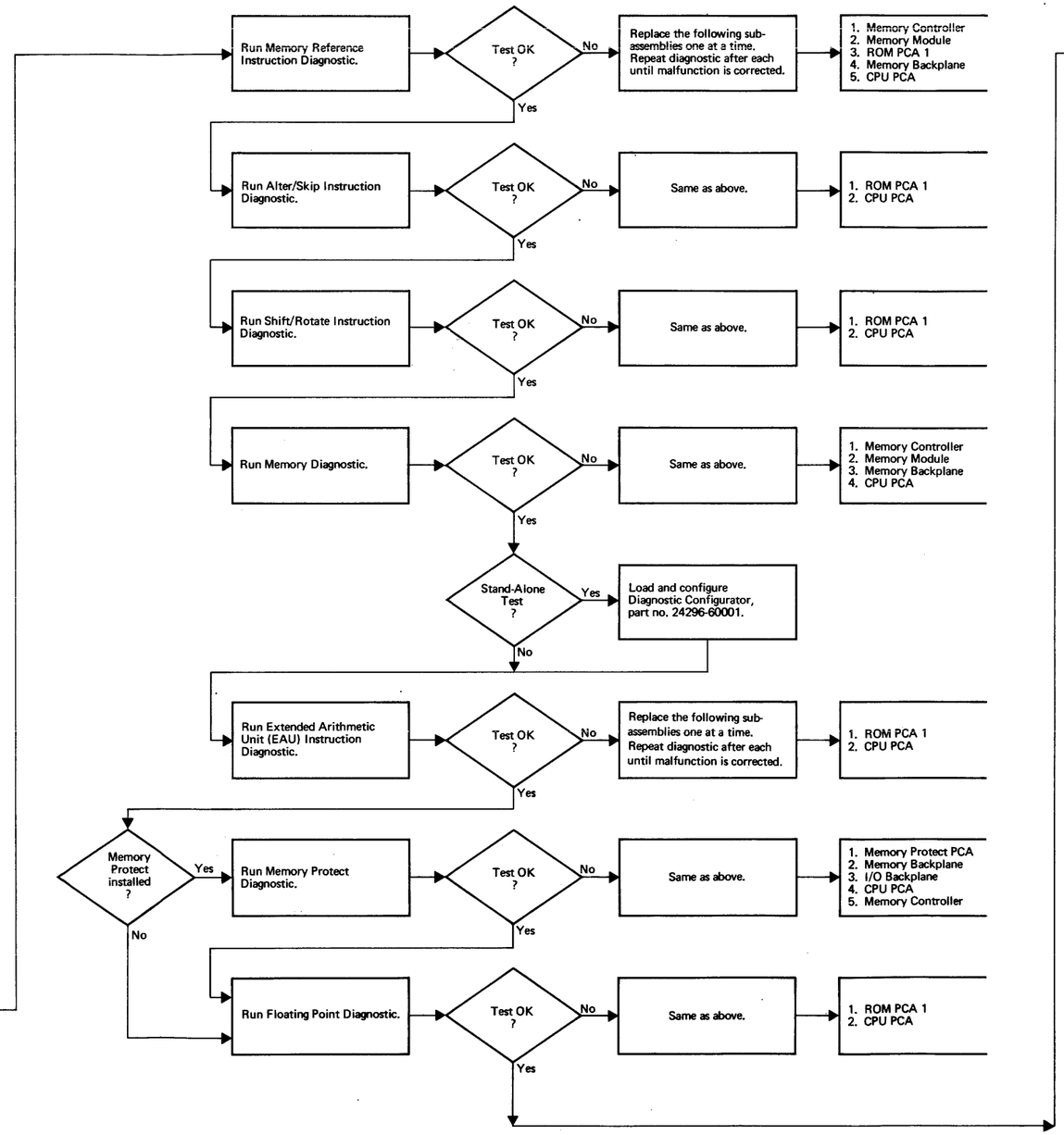
2-15. REMOVAL. Set the key-operated switch to STANDBY and remove the operator panel PCA as follows:

a. Loosen quarter-turn fasteners on operator panel and lower it to the access position.

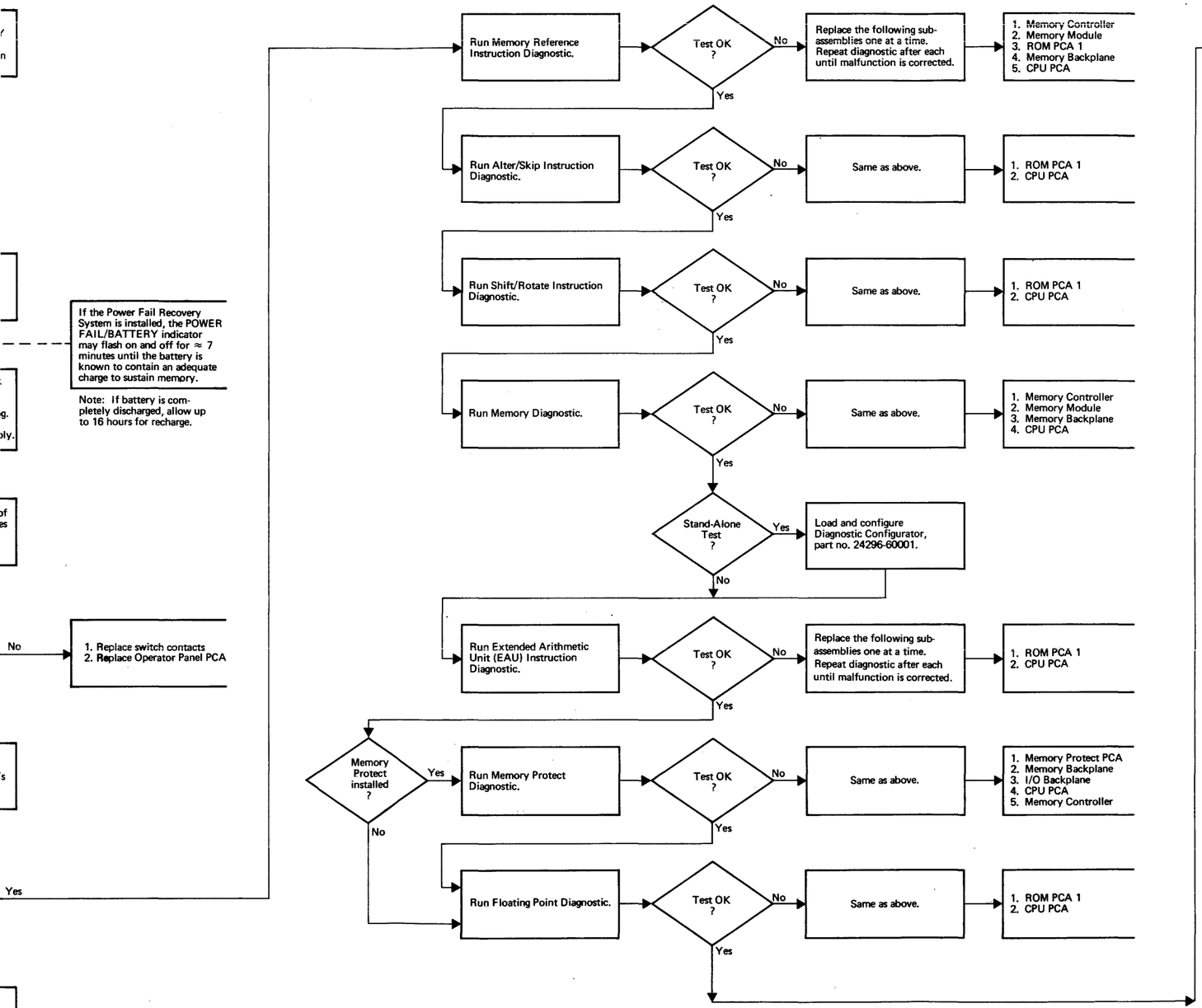
b. Disconnect operator panel cable assembly from CPU PCA front edge connector.

c. Remove the four screws and lockwashers from operator panel PCA cover; remove operator panel PCA cover.


START
Set ~ LINE and BATTERY switches to ON. Rotate key switch to R (Reset) and then to OPERATE.
One or more operator panel indicators on ?
No
Yes
Fans running ?
No
Yes
Check F1 on rear panel. If fuse is blown, replace fuse with same rating as specified on rear panel label. If fuse blows again, replace power supply. If fuse is good, check mains voltage input.
Perform Power Supply Check as specified in Section 1.
Voltages in tolerances ?
No
Yes
Perform Power Supply Accuracy Check as specified in Section 1. If voltage absent or still out of tolerance, replace power supply.
Check Operator Panel PCA connections to CPU. Check key switch connections to power supply.
Press PRESET.
If the Power Fail Recovery System is installed, the POWER FAIL/BATTERY indicator may flash on and off for ≈ 7 minutes until the battery is known to contain an adequate charge to sustain memory.
Note: If battery is completely discharged, allow up to 16 hours for recharge.
Perform Power Supply Check as specified in Section 1. If voltages within tolerance, continue with troubleshooting. If voltages absent or out of tolerance, replace power supply.
Verify the proper operation of operator panel rocker switches and indicators. (See 21MX Operator's Manual.)
Switches and indicators OK ?
No
Yes
1. Replace switch contacts
2. Replace Operator Panel PCA
Load initial binary loader (IBL), (See 21MX Operator's Manual.)
Load OK (i.e., OVERFLOW is clear) ?
Yes
No
1. Check Memory Cable
2. Check IBL Switch
3. Replace Operator Panel PCA
4. Replace ROM PCA 1
5. Replace CPU PCA


Run Memory Reference Instruction Diagnostic.
Test OK ?
No
Yes
Replace the following sub-assemblies one at a time. Repeat diagnostic after each until malfunction is corrected.
1. Memory Controller
2. Memory Module
3. ROM PCA 1
4. Memory Backplane
5. CPU PCA
Run Alter/Skip Instruction Diagnostic.
Test OK ?
No
Yes
Same as above.
1. ROM PCA 1
2. CPU PCA
Run Shift/Rotate Instruction Diagnostic.
Test OK ?
No
Yes
Same as above.
1. ROM PCA 1
2. CPU PCA
Run Memory Diagnostic.
Test OK ?
No
Yes
Same as above.
1. Memory Controller
2. Memory Module
3. Memory Backplane
4. CPU PCA
Stand-Alone Test ?
Yes
No
Load and configure Diagnostic Configurator, part no. 24296-60001.
Run Extended Arithmetic Unit (EAU) Instruction Diagnostic.
Test OK ?
No
Yes
Replace the following sub-assemblies one at a time. Repeat diagnostic after each until malfunction is corrected.
1. ROM PCA 1
2. CPU PCA
Memory Protect installed ?
Yes
No
Run Memory Protect Diagnostic.
Test OK ?
No
Yes
Same as above.
1. Memory Protect PCA
2. Memory Backplane
3. I/O Backplane
4. CPU PCA
5. Memory Controller
Run Floating Point Diagnostic.
Test OK ?
No
Yes
Same as above.
1. ROM PCA 1
2. CPU PCA

7021-2B



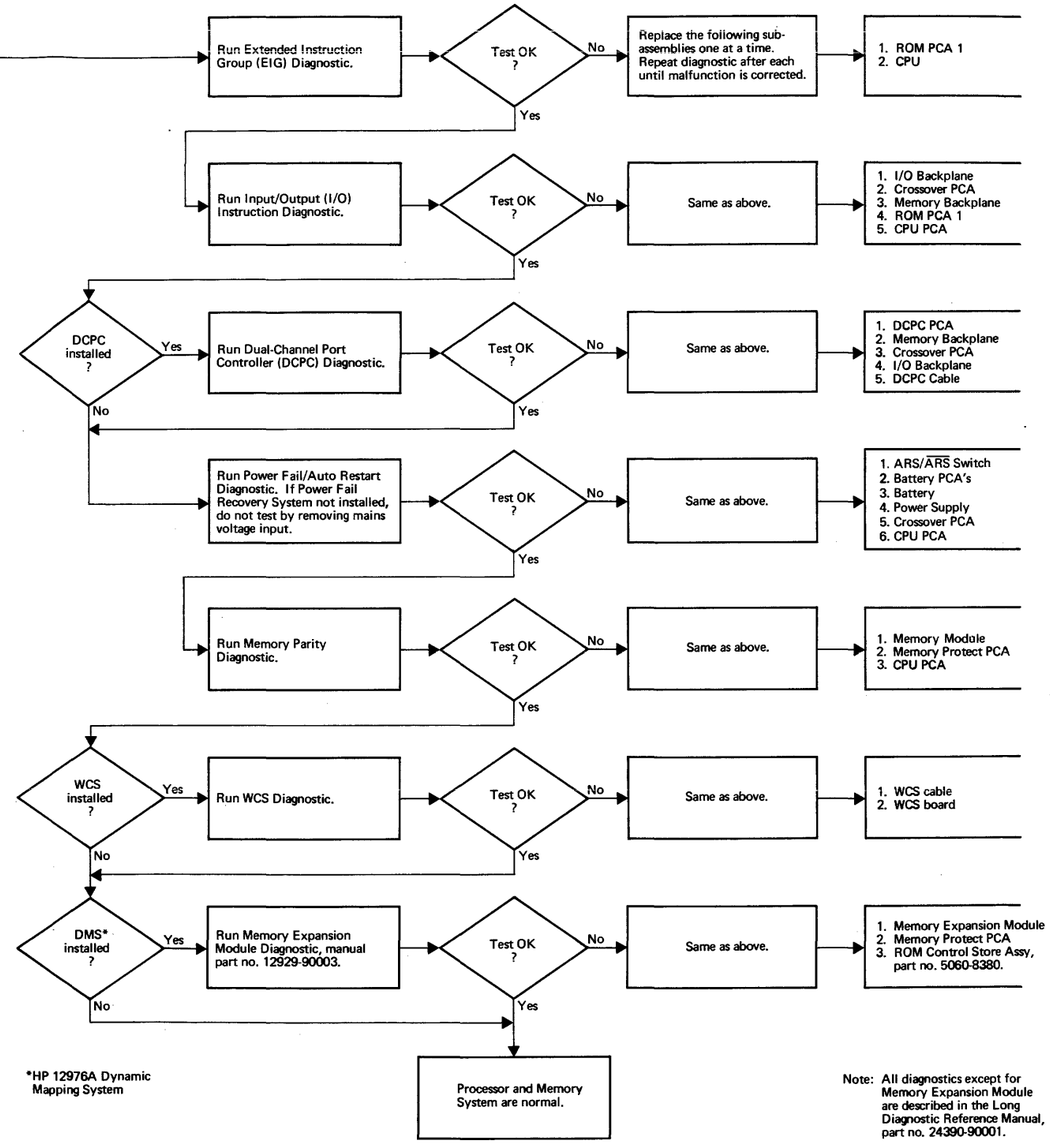


Figure 2-1. Troubleshooting Flowchart

d. Remove the eight screws and lockwashers securing operator panel PCA to operator panel; remove operator panel PCA.

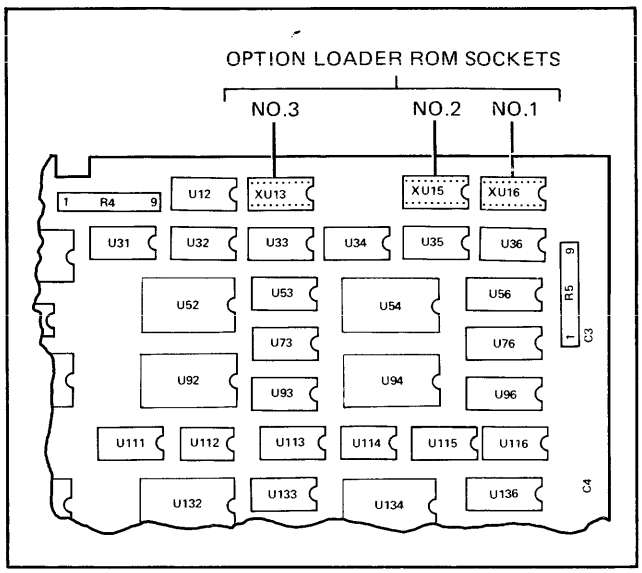


Figure 2-3. Optional Loader ROM Sockets

2-16. ROCKER SWITCH CONTACTS. Defective rocker switch contacts on the operator panel PCA are replaced as follows:

a. Grasp rocker switch assembly and pull straight out from operator panel PCA.

b. Separate defective spring contacts from rocker switch assembly.

c. Position replacement spring contacts onto operator panel PCA.

d. Place rocker switch assembly over spring contacts; press inward on rocker switch assembly until it snaps into place.

2-17. REPLACEMENT. Install the operator panel PCA as follows:

a. Carefully place front panel PCA into position and replace the eight screws and lockwashers.

b. Place operator panel PCA cover over operator panel PCA and secure in place with the four screws and lockwashers.

c. Connect operator panel cable assembly to CPU PCA front edge connector.

d. Replace operator panel and secure in place by tightening quarter-turn fasteners.

e. Set key-operated switch to OPERATE.

2-18. MEMORY CAGE PCA'S

2-19. REMOVAL. Remove the printed-circuit assemblies (PCA's) from the memory cage as follows:

a. Set ~ LINE and BATTERY switches to OFF. Loosen quarter-turn fasteners on operator panel and lower it to the access position.

b. Remove the two memory PCA cage cover retaining screws and lockwashers; remove memory PCA cage cover.

c. Disconnect cable assembly from front edge connector. (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.

2-20. 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. Figures 2-4 through 2-6 illustrate the jumper requirements for the HP 2102A 4K, 8K, and 16K memory modules.

2-21. I/O INTERFACE PCA'S

2-22. REMOVAL. Remove an I/O interface PCA from the I/O PCA cage as follows:

a. Set key-operated switch to STANDBY. Do not set ~ LINE switch to OFF unless this procedure is used in conjunction with the procedure to remove the I/O backplane. (Refer to paragraph 2-27.)

b. If power fail recovery system is installed, set BATTERY switch to OFF and disconnect battery cable(s) from BAT. INPUT connector(s).

c. Remove I/O PCA cage cover and loosen the screw(s) securing I/O PCA retainer. Slide retainer to the right.

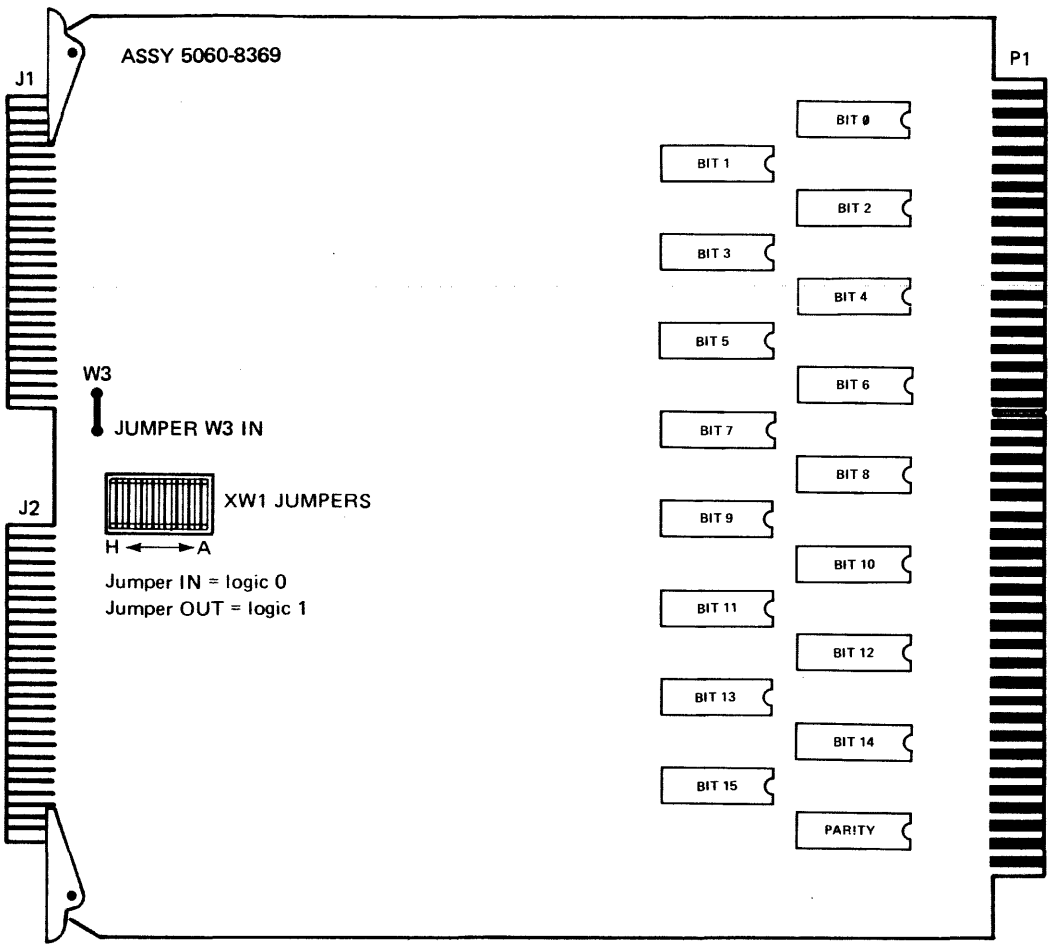
d. Remove I/O cable connector hood from I/O interface PCA. Remove I/O interface PCA by pulling outward on the PCA extractor levers.

