

# HP 3000 Computer System

# Series III System Installation Manual



GENERAL SYSTEMS DIVISION 19447 PRUNERIDGE AVE. CUPERTINO, CALIFORNIA 95014

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# RECEIVING THE SYSTEM

SECTION

I

When you (the Hewlett-Packard Customer Engineer) have been notified by the customer that his system has arrived, tell him to inspect it, verify the packing list, and, if no discrepancies are found, move the equipment to the installation site. It is his responsibility to do the unpacking, moving, and disposing of non-reusable packing material.

If damages or discrepancies are found, have the customer notify you and the carrier or the carrier's agent. Remind him that instructions on how to inspect, verify and move the shipment appear in the SITE PREPARATION MANUAL. (If the customer does not have ready access to this manual, see that he gets one.)

Tell the customer when you will arrive to begin the installation.

Once at the site, it is your responsibility to install the system, and ensure that it operates within factory specifications.

## Note

Should you find, on arrival, that the uncrating and moving is not complete, it is recommended that you limit your activities to supervising. Unpacking is the customer's responsibility, and he must submit any claims for damages.

Once the system is in place, open all doors and panels and look for damaged or missing parts. Check all device serial numbers against the packing list or the Product Identification Card(s). Inspect all software items (magnetic tapes, disc packs, card decks, etc.) for damage (broken reels, broken disc pack covers, etc.).

Report any problem to the responsible Product Support Engineer at the factory. Missing or damaged items will be replaced without waiting for the settlement of claims. Items shipped to replace damaged parts will be billed to the customer and he has the task of collecting from the carrier.

Then, proceed to install and check-out the system, using this Manual as a guide. Note that you are not responsible for the set up and cabling of any terminals other than the system console, unless it has been agreed to in a separate contract.

# INSTALLING THE PROCESSOR

SECTION

II

## 2-1. EQUIPMENT BAYS

The HP 3000 Series III System comes in an HP 29402K cabinet (the "CPU Bay"), and, if Option 200 is ordered, an HP 29402L cabinet (the "I/O Bay").

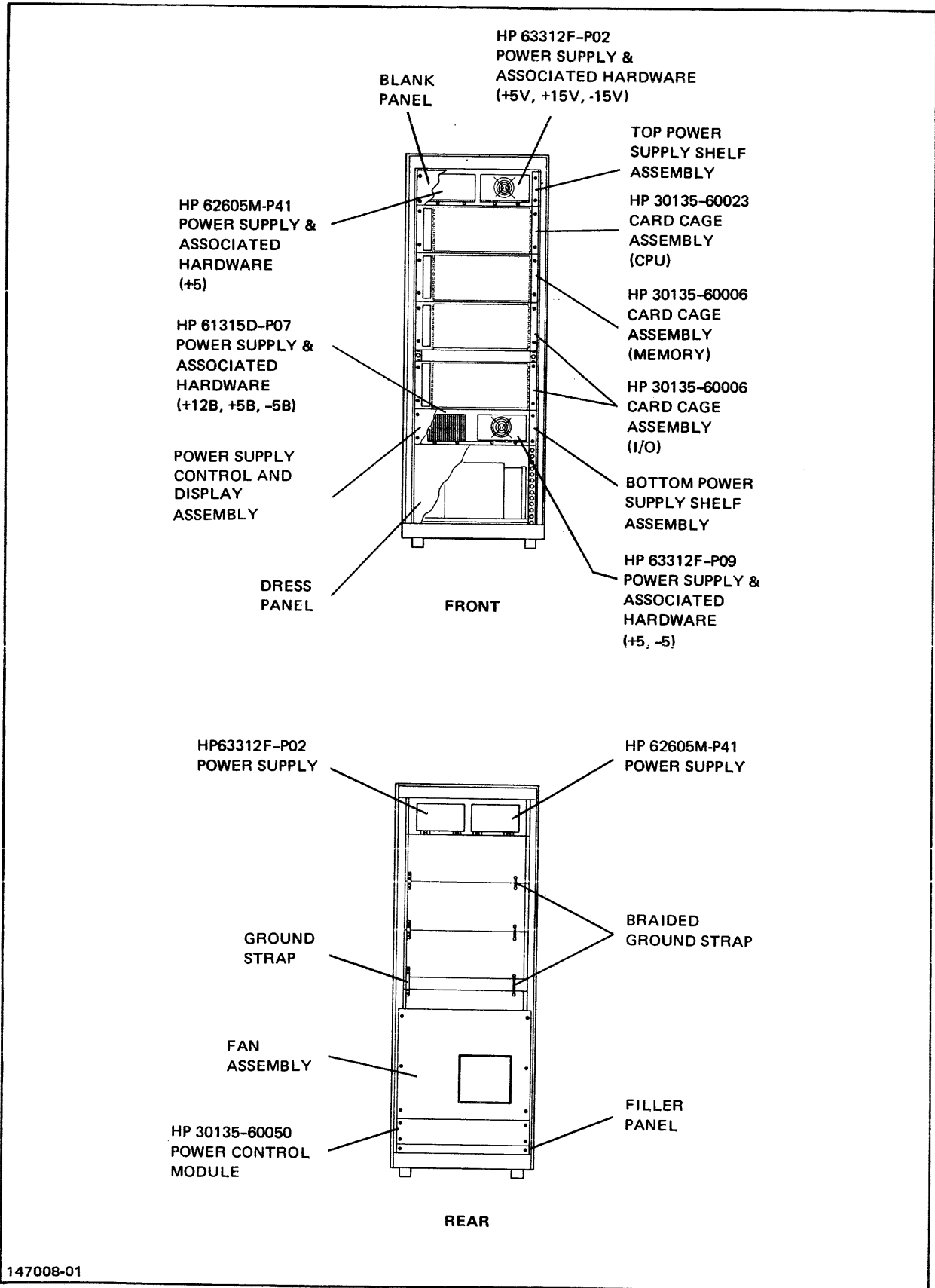
Figure 2-1 shows the locations of the major assemblies in the CPU Bay. The bay contains a CPU card cage, a memory card cage and two cages for I/O. An isolation transformer is mounted at the bottom of the cabinet. Input AC power is connected at a Power Control Module (PCM) at the bottom rear of the bay.

Figure 2-2 shows the Option 200 I/O Bay. It contains two card cages for I/O PCA's.

### CAUTION

Do not attempt to perform any work on the equipment bay(s) until they are permanently positioned with the Anti-Tip Base Extension Legs extended, locked in place, and the cabinet feet lowered at the ends of the extension legs and at the rear of the equipment bay(s). Failure to comply may result in damage to the equipment or possible injury to personnel.

# Installing the Processor



147008-01

Figure 2-1. CPU Bay, Component Locations

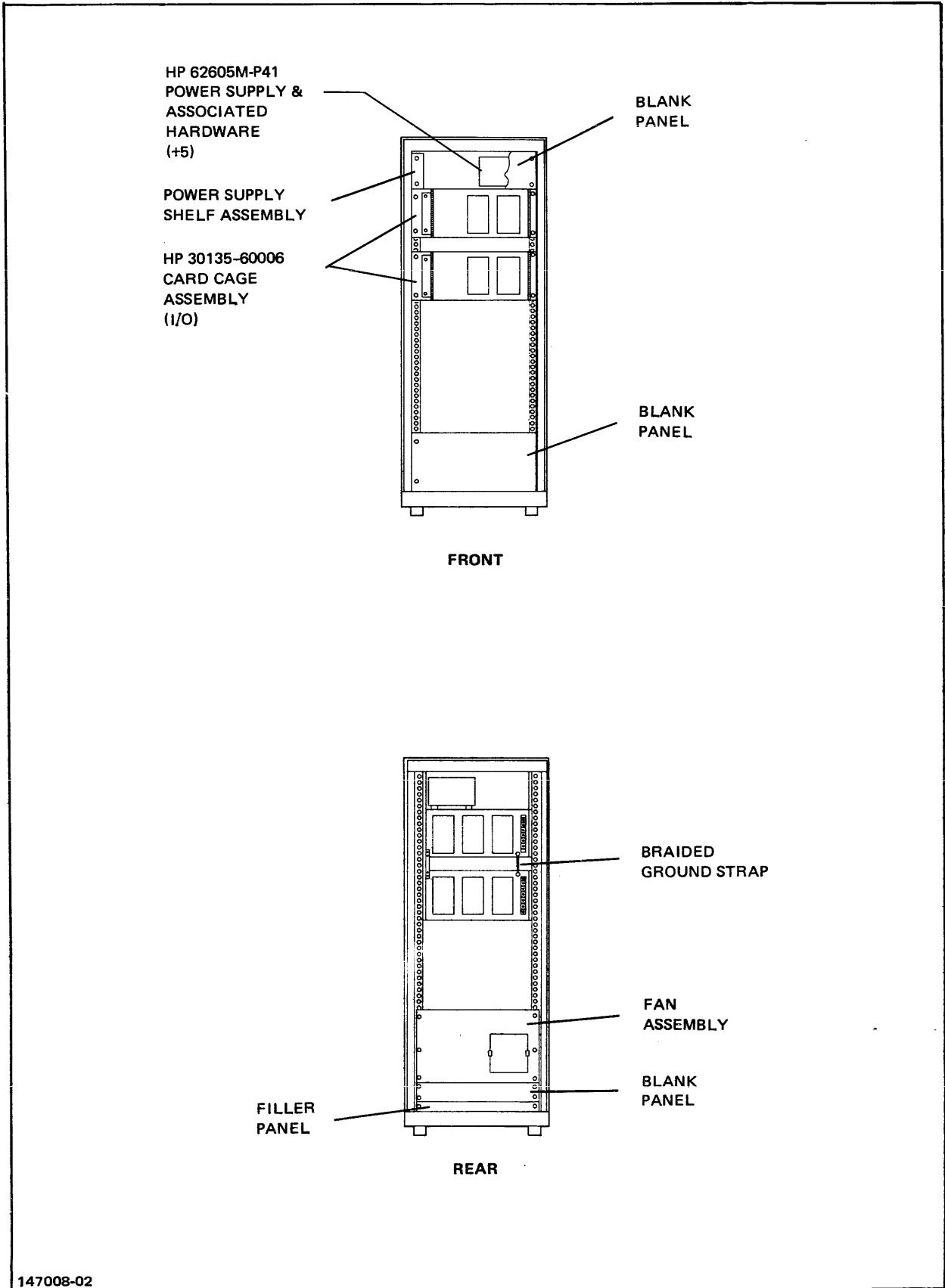


Figure 2-2. I/O Bay (Option 200), Component Locations

## 2-2. BASIC COMPONENTS

Each system must include one terminal (usually a 2621A), one disc drive (usually a 7925M), and one mag tape drive (usually a 7970E).

Peripherals available as options to replace the above, or to add to the system's capability, include:

Terminals:	2635A, 264X-series
Disc Drives:	7920M, 7925S, 7920S
Mag Tape Drive:	7970B
Line Printers:	2608A, 2613A, 2617A, 2618A, 2619A
Card Reader:	2893A
Card Reader/Punch:	2894A
Paper Tape Reader:	2748B
Paper Tape Punch:	2895A

This Manual contains installation procedures for all of the above.

## 2-3. INSTALLING THE CPU BAY

Either of two types of AC power will operate an HP 3000 Series III Computer System:

1. 200 to 240 volts, 60 Hertz, 1 phase, 2 wire plus earth wire.
2. 200 to 240 volts, 50 Hertz, 1 phase, 2 wire plus earth wire (System Option 015).

### CAUTION

Before proceeding further, make certain that ALL CIRCUIT BREAKERS AND POWER SWITCHES ON THE CPU BAY (BOTH FRONT AND BACK) are set to OFF, and that the AC POWER CABLE is DISCONNECTED from the AC power source. Instructions as to when to connect the power and turn on the bay are in Sections III and IV.

Ensure that the unit is positioned in an area which allows for complete access to all cabinet doors.

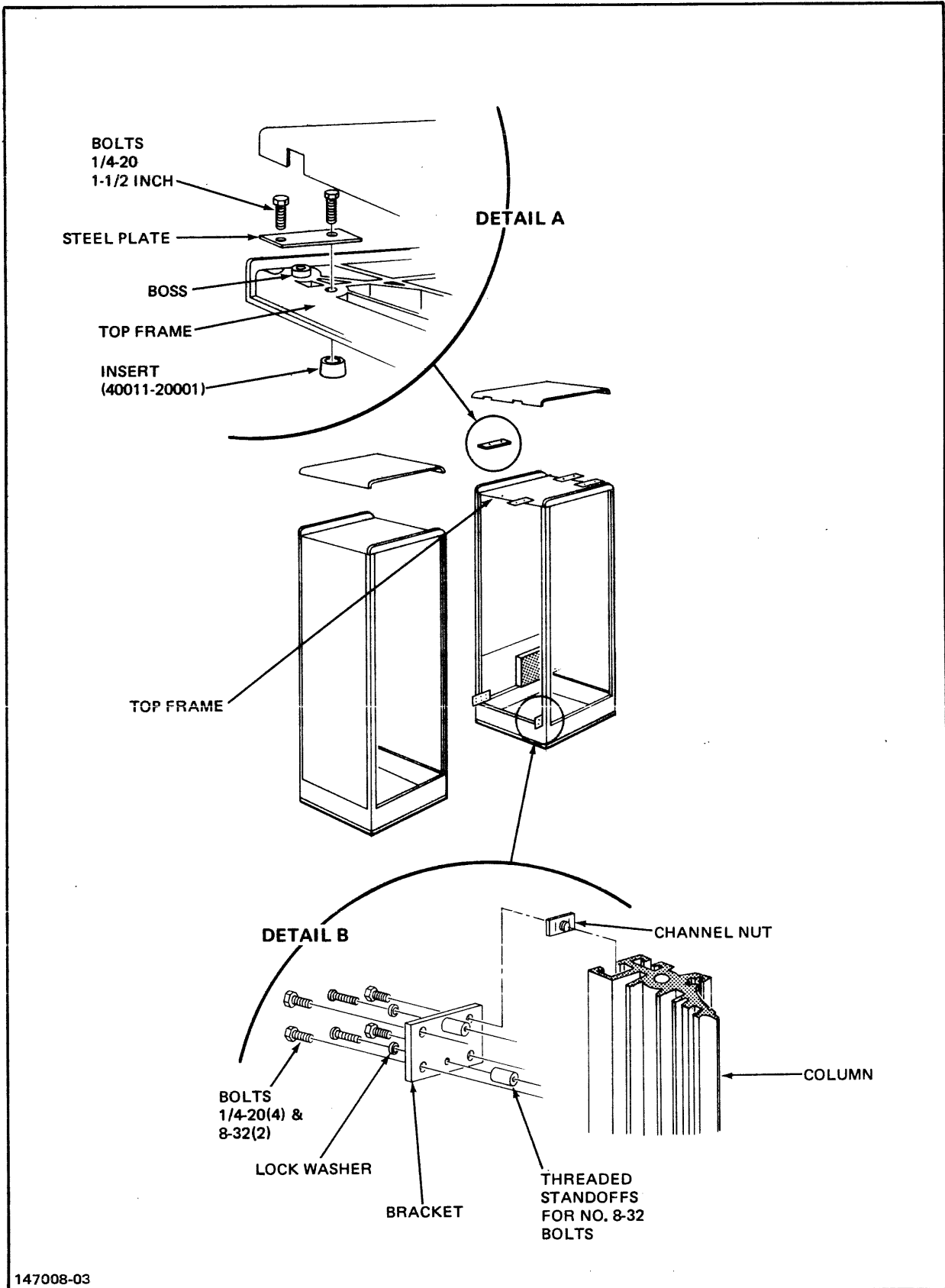
## **2-4. JOINING THE CABINETS (IF OPTION 200 IS PRESENT)**

(If Option 200 is NOT present, skip to Paragraph 2-6.)

### **Mechanical**

Locate HP Accessory Number 40011A Tie-Together Kit in a packet in one of the boxes shipped with the system. Then, follow the instructions below and refer to figure 2-3.

1. Remove the top cover and the rear door of each bay. Hinge pins for the rear doors are held in place by springs and can be easily pulled up or down as needed.
2. Install the Insert (part no. 40011-20001) into a top frame. Then, insert a bolt (1/4-20 x 1-1/2 inch) through a steel plate through that top frame and into the Insert as shown in figure 2-3, detail A.
3. Repeat step 2 for the adjacent cabinet.
4. Install 2 bolts (1/4-20 X 1-1/2 inch) through bottom bracket and into threaded nylon stand-offs as shown in figure 2-3, detail B.
5. Find four channel nuts, in kit.
6. Install four bolts (1/4-20 x 1-1/2 inch) through the bottom bracket (two in each cabinet) and into the channel nuts.
7. Securely tighten all bolts installed in steps 2 through 6.
8. The I/O bay comes with 2 slotted top covers. The CPU bay top cover has no slots. Therefore, the CPU bay top cover is replaced by one of the I/O bay top covers. Install the top covers, matching notches in the covers to the steel plates installed during this procedure. Fasten the covers using the screws removed in step 1. Leave the rear doors off.
9. Extend the Anti-Tip Base Extension Legs until they lock in place. Then, lower the cabinet feet on the extension legs at the rear of the bays.



147008-03

Figure 2-3. Tie-Together Kit Installation



## Electrical

Locate the loose end of cable harness 30235-60007 to the I/O Bay and proceed as follows:

1. At the CPU Bay, remove six screws holding the fan assembly and position the assembly aside as far as possible. (Cables must be disconnected because not enough cable service loops are provided.)
2. At the I/O Bay, locate the power supply in the upper left corner. (See Figure 2-2, rear view.) A cable connected to the power supply is coiled and tied. Uncoil and route this cable through the channel cut-out in the bottom of the side panel between bays and connect the three-prong connector to J6 of the PCM. (See Figure 2-4 for PCM jack locations.)

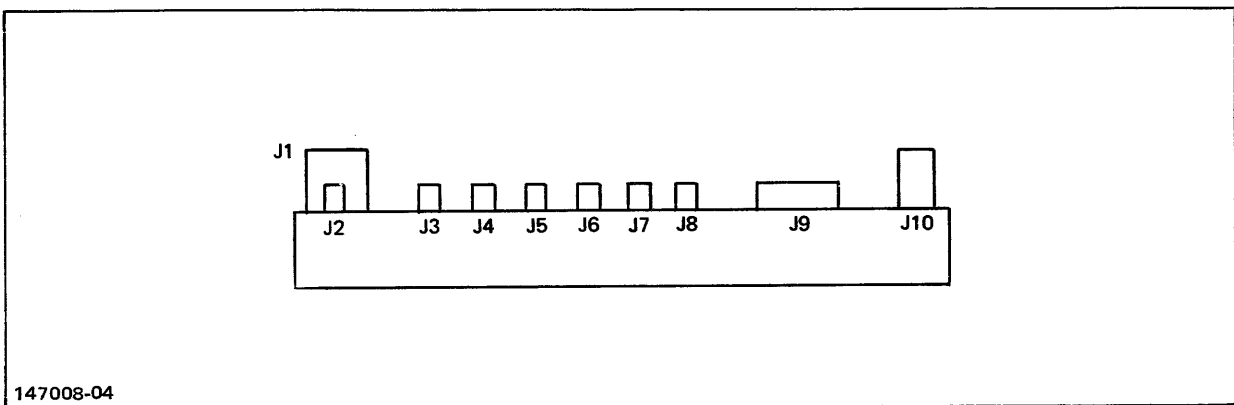


Figure 2-4. Power Control Module, Top View

3. Locate the harness that connects to the fan assembly in the I/O Bay, route it through the same channel cut-out as in Step 2, and connect the two-prong connector to J8 of the PCM.
4. Route cable harness 30325-60007 through channel cut-out in the middle of the side panel. Position it to interconnect CPU Bay card cage No. 4 and I/O Bay card cage No. 2 as shown in figure 2-5.
5. Connect the interbay ground strap between I/O Bay card cage No. 1 and CPU Bay card cage No. 1. (This ground strap is shipped from the factory already attached at the I/O Bay end.)
6. At CPU Bay card cage No. 4, locate the red wire coiled and connected to the +5 terminal of the power bus. Disconnect this wire, route it through the cabinet side panel, and connect it to the +5 terminal of I/O Bay card cage No. 2. (See figure 2-7.)

## Installing the Processor

7. At CPU Bay card cage No. 4, locate the black and yellow wire coiled and connected to a ground terminal. Disconnect this wire, route it through the cabinet side panel, and connect it to terminal A1 of the I/O Bay 5-volt power supply. (See figure 2-6.)
8. Reposition the cabinet fan assembly in place and secure it to the cabinet frame.

## 2-5. INTERBAY CABLING (IF OPTION 200 IS PRESENT)

Before the factory ships a system, it disconnects the cables and wires between the bays, at the CPU Bay ends. They must be connected now, as follows.

### MCU Clock Signals

As shown in figure 2-8, the grey coaxial cables are patched on the CPU bay backplane to carry the MCUFRC0 and MCUFRC1 signals to the memory modules in card cage No. 2 and the MCUCLK5, MCUCLK6, and MCUCLK7 signals to card cages No. 2, 3, and 4, respectively. The signal wire (clear plastic over conductor) connects to pin 13 or 55 and the ground lead (black heat-shrink over braid) connects to pin 14 or 56. As shown in figure 2-9, the MCUCLK2 and MCUCLK3 cables are connected to I/O bay card cages No. 5 and 6, respectively.

### Flat Cables

1. Locate the IOP bus flat cable contained in a plastic bag and connected to the IOP bus near card cage No. 5 connector AlP3.
2. Route the free end of the IOP flat cable to the CPU bay and connect it to the IOP bus near card cage No. 2 connector AlP3.
3. Locate the power bus flat cable contained in a plastic bag and connected to the power bus near card cage No. 5 connector AlP1.
4. Route the free end of the power bus to the CPU bay and connect it to the power bus near card cage No. 2 connector AlP1.
5. Locate the MUX bus flat cable contained in a plastic bag and connected to the MUX bus near card cage No. 5 connector AlP2.
6. Route the free end of the MUX bus to the CPU bay and connect it to the MUX bus near card cage No. 3 connector A8P2.