2-23. 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.

2-24. CROSSOVER PCA

2-25. REMOVAL. Remove the crossover PCA from the processor mainframe as follows:

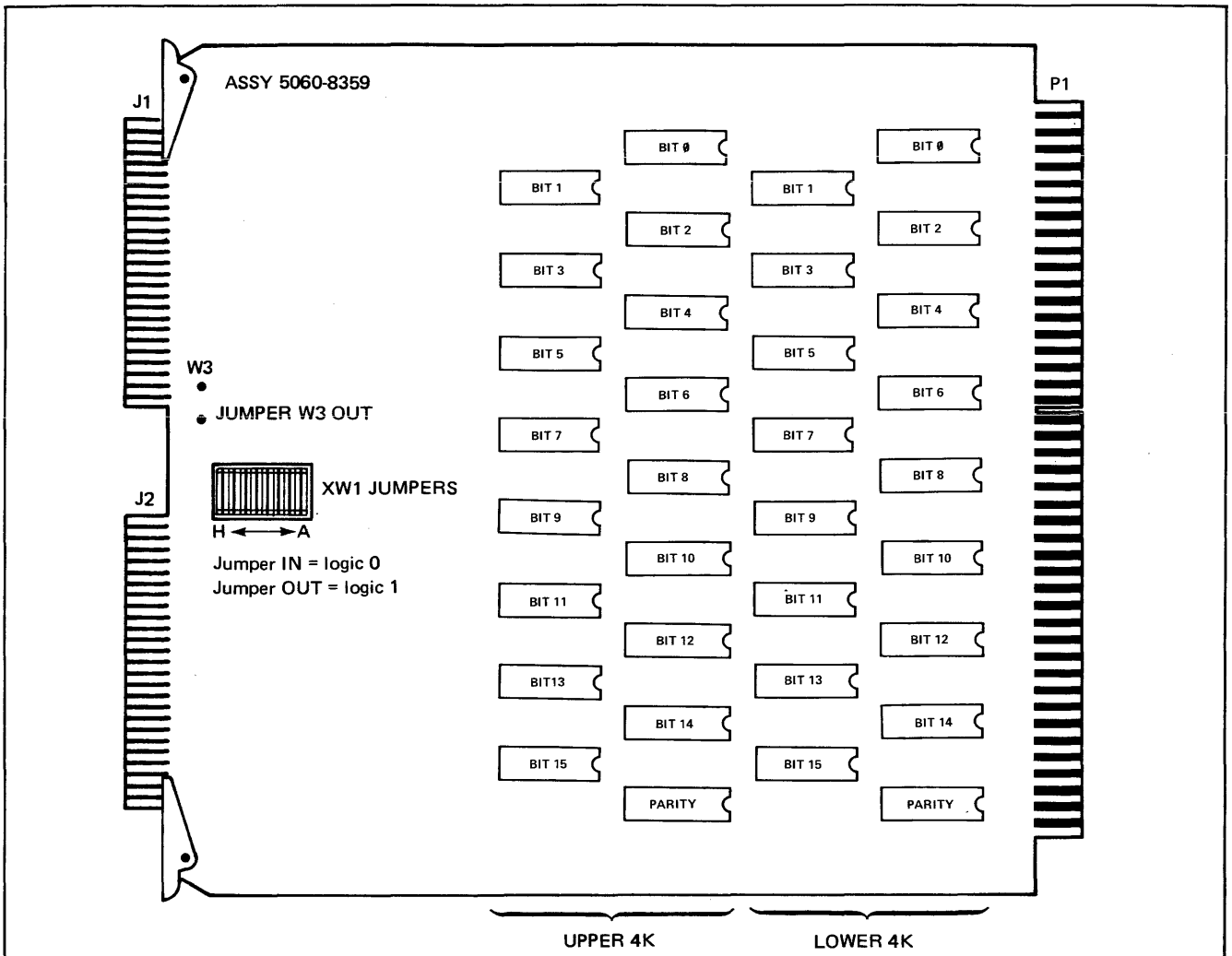
a. Set ~LINE and BATTERY switches to OFF.



MEMORY MODULE	W3	XW1 JUMPERS							
		A	B (2^0)	C (2^1)	D (2^2)	E (2^3)	F (2^4)	G (2^5)	H (2^6)
0	ALWAYS IN	ALWAYS IN	IN	IN	IN	IN	IN	IN	IN
1			OUT	IN	IN	IN	IN	IN	IN
2			IN	OUT	IN	IN	IN	IN	IN
3			OUT	OUT	IN	IN	IN	IN	IN
4			IN	IN	OUT	IN	IN	IN	IN
5			OUT	IN	OUT	IN	IN	IN	IN
6			IN	OUT	OUT	IN	IN	IN	IN
7			OUT	OUT	OUT	IN	IN	IN	IN
8			IN	IN	IN	OUT	IN	IN	IN
9			OUT	IN	IN	OUT	IN	IN	IN
10			IN	OUT	IN	OUT	IN	IN	IN
11			OUT	OUT	IN	OUT	IN	IN	IN
12			IN	IN	OUT	OUT	IN	IN	IN
13			OUT	IN	OUT	OUT	IN	IN	IN
14			IN	OUT	OUT	OUT	IN	IN	IN
15			OUT	OUT	OUT	OUT	IN	IN	IN
16			IN	IN	IN	IN	OUT	IN	IN

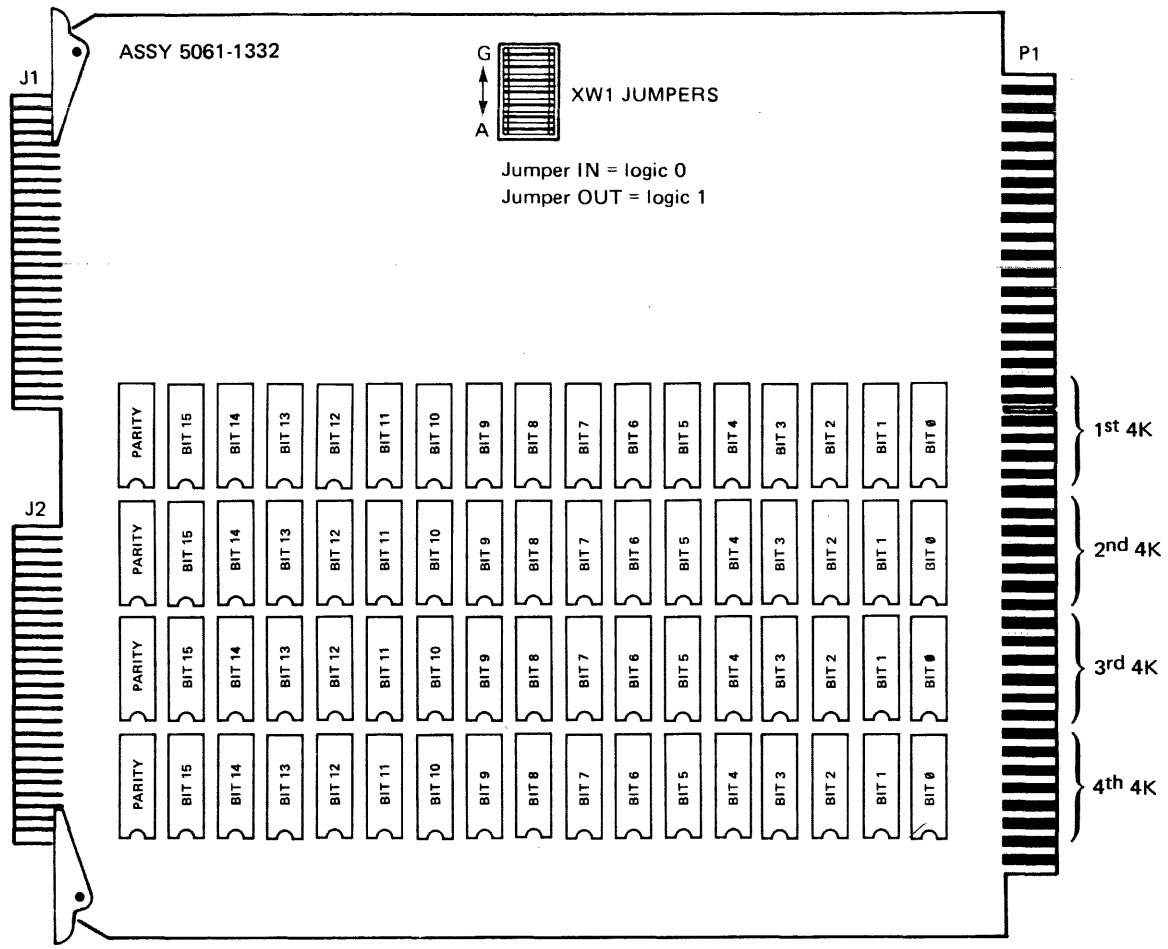
Note: This 4K module must be assigned the highest used memory module number regardless of the memory configuration. Only one 4K module allowed per configuration.

Figure 2-4. HP 2102A 4K Memory Module Address Jumpers



MEMORY MODULE	W3	XW1 JUMPERS							
		A	B (2^0)	C (2^1)	D (2^2)	E (2^3)	F (2^4)	G (2^5)	H 2^6)
0	ALWAYS OUT	DON'T CARE	IN	IN	IN	IN	IN	IN	IN
1			OUT	IN	IN	IN	IN	IN	IN
2			IN	OUT	IN	IN	IN	IN	IN
3			OUT	OUT	IN	IN	IN	IN	IN
4			IN	IN	OUT	IN	IN	IN	IN
5			OUT	IN	OUT	IN	IN	IN	IN
6			IN	OUT	OUT	IN	IN	IN	IN
7			OUT	OUT	OUT	IN	IN	IN	IN
8			IN	IN	IN	OUT	IN	IN	IN
9			OUT	IN	IN	OUT	IN	IN	IN
10			IN	OUT	IN	OUT	IN	IN	IN
11			OUT	OUT	IN	OUT	IN	IN	IN
12			IN	IN	OUT	OUT	IN	IN	IN
13			OUT	IN	OUT	OUT	IN	IN	IN
14			IN	OUT	OUT	OUT	IN	IN	IN
15			OUT	OUT	OUT	OUT	IN	IN	IN
16			IN	IN	IN	IN	OUT	IN	IN

Figure 2-5. HP 2102A 8K Memory Module Address Jumpers



MEMORY MODULE	XW1 JUMPERS						
	A (2^0)	B (2^1)	C (2^2)	D (2^3)	E (2^4)	F (2^5)	G
0	IN	IN	IN	IN	IN	IN	ALWAYS OUT
1	OUT	IN	IN	IN	IN	IN	
2	IN	OUT	IN	IN	IN	IN	
3	OUT	OUT	IN	IN	IN	IN	
4	IN	IN	OUT	IN	IN	IN	
5	OUT	IN	OUT	IN	IN	IN	
6	IN	OUT	OUT	IN	IN	IN	
7	OUT	OUT	OUT	IN	IN	IN	
8	IN	IN	IN	OUT	IN	IN	
9	OUT	IN	IN	OUT	IN	IN	
10	IN	OUT	IN	OUT	IN	IN	
11	OUT	OUT	IN	OUT	IN	IN	
12	IN	IN	OUT	OUT	IN	IN	
13	OUT	IN	OUT	OUT	IN	IN	
14	IN	OUT	OUT	OUT	IN	IN	
15	OUT	OUT	OUT	OUT	IN	IN	
16	IN	IN	IN	IN	OUT	IN	

Note: The 16K modules must be assigned the low order memory module numbers (0, 1, 2, etc.).

Figure 2-6. HP 2102A 16K Memory Module Address Jumpers

b. Remove processor top cover and disconnect DCPC cable assembly (if used) from edge connector J1. (See figure 2-7.) Disconnect power supply cable assembly from edge connector J2.

c. Each wire connected to TB1 is terminated with a spade lug. Loosen the 12 screws on TB1 and disconnect each wire.

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.

2-26. 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 inward on back of A6XA4 and A6XA5 to seat backplanes fully into crossover PCA receptacles. Secure crossover PCA and PCA cage covers using the four screws and lockwashers.

c. Slide spade lug of each wire under washer of appropriate connection point on terminal block and tighten screw.

d. Connect DCHC cable assembly (if used) to edge connector J1. Connect power supply cable assembly to J2.

e. Replace processor top cover and set ~LINE and BATTERY switches to ON.

2-27. MEMORY AND I/O BACKPLANES

2-28. REMOVAL. Remove the memory and I/O backplanes from the processor mainframe as follows:

a. Set ~LINE 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 2 inches (5 centimeters) to clear rear connectors from memory backplane receptacles.

d. Withdraw all I/O interface PCA's approximately 2 inches (5 centimeters) to clear rear connectors from I/O backplane receptqacles.

e. Remove the four screws and lockwashers securing crossover PCA to PCA cage covers. Carefully lift cross over 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.

2-29. 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 processor.

2-30. POWER FAIL RECOVERY SYSTEM FOR HP 2105A/2108A

2-31. BATTERY REMOVAL. Set the BATTERY switch to OFF and disconnect the battery cable from the BAT. INPUT connector. Remove the four screws and lockwashers securing the cover to the battery housing. Remove the battery assembly.

2-32. BATTERY PCA REMOVAL. Slide the processor top cover back to access the battery PCA's. Grasp battery output PCA and pull upward out of the battery board guides. Remove battery control I PCA and the battery control II PCA in the same manner as indicated for the battery output PCA.

2-33. REPLACEMENT. Replace the battery and the battery PCA's in the reverse order of the removal procedures.

2-34. POWER FAIL RECOVERY SYSTEM FOR HP 2112A

2-35. BATTERY REMOVAL. Set the BATTERY switch to OFF and disconnect the battery cables from the BAT. INPUT connectors. Remove the eight screws and lockwashers from the battery housing cover. Remove the housing cover and battery assemblies.

2-36. BATTERY PCA REMOVAL. Slide the processor top cover back to access the battery PCA. Grasp battery PCA and pull upward out of the battery PCA guide.

2-37. REPLACEMENT. Replace the batteries and the battery PCA in the reverse order of the removal procedures.

2-38. POWER SUPPLY FOR HP 2105A/2108A

WARNING

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

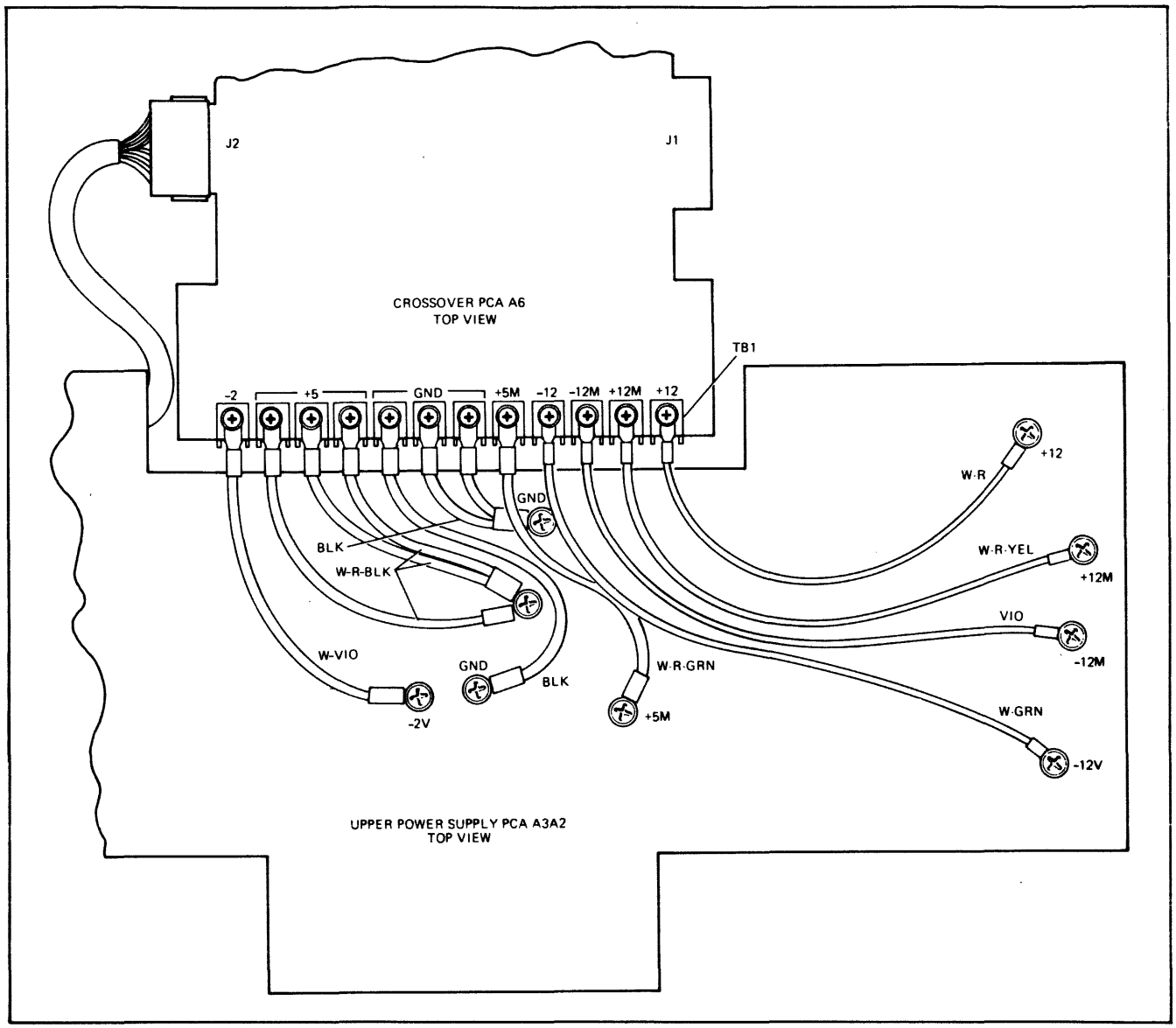


Figure 2-7. Crossover PCA Power Connections

2-39. REMOVAL. Remove the top cover and the crossover PCA and proceed as follows:

a. Loosen the two quarter-turn screws and lower operator panel to the access position. Remove memory PCA cage cover.

b. Remove the three screws and lockwashers securing front power supply shield to processor mainframe.

c. Disconnect key-operated switch assembly cable from lower power supply PCA.

d. Remove I/O PCA cage cover and loosen I/O PCA retainer; slide retainer to the right.

e. Remove the four screws and lockwashers securing rear panel to processor mainframe.

f. Disconnect battery cable assembly from upper power supply PCA.

g. Remove the eight long screws and lockwashers securing upper power supply PCA to processor mainframe.

h. Remove battery output PCA.

i. Remove the two screws and lockwashers securing lower power supply PCA to processor mainframe.

j. Disconnect power supply cable assembly from crossover PCA.

k. Disconnect ac power cable assembly from lower power supply PCA.

l. Lift power supply up and out of processor mainframe.