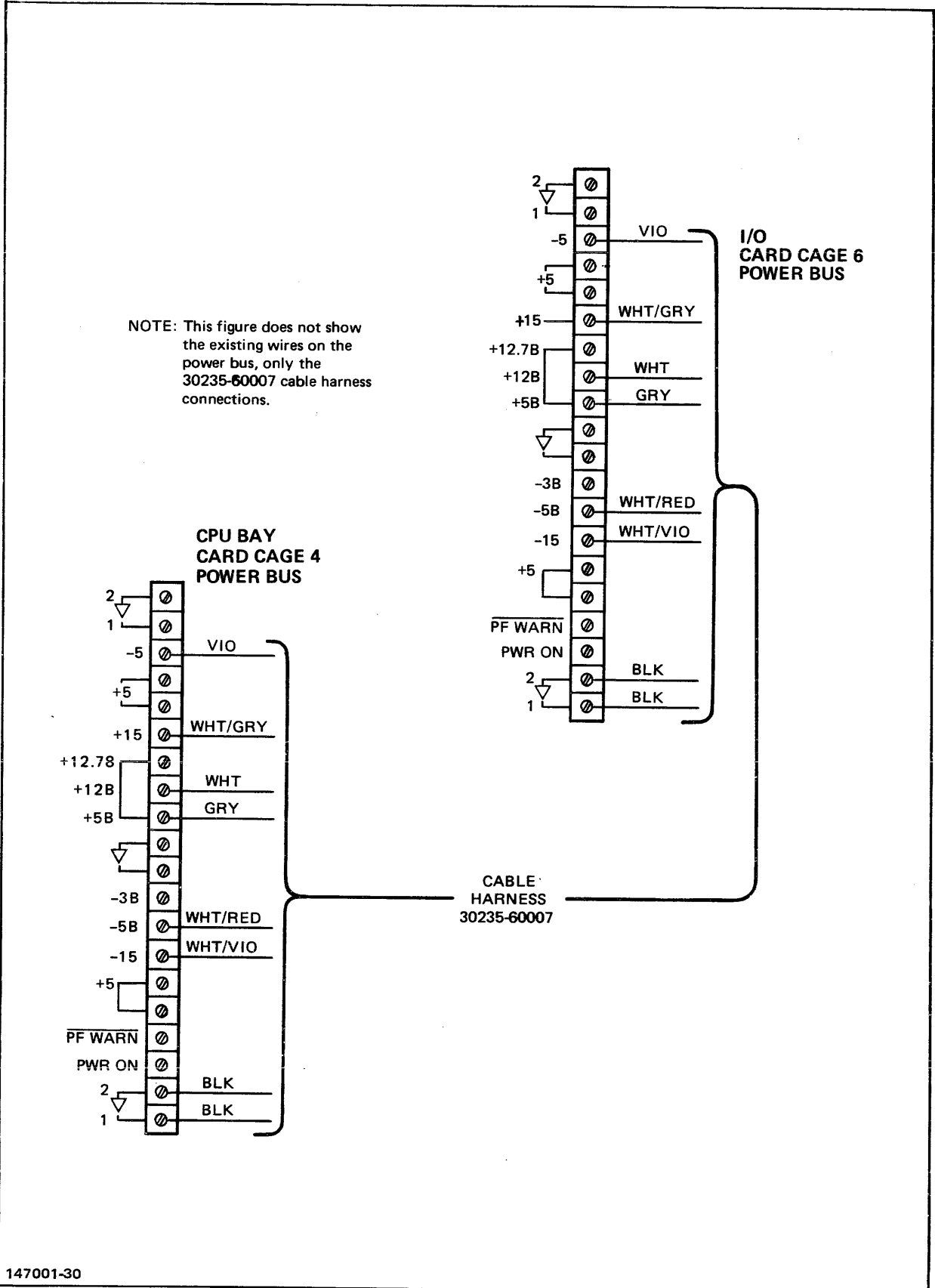


Figure 2-5. Cable Harness 30235-60007

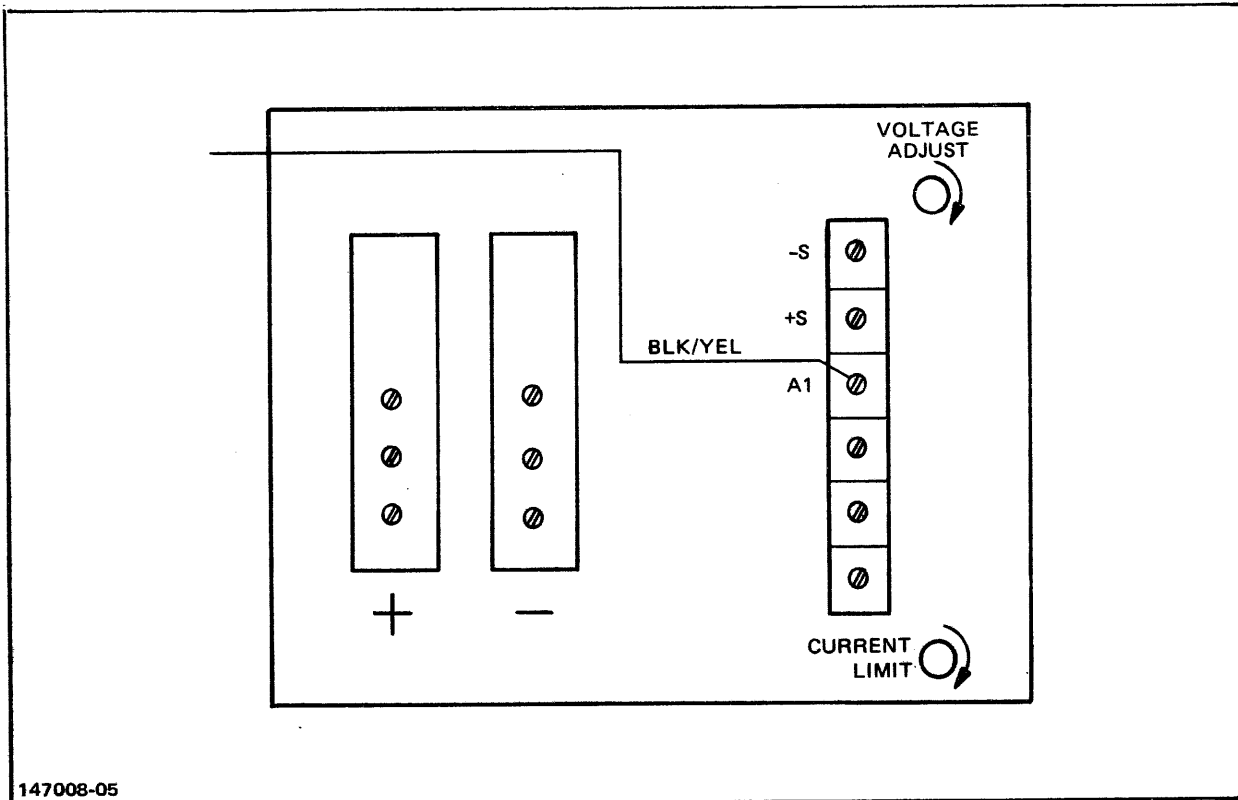


Figure 2-6. Power Supply Connection

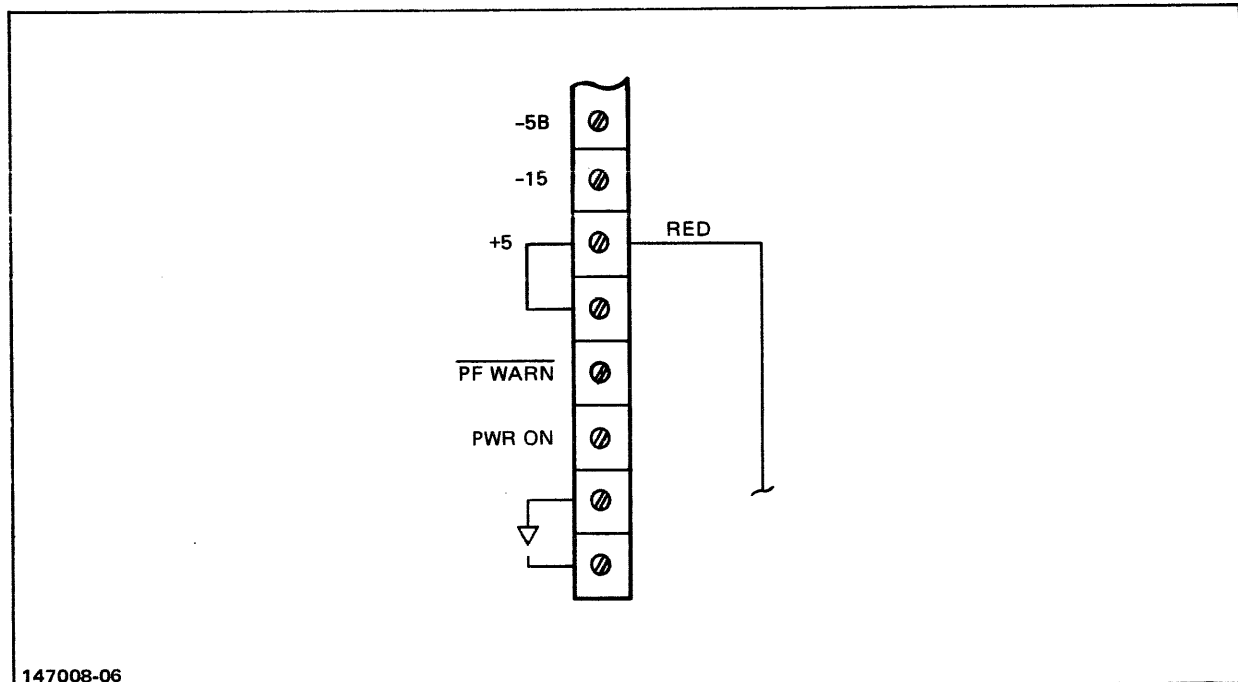
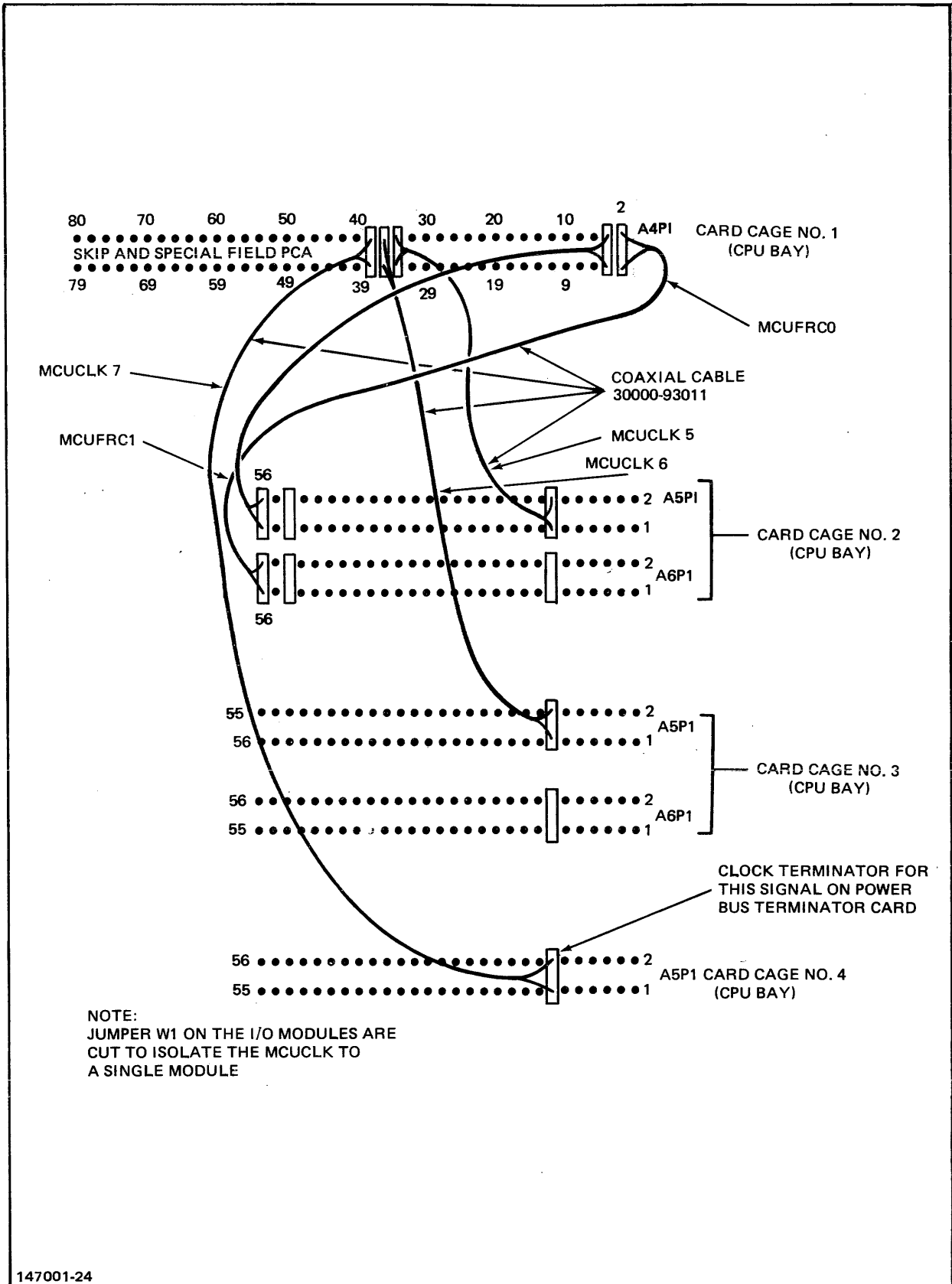


Figure 2-7. Power Bus Connection



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Figure 2-8. CPU Bay Clock Jumpers and Terminators

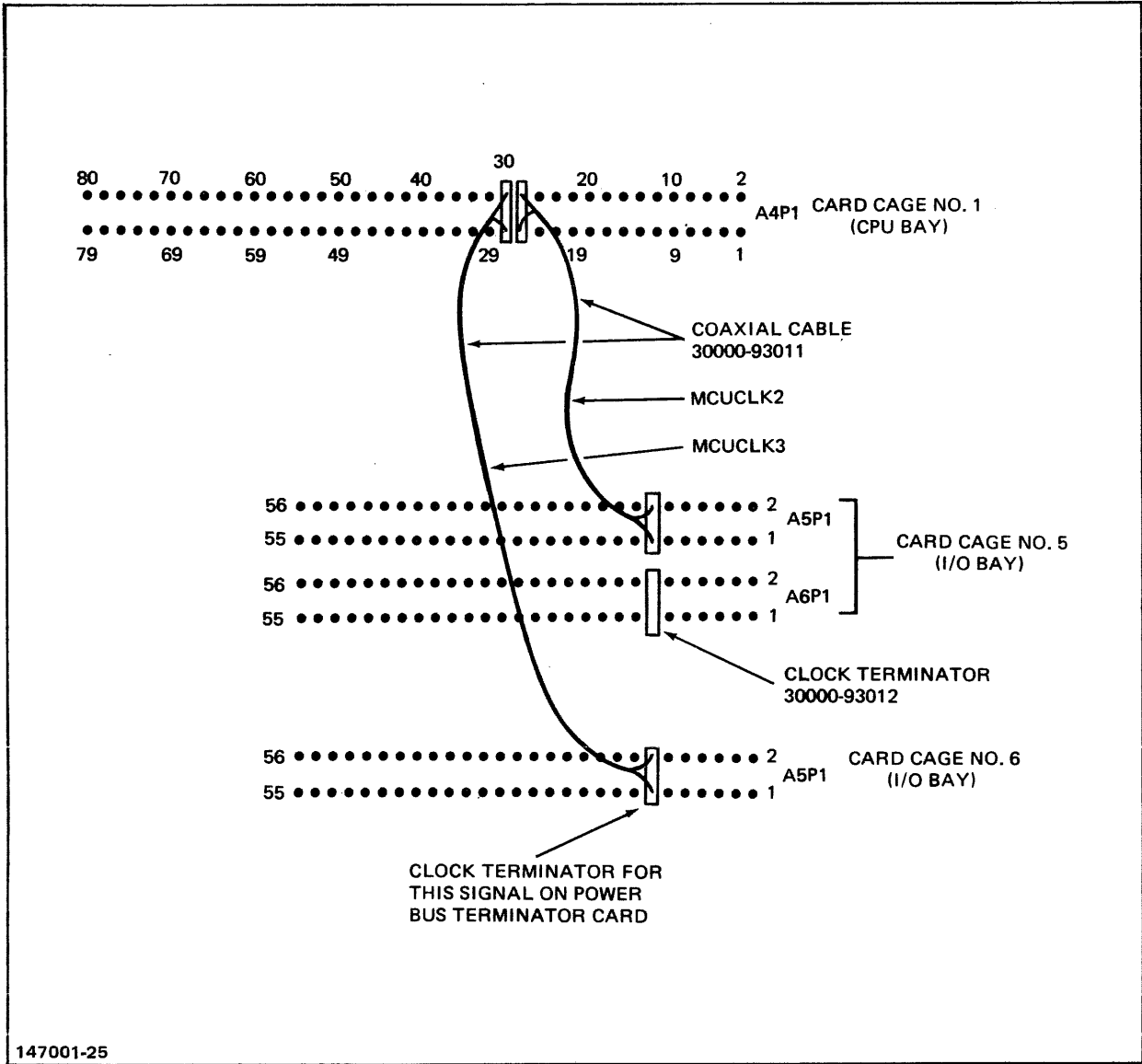


Figure 2-9. I/O Bay Clock Jumpers and Terminators

## 2-6. MEMORY CONFIGURATION

Calculate memory size at 128K words per Memory Array PCA. Be sure to count all memory supplied with the system and any other memory obtained separately. Write the final memory size below.

Final memory size is \_\_\_\_\_

If necessary, reconfigure the S-Bus, IOP, Selector Channel Register, Memory Control and Logging, and Memory Array PCA's for the final memory size. Refer to Appendix C for PCA jumper information and to figure 2-10, below, for PCA slot assignments.

CARD CAGE NO. 2	A1	30008-60003 Memory Array 128K
	A2	Reserved for 128K
	A3	Reserved for 128K
	A4	Reserved for 128K
	A5	30007-60003 Memory Control and Logging
	A6	Reserved for Memory Control and Logging
	A7	Reserved for 128K
	A8	Reserved for 128K
	A9	Reserved for 128K
	A10	Reserved for 128K
CARD CAGE NO. 3	A1	30135-60063 System Clock/FLI

Figure 2-10. Memory Slot Assignments

## 2-7. I/O CONFIGURATION

### Note

I/O configuration data is given here for information only. All PCA's including any I/O PCA's ordered with the system will be configured by the factory prior to shipment.

Table 2-1 lists typical Multiplexer Service Request (SR) assignments for I/O device controllers or interfaces in a descending order of priority.

Table 2-2 shows a typical interrupt polling sequence, in descending priority. When installing the interrupt poll twisted wire pair, the white wire is up at the CPU card cage but down at the I/O card cages.

Table 2-3 shows standard device number assignments for I/O controllers and logical device numbers assigned for devices.

Appendix E shows the locations of wire jumpers and rocker-arm switches on the I/O PCA's.

# Installing the Processor

Table 2-1. Typical Multiplexer Channel Data Service Priority

SR#	Device Name	Product Number	Trans- mission Mode*
0	Reserved-Selector Channel Test PCA	30033A	S,C
3	7970B/E Magnetic Tape	30215A	S
4	Hardwired Serial Interface	30360A	S
5	Hardwired Serial Interface	30360A	S
6	Card Reader	30106A/7A	S
7	Synchronous Single Line Controller	30055A	S
8	Intelligent Network Processor	30010A	S
9	CalComp Plotter	30126A	S
10	Paper Tape Punch	30105A	A
11	Programmable Controller	30300A/1A	A
12	Line Printer	All	A
13	Line Printer	All	A
14	Paper Tape Reader	30104A	D
15	Reader/Punch	30119A	D

\* C = Selector Channel  
 S = Multiplexer Channel (Synchronous)  
 A = Multiplexer Channel (Asynchronous)  
 D = Direct I/O Mode Only

Table 2-2. I/O System Interrupt Polling Sequence

Product Number	Device Name
30032B (Highest Priority)	Terminal Data Interface
30135-60063	System Clock/FLI
30104A	Paper Tape Reader
30055A	Sync. Single Line Cont. (all uses)
30229B	7920M/7925M Disc Interface
30032B-001,-002	Terminal Control Interface
30360A	Hardwired Serial Controller
30126A	Plotter
30300/1A	Programmable Controller
30215A	7970 Magnetic Tape
Line Printers	All
30106/7A	Card Reader
30119A	Card Reader/Punch
30105A (Lowest Priority)	Paper Tape Punch

Note: Multiple devices of the same type are polled individually but as a group in the above sequence.



Table 2-3. I/O System Standard Device Number Assignments

Device Number		PCA Or Product No.	Description	Logical Device
Dec	Oct			
3/2	3/2	30135-60063	System Clock/FLI	None
4	4	7920M or 7925M	System Disc	1
6	6	30215A	Mag Tape Controller	7-10
7	7	30032B	Asyn. Term Controller (With	20-35
8	10	30032B opt. 001	System Console as Unit 0)	
9	11	30032B opt. 002	103/202 Modem Capabilities	
10	12	30032B	Async. Term Controller	40-55
11	13	30032B opt. 001	103 Modem Cap.	
12	14	30032B opt. 002	202 Modem Cap.	
13	15	30106/107A	Card Reader	5
14	16	2608/13/17/18/19	Line Printer	6
15	17	2608/13/17/18/19	Line Printer	19
16	20	30360A	HSI	11
17	21	30360A	HSI	12
18	22	30055A	SSLC	13
19	23	30055A	SSLC	14
20	24	30104A	Paper Tape Reader	15
21	25	30105A	Paper Tape Punch	16
22	26	30119A	Card Reader/Punch	17
23	27	30126A	Cal Comp Plotter	18
24	30		For use as needed for de-	56
thru		*SEE NOTE	vices which have no stand-	thru
125	175		ard number or additional	225
			devices over the standard	
			allocation.	
126	176	30036A	2nd Mux Channel	None
127	177	30036A	1st Mux Channel	None

\* If the Intelligent Network Processor (INP) is present in the system, the recommended device number is 25 or 26. In this case, use a Logical number of 57 or 58.

## **2-8. EIS, APL, AND COBOL II CONFIGURATION**

Examine the CIR PCA. Jumpers W1, W4 and W8 must be removed. See Appendix A, Figure A-1 for their locations.

Removing W1 enables the floating point instructions of the Extended Instruction Set (EIS). Removing W8 enables the decimal instructions of the EIS. Removing W4 enables COBOL II instructions.

Additionally, if APL (Product Number HP32105A) is present on the EIS PCA, jumper W2 must be removed from the CIR PCA. Appendix A has further details on APL installation.

# INSTALLING PERIPHERAL DEVICES

SECTION

III

Before you begin installing peripherals, check the site for a professional appearance of the entire system. Then begin routing cables under flooring or through whatever conduits have been provided between the devices and the equipment bays. Bring the cables inside cabinets where needed and position them close to their associated connectors. Do not attach them to the connectors until: (1) you have determined the neatest and most professional appearance for the entire set of cables and, (2) you are directed to install them in the following instructions.

Cable gaps are provided at the rear of each equipment bay at the bottom of the cabinet. If the cable gap in the deck of the bay is to be used for running cables, its access cover must be removed. The access cover rear mounting nuts are hidden by a metal bar that holds the isolation transformer to the cabinet. Removing four bolts that secure the metal bar permits its removal which allows access to the access cover rear mounting nuts. It is not necessary to remove the isolation transformer. Do not discard the access cover after it is removed. Once the cables have been passed through the cable gap, the access cover must be reinstalled to meet UL specifications.

## **3-1. INTERACTIVE DISPLAY TERMINALS**

### **HP 2621A Terminal**

When placing the 2621A on a table, be sure that no spongy or plush surface is under it, as this might restrict the supply of air to the bottom vents. Set the keyboard in place and connect it to the KYBD connector at the rear of the console. Set the POWER Switch to OFF and connect the 3-prong AC power cord to an outlet. Connect Cable 13222N (USA) or 13222M (European) to the console's rear panel DATACOM connector and then route it to Connector J0 of the 30062A Terminal Controller/Multiplexer Connector Panel at the rear of the CPU Bay. (This assumes the 2621A is being installed as the system console. If it is being installed as a remote terminal, make the connection to any connector other than J0.)

## Installing Peripheral Devices

If necessary, use a 13222C extender cable. IF ONE OF THE AC POWER OPTIONS WAS ORDERED, ENSURE THAT THE VOLTAGE SUPPLIED MATCHES YOUR TERMINAL'S SPECIFICATIONS. The options are:

- Option 013 - 50 Hz, 240V
- Option 014 - 60 Hz, 100V
- Option 015 - 50 Hz, 220V
- Option 016 - 50 Hz, 100V

Figures 3-1, 3-2 and 3-3 show cabling for the HP 2621A.