2-40. REPLACEMENT. Replace the power supply in reverse order of the removal procedure.

2-41. POWER SUPPLY FOR HP 2112A

WARNING

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

2-42. REMOVAL. Remove the top cover and the cross over PCA and proceed as follows:

a. Loosen the four quarter-turn screws and lower operator panel to the access position. Remove memory PCA cage cover.

b. Remove the three screws and lockwashers securing front power supply shield to processor mainframe. Remove the one screw and lockwasher attaching shield to battery PCA guide.

c. Remove front power supply shield and disconnect key-operated switch assembly cable from lower power supply PCA.

d. Remove I/O PCA cage cover and loosen I/O PCA retainer; slide retainer to the right.

e. Remove the four screws and lockwashers securing rear panel to processor mainframe.

f. Disconnect battery cable assembly from upper power supply PCA.

g. Remove the six screws and lockwashers securing the three power supply support brackets to right side of processor.

h. Remove the eight long screws and lockwashers securing upper power supply PCA to processor mainframe.

i. Remove the two short screws and lockwashers securing lower power supply PCA to processor mainframe.

j. Disconnect power supply cable assembly from crossover PCA.

k. Disconnect power leads from upper fans.

l. Lift power supply up and out of processor mainframe.

m. Disconnect ac power cable assembly from lower power supply PCA.

2-43. REPLACEMENT. Replace the power supply in the reverse order of the removal procedure.

2-44. VENTILATING FANS FOR HP 2105A/2108A

2-45. REMOVAL. Remove the processor top, bottom, and right side covers and proceed as follows:

a. On the HP 2105A, unsolder the two power leads at bottom of fan.

b. On the HP 2108A, disconnect the two power leads at top of fan.

c. On the HP 2105A, remove the seven screws and lockwashers securing top left side frame to processor mainframe. Remove the seven screws and lockwashers securing bottom left side frame to processor mainframe.

d. On the HP 2108A, remove the 14 screws securing left side frame to processor mainframe.

e. Remove the four self-tapping screws securing fan to processor mainframe. Pull fan upward and out of the mainframe.

2-46. REPLACEMENT. Replace the ventilating fan(s) in reverse order of the removal procedure.

2-47. VENTILATING FANS FOR HP 2112A

2-48. REMOVAL. Remove processor top and right side covers and proceed as follows:

a. Remove power supply assembly and power leads from appropriate fan.

b. Remove the four self-tapping screws securing fan to processor mainframe; remove fan.

2-49. REPLACEMENT. Replace the ventilating fan(s) in reverse order of the removal procedure.

2-50. 110/220 VAC RECONFIGURATION FOR HP 2105A/2108A

To reconfigure the HP 2105A or HP 2108A Processor to operate from 220-volt mains instead of 110-volt mains (or vice versa), refer to figure 2-10 and proceed as follows:

WARNING

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

a. Set ~LINE and BATTERY switches to OFF and remove power cord.

b. Remove top cover of processor.

c. Remove the four mounting screws and lockwashers that secure voltage distribution panel to processor frame. (Two screws are located at the top of the panel and two screws are located at the bottom of the panel.)

d. Carefully swing voltage distribution panel outward to expose terminal block TB1 and other components.

e. For *110V ac* operation, connect a jumper wire between the WHT-YEL-GRA and WHT-BLU-GRA lead wires on terminal block. Connect one side of each fan to the WHT-BRN-GRA lead wire on terminal block; connect other side of each fan to the WHT-BLU-GRA lead wire on terminal block. Replace fuse F1 with the type and rating specified in table 3-1 (HP 2105A) or table 3-2 (HP 2108A).

f. For *220V ac* operation, remove jumper wire between the WHT-YEL-GRA and WHT-BLU-GRA lead wires on terminal block. Connect one fan across the WHT-BRN-GRA and WHT-YEL-GRA lead wires; connect other fan across the WHT-YEL-GRA and WHT-BLU-GRA lead wires. Replace fuse F1 with the type and rating specified in table 3-1 (HP 2105A) or table 3-2 (HP 2108A).

g. Position voltage distribution panel in place and secure with the four mounting screws and lockwashers. Replace top cover of processor.

2-51. 110/220 VAC RECONFIGURATION FOR HP 2112A

To reconfigure the HP 2112A Processor to operate from 220-volt mains instead of 110-volt mains (or vice versa), refer to figure 2-11 and proceed as follows:

WARNING

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

a. Set ~ LINE and BATTERY switches to OFF and remove power cord.

b. Remove top cover of processor.

c. Remove the four mounting screws and lockwashers that secure voltage distribution panel to processor frame. (Two screws are located at the top of the panel and two screws are located at the bottom of the panel.)

d. Carefully swing voltage distribution panel outward to expose terminal block TB1 and other components.

e. For *110V ac* operation, disconnect WHT-BRN-GRA lead wire from 5A LOAD terminal on circuit breaker CB1; reconnect this lead wire to 8A LOAD terminal. Disconnect WHT-YEL-GRA lead wire and the four fan lead wires from center terminal (terminal 3) on terminal block. Connect WHT-YEL-GRA lead wire to terminal 4. Connect one pair of fan lead wires to terminal 2 and the second pair of fan lead wires to terminal 4.

f. For *220V ac* operation, disconnect WHT-BRN-GRA lead wire from 8A LOAD terminal on circuit breaker CB1; reconnect this lead wire to 5A LOAD terminal. Disconnect WHT-YEL-GRA lead wire from terminal 4 and reconnect to terminal 3. Disconnect fan leads from terminals 2 and 4; connect the two pair of fan leads to terminal 3.

g. Position voltage distribution panel in place and secure with the four mounting screws and lockwashers. Replace top cover of processor.

2-52. BACKPLANE SIGNALS

Table 2-2 is a listing of signals transferred to and from the various computer subassemblies. The reference number appearing to the right of the signal definition are cross-indexes to the signal distribution listing provided in table 2-3. Table 2-3 lists these signals in alphanumeric order and indicates both the signal source and signal destination.

2-53. DIAGRAMS

Figure 2-8 is the input/output timing diagram and figure 2-9 is a simplified block diagram of the HP 21MX Computer. The power distribution diagrams are provided in figures 2-10 and 2-11.

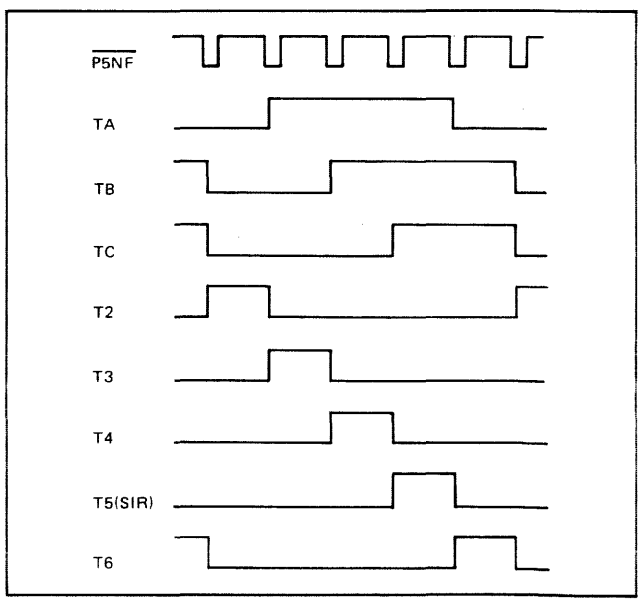


Figure 2-8. Input/Output Timing

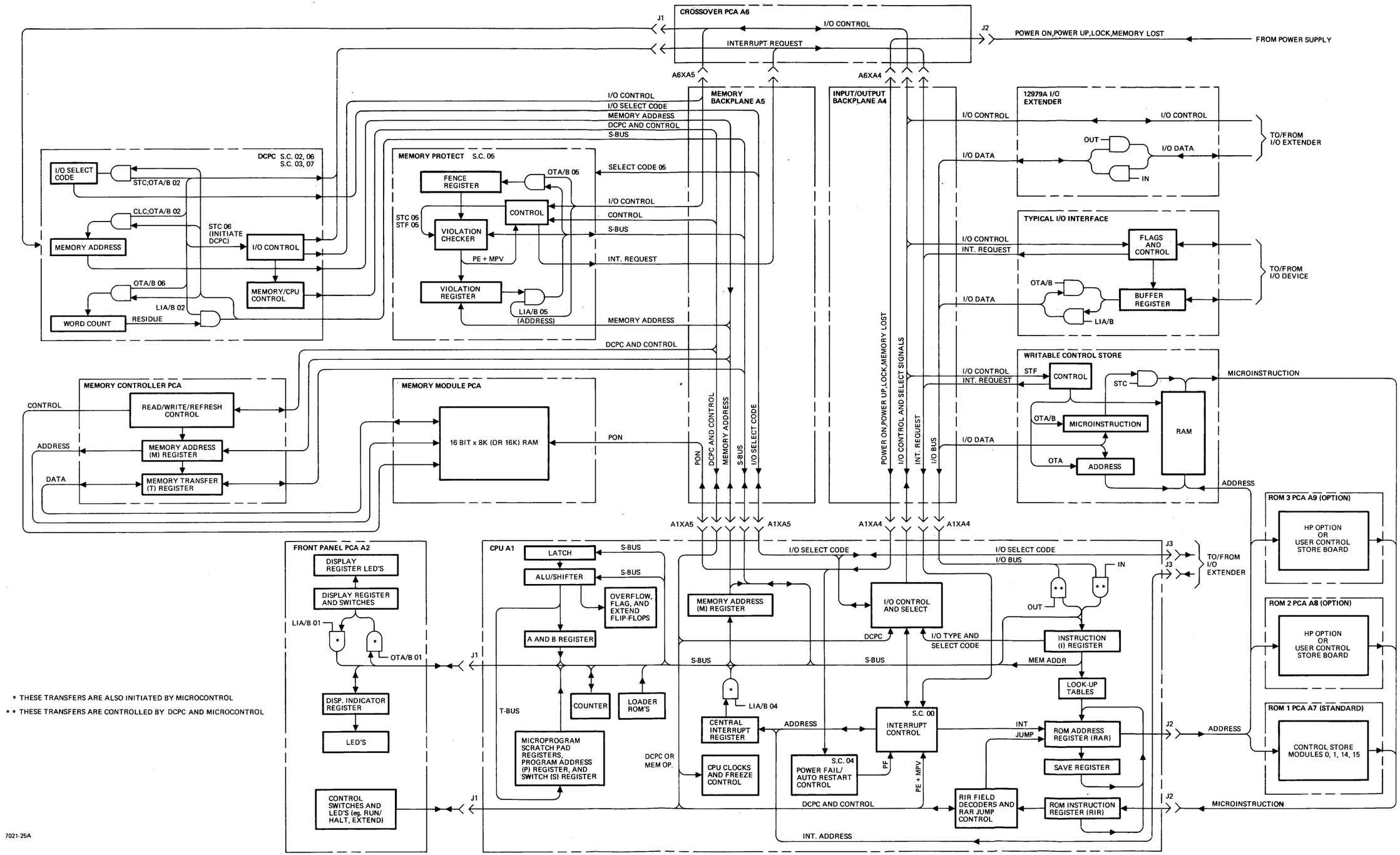
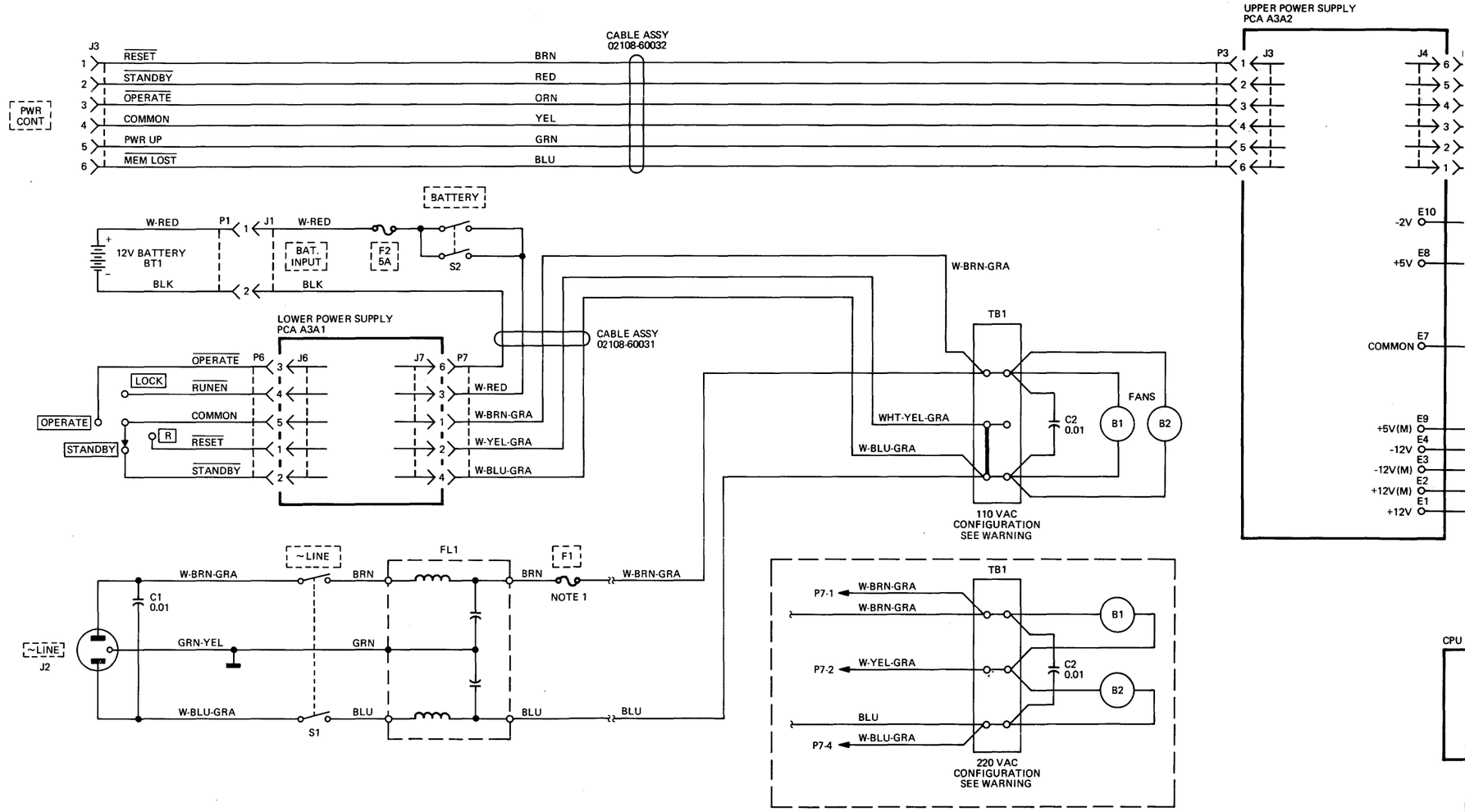
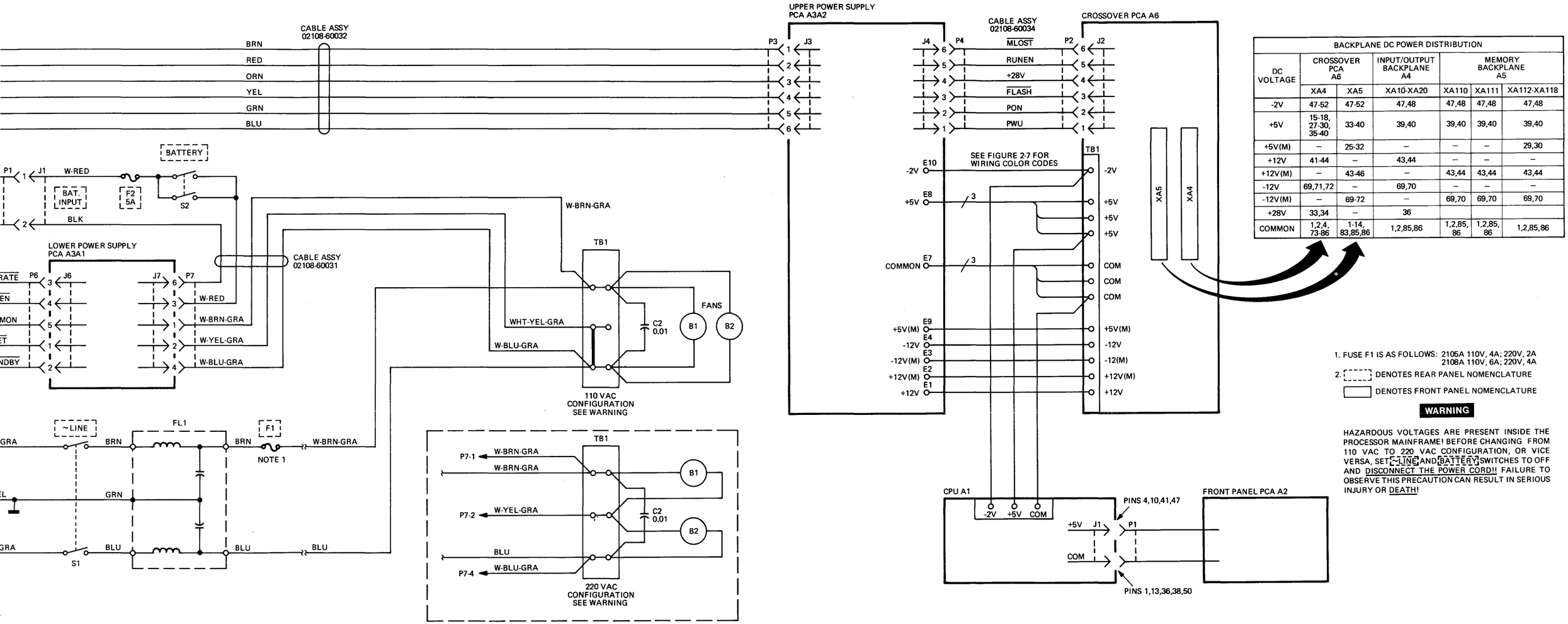


Figure 2-9. HP 21MX Computer Simplified Block Diagram


PWR CONT
J3
1 RESET
2 STANDBY
3 OPERATE
4 COMMON
5 PWR UP
6 MEM LOST
CABLE ASSY 02108-60032
BRN
RED
ORN
YEL
GRN
BLU
P3
UPPER POWER SUPPLY PCA A3A2
J3
J4
E10 -2V
E8 +5V
E7 COMMON
E9 +5V(M)
E4 -12V
E3 -12V(M)
E2 +12V(M)
E1 +12V
CPU
BATTERY
W-RED
P1
J1
W-RED
12V BATTERY BT1
BAT. INPUT
F2 5A
S2
BLK
BLK
LOWER POWER SUPPLY PCA A3A1
OPERATE
P6
J6
J7
P7
LOCK
RUNEN
W-RED
OPERATE
COMMON
W-BRN-GRA
R
RESET
W-YEL-GRA
STANDBY
STANDBY
W-BLU-GRA
CABLE ASSY 02108-60031
W-BRN-GRA
TB1
WHT-YEL-GRA
W-BLU-GRA
C2 0.01
B1
B2
FANS
110 VAC CONFIGURATION SEE WARNING
~LINE
FL1
F1
W-BRN-GRA
BRN
BRN
W-BRN-GRA
NOTE 1
C1 0.01
~LINE J2
GRN-YEL
GRN
W-BLU-GRA
BLU
BLU
BLU
S1
TB1
P7-1
W-BRN-GRA
W-BRN-GRA
B1
C2 0.01
P7-2
W-YEL-GRA
B2
BLU
P7-4
W-BLU-GRA
220 VAC CONFIGURATION SEE WARNING