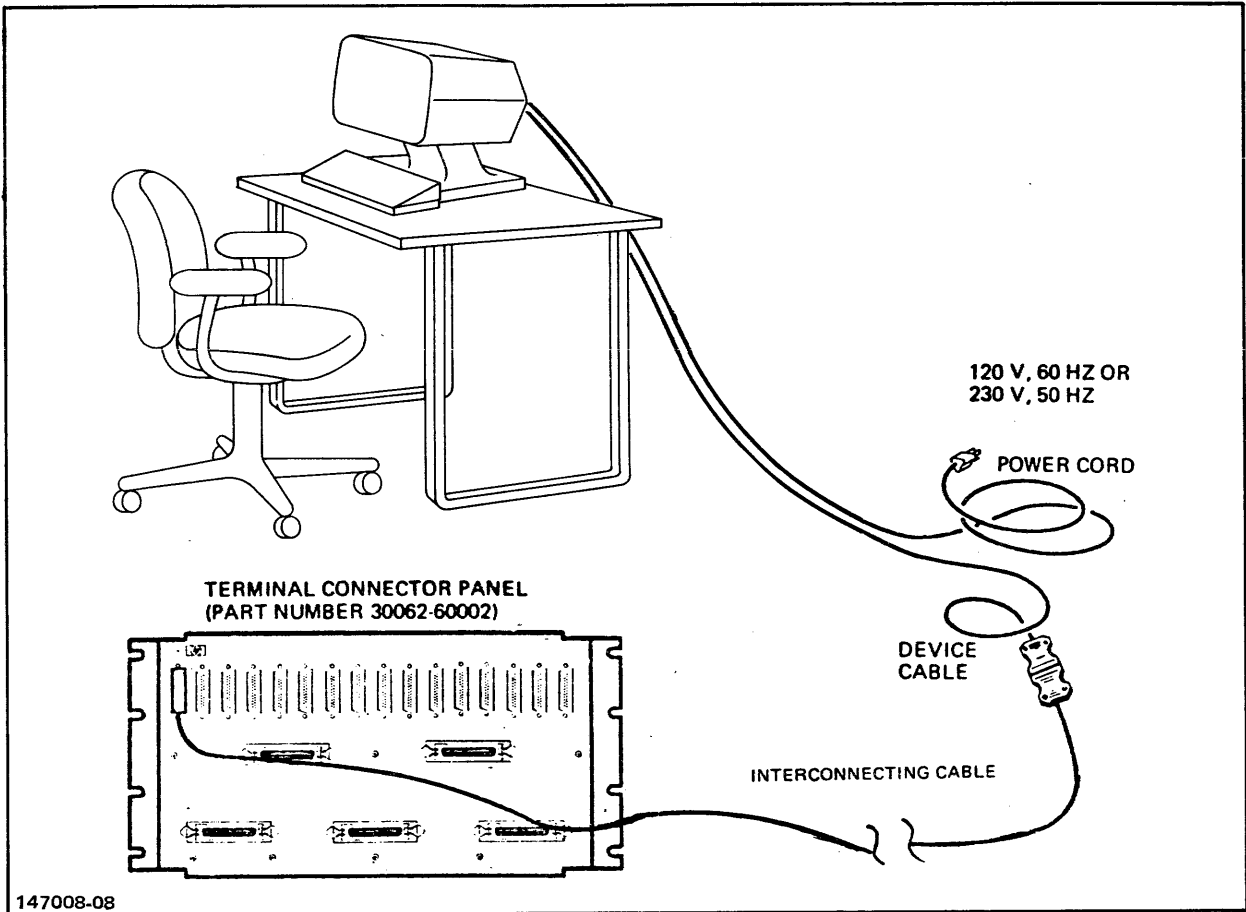


Figure 3-1. The HP 2621A as a System Console

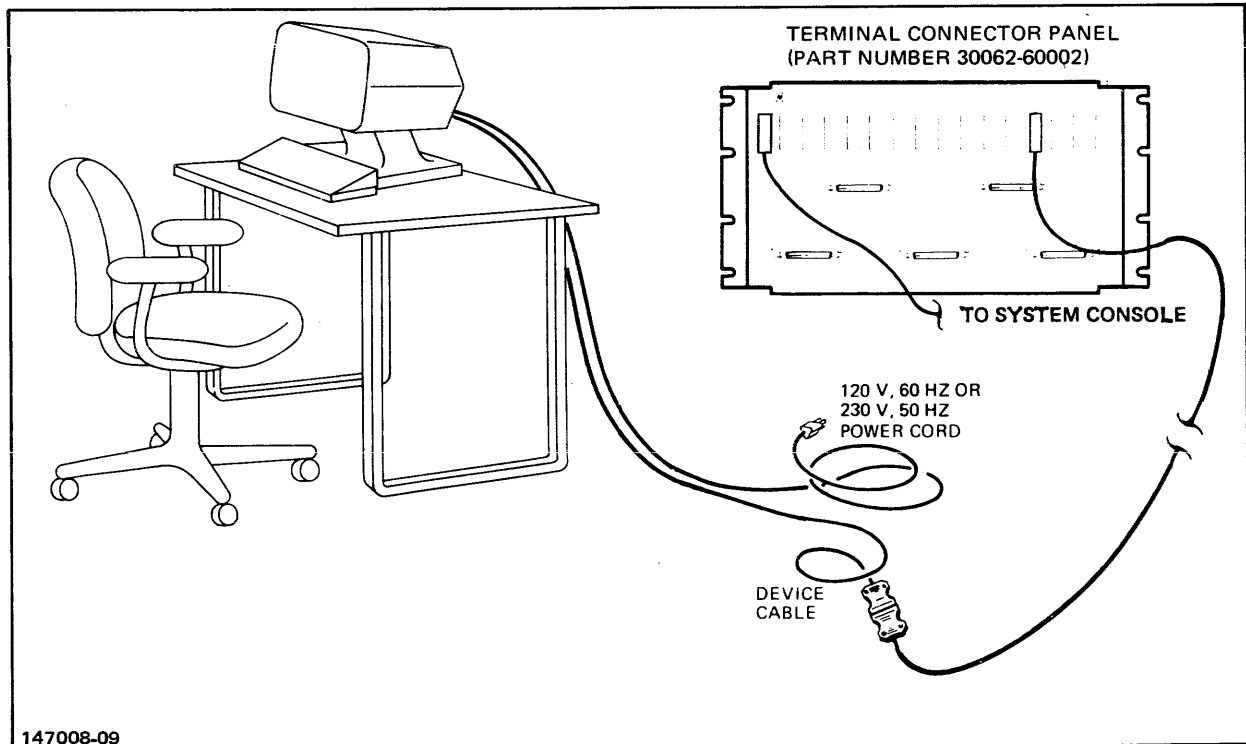


Figure 3-2. The HP 2621A as a Remote Terminal

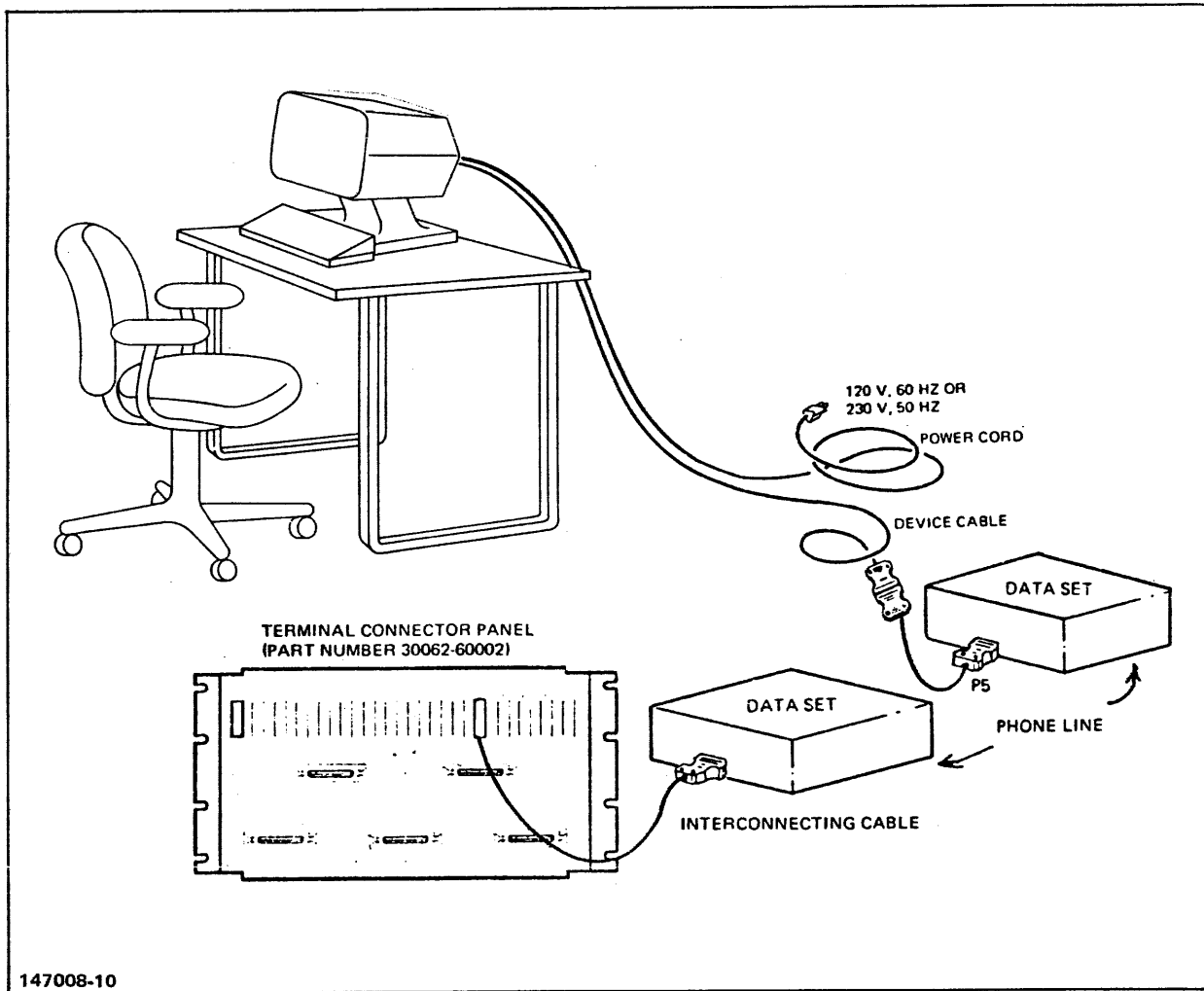


Figure 3-3. The HP 2621A as Remote Terminal Using a Modem

## HP 264X Series Terminals

### NOTE

The following instructions apply to all HP 264X terminals, including the U.S., Cyrillic, Danish/Norwegian and Swedish/Finnish models.

Follow this procedure:

1. Ensure that the AC POWER Switch on the terminal's rear panel is set to OFF.
2. Raise the hinged rear access cover. (Two rotating latches hold it in place.) Connect the keyboard cable hood connector to the printed-circuit card connector that is notched to match the keying in the hood connector. Align the connectors carefully and use no more pressure than necessary. Repeat this procedure with the Interface Cable Assembly, part no. 02640-60131.
3. Connect the power cable to the peripheral AC power outlet.
4. Place the terminal on any convenient surface except a plush or soft surface that might restrict air flow to the bottom vents.
5. Set the DUPLEX switch to FULL, the PARITY switch to NONE, and the BAUD RATE switch to 2400.
6. Press the REMOTE pushbutton down.

### 3-2. HP 2635A PRINTER TERMINAL

The POWER Switch is located at the lower left rear. Turn it OFF by setting it to "0". Then, beneath the hinged panel above the keyboard:

- Set DUPLEX to FULL.
- Set PARITY to NONE.
- Set BAUD RATE to 1200.

Any of the cables listed in Table 3-1 can be used to extend the distance the terminal may be installed from the computer system. The printer terminal can operate on 100V, 120V, 220V, or 240V line voltages. If the power at the installation site does not agree with the power configuration of the printer terminal, the terminal must be reconfigured. For power configuration instructions, refer to the HP2635A Operators Manual, part no. 02635-90901 or the HP 2635A Technical Reference Manual, part no. 02635-90905. An extra power configuration tag is supplied if the installation site is not in the United States. Replace the configuration tag if the power configuration is changed.

Table 3-1. Display Terminal Extender Cables

Cable Description	HP Part No.	Product
25 foot, terminal-to-connector panel	30062-60006	30062C
25 foot, data set-to-connector panel	30062-60004	30062B
50 foot, terminal-to-connector panel	30062-60009	30062C-001
50 foot, data set-to-connector panel	30062-60007	30062B-001
100 foot, terminal-to-connector panel	30062-60012	30062C-002

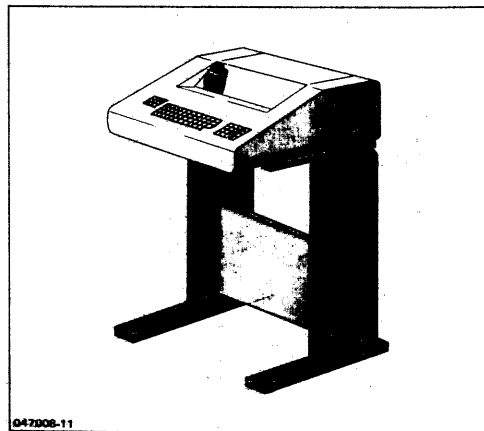


Figure 3-4. HP 2635A Printer Terminal



### 3-3. CARD READERS/CARD READER PUNCHES

#### HP 2893A Card Reader

Tilt the card reader so that you can check that the two red 8 x 32 screws in the bottom plate have been removed. These screws lock the blower motor plate in a solid position to prevent damage to the motor plate vibration insulators during shipment and must be removed before operating the card reader. If the card reader is reshipped, these screws must be reinstalled.

Locate the Card Reader Interface PCA, Part No. 30206-60001. Install it in an I/O Card Cage slot, where its P3 connector mates with the IOP bus and its P2 connector mates with the MUX Channel bus. Connect the interface cable's Winchester connector at the back of the card reader and the connector at the other end to the interface PCA as shown in figure 3-5. Set the CIRCUIT BREAKER to OFF, and connect the card reader's AC power cord to an outlet.

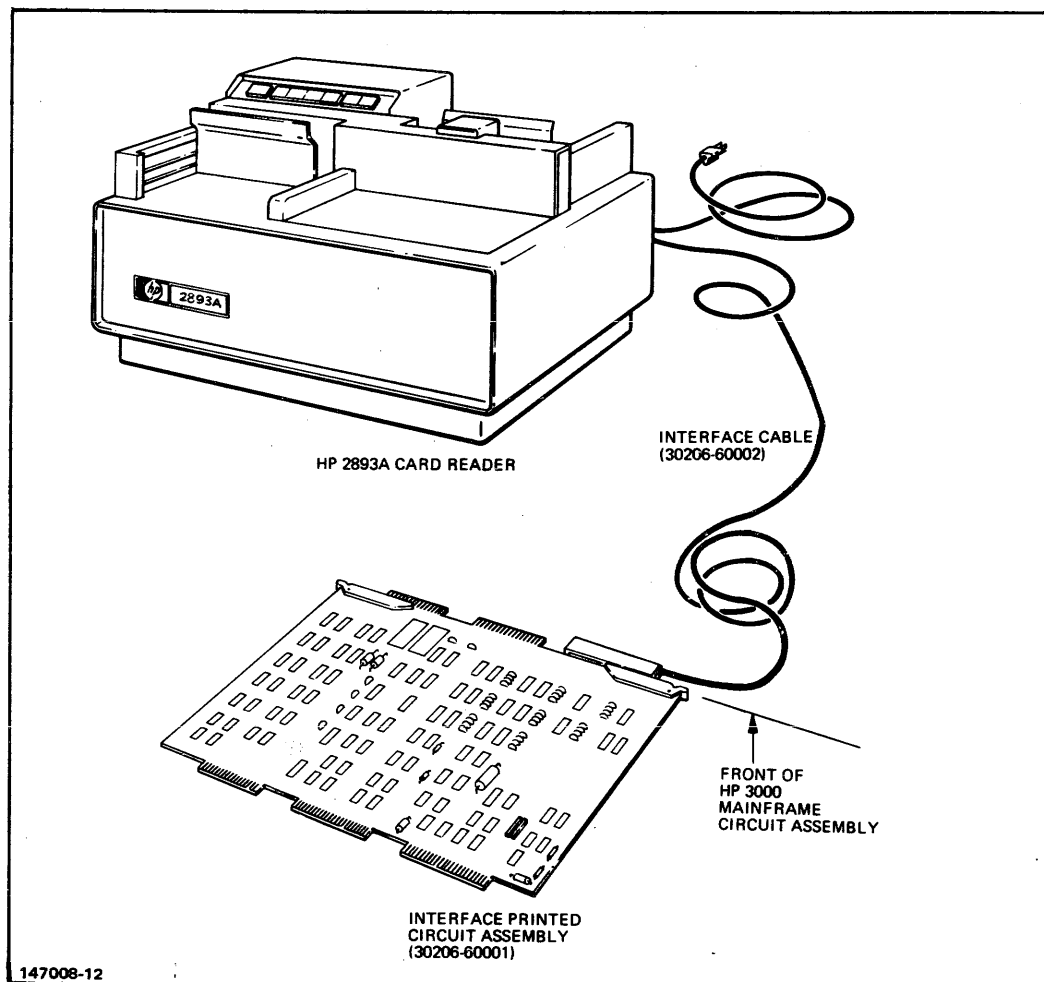


Figure 3-5. HP 2893A Card Reader

## HP 2894A Card Reader Punch

An interface cable and a power cable are hardwired to this card reader punch at the factory. Install Card Reader Punch Interface PCA, part no. 30050-60008 in an I/O slot where its P3 connector mates with the IOP bus and its P2 connector mates with the MUX Channel bus. Connect the interface cable to Interface PCA connectors J1 through J3 as shown in Figure 3-6, below. Then turn the POWER Switch OFF and connect the AC power cord to an outlet.

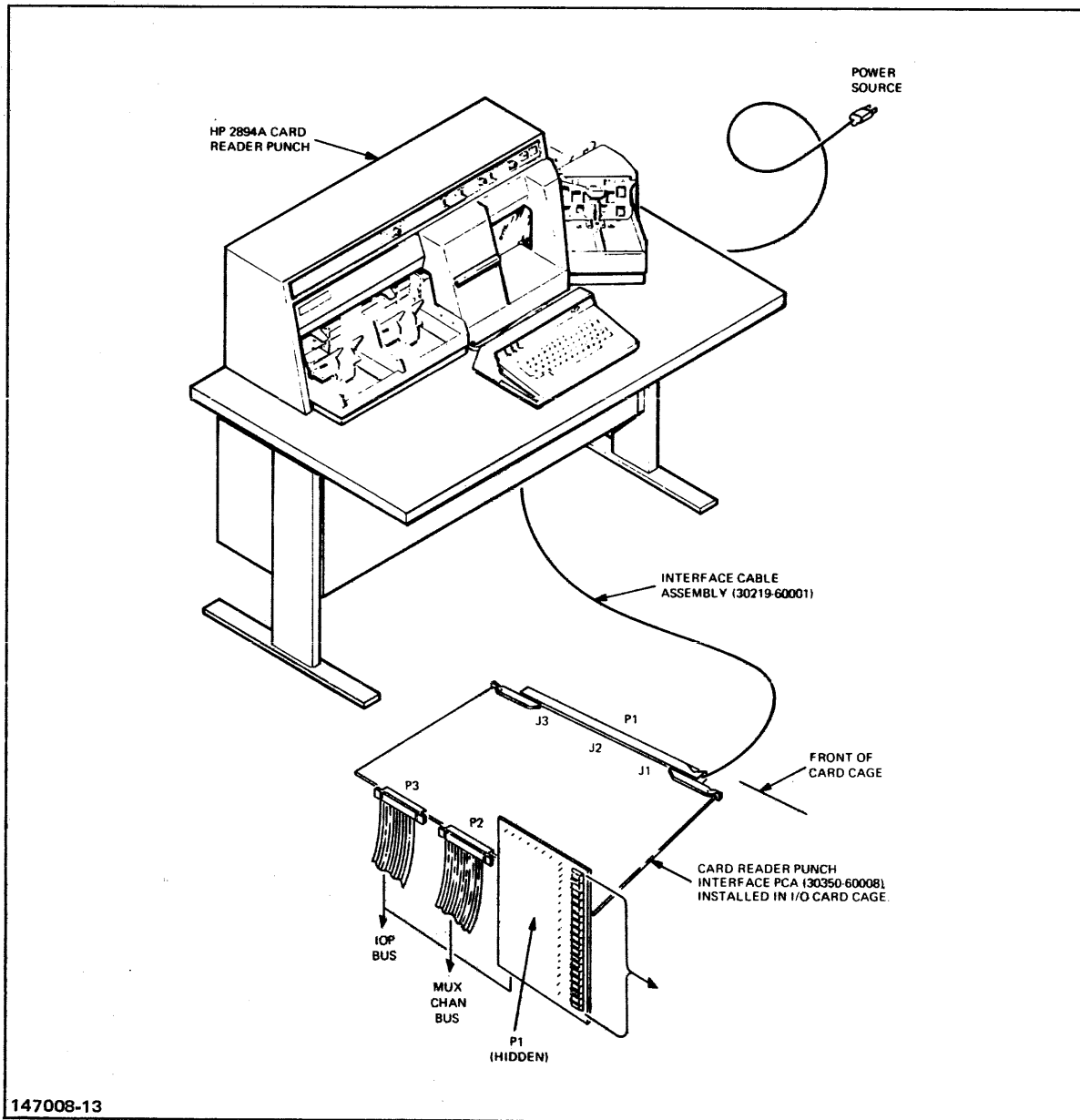


Figure 3-6. HP 2894A Card Reader Punch

### 3-4. LINE PRINTERS

#### HP 2608A Line Printer

Proceed as follows:

1. Connect the interconnecting cable assembly's P1 connector to the interface PCA as shown in figure 3-7.
2. Connect the interconnecting cable assembly's Winchester connector to a mating connector on the left-rear of the line printer.
3. Set the ON and ON LINE Switches to their OFF positions.
4. Connect the AC power cord from the connector on the right-rear of the line printer to an outlet.