7021-1A



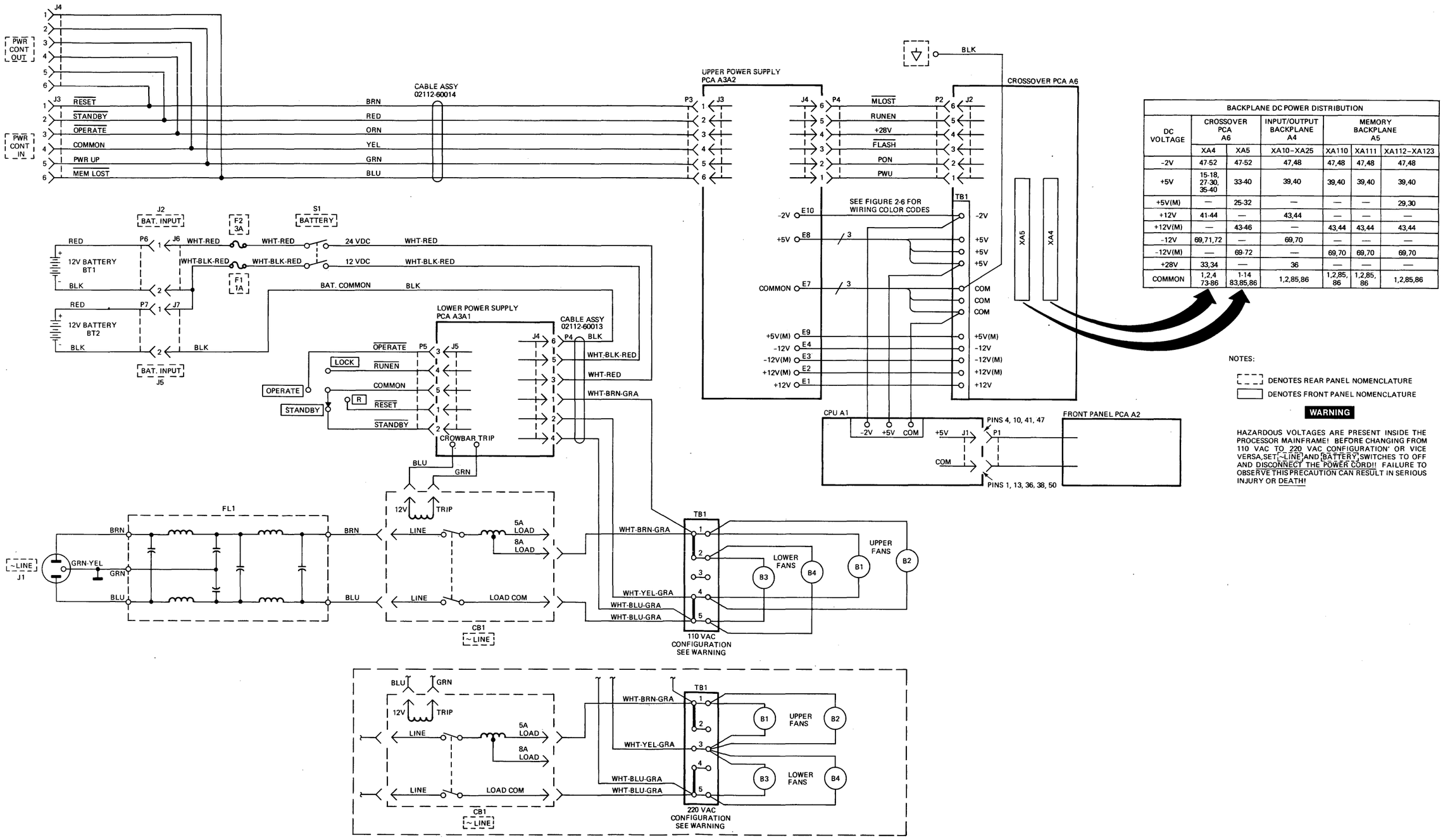
BACKPLANE DC POWER DISTRIBUTION						
DC VOLTAGE	CROSSOVER PCA A6		INPUT/OUTPUT BACKPLANE A4	MEMORY BACKPLANE A5		
	XA4	XA5	XA10-XA20	XA110	XA111	XA112-XA118
-2V	47-52	47-52	47,48	47,48	47,48	47,48
+5V	15-18, 27-30, 35-40	33-40	39,40	39,40	39,40	39,40
+5V(M)	–	25-32	–	–	–	29,30
+12V	41-44	–	43,44	–	–	–
+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
+28V	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

1. FUSE F1 IS AS FOLLOWS: 2105A 110V, 4A; 220V, 2A
   2108A 110V, 6A; 220V, 4A
2. [ ] DENOTES REAR PANEL NOMENCLATURE
   [ ] DENOTES FRONT PANEL NOMENCLATURE

WARNING

HAZARDOUS VOLTAGES ARE PRESENT INSIDE THE PROCESSOR MAINFRAME! BEFORE CHANGING FROM 110 VAC TO 220 VAC CONFIGURATION, OR VICE VERSA, SET ~LINE AND BATTERY SWITCHES TO OFF AND DISCONNECT THE POWER CORD!! FAILURE TO OBSERVE THIS PRECAUTION CAN RESULT IN SERIOUS INJURY OR DEATH!

Figure 2-10. HP 2105A and HP 2108A Power Distribution Diagram



BACKPLANE DC POWER DISTRIBUTION						
DC VOLTAGE	CROSSOVER PCA A6		INPUT/OUTPUT BACKPLANE A4	MEMORY BACKPLANE A5		
	XA4	XA5	XA10-XA25	XA110	XA111	XA112-XA123
-2V	47-52	47-52	47,48	47,48	47,48	47,48
+5V	15-18, 27-30, 35-40	33-40	39,40	39,40	39,40	39,40
+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
+28V	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

NOTES:

DENOTES REAR PANEL NOMENCLATURE

DENOTES FRONT PANEL NOMENCLATURE

WARNING

HAZARDOUS VOLTAGES ARE PRESENT INSIDE THE PROCESSOR MAINFRAME! BEFORE CHANGING FROM 110 VAC TO 220 VAC CONFIGURATION OR VICE VERSA, SET ~LINE AND BATTERY SWITCHES TO OFF AND DISCONNECT THE POWER CORD!! FAILURE TO OBSERVE THIS PRECAUTION CAN RESULT IN SERIOUS INJURY OR DEATH!

Figure 2-11. HP 2112A Power Distribution Diagram.

Table 2-2. Signal Name Index

SIGNAL MNEMONIC	DEFINITION	REF NO.
CLC	Clear Control	1
CLF	Clear Flag	2
CLKX	Clock, External	3
CLXEN	Clock, External, Enable	4
CRS	Control Reset	5
$\overline{\text{CTL5}}$	"Not" Control 5	6
$\overline{\text{DECM}}$	"Not" Decrement M-register	7
$\overline{\text{DIEN}}$	"Not" Display Enable	8
$\overline{\text{DISPLAY}}$	"Not" Display	9
$\overline{\text{DIST}}$	"Not" Display Store	10
$\overline{\text{DMACYC}}$	"Not" DMA Cycle	11
$\overline{\text{DMAEN}}$	"Not" DMA Enable	12
$\overline{\text{DMAFRZ}}$	"Not" DMA Freeze	13
$\overline{\text{DMAIOI}}$	"Not" DMA I/O Input	14
$\overline{\text{DMAIOO}}$	"Not" DMA I/O Output	15
$\overline{\text{DMALCH}}$	"Not" DMA Latch	16
$\overline{\text{DMALO}}$	"Not" DMA Lockout	17
$\overline{\text{DMAREAD}}$	"Not" DMA Read	18
$\overline{\text{DMARQ1}}$	"Not" DMA Request 1	19
$\overline{\text{DMARQ2}}$	"Not" DMA Request 2	20
$\overline{\text{DMASTRB}}$	"Not" DMA Strobe	21
$\overline{\text{DSPCL}}$	"Not" Display Clear	22
$\overline{\text{DSPEN}}$	"Not" Display Enable	23
$\overline{\text{DSPST}}$	"Not" Display Store	24
EDT	End Data Transfer	25
ENF	Enable Flag	26
ENRMX	Enable ROM, External	27
EXFF	Extend Flip-flop	28
FPSP	Front Panel Special	29

Table 2-2. Signal Name Index (Continued)

SIGNAL MNEMONIC	DEFINITION	REF NO.
FRZFF	Freeze Flip-Flop	30
$\overline{\text{FTCH}}$	"Not" Fetch	31
$\overline{\text{FLASH}}$	"Not" Flash	32
FLG1	Flag bit 1	33
FLG2	Flag bit 2	34
$\overline{\text{FLG5}}$	"Not" Flag s.c. 5 (memory protect)	35
HLTB	Halt Button	36
$\overline{\text{HLTPE}}$	"Not" Halt Parity Error	37
IAK	Interrupt Acknowledge	38
$\overline{\text{IA0}}$	"Not" Interrupt Address bit 0	39
$\overline{\text{IA1}}$	"Not" Interrupt Address bit 1	40
$\overline{\text{IA2}}$	"Not" Interrupt Address bit 2	41
$\overline{\text{IA3}}$	"Not" Interrupt Address bit 3	42
$\overline{\text{IA4}}$	"Not" Interrupt Address bit 4	43
$\overline{\text{IA5}}$	"Not" Interrupt Address bit 5	44
$\overline{\text{IBL}}$	"Not" Initial Binary Loader	45
IEN5	Interrupt Enable s.c. 5	46
IEN10	Interrupt Enable s.c. 10	47
IEN20	Interrupt Enable s.c. 20	48
$\overline{\text{INCI}}$	"Not" Indirect Counter Increment	49
$\overline{\text{INCM}}$	"Not" Increment M-register	50
$\overline{\text{INSTEP}}$	"Not" Instruction Step	51
INTL	Interrupt Light	52
$\overline{\text{INTX}}$	"Not" Interrupt, External	53
IOB0	Input/Output Bus bit 0	54
IOB1	Input/Output Bus bit 1	55
IOB2	Input/Output Bus bit 2	56
IOB3	Input/Output Bus bit 3	57
IOB4	Input/Output Bus bit 4	58

Table 2-2. Signal Name Index (Continued)

SIGNAL MNEMONIC	DEFINITION	REF NO.
IOB5	Input/Output Bus bit 5	59
IOB6	Input/Output Bus bit 6	60
IOB7	Input/Output Bus bit 7	61
IOB8	Input/Output Bus bit 8	62
IOB9	Input/Output Bus bit 9	63
IOB10	Input/Output Bus bit 10	64
IOB11	Input/Output Bus bit 11	65
IOB12	Input/Output Bus bit 12	66
IOB13	Input/Output Bus bit 13	67
IOB14	Input/Output Bus bit 14	68
IOB15	Input/Output Bus bit 15	69
IOB16	Input/Output Bus bit 16	70
IOG	Input/Output Group	71
$\overline{\text{IOGSP}}$	"Not" Input/Output Group, Special	72
IOI	I/O Input	73
IOO	I/O Output	74
IRQ0	Interrupt Request bit 0	75
IRQ1	Interrupt Request bit 1	76
IRQ2	Interrupt Request bit 2	77
IRQ3	Interrupt Request bit 3	78
IRQ4	Interrupt Request bit 4	79
IRQ5	Interrupt Request bit 5	80
IRQ6	Interrupt Request bit 6	81
IRQ7	Interrupt Request bit 7	82
$\overline{\text{IRSTF}}$	"Not" Instruction Register Store	83
$\overline{\text{LEFT}}$	"Not" Left	84
$\overline{\text{LEGAL}}$	"Not" Legal	85
$\overline{\text{MBEN}}$	"Not" Memory Bus Enable	86
MB0	Memory Bus bit 0	87

Table 2-2. Signal Name Index (Continued)

SIGNAL MNEMONIC	DEFINITION	REF NO.
MB1	Memory Bus bit 1	88
MB2	Memory Bus bit 2	89
MB3	Memory Bus bit 3	90
MB4	Memory Bus bit 4	91
MB5	Memory Bus bit 5	92
MB6	Memory Bus bit 6	93
MB7	Memory Bus bit 7	94
MB8	Memory Bus bit 8	95
MB9	Memory Bus bit 9	96
MB10	Memory Bus bit 10	97
MB11	Memory Bus bit 11	98
MB12	Memory Bus bit 12	99
MB13	Memory Bus bit 13	100
MB14	Memory Bus bit 14	101
MB15	Memory Bus bit 15	102
$\overline{\text{MEBEN}}$	"Not" Memory Expansion Bus Enable	103
MEB10	Memory Expansion Bus bit 10	104
MEB11	Memory Expansion Bus bit 11	105
MEB12	Memory Expansion Bus bit 12	106
MEB13	Memory Expansion Bus bit 13	107
MEB14	Memory Expansion Bus bit 14	108
MEB15	Memory Expansion Bus bit 15	109
MEB16	Memory Expansion Bus bit 16	110
MEB17	Memory Expansion Bus bit 17	111
MEB18	Memory Expansion Bus bit 18	112
MEB19	Memory Expansion Bus bit 19	113
$\overline{\text{MEEN}}$	"Not" Memory Expansion Enable	114
$\overline{\text{MESP}}$	"Not" Memory Expansion Special	115
$\overline{\text{MEST}}$	"Not" Memory Expansion Store	116

Table 2-2. Signal Name Index (Continued)

SIGNAL MNEMONIC	DEFINITION	REF NO.
$\overline{\text{METDIS}}$	"Not" Memory Expansion: T-register Disabled	117
$\overline{\text{MEV}}$	"Not" Memory Expansion Violation	118
$\overline{\text{MLOST}}$	"Not" Memory Lost	119
$\overline{\text{MPCND}}$	"Not" Memory Protect Conditional	120
$\overline{\text{MPCK}}$	"Not" Memory Protect Check	121
$\overline{\text{MPINTON}}$	"Not" Memory Protect Interrupt On	122
$\overline{\text{MPV}}$	"Not" Memory Protect Violation	123
MSRDY	Memory Soon Ready	124
OVERFF	Overflow Flip-Flop	125
PARFF	Parity Flip-Flop	126
$\overline{\text{PE}}$	"Not" Parity Error	127
PF	Power Fail	128
PON	Power On	129
POPIO	Power On Preset I/O	130
PRH6	Priority High s.c. 6	131
PRH10	Priority High s.c. 10	132
PRL4/PRH5	Priority Low s.c. 4/Priority High s.c. 5	133
PRL7	Priority Low s.c. 7	134
PRL10/PRH11	Priority Low s.c. 10/Priority High s.c. 11	135
PRL11/PRH12	Priority Low s.c. 11/Priority High s.c. 12	136
PRL12/PRH13	Priority Low s.c. 12/Priority High s.c. 13	137
PRL13/PRH14	Priority Low s.c. 13/Priority High s.c. 14	138
PRL14/PRH15	Priority Low s.c. 14/Priority High s.c. 15	139
PRL15/PRH16	Priority Low s.c. 15/Priority High s.c. 16	140
PRL16/PRH17	Priority Low s.c. 16/Priority High s.c. 17	141
PRL17/PRH20	Priority Low s.c. 17/Priority High s.c. 20	142
PRL20/PRH21	Priority Low s.c. 20/Priority High s.c. 21	143
PRL21/PRH22	Priority Low s.c. 21/Priority High s.c. 22	144

Table 2-2. Signal Name Index (Continued)

SIGNAL MNEMONIC	DEFINITION	REF NO.
PRL22/PRH23	Priority Low s.c. 22/Priority High s.c. 23	145
PRL23/PRH24	Priority Low s.c. 23/Priority High s.c. 24	146
PRL24/PRH25	Priority Low s.c. 24/Priority High s.c. 25	147
PRL25	Priority Low s.c. 25	148
PRSTB	Preset Button	149
PWU	Power Up	150
$\overline{\text{P4NF}}$	"Not" Period 4 Not Freezable	151
$\overline{\text{P5}}$	"Not" Period 5	152
$\overline{\text{P5NF}}$	"Not" Period 5 Not Freezable	153
RAR0	ROM Address Register bit 0	155
RAR1	ROM Address Register bit 1	156
RAR2	ROM Address Register bit 2	157
RAR3	ROM Address Register bit 3	158
RAR4	ROM Address Register bit 4	159
RAR5	ROM Address Register bit 5	160
RAR6	ROM Address Register bit 6	161
RAR7	ROM Address Register bit 7	162
RAR8	ROM Address Register bit 8	163
RAR9	ROM Address Register bit 9	164
RAR10	ROM Address Register bit 10	165
RAR11	ROM Address Register bit 11	166
$\overline{\text{READ}}$	"Not" Read	167
$\overline{\text{REFRESH}}$	"Not" Refresh	168
$\overline{\text{RSPE}}$	"Not" Reset Parity Error	169
$\overline{\text{RIGHT}}$	"Not" Right	170
RME	Reset Memory Expansion	171
RMX	ROM, External	172
ROMEN	ROM Enable	173
ROM0	ROM bit 0	174

Table 2-2. Signal Name Index (Continued)

SIGNAL MNEMONIC	DEFINITION	REF NO.
ROM1	ROM bit 1	175
ROM2	ROM bit 2	176
ROM3	ROM bit 3	177
ROM4	ROM bit 4	178
ROM5	ROM bit 5	179
ROM6	ROM bit 6	180
ROM7	ROM bit 7	181
ROM8	ROM bit 8	182
ROM9	ROM bit 9	183
ROM10	ROM bit 10	184
ROM11	ROM bit 11	185
ROM12	ROM bit 12	186
ROM13	ROM bit 13	187
ROM14	ROM bit 14	188
ROM15	ROM bit 15	189
ROM16	ROM bit 16	190
ROM17	ROM bit 17	191
ROM18	ROM bit 18	192
ROM19	ROM bit 19	193
ROM20	ROM bit 20	194
ROM21	ROM bit 21	195
ROM22	ROM bit 22	196
ROM23	ROM bit 23	197
RUN	Run	198
RUNB	Run Button	199
RUNEN	Run Enable	200
RUNFF	Run Flip-Flop	201
SB0	S-Bus bit 0	202
SB1	S-Bus bit 1	203

Table 2-2. Signal Name Index (Continued)

SIGNAL MNEMONIC	DEFINITION	REF NO.
SB2	S-Bus bit 2	204
SB3	S-bus bit 3	205
SB4	S-Bus bit 4	206
SB5	S-Bus bit 5	207
SB6	S-bus bit 6	208
SB7	S-bus bit 7	209
SB8	S-Bus bit 8	210
SB9	S-Bus bit 9	211
SB10	S-Bus bit 10	212
SB11	S-Bus bit 11	213
SB12	S-Bus bit 12	214
SB13	S-Bus bit 13	215
SB14	S-Bus bit 14	216
SB15	S-Bus bit 15	217
SCB0	Select Code Bit 0	218
SCB1	Select Code Bit 1	219
SCB2	Select Code Bit 2	220
SCB3	Select Code Bit 3	221
SCB4	Select Code Bit 4	222
SCB5	Select Code Bit 5	223
SCL0	Select Code Least significant bit 0	224
SCL1	Select Code Least significant bit 1	225
SCL2	Select Code Least significant bit 2	226
SCL3	Select Code Least significant bit 3	227
SCL4	Select Code Least significant bit 4	228
SCL5	Select Code Least significant bit 5	229
SCL6	Select Code Least significant bit 6	230
SCL7	Select Code Least significant bit 7	231
SCM1	Select Code Most significant bit 1	232

Table 2-2. Signal Name Index (Continued)

SIGNAL MNEMONIC	DEFINITION	REF NO.
SCM2	Select Code Most significant bit 2	233
SFC	Skip if Flag is Clear	234
$\overline{\text{SFP}}$	"Not" Standard Front Panel	235
SFS	Skip if Flag is Set	236
SFSB	Skip if Flag is Set (Buffered)	237
SIR	Set Interrupt Request	238
SKF	Skip on Flag	239
SRQ10	Service Request s.c. 10	240
SRQ11	Service Request s.c. 11	241
SRQ12	Service Request s.c. 12	242
SRQ13	Service Request s.c. 13	243
SRQ14	Service Request s.c. 14	244
SRQ15	Service Request s.c. 15	245
SRQ16	Service Request s.c. 16	246
SRQ17	Service Request s.c. 17	247
SRQ20	Service Request s.c. 20	248
SRQ21	Service Request s.c. 21	249
SRQ22	Service Request s.c. 22	250
SRQ23	Service Request s.c. 23	251
SRQ24	Service Request s.c. 24	252
SRQ25	Service Request s.c. 25	253
STATUS	Status	254
STC	Set Control	255
STF	Set Flag	256
$\overline{\text{STORE}}$	"Not" Store	257
$\overline{\text{STROBE}}$	"Not" Strobe	258
$\overline{\text{SYNX}}$	"Not" Synchronize, External	259
TA	Time A	260
TB	Time B	261

Table 2-2. Signal Name Index (Continued)

SIGNAL MENMONIC	DEFINITION	REF NO.
TC	Time C	262
$\overline{\text{TEN}}$	"Not" T-register Enable	263
$\overline{\text{TST}}$	"Not" T-register Store	264
T3	Time 3	265
$\overline{\text{WRITE}}$	"Not" Write	266

REF. NO.	SIGNAL	CPU PCA A1					FRONT PANEL PCA A2	POWER SUPPLY A3	INPUT/OUTPUT BACKPLANE A4														DCPC PCA P1	MEMORY PROTECT PCA P1	MEMORY EXP. MODULE P1	MEMORY PCA P1	MEMORY PCA P1
		FRONT PANEL PCA A2	ROM 1 PCA A7	I/O EXT HP 12979A			FRONT PANEL PCA A2	POWER SUPPLY A3	I/O S.C. 10	I/O S.C. 11	I/O S.C. 12	I/O S.C. 13	I/O S.C. 14	I/O S.C. 15	I/O S.C. 16	I/O S.C. 17	I/O S.C. 20	I/O S.C. 21	I/O S.C. 22	I/O S.C. 23	I/O S.C. 24	I/O S.C. 25					
		J1	J2	J3	XA4	XA5	P1	**	XA10	XA11	XA12	XA13	XA14	XA15	XA16	XA17	XA20	XA21	XA22	XA23	XA24	XA25	XA110	XA111	XA112	XA113	XA11
1	CLC				29				21	21	21	21	21	21	21	21	21	21	21	21	21	21	66				
2	CLF				17				7	7	7	7	7	7	7	7	7	7	7	7	7	7		80			
3	CLKX			30																							
4	CLXEN			32																							
5	CRS				23				13	13	13	13	13	13	13	13	13	13	13	13	13	13	74				
6	$\overline{\text{CTL5}}$																						·	13	18		
7	$\overline{\text{DECM}}$	20					20																				
8	$\overline{\text{DIEN}}$	27					27																				
9	$\overline{\text{DISPLAY}}$	24					24																				
10	$\overline{\text{DIST}}$	26					26																				
11	$\overline{\text{DMACYC}}$					26																	56		56	56	56
12	$\overline{\text{DMAEN}}$					23																	41		51	51	51
13	$\overline{\text{DMAFRZ}}$					4																	10	10	10	10	10
14	$\overline{\text{DMAIOI}}$					20																	25				
15	$\overline{\text{DMAIOO}}$					7																	14				
16	$\overline{\text{DMALCH}}$					83																	83				
17	$\overline{\text{DMALO}}$					69																	57		57	57	57
18	$\overline{\text{DMAREAD}}$																						81		81	81	81
19	$\overline{\text{DMARQI}}$			20		24																	55				
20	$\overline{\text{DMARQ2}}$			18		31																	59				
21	$\overline{\text{DMASTRB}}$					28																	17				
22	$\overline{\text{DSPCL}}$	35					35																				
23	$\overline{\text{DSPEN}}$	33					33																				
24	$\overline{\text{DSPST}}$	34					34																				
25	EDT				63				62	62	62	62	62	62	62	62	62	62	62	62	62	62					

*PINS ACCESSIBLE FOR MAINTENANCE AT TOP OF CROSSOVER PCA A6.

**SEE FIGURE 2-9.

DENOTES SIGNAL SOURCE.

DENOTES BIDIRECTIONAL SIGNAL.

DENOTES SLOTS NOT AVAILABL

DENOTES SLOTS NOT AVAILABL

Table 2-3. Signal Distribution List

OUTPUT BACKPLANE A4								MEMORY BACKPLANE A5													CROSSOVER PCA A6				ROM 1 PCA A7		ROM 2 PCA A8		ROM 3 PCA A9		REF. NO.
I/O S.C. 16	I/O S.C. 17	I/O S.C. 20	I/O S.C. 21	I/O S.C. 22	I/O S.C. 23	I/O S.C. 24	I/O S.C. 25	DCPC PCA P1	MEMORY PROTECT PCA P1	MEMORY EXP. MODULE P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	DCPC PCA J1	POWER SUPPLY A3									
XA16	XA17	XA20	XA21	XA22	XA23	XA24	XA25	XA110	XA111	XA112	XA113	XA114	XA115	XA116	XA117	XA118	XA119	XA120	XA121	XA122	XA123	J1	J2	XA4*	XA5*	J1	P1/J2	J1	P1/J2	J1	P1/J2	
21	21	21	21	21	21	21	21	66																22	65						1
7	7	7	7	7	7	7	7		80													32		8	79						2
																															3
																															4
13	13	13	13	13	13	13	13	74																14	73						5
									13	18																					6
																															7
																															8
																															9
																															10
								56		56	56	56	56	56	56	56	56	56	56	56	56										11
								41		51	51	51	51	51	51	51	51	51	51	51	51										12
								10	10	10	10	10	10	10	10	10	10	10	10	10	10										13
								25																							14
								14																							15
								83																							16
								57		57	57	57	57	57	57	57	57	57	57	57	57										17
								81		81	81	81	81	81	81	81	81	81	81	81	81										18
								55																							19
								59																							20
								17																							21
																															22
																															23
																															24
62	62	62	62	62	62	62	62															10		61							25

URCE.

DENOTES BIDIRECTIONAL SIGNAL.

DENOTES SLOTS NOT AVAILABLE IN HP 2105A.

DENOTES SLOTS NOT AVAILABLE IN HP 2108A.

REF. NO.	SIGNAL	CPU PCA A1					FRONT PANEL PCA A2	POWER SUPPLY A3	INPUT/OUTPUT BACKPLANE A4														DCPC PCA P1	MEMORY PROTECT PCA P1	MEMORY EXP. MODULE P1	MEMORY PCA P1	MEMORY PCA P1
		FRONT PANEL PCA A2	ROM 1 PCA A7	I/O EXT HP 12979A			FRONT PANEL PCA A2	POWER SUPPLY A3	I/O S.C. 10	I/O S.C. 11	I/O S.C. 12	I/O S.C. 13	I/O S.C. 14	I/O S.C. 15	I/O S.C. 16	I/O S.C. 17	I/O S.C. 20	I/O S.C. 21	I/O S.C. 22	I/O S.C. 23	I/O S.C. 24	I/O S.C. 25					
		J1	J2	J3	XA4	XA5	P1	**	XA10	XA11	XA12	XA13	XA14	XA15	XA16	XA17	XA20	XA21	XA22	XA23	XA24	XA25	XA110	XA111	XA112	XA113	XA11
26	ENF				58				46	46	46	46	46	46	46	46	46	46	46	46	46	46		41			
27	ENRMX		38																								
28	EXFF	29					29																				
29	FPSP	38					38																				
30	FRZFF					76																			76	76	76
31	$\overline{\text{FTCH}}$					27																		57			
32	$\overline{\text{FLASH}}$				49			J4-3																			
33	FLG1				61				4/49	4/49	4/49	4/49	4/49	4/49	4/49	4											
34	FLG2				45											49	4/49	4/49	4/49	4/49	4/49	4/49					
35	$\overline{\text{FLG5}}$					16																		29			
36	HLTB	31					31																				
37	$\overline{\text{HLTPE}}$					8																		17			
38	IAK				16				10	10	10	10	10	10	10	10	10	10	10	10	10	10	77	77	77	77	77
39	$\overline{\text{IA0}}$			48																							
40	$\overline{\text{IA1}}$			46																							
41	$\overline{\text{IA2}}$			44																							
42	$\overline{\text{IA3}}$			42																							
43	$\overline{\text{IA4}}$			40																							
44	$\overline{\text{IA5}}$			38																							
45	$\overline{\text{IBL}}$	17					17																				
46	IEN5					79																	79	79			
47	IEN10				20				8	8	8	8	8	8	8	8											
48	IEN20				7												8	8	8	8	8	8					
49	$\overline{\text{INCI}}$					74																		76			
50	$\overline{\text{INCM}}$	19					19																				

*PINS ACCESSIBLE FOR MAINTENANCE AT TOP OF CROSSOVER PCA A6.

**SEE FIGURE 2-9.

DENOTES SIGNAL SOURCE.

DENOTES BIDIRECTIONAL SIGNAL.

DENOTES SLOTS NOT AVAILABL

DENOTES SLOTS NOT AVAILABL

Table 2-3. Signal Distribution List (Continued)

I/O BACKPLANE A4									MEMORY BACKPLANE A5															CROSSOVER PCA A6				ROM 1 PCA A7		ROM 2 PCA A8		ROM 3 PCA A9		REF. NO.
	I/O S.C. 16	I/O S.C. 17	I/O S.C. 20	I/O S.C. 21	I/O S.C. 22	I/O S.C. 23	I/O S.C. 24	I/O S.C. 25	DCPC PCA P1	MEMORY PROTECT PCA P1	MEMORY EXP. MODULE P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	DCPC PCA J1	POWER SUPPLY A3									
5	XA16	XA17	XA20	XA21	XA22	XA23	XA24	XA25	XA110	XA111	XA112	XA113	XA114	XA115	XA116	XA117	XA118	XA119	XA120	XA121	XA122	XA123	J1	J2	XA4*	XA5*	J1	P1/J2	J1	P1/J2	J1	P1/J2	
	46	46	46	46	46	46	46	46		41															45	42							26
																																	27
																																	28
																																	29
											76	76	76	76	76	76	76	76	76	76	76	76											30
										57																							31
																							3	63									32
9	4	4																															33
	49	49	4 / 49	4 / 49	4 / 49	4 / 49	4 / 49	4 / 49																									34
										29																							35
																																	36
										17																							37
	10	10	10	10	10	10	10	10	77	77	77	77	77	77	77	77	77	77	77	77	77	77		9	78								38
																																	39
																																	40
																																	41
																																	42
																																	43
																																	44
																																	45
									79	79																							46
	8	8																															47
			8	8	8	8	8	8																									48
										76																							49
																																	50

OURCE.

DENOTES BIDIRECTIONAL SIGNAL.

DENOTES SLOTS NOT AVAILABLE IN HP 2105A.

DENOTES SLOTS NOT AVAILABLE IN HP 2108A.

REF. NO.	SIGNAL	CPU PCA A1					FRONT PANEL PCA A2	POWER SUPPLY A3	INPUT/OUTPUT BACKPLANE A4														DCPC PCA P1	MEMORY PROTECT PCA P1	MEMORY EXP. MODULE P1	MEMORY PCA P1	MEMORY PCA P1
		FRONT PANEL PCA A2	ROM 1 PCA A7	I/O EXT HP 12979A					I/O S.C. 10	I/O S.C. 11	I/O S.C. 12	I/O S.C. 13	I/O S.C. 14	I/O S.C. 15	I/O S.C. 16	I/O S.C. 17	I/O S.C. 20	I/O S.C. 21	I/O S.C. 22	I/O S.C. 23	I/O S.C. 24	I/O S.C. 25					
		J1	J2	J3	XA4	XA5	P1	**	XA10	XA11	XA12	XA13	XA14	XA15	XA16	XA17	XA20	XA21	XA22	XA23	XA24	XA25	XA110	XA111	XA112	XA113	XA11
51	$\overline{\text{INSTEP}}$	18					18																				
52	INTL	44					44																				
53	$\overline{\text{INTX}}$			36																							
54	IOB0				68				26/35	26/35	26/35	26/35	26/35	26/35	26/35	26/35	26/35	26/35	26/35	26/35	26/35	26/35					
55	IOB1				66				29/38	29/38	29/38	29/38	29/38	29/38	29/38	29/38	29/38	29/38	29/38	29/38	29/38	29/38					
56	IOB2				72				30/41	30/41	30/41	30/41	30/41	30/41	30/41	30/41	30/41	30/41	30/41	30/41	30/41	30/41					
57	IOB3				71				64/45	64/45	64/45	64/45	64/45	64/45	64/45	64/45	64/45	64/45	64/45	64/45	64/45	64/45					
58	IOB4				74				77/42	77/42	77/42	77/42	77/42	77/42	77/42	77/42	77/42	77/42	77/42	77/42	77/42	77/42					
59	IOB 5				73				80/51	80/51	80/15	80/51	80/51	80/51	80/51	80/51	80/51	80/51	80/51	80/51	80/51	80/51					
60	IOB6				76				81/53	81/53	81/53	81/53	81/53	81/53	81/53	81/53	81/53	81/53	81/53	81/53	81/53	81/53					
61	IOB7				75				84/52	84/52	84/52	84/52	84/52	84/52	84/52	84/52	84/52	84/52	84/52	84/52	84/52	84/52					
62	IOB8				78				27/54	27/54	27/54	27/54	27/54	27/54	27/54	27/54	27/54	27/54	27/54	27/54	27/54	27/54					
63	IOB9				77				28/56	28/56	28/56	28/56	28/56	28/56	28/56	28/56	28/56	28/56	28/56	28/56	28/56	28/56					
64	IOB10				80				31/58	31/58	31/58	31/58	31/58	31/58	31/58	31/58	31/58	31/58	31/58	31/58	31/58	31/58					
65	IOB11				79				60/55	60/55	60/55	60/55	60/55	60/55	60/55	60/55	60/55	60/55	60/55	60/55	60/55	60/55					
66	IOB12				82				78/57	78/57	78/57	78/57	78/57	78/57	78/57	78/57	78/57	78/57	78/57	78/57	78/57	78/57					
67	IOB13				81				79/61	79/61	79/61	79/61	79/61	79/61	79/61	79/16	79/61	79/61	79/61	79/61	79/61	79/61					
68	IOB14				84				82/65	82/65	82/65	82/65	82/65	82/65	82/65	82/65	82/65	82/65	82/65	82/65	82/65	82/65					
69	IOB15				83				83/74	83/74	83/74	83/74	83/74	83/74	83/74	83/74	83/74	83/74	83/74	83/74	83/74	83/74					
70	IOB16				31				18	18	18	18	18	18	18	18	18	18	18	18	18	18					
71	IOG				25				15	15	15	15	15	15	15	15	15	15	15	15	15	15	68	68			
72	$\overline{\text{IOGSP}}$					70																		66			
73	IOI				30				24	24	24	24	24	24	24	24	24	24	24	24	24	24	63	63			
74	IOO				26				20	20	20	20	20	20	20	20	20	20	20	20	20	20	67	67			
75	IRQ0				12				6							33	6										

*PINS ACCESSIBLE FOR MAINTENANCE AT TOP OF CROSSOVER PCA A6.

**SEE FIGURE 2-9.

DENOTES SIGNAL SOURCE.

DENOTES BIDIRECTIONAL SIGNAL.

DENOTES SLOTS NOT AVAILABL

DENOTES SLOTS NOT AVAILABL

Table 2-3. Signal Distribution List (Continued)

I/O BACKPLANE A4									MEMORY BACKPLANE A5																CROSSOVER PCA A6				ROM 1 PCA A7		ROM 2 PCA A8		ROM 3 PCA A9		REF. NO.
	I/O S.C. 16	I/O S.C. 17	I/O S.C. 20	I/O S.C. 21	I/O S.C. 22	I/O S.C. 23	I/O S.C. 24	I/O S.C. 25	DCPC PCA P1	MEMORY PROTECT PCA P1	MEMORY EXP. MODULE P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	DCPC PCA J1	POWER SUPPLY A3									
	XA16	XA17	XA20	XA21	XA22	XA23	XA24	XA25	XA110	XA111	XA112	XA113	XA114	XA115	XA116	XA117	XA118	XA119	XA120	XA121	XA122	XA123	J1	J2	XA4*	XA5*	J1	P1/J2	J1	P1/J2	J1	P1/J2	
																																	51
																																	52
																																	53
	26 35	26 35	26 35	26 35	26 35	26 35	26 35	26 35																									54
	29 38	29 38	29 38	29 38	29 38	29 38	29 38	29 38																									55
	30 41	30 41	30 41	30 41	30 41	30 41	30 41	30 41																									56
	64 45	64 45	64 45	64 45	64 45	64 45	64 45	64 45																									57
	77 42	77 42	77 42	77 42	77 42	77 42	77 42	77 42																									58
	80 51	80 51	80 51	80 51	80 51	80 51	80 51	80 51																									59
	81 53	81 53	81 53	81 53	81 53	81 53	81 53	81 53																									60
	84 52	84 52	84 52	84 52	84 52	84 52	84 52	84 52																									61
	27 54	27 54	27 54	27 54	27 54	27 54	27 54	27 54																									62
	28 56	28 56	28 56	28 56	28 56	28 56	28 56	28 56																									63
	31 58	31 58	31 58	31 58	31 58	31 58	31 58	31 58																									64
	60 55	60 55	60 55	60 55	60 55	60 55	60 55	60 55																									65
	78 57	78 57	78 57	78 57	78 57	78 57	78 57	78 57																									66
	79 61	79 16	79 61	79 61	79 61	79 61	79 61	79 61																									67
	82 65	82 65	82 65	82 65	82 65	82 65	82 65	82 65																									68
	83 74	83 74	83 74	83 74	83 74	83 74	83 74	83 74																									69
	18	18	18	18	18	18	18	18																									70
	15	15	15	15	15	15	15	15	68	68																	20	67					71
										66																							72
	24	24	24	24	24	24	24	24	63	63																	23	64					73
	20	20	20	20	20	20	20	20	67	67																	19	68					74
		33	6																														75

OURCE.

DENOTES BIDIRECTIONAL SIGNAL.

DENOTES SLOTS NOT AVAILABLE IN HP 2105A.

DENOTES SLOTS NOT AVAILABLE IN HP 2108A.

REF. NO.	SIGNAL	CPU PCA A1					FRONT PANEL PCA A2	POWER SUPPLY A3	INPUT/OUTPUT BACKPLANE A4																
		FRONT PANEL PCA A2	ROM 1 PCA A7	I/O EXT HP 12979A					I/O S.C. 10	I/O S.C. 11	I/O S.C. 12	I/O S.C. 13	I/O S.C. 14	I/O S.C. 15	I/O S.C. 16	I/O S.C. 17	I/O S.C. 20	I/O S.C. 21	I/O S.C. 22	I/O S.C. 23	I/O S.C. 24	I/O S.C. 25	DCPC PCA P1	MEMORY PROTECT PCA P1	MEMORY EXP. MODULE P1	MEMORY PCA P1	MEMORY PCA P1
		J1	J2	J3	XA4	XA5	P1	**	XA10	XA11	XA12	XA13	XA14	XA15	XA16	XA17	XA20	XA21	XA22	XA23	XA24	XA25	XA110	XA111	XA112	XA113	XA11
76	IRQ1				38				33	6							33	6									
77	IRQ2				36					33	6							33	6								
78	IRQ3				10						33	6							33	6							
79	IRQ4				8							33	6							33	6						
80	IRQ5				4								33	6							33	6		83			
81	IRQ6				13									33	6							33					
82	IRQ7				11										33	6											
83	$\overline{\text{IRSTF}}$					12																		25		33	33
84	$\overline{\text{LEFT}}$	22					22																				
85	$\overline{\text{LEGAL}}$					40																				41	41
86	$\overline{\text{MBEN}}$					29																			25	25	25
87	MB0					67																	72	72	72	72	72
88	MB1					65																	61	61	61	61	61
89	MB2					63																	54	54	54	54	54
90	MB3					61																	52	52	52	52	52
91	MB4					59																	50	50	50	50	50
92	MB5					57																	46	46	46	46	46
93	MB6					55																	42	42	42	42	42
94	MB7					53																	37	37	37	37	37
95	MB8					51																	32	32	32	32	32
96	MB9					49																	28	28	28	28	28
97	MB10					45																	24	24	24	24	24
98	MB11					43																	20	20	20	20	20
99	MB12					41																	16	16	16	16	16
100	MB13					37																	12	12	12	12	12

*PINS ACCESSIBLE FOR MAINTENANCE AT TOP OF CROSSOVER PCA A6.