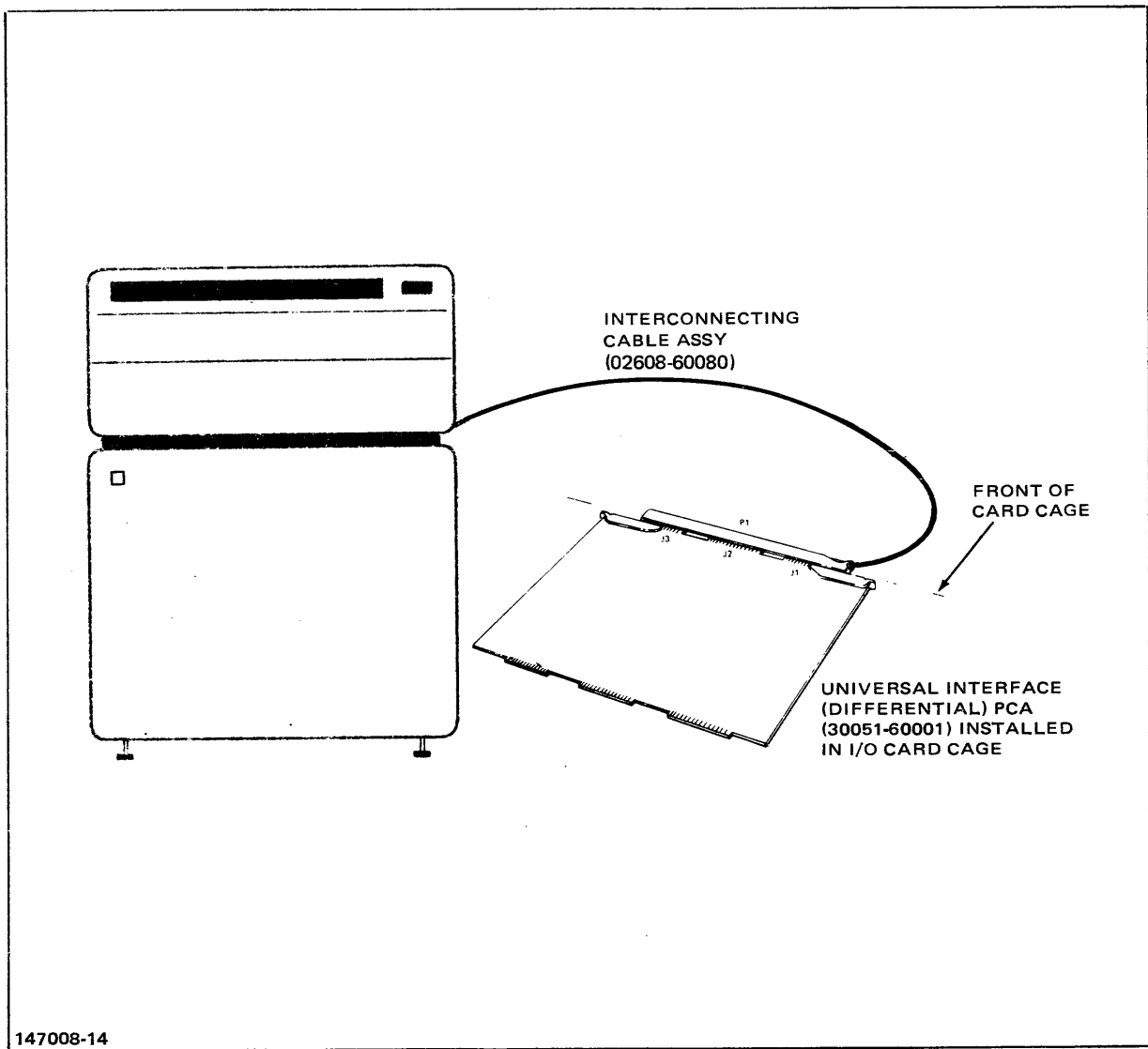


Figure 3-7. HP 2608A Line Printer

## HP 2613A Line Printer

Install the printer as follows:

1. Connect the interconnecting cable assembly's P1 connector to the interface PCA as shown in figure 3-8.
2. Connect the interconnecting cable assembly's Winchester connector to a mating connector located on the bottom of the printer (right-rear of the printer when facing the back of the printer).
3. Be sure the POWER Switch is OFF.
4. Connect the printer's AC power cord to an outlet.

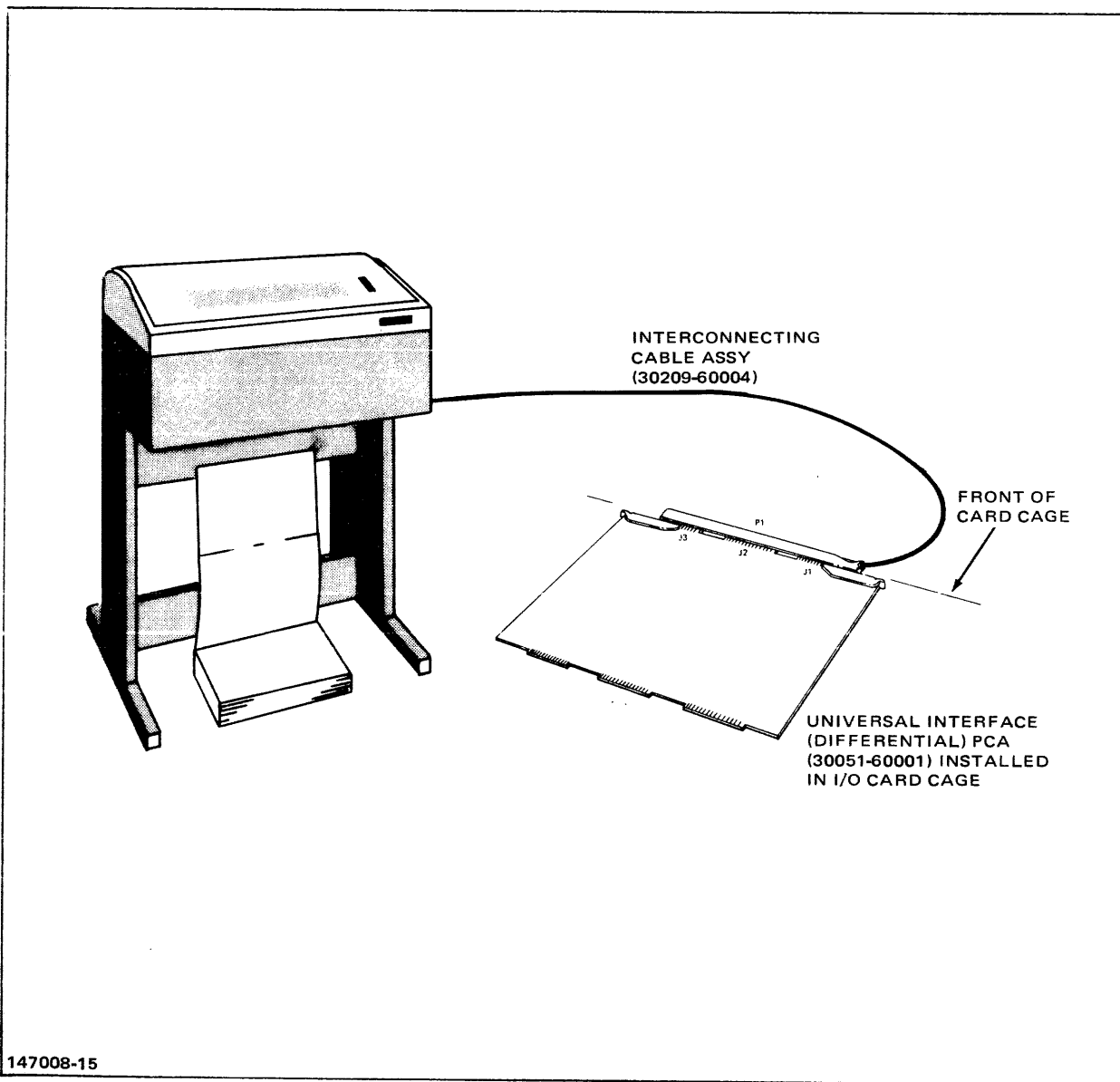


Figure 3-8. HP 2613A Line Printer

**HP 2617A Line Printer**

Install the printer as follows:

1. Connect the interconnecting cable assembly's P1 connector to the interface PCA as shown in figure 3-9.
2. Connect the interconnecting cable assembly's Winchester connector to a mating connector located on the bottom of the printer (right-rear of the printer when facing the back of the printer).
3. Be sure the POWER Switch is OFF.
4. Connect the AC power cord to an outlet.

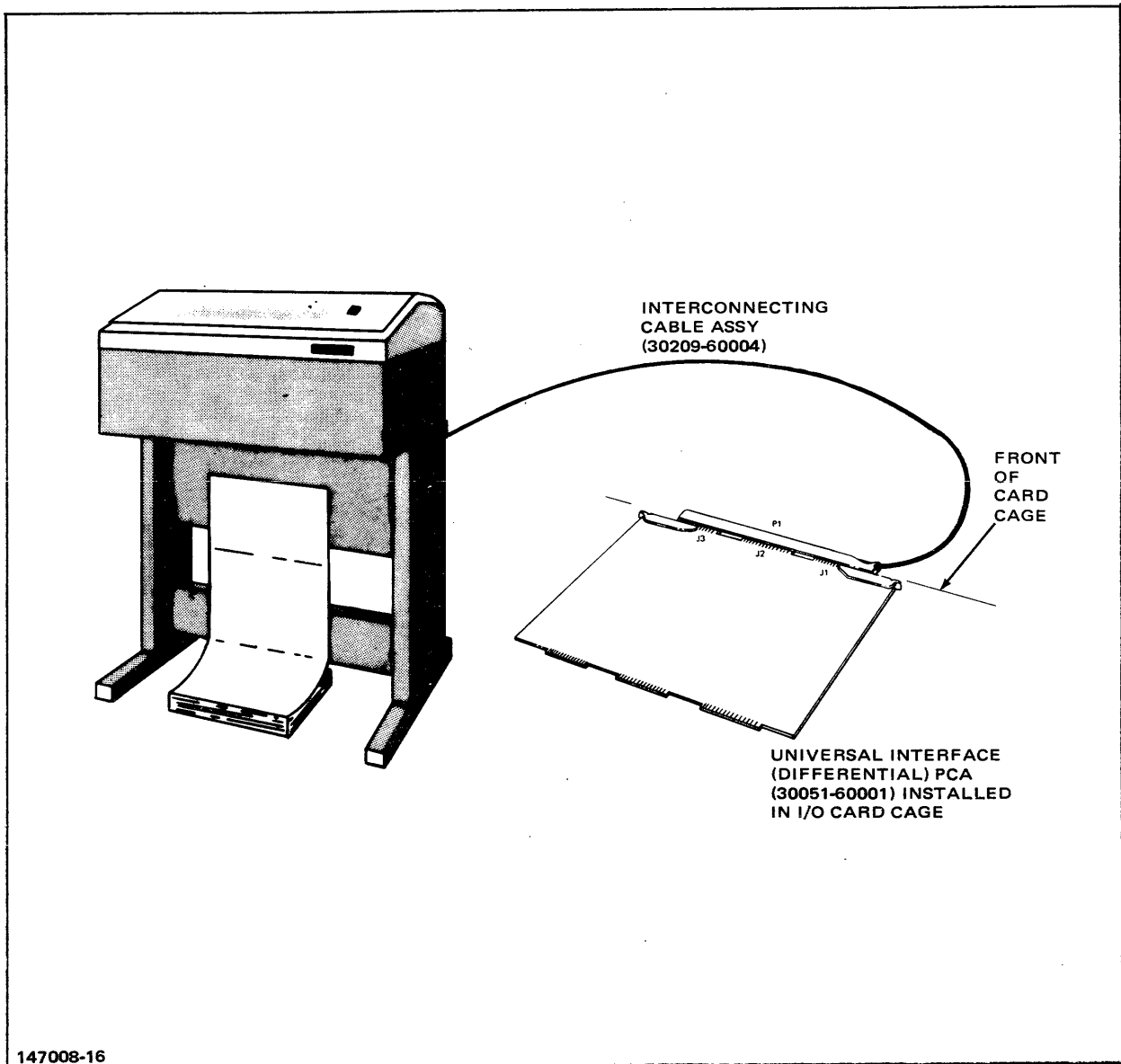


Figure 3-9. HP 2617A Line Printer

## HP 2618A Line Printer

Install the line printer as follows:

1. Connect the interconnecting cable assembly's P1 connector to the interface PCA as shown in figure 3-10.
2. Connect the interconnecting cable assembly's Winchester connector to the rear of the printer (bottom-right of the printer when facing the back of the printer).
3. Lift the cover at the top left and be sure the POWER Switch is OFF.
4. Connect the AC power cord to an outlet.

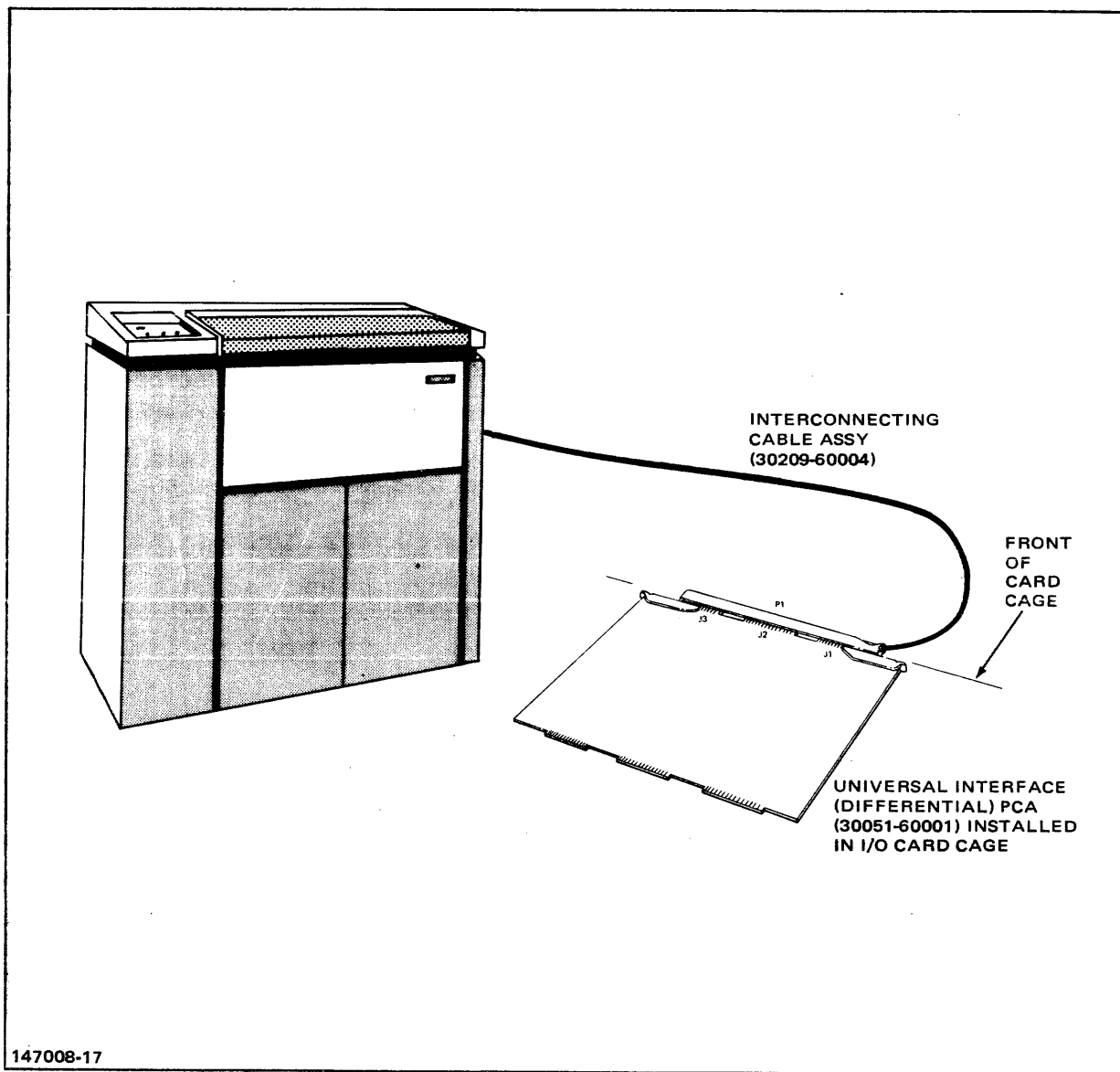


Figure 3-10. HP 2618A Line Printer

## HP 2619A Line Printer

Proceed as follows:

1. Connect the interconnecting cable assembly's P1 connector to the interface PCA as shown in figure 3-11.
2. Connect the interconnecting cable assembly's Winchester connector to the rear of the printer (bottom-right of the printer when facing the back of the printer).
3. The main circuit breaker is accessible through an opening at the lower left-rear of the cabinet. Be sure it is OFF.
4. Connect the AC power cord to an outlet.

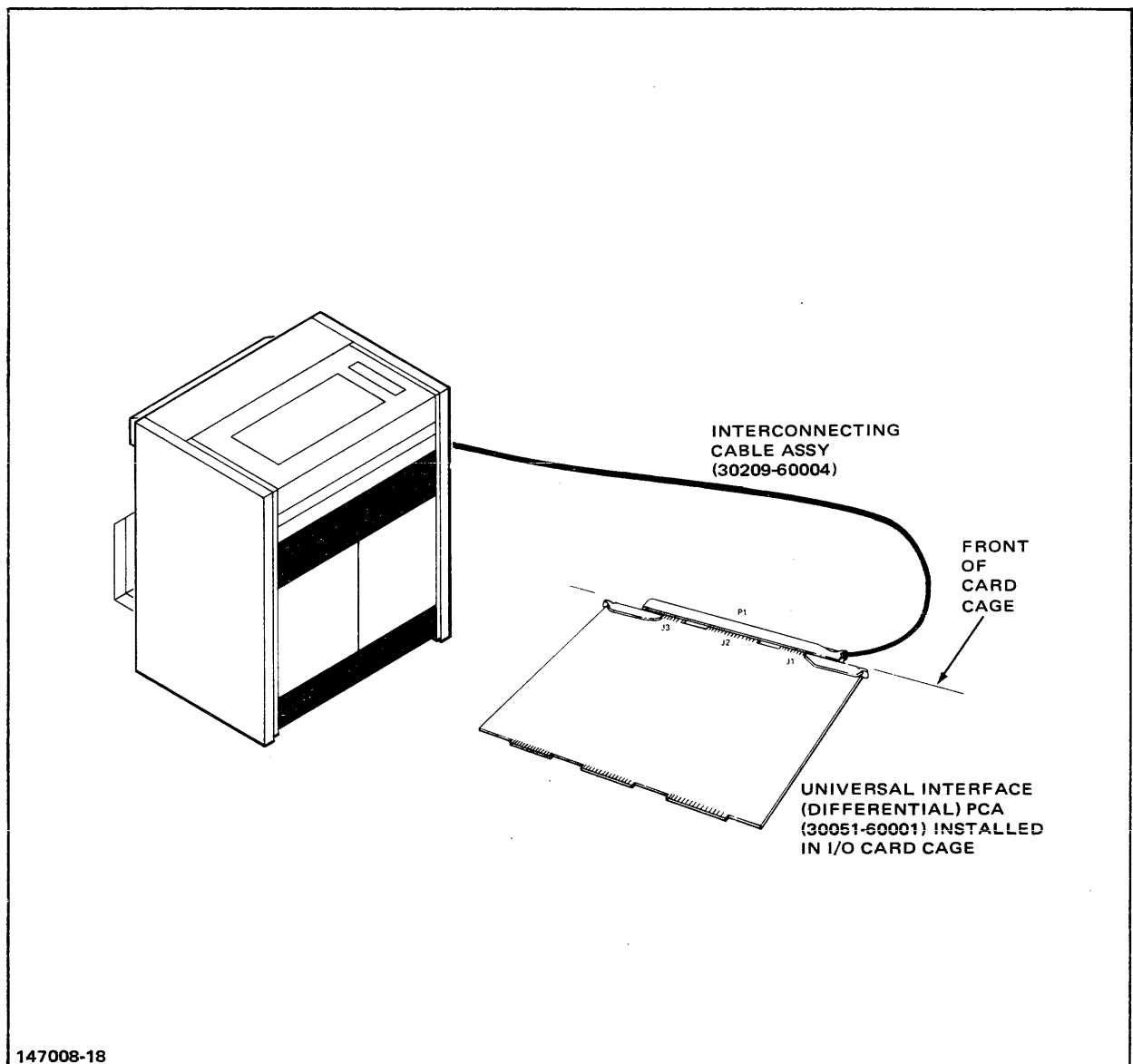


Figure 3-11. HP 2619A Line Printer

### **3-5. HP 7920/7925 DISC DRIVES**

This section contains instructions for installing one or more HP 7920 Disc Drives, HP 7925 Disc Drives, or any combination of the two in an HP 3000 Series III Computer System. The task may consist of:

1. Making a single-unit disc drive installation, or
2. Making a multiple-unit disc drive installation, or
3. Adding one or more drives to a system's existing complement.

The installation procedures consist of:

1. Placing the drive(s) in a planned location.
2. Ensuring that Selector Channel and interface PCA's sufficient for your complement of Master and Slave units have been installed in the system.
3. Cabling the Disc Interface PCA (located in CPU Bay Card Cage 4 Slot 10) to the Disc Controller PCA (located in the enclosure at the bottom of the disc drive cabinet).
4. Ensuring that all POWER Switches are OFF, then connecting the drive(s) to AC power.

#### **Locating the Disc Drives**

The lengths of the multi-unit cables furnished with the hardware from the factory are the main factors that determine the disc drive location(s). The first disc drive installed in the system (the system disc) is supplied with an 18-foot multi-unit cable. Considering the loss of approximately five feet at the I/O interface in routing the cable down to a cable run and perhaps another two-foot loss at the disc drive in coming up from the cable run, the system disc is restricted to a maximum distance of 10 or 11 feet from the CPU bay in the computer mainframe.

All additionally furnished disc drives are supplied with eight-foot multi-unit cables and 50-foot data cables. The multiunit cables interconnect the disc drives in parallel from disc drive to disc drive in a "daisy chained" configuration. Therefore, the disc drives must be located in close proximity to each other.



## Disc Drive PCA Slot Locations

The following slot assignments are mandatory:

Card Cage No. 3

A4 30030-60020 Selector Channel Port Controller  
 A5 30030-60021 Selector Channel Register  
 A6 30030-60003 Selector Channel Control  
 A7 30030-60011 Selector Channel Sequencer

Card Cage No. 4

A10 30229-60001 HP Disc Interface PCA

## Cabling

Cable connections are made at similar terminator brackets in both disc drive models. Figure 3-12 illustrates the connector locations for both models. Figures 3-13 and 3-14 illustrate the cabling and hardware required for a three disc drive configuration.

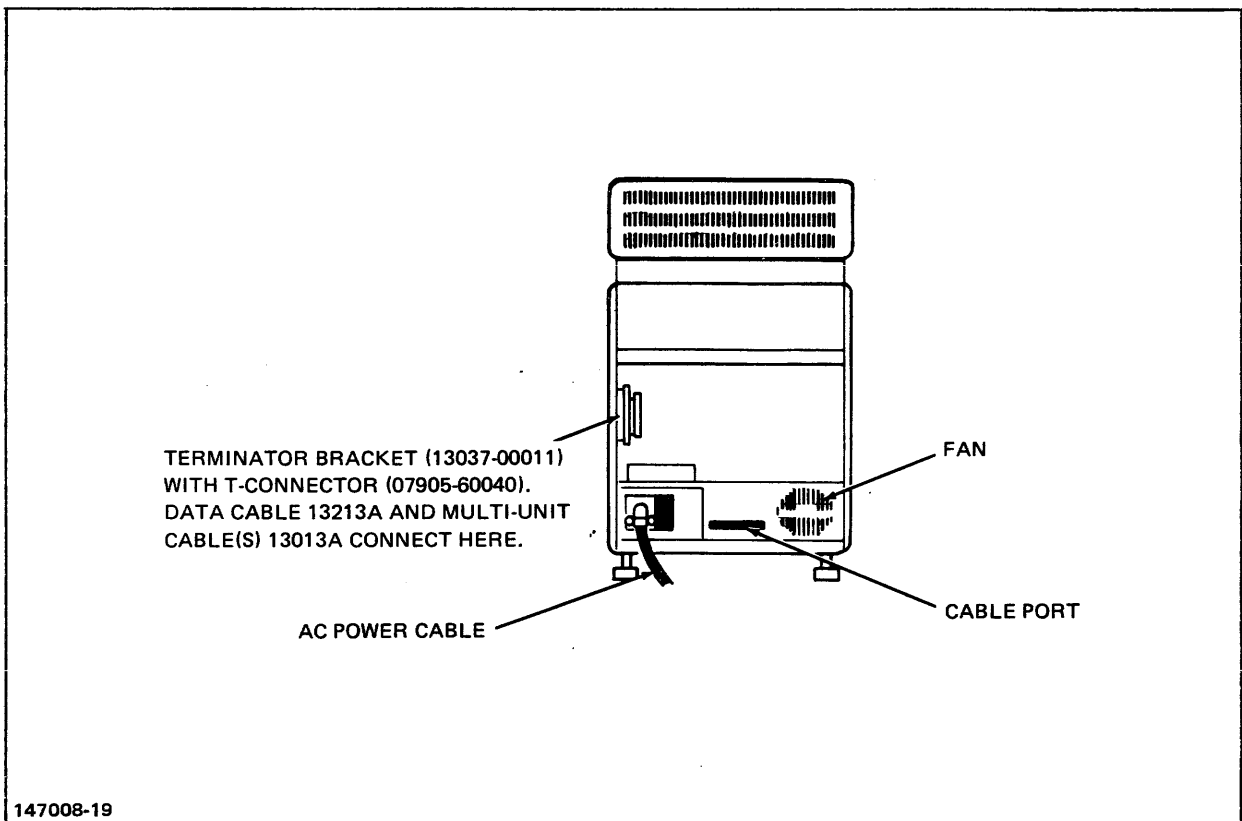
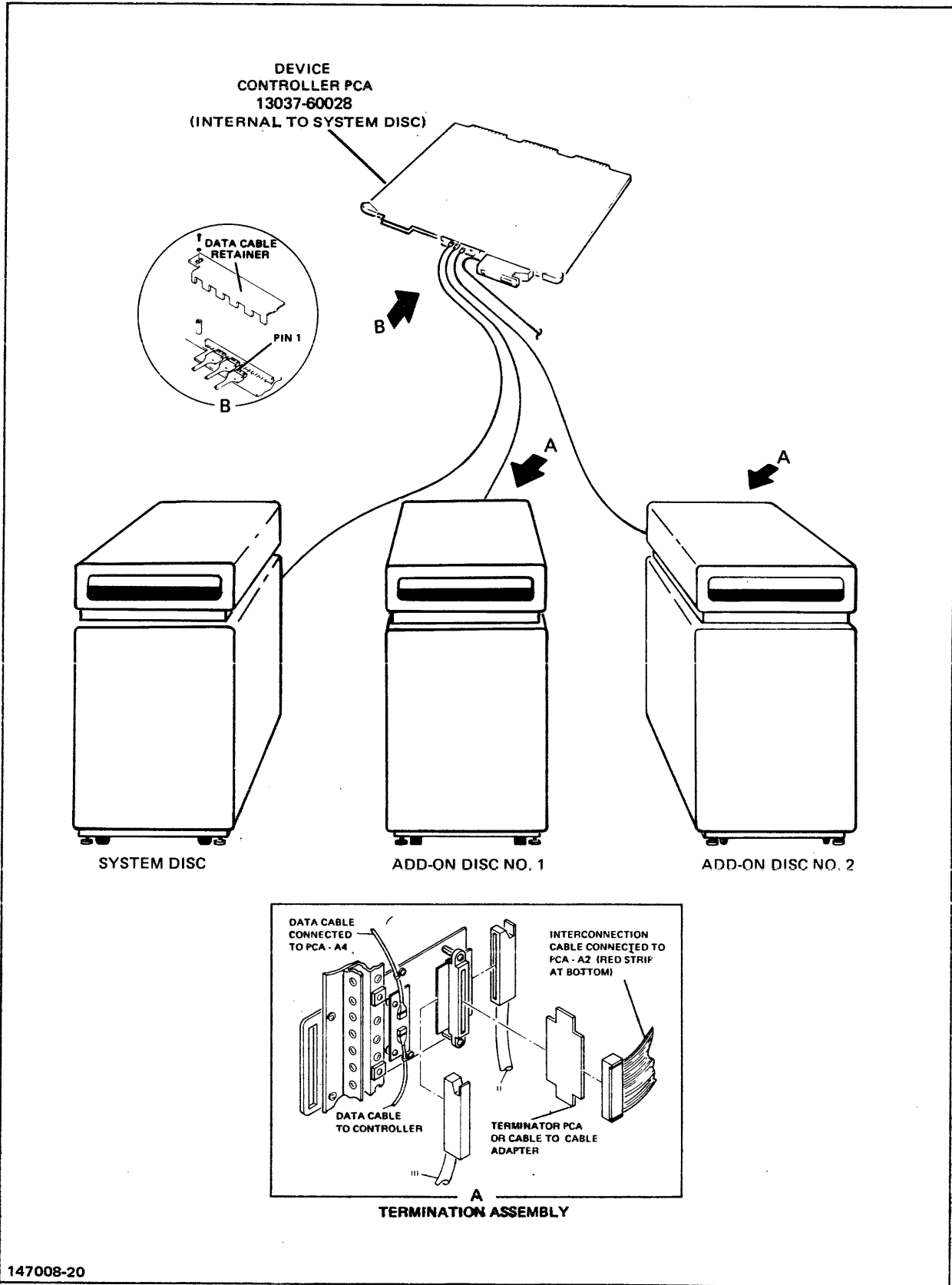