**SEE FIGURE 2-9.

DENOTES SIGNAL SOURCE.

DENOTES BIDIRECTIONAL SIGNAL.

DENOTES SLOTS NOT AVAILABL

DENOTES SLOTS NOT AVAILABL

Table 2-3. Signal Distribution List (Continued)

/OUTPUT BACKPLANE A4									MEMORY BACKPLANE A5																CROSSOVER PCA A6				ROM 1 PCA A7		ROM 2 PCA A8		ROM 3 PCA A9		REF. NO.
I/O S.C. 16	I/O S.C. 17	I/O S.C. 20	I/O S.C. 21	I/O S.C. 22	I/O S.C. 23	I/O S.C. 24	I/O S.C. 25	DCPC PCA P1	MEMORY PROTECT PCA P1	MEMORY EXP. MODULE P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	DCPC PCA J1	POWER SUPPLY A3			ROM 1 PCA A7		ROM 2 PCA A8		ROM 3 PCA A9		REF. NO.
XA16	XA17	XA20	XA21	XA22	XA23	XA24	XA25	XA110	XA111	XA112	XA113	XA114	XA115	XA116	XA117	XA118	XA119	XA120	XA121	XA122	XA123	J1	J2	XA4*	XA5*	J1	P1/J2	J1	P1/J2	J1	P1/J2	
		33	6																													76
			33	6																												77
				33	6																											78
					33	6																										79
						33	6		83															3	84							80
6							33																34		5							81
33	6																						38		7							82
									25		33	33	33	33	33	33	33	33	33	33	33											83
																																84
											41	41	41	41	41	41	41	41	41	41	41					14	19		19		19	85
										25	25	25	25	25	25	25	25	25	25	25	25											86
								72	72	72	72	72	72	72	72	72	72	72	72	72	72											87
								61	61	61	61	61	61	61	61	61	61	61	61	61	61											88
								54	54	54	54	54	54	54	54	54	54	54	54	54	54											89
								52	52	52	52	52	52	52	52	52	52	52	52	52	52											90
								50	50	50	50	50	50	50	50	50	50	50	50	50	50											91
								46	46	46	46	46	46	46	46	46	46	46	46	46	46											92
								42	42	42	42	42	42	42	42	42	42	42	42	42	42											93
								37	37	37	37	37	37	37	37	37	37	37	37	37	37											94
								32	32	32	32	32	32	32	32	32	32	32	32	32	32											95
								28	28	28	28	28	28	28	28	28	28	28	28	28	28											96
								24	24	24	24	24	24	24	24	24	24	24	24	24	24											97
								20	20	20	20	20	20	20	20	20	20	20	20	20	20											98
								16	16	16	16	16	16	16	16	16	16	16	16	16	16											99
								12	12	12	12	12	12	12	12	12	12	12	12	12	12											100

OURCE. DENOTES BIDIRECTIONAL SIGNAL.

DENOTES SLOTS NOT AVAILABLE IN HP 2105A.

DENOTES SLOTS NOT AVAILABLE IN HP 2108A.

REF. NO.	SIGNAL	CPU PCA A1					FRONT PANEL PCA A2	POWER SUPPLY A3	INPUT/OUTPUT BACKPLANE A4															DCPC PCA P1	MEMORY PROTECT PCA P1	MEMORY EXP. MODULE P1	MEMORY PCA P1	MEMORY PCA P1
		FRONT PANEL PCA A2	ROM 1 PCA A7	I/O EXT HP 12979A					I/O S.C. 10	I/O S.C. 11	I/O S.C. 12	I/O S.C. 13	I/O S.C. 14	I/O S.C. 15	I/O S.C. 16	I/O S.C. 17	I/O S.C. 20	I/O S.C. 21	I/O S.C. 22	I/O S.C. 23	I/O S.C. 24	I/O S.C. 25					
		J1	J2	J3	XA4	XA5	P1	**	XA10	XA11	XA12	XA13	XA14	XA15	XA16	XA17	XA20	XA21	XA22	XA23	XA24	XA25	XA110	XA111	XA112	XA113	XA114
101	MB14					35																		8	8	8	8	8
102	MB15					33																		4	4	4	4	4
103	$\overline{\text{MEBEN}}$																									67	67	67
104	MEB10																									83	83	83
105	MEB11																									79	79	79
106	MEB12																									75	75	75
107	MEB13																									68	68	68
108	MEB14																									62	62	62
109	MEB15																									55	55	55
110	MEB16																									21	21	21
111	MEB17																									17	17	17
112	MEB18																									13	13	13
113	MEB19																									5	5	5
114	$\overline{\text{MEEN}}$					48																				22		
115	$\overline{\text{MESP}}$					32																				33		
116	$\overline{\text{MEST}}$					39																				34	34	34
117	$\overline{\text{METDIS}}$																									36	36	36
118	$\overline{\text{MEV}}$																								73	73		
119	$\overline{\text{MLOST}}$					77		J4-6																				
120	$\overline{\text{MPCND}}$																								5	6		
121	$\overline{\text{MPCK}}$					25																			56	66		
122	$\overline{\text{MPINTON}}$					10																			18			
123	$\overline{\text{MPV}}$					14																			14		14	14
124	MSRDY					73																					73	73
125	OVERFF	28					28																					

*PINS ACCESSIBLE FOR MAINTENANCE AT TOP OF CROSSOVER PCA A6.

**SEE FIGURE 2-9.

DENOTES SIGNAL SOURCE.

DENOTES BIDIRECTIONAL SIGNAL.

DENOTES SLOTS NOT AVAILABL

DENOTES SLOTS NOT AVAILABL

Table 2-3. Signal Distribution List (Continued)

'OUTPUT BACKPLANE A4								MEMORY BACKPLANE A5													CROSSOVER PCA A6				ROM 1 PCA A7		ROM 2 PCA A8		ROM 3 PCA A9		REF. NO.
I/O S.C. 16	I/O S.C. 17	I/O S.C. 20	I/O S.C. 21	I/O S.C. 22	I/O S.C. 23	I/O S.C. 24	I/O S.C. 25	DCPC PCA P1	MEMORY PROTECT PCA P1	MEMORY EXP. MODULE P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	DCPC PCA J1	POWER SUPPLY A3								
XA16	XA17	XA20	XA21	XA22	XA23	XA24	XA25	XA110	XA111	XA112	XA113	XA114	XA115	XA116	XA117	XA118	XA119	XA120	XA121	XA122	XA123	J1	J2	XA4*	XA5*	J1	P1/J2	J1	P1/J2	J1	P1/J2	
								8	8	8	8	8	8	8	8	8	8	8	8	8	8									101
								4	4	4	4	4	4	4	4	4	4	4	4	4	4									102
										67	67	67	67	67	67	67	67	67	67	67	67									103
										83	83	83	83	83	83	83	83	83	83	83	83									104
										79	79	79	79	79	79	79	79	79	79	79	79									105
										75	75	75	75	75	75	75	75	75	75	75	75									106
										68	68	68	68	68	68	68	68	68	68	68	68									107
										62	62	62	62	62	62	62	62	62	62	62	62									108
										55	55	55	55	55	55	55	55	55	55	55	55									109
										21	21	21	21	21	21	21	21	21	21	21	21									110
										17	17	17	17	17	17	17	17	17	17	17	17									111
										13	13	13	13	13	13	13	13	13	13	13	13									112
										5	5	5	5	5	5	5	5	5	5	5	5									113
										22																				114
										33																				115
										34	34	34	34	34	34	34	34	34	34	34	34									116
										36	36	36	36	36	36	36	36	36	36	36	36									117
									73	73																				118
																							6		80					119
									5	6																				120
									56	66																				121
									18																					122
									14		14	14	14	14	14	14	14	14	14	14	14									123
											73	73	73	73	73	73	73	73	73	73	73									124
																														125

URCE. DENOTES BIDIRECTIONAL SIGNAL.

DENOTES SLOTS NOT AVAILABLE IN HP 2105A.

DENOTES SLOTS NOT AVAILABLE IN HP 2108A.

REF. NO.	SIGNAL	CPU PCA A1					FRONT PANEL PCA A2	POWER SUPPLY A3	INPUT/OUTPUT BACKPLANE A4																
		FRONT PANEL PCA A2	ROM 1 PCA A7	I/O EXT HP 12979A			FRONT PANEL PCA A2	POWER SUPPLY A3	I/O S.C. 10	I/O S.C. 11	I/O S.C. 12	I/O S.C. 13	I/O S.C. 14	I/O S.C. 15	I/O S.C. 16	I/O S.C. 17	I/O S.C. 20	I/O S.C. 21	I/O S.C. 22	I/O S.C. 23	I/O S.C. 24	I/O S.C. 25	DCPC PCA P1	MEMORY PROTECT PCA P1	MEMORY EXP. MODULE P1	MEMORY PCA P1	MEMORY PCA P1
		J1	J2	J3	XA4	XA5	P1	**	XA10	XA11	XA12	XA13	XA14	XA15	XA16	XA17	XA20	XA21	XA22	XA23	XA24	XA25	XA110	XA111	XA112	XA113	XA11
126	PARFF	32					32																				
127	$\overline{PE}$					72																		59	59	59	59
128	PF	7					7																				
129	PON				65			J4-2	66	66	66	66	66	66	66	66	66	66	66	66	66	66			26	26	26
130	POPIO				27				17	17	17	17	17	17	17	17	17	17	17	17	17	17	73	74	74	74	74
131	PRH6					5																	13				
132	PRH10				32				23																		
133	PRL4/PRH5					81																		81			
134	PRL7					3																	5				
135	PRL10/PRH11								3	23																	
136	PRL11/PRH12									3	23																
137	PRL12/PRH13										3	23															
138	PRL13/PRH14				3†							3	23														
139	PRL14/PRH15												3	23													
140	PRL15/PRH16													3	23												
141	PRL16/PRH17														3	23											
142	PRL17/PRH20				9											3	23										
143	PRL20/PRH21																3	23									
144	PRL21/PRH22																	3	23								
145	PRL22/PRH23																		3	23							
146	PRL23/PRH24																			3	23						
147	PRL24/PRH25																				3	23					
148	PRL25																					3					
149	PRSTB	16					16*																				
150	PWU			26	55			J4-1																			

*PINS ACCESSIBLE FOR MAINTENANCE AT TOP OF CROSSOVER PCA A6.

**SEE FIGURE 2-9.

DENOTES SIGNAL SOURCE.

DENOTES BIDIRECTIONAL SIGNAL.

DENOTES SLOTS NOT AVAILABL

DENOTES SLOTS NOT AVAILABL

Table 2-3. Signal Distribution List (Continued)

I/O BACKPLANE A4								MEMORY BACKPLANE A5													CROSSOVER PCA A6				ROM 1 PCA A7		ROM 2 PCA A8		ROM 3 PCA A9		REF. NO.
I/O S.C. 16	I/O S.C. 17	I/O S.C. 20	I/O S.C. 21	I/O S.C. 22	I/O S.C. 23	I/O S.C. 24	I/O S.C. 25	DCPC PCA P1	MEMORY PROTECT PCA P1	MEMORY EXP. MODULE P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	DCPC PCA J1	POWER SUPPLY A3									
XA16	XA17	XA20	XA21	XA22	XA23	XA24	XA25	XA110	XA111	XA112	XA113	XA114	XA115	XA116	XA117	XA118	XA119	XA120	XA121	XA122	XA123	J1	J2	XA4*	XA5*	J1	P1/J2	J1	P1/J2	J1	P1/J2	
																																126
									59	59	59	59	59	59	59	59	59	59	59	59	59											127
																																128
66	66	66	66	66	66	66	66			26	26	26	26	26	26	26	26	26	26	26	26		2	65	22							129
17	17	17	17	17	17	17	17	73	74	74	74	74	74	74	74	74	74	74	74	74	74			13	74							130
								13																								131
																																132
									81													40			82							133
								5																								134
																																135
																																136
																																137
																																138
																																139
23																																140
3	23																															141
	3	23																														142
		3	23																													143
			3	23																												144
				3	23																											145
					3	23																										146
						3	23																									147
							3																									148
																																149
																							1	68								150

URCE. DENOTES BIDIRECTIONAL SIGNAL. DENOTES SLOTS NOT AVAILABLE IN HP 2105A. DENOTES SLOTS NOT AVAILABLE IN HP 2108A.

REF. NO.	SIGNAL	CPU PCA A1					FRONT PANEL PCA A2	POWER SUPPLY A3	INPUT/OUTPUT BACKPLANE A4														DCPC PCA P1	MEMORY PROTECT PCA P1	MEMORY EXP. MODULE P1	MEMORY PCA P1	MEMORY PCA P1
		FRONT PANEL PCA A2	ROM 1 PCA A7	I/O EXT HP 12979A			FRONT PANEL PCA A2	POWER SUPPLY A3	I/O S.C. 10	I/O S.C. 11	I/O S.C. 12	I/O S.C. 13	I/O S.C. 14	I/O S.C. 15	I/O S.C. 16	I/O S.C. 17	I/O S.C. 20	I/O S.C. 21	I/O S.C. 22	I/O S.C. 23	I/O S.C. 24	I/O S.C. 25					
		J1	J2	J3	XA4	XA5	P1	**	XA10	XA11	XA12	XA13	XA14	XA15	XA16	XA17	XA20	XA21	XA22	XA23	XA24	XA25	XA110	XA111	XA112	XA113	XA11
151	$\overline{\text{P4NF}}$					47																	76	21	63	63	63
152	$\overline{\text{P5}}$	37					37																				
153	$\overline{\text{P5NF}}$					84																	84	84	84	84	84
155	RAR0		33																								
156	RAR1		31																								
157	RAR2		29																								
158	RAR3		23																								
159	RAR4		22																								
160	RAR5		21																								
161	RAR6		19																								
162	RAR7		17																								
163	RAR8		46																								
164	RAR9		48																								
165	RAR10		18																								
166	RAR11		20																								
167	$\overline{\text{READ}}$					9																	9	9	9	9	9
168	$\overline{\text{REFRESH}}$					78																			78	78	78
169	$\overline{\text{RESPE}}$					30																		60			
170	$\overline{\text{RIGHT}}$	21					21																				
171	RME																							6	14		
172	RMX		40																								
173	ROMEN		44																								
174	ROM0		26																								
175	ROM1		27																								

*PINS ACCESSIBLE FOR MAINTENANCE AT TOP OF CROSSOVER PCA A6.

**SEE FIGURE 2-9.

DENOTES SIGNAL SOURCE.

DENOTES BIDIRECTIONAL SIGNAL.

DENOTES SLOTS NOT AVAILABL

DENOTES SLOTS NOT AVAILABL

Table 2-3. Signal Distribution List (Continued)

I/O BACKPLANE A4								MEMORY BACKPLANE A5													CROSSOVER PCA A6				ROM 1 PCA A7		ROM 2 PCA A8		ROM 3 PCA A9		REF. NO.
I/O S.C. 16	I/O S.C. 17	I/O S.C. 20	I/O S.C. 21	I/O S.C. 22	I/O S.C. 23	I/O S.C. 24	I/O S.C. 25	DCPC PCA P1	MEMORY PROTECT PCA P1	MEMORY EXP. MODULE P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	DCPC PCA J1	POWER SUPPLY A3			J1	P1/J2	J1	P1/J2	J1	P1/J2	
XA16	XA17	XA20	XA21	XA22	XA23	XA24	XA25	XA110	XA111	XA112	XA113	XA114	XA115	XA116	XA117	XA118	XA119	XA120	XA121	XA122	XA123	J1	J2	XA4*	XA5*						
								76	21	63	63	63	63	63	63	63	63	63	63	63	63									151
																														152
								84	84	84	84	84	84	84	84	84	84	84	84	84	84									153
																										33	48		48		48	155
																										31	50		50		50	156
																										29	49		49		49	157
																										23	32		32		32	158
																										22	31		31		31	159
																										21	30		30		30	160
																										19	29		29		29	161
																										17	36		36		36	162
																										46	37		37		37	163
																										48	46		46		46	164
																										18	42		42		42	165
																										20	41		41		41	166
								9	9	9	9	9	9	9	9	9	9	9	9	9	9									167
										78	78	78	78	78	78	78	78	78	78	78	78									168
									60																					169
																														170
									6	14																				171
																														172
																										44	38		38		38	173
																										26	47		47		47	174
																										27	45		45		45	175

OURCE. DENOTES BIDIRECTIONAL SIGNAL.

DENOTES SLOTS NOT AVAILABLE IN HP 2105A.

DENOTES SLOTS NOT AVAILABLE IN HP 2108A.

REF. NO.	SIGNAL	CPU PCA A1					FRONT PANEL PCA A2	POWER SUPPLY A3	INPUT/OUTPUT BACKPLANE A4															DCPC PCA P1	MEMORY PROTECT PCA P1	MEMORY EXP. MODULE P1	MEMORY PCA P1	MEMORY PCA P1
		FRONT PANEL PCA A2	ROM 1 PCA A7	I/O EXT HP 12979A			FRONT PANEL PCA A2	POWER SUPPLY A3	I/O S.C. 10	I/O S.C. 11	I/O S.C. 12	I/O S.C. 13	I/O S.C. 14	I/O S.C. 15	I/O S.C. 16	I/O S.C. 17	I/O S.C. 20	I/O S.C. 21	I/O S.C. 22	I/O S.C. 23	I/O S.C. 24	I/O S.C. 25					
		J1	J2	J3	XA4	XA5	P1	**	XA10	XA11	XA12	XA13	XA14	XA15	XA16	XA17	XA20	XA21	XA22	XA23	XA24	XA25	XA110	XA111	XA112	XA113	XA11
176	ROM2		24																								
177	ROM3		25																								
178	ROM4		8																								
179	ROM5		7																								
180	ROM6		6																								
181	ROM7		5																								
182	ROM8		11																								
183	ROM9		12																								
184	ROM10		13																								
185	ROM11		15																								
186	ROM12		41																								
187	ROM13		39																								
188	ROM14		37																								
189	ROM15		35																								
190	ROM16		10																								
191	ROM17		9																								
192	ROM18		4																								
193	ROM19		3																								
194	ROM20		47																								
195	ROM21		45																								
196	ROM22		43																								
197	ROM23		42																								
198	RUN				60				50	50	50	50	50	50	50	50	50	50	50	50	50	50					
199	RUNB	14					14																				
200	RUNEN					75		J4-5																			

*PINS ACCESSIBLE FOR MAINTENANCE AT TOP OF CROSSOVER PCA A6.

**SEE FIGURE 2-9.

DENOTES SIGNAL SOURCE.

DENOTES BIDIRECTIONAL SIGNAL.

DENOTES SLOTS NOT AVAILABL

DENOTES SLOTS NOT AVAILABL

Table 2-3. Signal Distribution List (Continued)

I/O BACKPLANE A4									MEMORY BACKPLANE A5															CROSSOVER PCA A6				ROM 1 PCA A7		ROM 2 PCA A8		ROM 3 PCA A9		REF. NO.
	I/O S.C. 16	I/O S.C. 17	I/O S.C. 20	I/O S.C. 21	I/O S.C. 22	I/O S.C. 23	I/O S.C. 24	I/O S.C. 25	DCPC PCA P1	MEMORY PROTECT PCA P1	MEMORY EXP. MODULE P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	DCPC PCA J1	POWER SUPPLY A3			J1	P1/J2	J1	P1/J2	J1	P1/J2	
5	XA16	XA17	XA20	XA21	XA22	XA23	XA24	XA25	XA110	XA111	XA112	XA113	XA114	XA115	XA116	XA117	XA118	XA119	XA120	XA121	XA122	XA123	J1	J2	XA4*	XA5*							
																											24	44		44		44	176
																											25	43		43		43	177
																											8	16		16		16	178
																											7	15		15		15	179
																											6	14		14		14	180
																											5	13		13		13	181
																											11	12		12		12	182
																											12	11		11		11	183
																											13	10		10		10	184
																											15	9		9		9	185
																											41	35		35		35	186
																											39	34		34		34	187
																											37	33		33		33	188
																											35	39		39		39	189
																											10	8		8		8	190
																											9	7		7		7	191
																											4	6		6		6	192
																											3	5		5		5	193
																											47	3		3		3	194
																											45	4		4		4	195
																											43	1		1		1	196
																											42	2		2		2	197
	50	50	50	50	50	50	50	50																									198
																																	199
																								5		75							200

OURCE. DENOTES BIDIRECTIONAL SIGNAL.

DENOTES SLOTS NOT AVAILABLE IN HP 2105A.

DENOTES SLOTS NOT AVAILABLE IN HP 2108A.

REF. NO.	SIGNAL	CPU PCA A1					FRONT PANEL PCA A2	POWER SUPPLY A3	INPUT/OUTPUT BACKPLANE A4													DCPC PCA P1	MEMORY PROTECT PCA P1	MEMORY EXP. MODULE P1	MEMORY PCA P1	MEMORY PCA P1
		FRONT PANEL PCA A2	ROM 1 PCA A7	I/O EXT HP 12979A					I/O S.C. 10	I/O S.C. 11	I/O S.C. 12	I/O S.C. 13	I/O S.C. 14	I/O S.C. 15	I/O S.C. 16	I/O S.C. 17	I/O S.C. 20	I/O S.C. 21	I/O S.C. 22	I/O S.C. 23	I/O S.C. 24	I/O S.C. 25					
		J1	J2	J3	XA4	XA5	P1	**	XA10	XA11	XA12	XA13	XA14	XA15	XA16	XA17	XA20	XA21	XA22	XA23	XA24	XA25	XA110	XA111	XA112	XA113	XA11
201	RUNFF	15					15																				
202	SB0	49				68	49																71	71	71	71	71
203	SB1	48				66	48																64	64	64	64	64
204	SB2	46				64	46																58	58	58	58	58
205	SB3	45				62	45																53	53	53	53	53
206	SB4	43				60	43																49	49	49	49	49
207	SB5	42				58	42																45	45	45	45	45
208	SB6	40				56	40																38	38	38	38	38
209	SB7	39				54	39																35	35	35	35	35
210	SB8	12				52	12																31	31	31	31	31
211	SB9	11				50	11																27	27	27	27	27
212	SB10	9				46	9																23	23	23	23	23
213	SB11	8				44	8																19	19	19	19	19
214	SB12	6				42	6																15	15	15	15	15
215	SB13	5				38	5																11	11	11	11	11
216	SB14	3				36	3																7	7	7	7	7
217	SB15	2				34	2																3	3	3	3	3
218	SCB0			16		11																	22	22			
219	SCB1			14		13																	26	26			
220	SCB2			12		15																	30	30			
221	SCB3			10		17																	33	33			
222	SCB4			8		19																	34	34			
223	SCB5			6		21																	51	51			
224	SCL0				24				16								34	16									
225	SCL1				42				34	16								34	16								

*PINS ACCESSIBLE FOR MAINTENANCE AT TOP OF CROSSOVER PCA A6.

**SEE FIGURE 2-9.

DENOTES SIGNAL SOURCE.

DENOTES BIDIRECTIONAL SIGNAL.

DENOTES SLOTS NOT AVAILABL

DENOTES SLOTS NOT AVAILABL

Table 2-3. Signal Distribution List (Continued)

I/O BACKPLANE A4								MEMORY BACKPLANE A5													CROSSOVER PCA A6				ROM 1 PCA A7		ROM 2 PCA A8		ROM 3 PCA A9		REF. NO.
I/O S.C. 16	I/O S.C. 17	I/O S.C. 20	I/O S.C. 21	I/O S.C. 22	I/O S.C. 23	I/O S.C. 24	I/O S.C. 25	DCPC PCA P1	MEMORY PROTECT PCA P1	MEMORY EXP. MODULE P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	DCPC PCA J1	POWER SUPPLY A3									
XA16	XA17	XA20	XA21	XA22	XA23	XA24	XA25	XA110	XA111	XA112	XA113	XA114	XA115	XA116	XA117	XA118	XA119	XA120	XA121	XA122	XA123	J1	J2	XA4*	XA5*	J1	P1/J2	J1	P1/J2	J1	P1/J2	
																																201
								71	71	71	71	71	71	71	71	71	71	71	71	71	71											202
								64	64	64	64	64	64	64	64	64	64	64	64	64	64											203
								58	58	58	58	58	58	58	58	58	58	58	58	58	58											204
								53	53	53	53	53	53	53	53	53	53	53	53	53	53											205
								49	49	49	49	49	49	49	49	49	49	49	49	49	49											206
								45	45	45	45	45	45	45	45	45	45	45	45	45	45											207
								38	38	38	38	38	38	38	38	38	38	38	38	38	38											208
								35	35	35	35	35	35	35	35	35	35	35	35	35	35											209
								31	31	31	31	31	31	31	31	31	31	31	31	31	31											210
								27	27	27	27	27	27	27	27	27	27	27	27	27	27											211
								23	23	23	23	23	23	23	23	23	23	23	23	23	23											212
								19	19	19	19	19	19	19	19	19	19	19	19	19	19											213
								15	15	15	15	15	15	15	15	15	15	15	15	15	15											214
								11	11	11	11	11	11	11	11	11	11	11	11	11	11											215
								7	7	7	7	7	7	7	7	7	7	7	7	7	7											216
								3	3	3	3	3	3	3	3	3	3	3	3	3	3											217
								22	22																							218
								26	26																							219
								30	30																							220
								33	33																							221
								34	34																							222
								51	51																							223
		34	16																													224
			34	16																												225

OURCE.

DENOTES BIDIRECTIONAL SIGNAL.

DENOTES SLOTS NOT AVAILABLE IN HP 2105A.

DENOTES SLOTS NOT AVAILABLE IN HP 2108A.

REF. NO.	SIGNAL	CPU PCA A1					FRONT PANEL PCA A2	POWER SUPPLY A3	INPUT/OUTPUT BACKPLANE A4														DCPC PCA P1	MEMORY PROTECT PCA P1	MEMORY EXP. MODULE P1	MEMORY PCA P1	MEMORY
		FRONT PANEL PCA A2	ROM 1 PCA A7	I/O EXT HP 12979A			FRONT PANEL PCA A2	POWER SUPPLY A3	I/O S.C. 10	I/O S.C. 11	I/O S.C. 12	I/O S.C. 13	I/O S.C. 14	I/O S.C. 15	I/O S.C. 16	I/O S.C. 17	I/O S.C. 20	I/O S.C. 21	I/O S.C. 22	I/O S.C. 23	I/O S.C. 24	I/O S.C. 25					
		J1	J2	J3	XA4	XA5	P1	**	XA10	XA11	XA12	XA13	XA14	XA15	XA16	XA17	XA20	XA21	XA22	XA23	XA24	XA25	XA110	XA111	XA112	XA113	XA1
226	SCL2				34					34	16							34	16								
227	SCL3				43						34	16							34	16							
228	SCL4				41							34	16							34	16						
229	SCL5				39								34	16							34	16					
230	SCL6				37									34	16							34					
231	SCL7				35										34	16											
232	SCM1				46				14/37	14/37	14/37	14/37	14/37	14/37	14/37	14											
233	SCM2				15											37	14/37	14/37	14/37	14/37	14/37	14/37					
234	SFC				14				5	5	5	5	5	5	5	5	5	5	5	5	5	5		82			
235	$\overline{SFP}$	30					30																				
236	SFS				33				25	25	25	25	25	25	25	25	25	25	25	25	25	25	62	62			
237	SFSB								73	73	73	73	73	73	73	73	73	73	73	73	73	73					
238	SIR				40				32	32	32	32	32	32	32	32	32	32	32	32	32	32		55			
239	SKF				22				12	12	12	12	12	12	12	12	12	12	12	12	12	12	75	75			
240	SRQ10								19																		
241	SRQ11									19																	
242	SRQ12										19																
243	SRQ13											19															
244	SRQ14												19														
245	SRQ15													19													
246	SRQ16														19												
247	SRQ17															19											
248	SRQ20																19										
249	SRQ21																	19									
250	SRQ22																		19								

*PINS ACCESSIBLE FOR MAINTENANCE AT TOP OF CROSSOVER PCA A6.

**SEE FIGURE 2-9.

DENOTES SIGNAL SOURCE.

DENOTES BIDIRECTIONAL SIGNAL.

DENOTES SLOTS NOT AVAILAB

DENOTES SLOTS NOT AVAILAB

Table 2-3. Signal Distribution List (Continued)

I/O BACKPLANE A4									MEMORY BACKPLANE A5															CROSSOVER PCA A6		ROM 1 PCA A7		ROM 2 PCA A8		ROM 3 PCA A9		REF. NO.
S.C. 15	I/O S.C. 16	I/O S.C. 17	I/O S.C. 20	I/O S.C. 21	I/O S.C. 22	I/O S.C. 23	I/O S.C. 24	I/O S.C. 25	DCPC PCA P1	MEMORY PROTECT PCA P1	MEMORY EXP. MODULE P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	DCPC PCA J1	POWER SUPPLY A3							
15	XA16	XA17	XA20	XA21	XA22	XA23	XA24	XA25	XA110	XA111	XA112	XA113	XA114	XA115	XA116	XA117	XA118	XA119	XA120	XA121	XA122	XA123	J1	J2	XA4*	XA5*	J1	P1/J2	J1	P1/J2	J1	P1/J2	
				34	16																												226
					34	16																											227
						34	16																										228
							34	16																									229
	16							34																									230
	34	16																															231
37	14/37	14																															232
		37	14/37	14/37	14/37	14/37	14/37	14/37																									233
	5	5	5	5	5	5	5	5		82													36		6	81							234
																																	235
5	25	25	25	25	25	25	25	25	62	62															26	61							236
	73	73	73	73	73	73	73	73																									237
	32	32	32	32	32	32	32	32		55															31	56							238
	12	12	12	12	12	12	12	12	75	75															11	76							239
																							30		24								240
																							28		25								241
																							26		46								242
																							24		56								243
																							22		55								244
																							20		58								245
	19																						18		57								246
		19																					16		60								247
			19																				14		59								248
				19																													249
					19																												250

SOURCE.

DENOTES BIDIRECTIONAL SIGNAL.

DENOTES SLOTS NOT AVAILABLE IN HP 2105A.

DENOTES SLOTS NOT AVAILABLE IN HP 2108A.

REF. NO.	SIGNAL	CPU PCA A1					FRONT PANEL PCA A2	POWER SUPPLY A3	INPUT/OUTPUT BACKPLANE A4															DCPC PCA P1	MEMORY PROTECT PCA P1	MEMORY EXP. MODULE P1	MEMORY PCA P1	MEMORY PCA P1
		FRONT PANEL PCA A2	ROM 1 PCA A7	I/O EXT HP 12979A			FRONT PANEL PCA A2	POWER SUPPLY A3	I/O S.C. 10	I/O S.C. 11	I/O S.C. 12	I/O S.C. 13	I/O S.C. 14	I/O S.C. 15	I/O S.C. 16	I/O S.C. 17	I/O S.C. 20	I/O S.C. 21	I/O S.C. 22	I/O S.C. 23	I/O S.C. 24	I/O S.C. 25					
		J1	J2	J3	XA4	XA5	P1	**	XA10	XA11	XA12	XA13	XA14	XA15	XA16	XA17	XA20	XA21	XA22	XA23	XA24	XA25	XA110	XA111	XA112	XA113	XA11
251	SRQ23																			19							
252	SRQ24																				19						
253	SRQ25																					19					
254	STATUS					67			67	67	67	67	67	67	67	67	67	67	67	67	67	67					
255	STC				28				22	22	22	22	22	22	22	22	22	22	22	22	22	22	65	65			
256	STF				19				9	9	9	9	9	9	9	9	9	9	9	9	9	9	78	78			
257	$\overline{\text{STORE}}$	23					23																				
258	$\overline{\text{STROBE}}$	25					25																				
259	SYNX			34																							
260	TA					71																	60		60	60	60
261	TB					18																	18			18	18
262	TC					22																	21			22	22
263	$\overline{\text{TEN}}$					80																	80		80	80	80
264	$\overline{\text{TST}}$					82																	82		82	82	82
265	T3				21				11	11	11	11	11	11	11	11	11	11	11	11	11	11					
266	$\overline{\text{WRITE}}$					6																	6			6	6
267																											
268																											
269																											
270																											
271																											
272																											
273																											
274																											
275																											

*PINS ACCESSIBLE FOR MAINTENANCE AT TOP OF CROSSOVER PCA A6.

**SEE FIGURE 2-9.

DENOTES SIGNAL SOURCE.

DENOTES BIDIRECTIONAL SIGNAL.

DENOTES SLOTS NOT AVAILABL

DENOTES SLOTS NOT AVAILABL

Table 2-3. Signal Distribution List (Continued)

/OUTPUT BACKPLANE A4								MEMORY BACKPLANE A5													CROSSOVER PCA A6				ROM 1 PCA A7		ROM 2 PCA A8		ROM 3 PCA A9		REF. NO.
I/O S.C. 16	I/O S.C. 17	I/O S.C. 20	I/O S.C. 21	I/O S.C. 22	I/O S.C. 23	I/O S.C. 24	I/O S.C. 25	DCPC PCA P1	MEMORY PROTECT PCA P1	MEMORY EXP. MODULE P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	MEMORY PCA P1	DCPC PCA J1	POWER SUPPLY A3									
5 XA16	XA17	XA20	XA21	XA22	XA23	XA24	XA25	XA110	XA111	XA112	XA113	XA114	XA115	XA116	XA117	XA118	XA119	XA120	XA121	XA122	XA123	J1	J2	XA4*	XA5*	J1	P1/J2	J1	P1/J2	J1	P1/J2	
					19																											251
						19																										252
							19																									253
67	67	67	67	67	67	67	67																									254
22	22	22	22	22	22	22	22	65	65															21	66							255
9	9	9	9	9	9	9	9	78	78															10	77							256
																																257
																																258
																																259
								60		60	60	60	60	60	60	60	60	60	60	60	60											260
								18			18	18	18	18	18	18	18	18	18	18	18											261
								21			22	22	22	22	22	22	22	22	22	22	22											262
								80		80	80	80	80	80	80	80	80	80	80	80	80											263
								82		82	82	82	82	82	82	82	82	82	82	82	82											264
11	11	11	11	11	11	11	11																									265
								6			6	6	6	6	6	6	6	6	6	6	6											266
																																267
																																268
																																269
																																270
																																271
																																272
																																273
																																274
																																275

OURCE. DENOTES BIDIRECTIONAL SIGNAL.

DENOTES SLOTS NOT AVAILABLE IN HP 2105A.

DENOTES SLOTS NOT AVAILABLE IN HP 2108A.

REPLACEABLE PARTS

SECTION III

This section provides a field-replaceable parts listing and an illustrated parts breakdown of the HP 2105A, HP 2108A, and HP 2112A Microprogrammable Processors. Components parts of printed-circuit assemblies (PCA's) are not included, since these parts are considered replaceable only at the factory or a depot. Also included in this section is a listing of subassemblies that comprise the HP 2102A Memory System.

3-1. PROCESSOR REPLACEABLE PARTS

Tables 3-1 through 3-3 and figures 3-1 through 3-3 list and illustrate the field-replaceable parts of the HP 2105A, HP 2108A, and HP 2112A Microprogrammable Processors. 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.

f. UNITS PER ASSY. The total quantity of each replaceable part of the processor or memory system.

3-2. MEMORY SYSTEM REPLACEABLE PARTS

Table 3-4 lists the field-replaceable parts of the HP 2102A memory System.

3-3. 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 card 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.

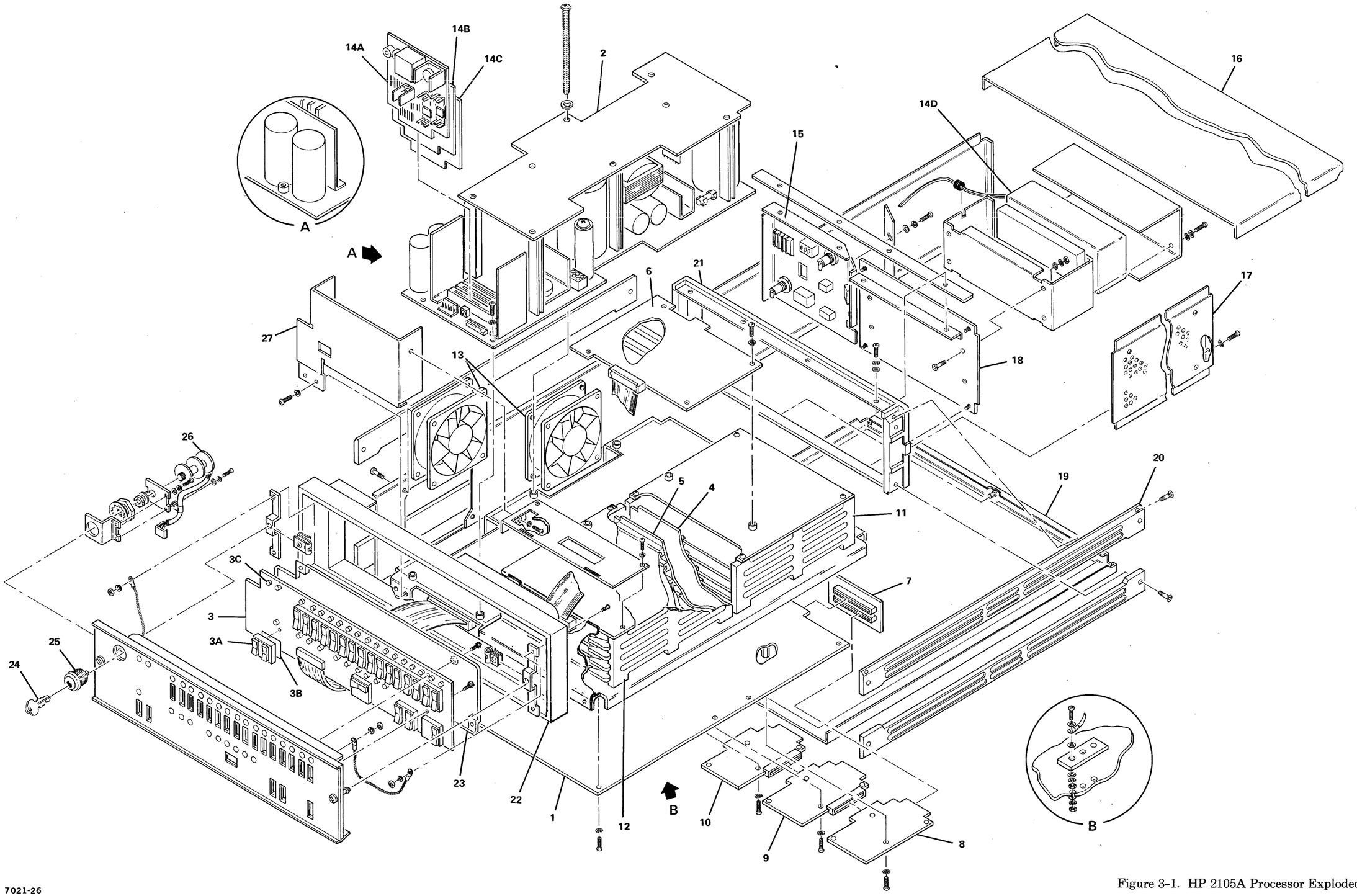
b. Hewlett-Packard part number for each part.

c. Complete description for each part as provided in the replaceable parts lists.

Table 3-1. HP 2105A Processor Replaceable Parts

FIG & INDEX NO.	HP PART NO.	DESCRIPTION	MFR. CODE	MFR. PART NO.	UNITS PER ASSY.
3-1-	2105A	MICROPROGRAMMABLE PROCESSOR	28480	2105A	1
1	5060-8352	*Central Processor Unit A1	28480	5060-8352	1
2	02105-60012	*Power Supply A2	28480	02105-60012	1
3	5060-8343	*Operator Panel PCA A3	28480	5060-8343	1
3A	5040-6076	**Switch (Mint Gray)	28480	5040-6076	13
—	5040-6077	**Switch (Jade Gray)	28480	5040-6077	9
3B	02108-00014	**Contact, Spring	28480	02108-00014	22
3C	1990-0325	**Light Emitting Diode	28480	1990-0325	28
4	02105-60002	*Input/Output Backplane A4	28480	02105-60002	1
5	02105-60005	*Memory Backplane A5	28480	02105-60005	1
6	5060-8345	*Crossover PCA A6	28480	5060-8345	1
7	5061-1336	*Connector Assembly	28480	5061-1336	1
8	5060-8400	*Control Store ROM A7	28480	5060-8400	1
9	Note 1	*Control Store ROM A8	28480		
10	Note 1	*Control Store ROM A9	28480		
11	Note 2	*I/O PCA Cage	28480		1
12	Note 3	*Memory PCA Cage	28480		1
13	3160-0224	*Fan, Tubeaxial	28480	3160-0224	2
14	Note 4	*Power Fail Recovery System	28480		
15	02105-60014	*Rear Panel Assembly	28480	02105-60014	1
	02105-00001	**Rear Panel (includes J2, J3, and S2)	28480	02105-00001	1
	0360-0556	**Terminal Block TB1	75382	670A-3	1
	2110-0470	**Fuseholder XF1	75915	345001-010	1
	2110-0055	**Fuse F1, 4A, Fast-Blow (110V operation)	71400	MTH-4	1
	2110-0002	**Fuse F1, 2A, Slow-Blow (220V operation)	71400	AGC-2	1
	2110-0470	**Fuseholder XF2	75915	345001-010	1
	2110-0010	**Fuse F2, 5A, Normal Blow	71400	MTH-5	1
	3101-0646	**Toggle Switch S1	28480	3101-0646	1
	9135-0017	**Line Filter FL1	28480	9135-0017	1
	1251-3408	**Battery Input Jack J1	27264	03-09-2021	1
16	5068-9836	*Top Cover	28480	5068-9836	1
17	02105-00008	*Side Covers	28480	02105-00008	2
18	02105-00006	*I/O Cage Cover	28480	02105-00006	1
19	5060-9836	*Bottom Cover	28480	5060-9836	1
20	5020-8838	*Strut	28480	5020-8838	4
21	5020-8804	*Rear Frame	28480	5020-8804	1
22	02105-20002	*Front Frame	28480	02105-20002	1
23	4040-0572	*Operator Panel PCA Cover	28480	4040-0572	1
24	1390-0302	*Key	81741	H2007	2
25	1390-0301	*Lock	81741	2242V	1
26	02108-60033	*Switch Assembly	28480	02108-60033	1
27	02105-00017	*Front Shield; Power Supply	28480	02105-00017	1

NOTES:
1. Either HP option or User designed.
2. I/O PCA cage not field replaceable; shown only for reference.
3. Memory PCA cage not field replaceable; see table 3-4 for memory options.
4. Part of memory options; see table 3-4.



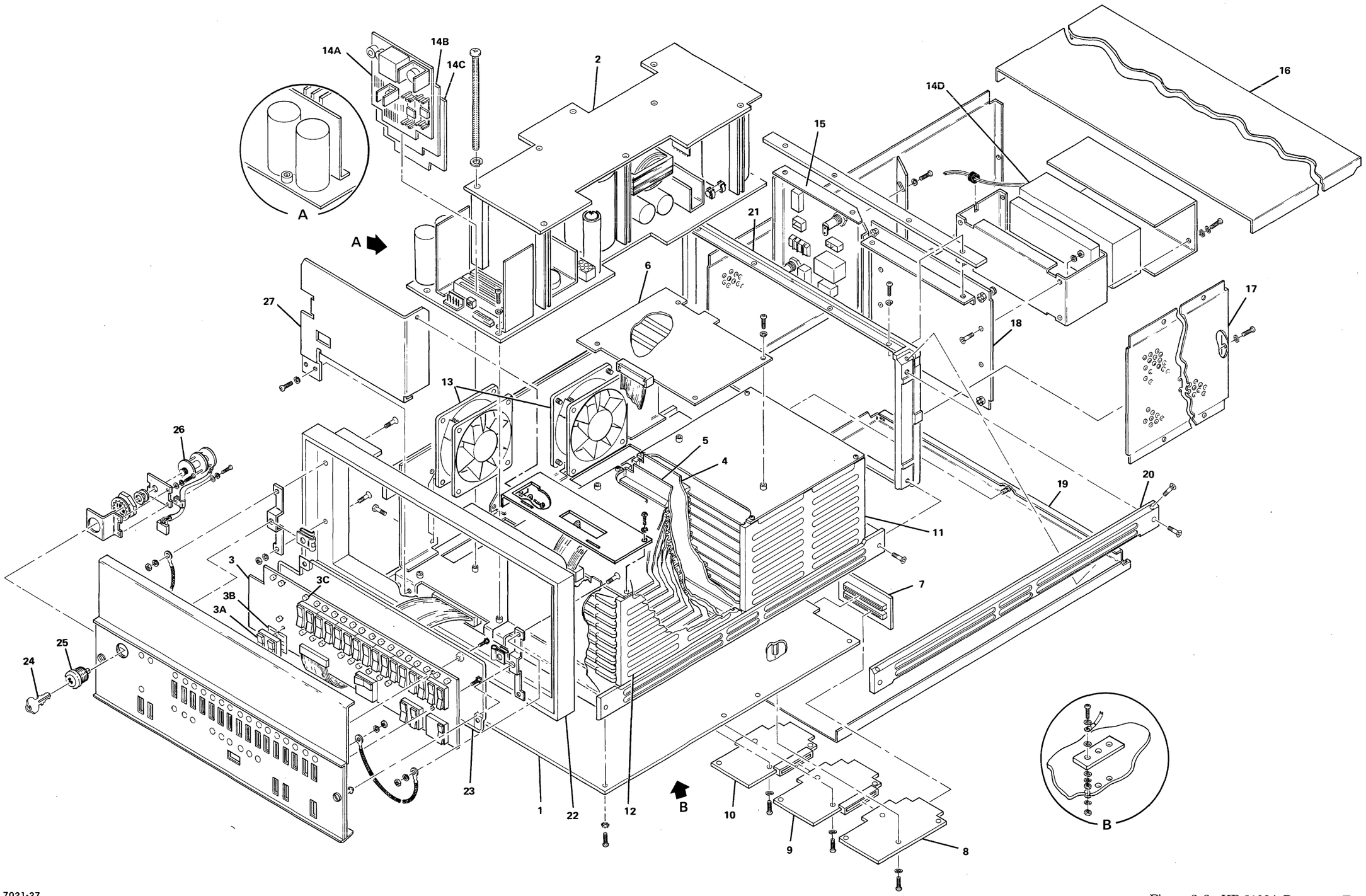
7021-26

Figure 3-1. HP 2105A Processor Exploded View

Table 3-2. HP 2108A Processor Replaceable Parts

FIG & INDEX NO.	HP PART NO.	DESCRIPTION	MFR. CODE	MFR. PART NO.	UNITS PER ASSY.
3-2-	2108A	MICROPROGRAMMABLE PROCESSOR	28480	2108A	1
1	5060-8352	*Central Processor Unit A1	28480	5060-8352	1
2	02108-60023	*Power Supply A2	28480	02108-60023	1
3	5060-8343	*Operator Panel PCA A3	28480	5060-8343	1
3A	5040-6076	**Switch (Mint Gray)	28480	5040-6076	13
—	5040-6077	**Switch (Jade Gray)	28480	5040-6077	9
3B	02108-00014	**Contact, Spring	28480	02108-00014	22
3C	1990-0325	**Light Emitting Diode	28480	1990-0325	28
4	02108-60007	*Input/Output Backplane A4	28480	02108-60007	1
5	02108-60005	*Memory Backplane A5	28480	02108-60005	1
6	5060-8345	*Crossover PCA A6	28480	5060-8345	1
7	5061-1336	*Connector Assembly	28480	5061-1336	1
8	5060-8400	*Control Store ROM A7	28480	5060-8400	1
9	Note 1	*Control Store ROM A8			
10	Note 1	*Control Store ROM A9			
11	Note 2	*I/O PCA Cage	28480		1
12	Note 3	*Memory PCA Cage	28480		1
13	3160-0224	*Fan, Tubeaxial	28480	3160-0224	2
14	Note 4	*Power Fail Recovery System	28480		
15	02108-60028	*Rear Panel Assembly	28480	02108-60028	1
	02108-00005	**Rear Panel (includes J2, J3, and S2)	28480	02108-00005	1
	0360-0556	**Terminal Block TB1	75382	670A-3	1
	2110-0470	**Fuseholder XF1	75915	345001-010	1
	2110-0056	**Fuse F1, 6A, Fast-Blow (110V operation)	71400	MTH-6	1
	2110-0055	**Fuse, F1, 4A, Fast-Blow (220V operation)	71400	MTH-4	1
	2110-0470	**Fuseholder XF2	75915	345001-010	1
	2110-0010	**Fuse F2, 5A, Normal Blow	71400	MTH-5	1
	3101-0646	**Toggle Switch S1	28480	3101-0646	1
	9135-0018	**Line Filter FL1	28480	9135-0018	1
	1251-3408	**Battery Input Jack J1	27264	03-09-2021	1
16	5068-9836	*Top Cover	28480	5068-9836	1
17	02108-00017	*Side Covers	28480	02108-00017	2
18	02108-00011	*I/O Cage Cover	28480	02108-00011	1
19	5060-9836	*Bottom Cover	28480	5060-9836	1
20	5020-8838	*Strut	28480	5020-8838	4
21	5020-8808	*Rear Frame	28480	5020-8808	1
22	5020-7335	*Front Frame	28480	5020-7335	1
23	4040-0572	*Operator Panel PCA Cover	28480	4040-0572	1
24	1390-0302	*Key	81741	H2007	2
25	1390-0301	*Lock	81741	2242V	1
26	02108-60033	*Switch Assembly	28480	02108-60033	1
27	02108-00032	*Front Shield, Power Supply	28480	02108-00032	1

NOTES:
1. Either HP option or User designed.
2. I/O PCA cage not field replaceable; shown only for reference.
3. Memory PCA cage not field replaceable; see table 3-4 for memory options.
4. Part of memory options; see table 3-4.



7021-27

Figure 3-2. HP 2108A Processor Exploded View

Table 3-3. HP 2112A Processor Replaceable Parts

FIG. & INDEX NO.	HP PART NO.	DESCRIPTION	MFR. CODE	MFR. PART NO.	UNITS PER ASSY.
3-3-	2112A	MICROPROGRAMMABLE PROCESSOR	28480	2112A	1
1	5060-8352	*Central Processor Unit PCA A1	28480	5060-8352	1
2	02112-60006	*Power Supply A2	28480	02112-60006	1
3	5060-8353	*Operator Panel PCA A3	28480	5060-8353	1
3A	5040-6076	**Switch (Mint Gray)	28480	5040-6076	13
—	5040-6077	**Switch (Jade Gray)	28480	5040-6077	9
3B	02108-00014	**Contact Spring	28480	02108-00014	22
3C	1990-0325	**Light Emitting Diode	28480	1990-0325	28
4	02112-60001	*Input/Output Backplane A4	28480	02112-60001	1
5	02112-60002	*Memory Backplane A5	28480	02112-60002	1
6	5060-8345	*Crossover PCA A6	28480	5060-8345	1
7	5061-1336	*Connector Assembly	28480	5061-1336	1
8	5060-8400	*Control Store ROM A7	28480	5060-8400	1
9	Note 1	*Control Store ROM A8	28480		
10	Note 1	*Control Store ROM A9	28480		
11	Note 2	*I/O PCA Cage	28480		1
12	Note 3	*Memory PCA Cage	28480		1
13	3160-0224	*Fan, Tubeaxial	28480	3160-0224	4
14	Note 4	*Power Fail Recovery System	28480		
15	02112-60009	*Rear Panel Assembly	28480	02112-60009	1
	02112-00001	**Rear Panel (includes J1, J3, J4, S1)	28480	02112-00001	1
	0360-0624	**Terminal Block	75382	620A-25	1
	2110-0470	**Fuseholders XF1 and XF2	75915	345001-010	2
	2110-0001	**Fuse F1, 1A, NB	71400	AGC-1	1
	2110-0003	**Fuse F2, 3A, NB	71400	AGC-3	1
	3105-0051	**Circuit Breaker CB1, two-pole, 8A	28480	3105-0051	1
	9135-0030	**Line Filter FL1	28480	9135-0030	1
	1251-3408	**Battery Input Jacks J2 and J5	27264	03-09-2021	2
16	5060-9836	*Top Cover	28480	5060-9836	1
17	5060-9958	*Side Covers	28480	5060-9958	2
18	02112-00013	*I/O Cage Cover	28480	02112-00013	1
19	5060-9836	*Bottom Cover	28480	5060-9836	1
20	5020-8838	*Strut	28480	5020-8838	4
21	5020-8812	*Rear Frame	28480	5020-8812	1
22	5020-7333	*Front Frame	28480	5020-7333	1
23	4040-0572	*Operator Panel PCA Cover	28480	4040-0572	1
24	1390-0302	*Key	81741	H2007	1
25	1390-0301	*Lock	81741	2242V	1
26	02108-60023	*Switch Assembly	28480	02108-60023	1
27	02112-00011	*Front Shield, Power Supply	28480	02112-00011	1

NOTES:
1. Either HP option or User designed.
2. I/O PCA cage not field replaceable; shown only for reference.
3. Memory PCA cage not field replaceable; see table 3-4 for memory options.
4. Part of memory options; see table 3-4.

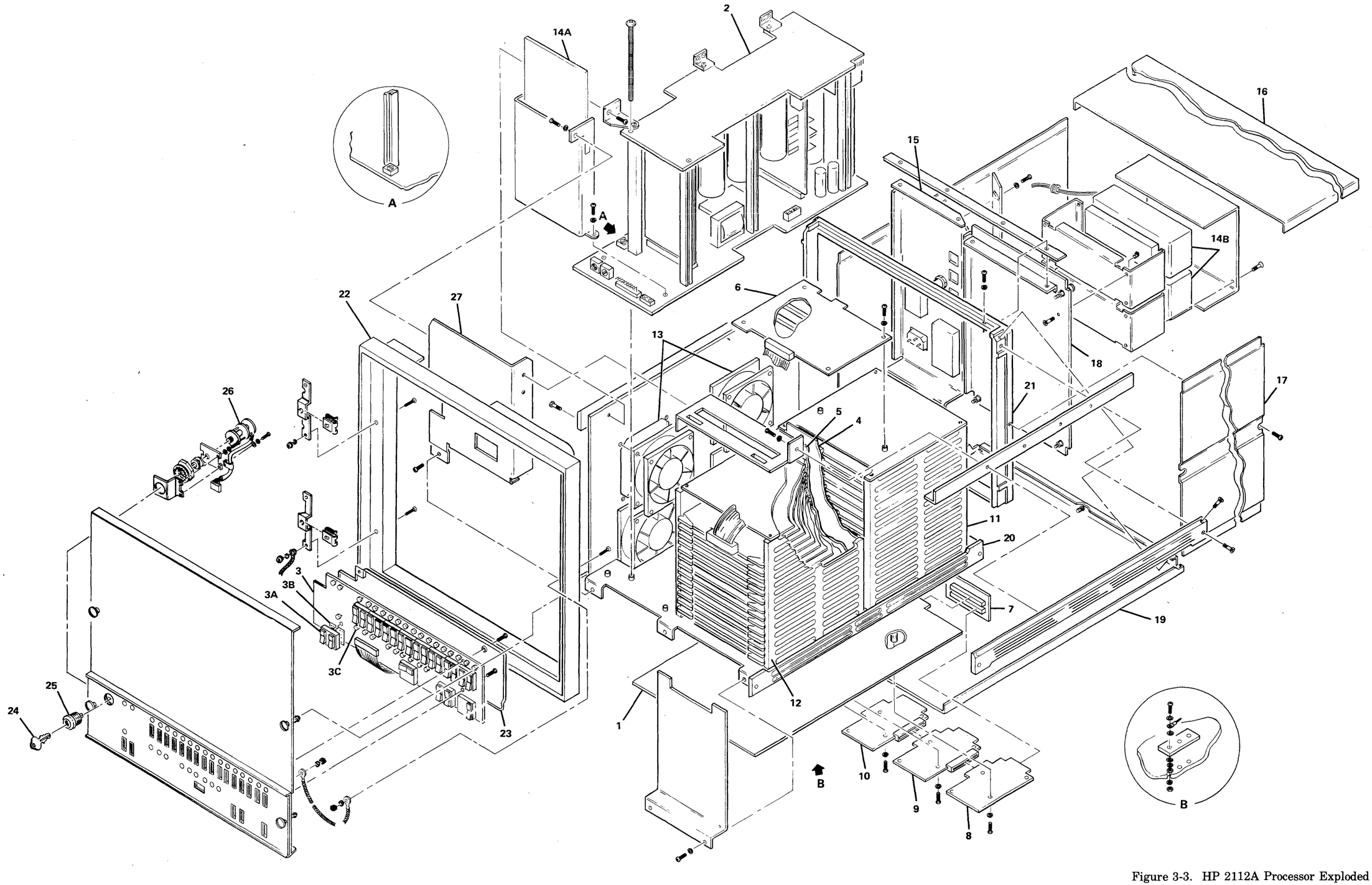


Figure 3-3. HP 2112A Processor Exploded View

Table 3-4. HP 2102A Memory System Replaceable Parts

FIG. & INDEX NO.	HP PART NO.	DESCRIPTION	MFR. CODE	MFR. PART NO.	UNITS PER ASSY.
—	2102A	MOS MEMORY SYSTEM	28480	2102A	1
—	5060-8360	*Memory Controller PCA	28480	5060-8360	1
—	5060-8369	*4K Memory Module	28480	5060-8369	Note 1
—	5060-8359	*8K Memory Module	28480	5060-8359	Note 1
—	5061-1332	*16K Memory Module	28480	5061-1332	Note 1
—	12993A	*Memory System Cable	28480	12893A	1
—	12897A	*Dual-Channel Port Controller	28480	12897A	1
—	12892A	*Memory Protect (not used with HP 2105A)	28480	12892A	1
3-1-					
3-2-	12944A	*Power Fail Recovery System (for HP 2105A and HP 2108A)	28480	12944A	1
14A	5060-8346	**Battery Output PCA	28480	5060-8346	1
14B	5060-8346	**Battery Control I PCA	28480	5060-8347	1
14C	5060-8353	**Battery Control II PCA	28480	5060-8353	1
14D	1420-0206	**Battery Pack	28480	1420-0206	1
14E	2110-0010	**Fuse, 5A, NB	28480	2110-0010	1
3-3-	12991A	*Power Fail Recovery System (for HP 2112A)	28480	12991A	1
14A	02112-60003	**Battery Inverter PCA	28480	02112-60003	1
14B	1420-0206	**Battery Pack	28480	1420-0206	2
14C	2110-0001	**Fuse, 1A, NB	28480	2110-0001	1
14D	2110-0003	**Fuse, 3A, NB	28480	2110-0003	1

NOTES: 1. Depends on particular installations.

Table 3-5. Code List of Manufacturers

The following code numbers are from the Federal Supply Code for Manufacturers Cataloging Handbooks H4-1 and H4-2, and their latest supplements.

Code No.	Manufacturer	Address	Code No.	Manufacturer	Address
27264	Molex Products Co.,	Downers Grove, Ill.	75382	Kulka Electric Corp.,	Mt. Vernon, N.Y.
28480	Hewlett-Packard Co.,	Palo Alto, Calif.			
71400	Bussman Manufacturing Div., McGraw-Edison Co.,	St. Louis, Mo.	75915	Littlefuse, Inc.,	DesPlaines, Ill.
			81741	Chicago Lock Co.,	Chicago, Ill.

PRINTED IN U.S.A.