Figure 3-12. Rear View of Disc Drive

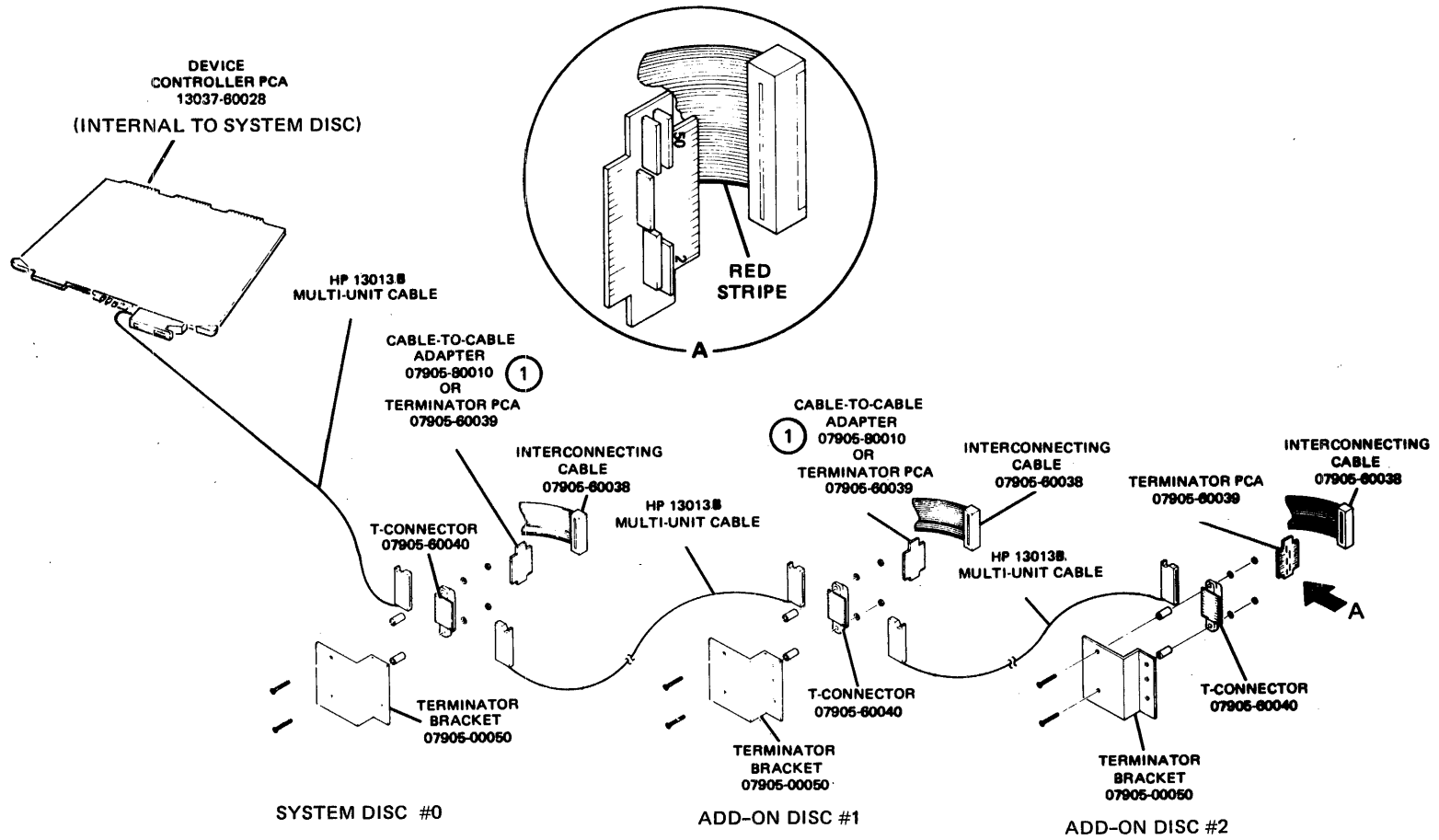
# Installing Peripheral Devices



147008-20

Figure 3-13. Data Cable Connections

Figure 3-14. Multi-Unit Cable Connections



① TERMINATOR PCA 07505-60039 IS INSTALLED ONLY AT THE LAST DRIVE ON THE CHAIN. CABLE-TO-CABLE ADAPTERS 07905-80010 ARE INSTALLED AT ALL OTHER DRIVES.

## Installing Peripheral Devices

The system disc (Unit 0) is shipped from the factory with a Disc Controller PCA installed in a card-cage-like enclosure built into the bottom of its cabinet. The terminator bracket and Tconnector are installed and the interconnecting cable from the drive circuits is connected to the terminator PCA. The cable-to-cable adapter is taped to the inside of the drive enclosure for use in multi-unit configurations. A multi-unit cable is connected at the factory from the disc controller PCA connector J3 to one side of the T-connector. A data cable is also connected from the drive to one of the data ports on connector J2 of the PCA.

Drives other than the system disc do not contain a Disc Controller and are shipped with the data cable and multi-unit cable required for interconnection in a separate container.

**CABLING THE SYSTEM DISC (UNIT 0).** Open the front and rear doors of the CPU Bay and the rear doors of the disc drive. Remove the cover plate over the disc controller enclosure and proceed as follows:

1. At the rear of the disc drive, check that the interconnecting cable from the disc drive unit is connected to a terminator PCA and that the terminator PCA is plugged into the terminator bracket. See figure 3-13, detail A. Also check that the data cable and multi-unit cable from the system disc are connected as previously described.
2. Locate the other multi-unit cable shipped separately from the disc drive. At the CPU bay end, route one end of the cable up the back of the bay and through the cable gap to Disc Interface PCA connector J1 in card cage No. 4, slot A10.

### Note

Multi-unit Cable 13013A, part no. 13013-60003 is replaced by Cable 13013B, part no. 13013-60014 to conform to VDE, German Safety Standards.

3. Place the cable in the cable run between the CPU bay and the disc drive leaving any excess at the disc drive end.
4. At the disc drive, route the other end of the cable (refer to step 3) through the cable port and into the disc controller enclosure. Connect the cable to the Disc Controller PCA, connector J1. Close the disc controller enclosure cover plate.
5. Feed the excess of the cables through the cable port, coil, tie with a cable tie, and leave in the bottom of the disc drive enclosure. Close the rear doors of the disc drive and CPU bay.

## Installing Peripheral Devices

CABLING A MULTI-UNIT INSTALLATION. Open the front and rear doors of the CPU Bay and the rear doors of all disc drives. Proceed as follows:

1. At the rear of the most remote disc drive, check that the inter-connecting cable from the disc drive unit is connected to a terminator PCA and that the terminator PCA is plugged into the terminator bracket. THE RED STRIPE OF THE CABLE MUST BE TOWARDS THE BOTTOM (PIN 2 OF THE ADAPTER). See figure 3-14, detail A.
2. At the rear of the other disc drives, disconnect the inter-connecting cable from the Terminator PCA and unplug the terminator PCA. Plug a cable-to-cable adapter into the terminator bracket. You will find the cable-to-cable adapter taped to the hardware inside the disc drive cabinet. Tape the terminator PCA to the hardware where the cable-to-cable adapter was mounted. Connect the cable to the cable-to-cable adapter. THE RED STRIPE OF THE CABLE MUST BE TOWARDS THE BOTTOM (PIN 2 OF THE ADAPTER). See figure 3-14, detail A.
3. Locate the multi-unit cable shipped separately from the system disc drive. At the CPU bay, route one end of the cable up the back of the bay and through the cable gap to connector J1 of the Disc Interface PCA, in card cage No. 4, slot A10. At the system disc drive, route the other end of the cable through the cable port and into the disc controller enclosure. Connect the cable to connector J1 of Disc Controller PCA.
4. Locate the 50-foot data cables; one for each disc drive following the system disc. At the system disc, route one end of each cable through the cable port and into the disc controller enclosure. Connect each cable to one of the data ports on the Disc Controller PCA. Be sure to replace the data cable retainer. Place the cables in the cable run between the disc drives and drop off a connector and any excess cable at each disc drive. Reinstall the cover plates for the disc drive enclosures.
5. Locate the eight-foot multi-unit cables; one for each disc drive following the system disc. Place them in the cable run; one from disc drive No. 1 to disc drive No. 2, one from disc drive No. 2 to disc drive No. 3, etc.
6. At the last disc drive, route a data cable and a multi-unit cable through the cable port. For either an HP 7920S or HP 7925S, connect both cables to the terminator bracket as shown in figure 3-13, detail A.
7. At all other disc drives, route two multi-unit cables and a data cable through the cable port. For either an HP 7920S or HP 7925S, connect all three cables to the terminator bracket as shown in figure 3-13, detail A.

## Installing Peripheral Devices

8. At each disc drive, feed all cable excess through the cable port, coil the excess and tie it with a cable tie, and leave it in the bottom of the disc drive cabinet.
9. Close the rear doors of all disc drive cabinets and both doors of the CPU bay.

AC POWER CABLES. Check that each disc drive's AC power cord is plugged into its cabinet receptacle. Set the SWITCHED 120V (if European, 230V) OUTLETS Switch on the rear of the CPU Bay to OFF. Connect the power cord of the system disc into one of these SWITCHED outlets; connect the cords of any other discs to an outlet. DO NOT TURN ON ANY AC POWER AT THIS TIME.

### Note

Disc drives that are to be installed as part of a system using 50-Hz power are shipped without an AC power cable. The AC power cable must be fabricated by the customer during site preparation. The cable must have a neutral and ground line and be capable of supplying 15 amps at 230 volts. This AC power cable is connected to the circuit breaker on the disc drive cabinet power panel assembly.

## 3-6. HP 7970E/7970B DIGITAL MAGNETIC TAPE DRIVES

The HP 7970E Subsystem includes a 1600 BPI (Bytes-Per-Inch), 45 IPS (Inches-Per-Second), PE (Phase Encoded), Digital Magnetic Tape Unit. The HP 7970B Subsystem includes an 800 BPI, 45 IPS, NRZI (Non-Return Zero Index), Digital Magnetic Tape Unit. The HP 7970E is available as either a Master Unit or a Slave Unit. A system can include a combination of HP 7970B, Master HP 7970E, and Slave HP 7970E Tape Units. A Slave HP 7970E cannot be in a system unless there is a Master HP 7970E.

One Magnetic Tape Unit Interface (Figure 3-15) can control up to four tape drive units. An additional controller can be included in a system if it is necessary to divide the control of two or more units. Each controller consists of the following:

1. One Magnetic Tape (Nine-Track) Controller PCA, part no. 30215-60006
2. One Magnetic Tape Controller Processor PCA, part no. 30215-60002
3. Two Connecting Cable Assemblies, part no. 30000-93052
4. One Interface Cable Assembly, part no. 30215-60003

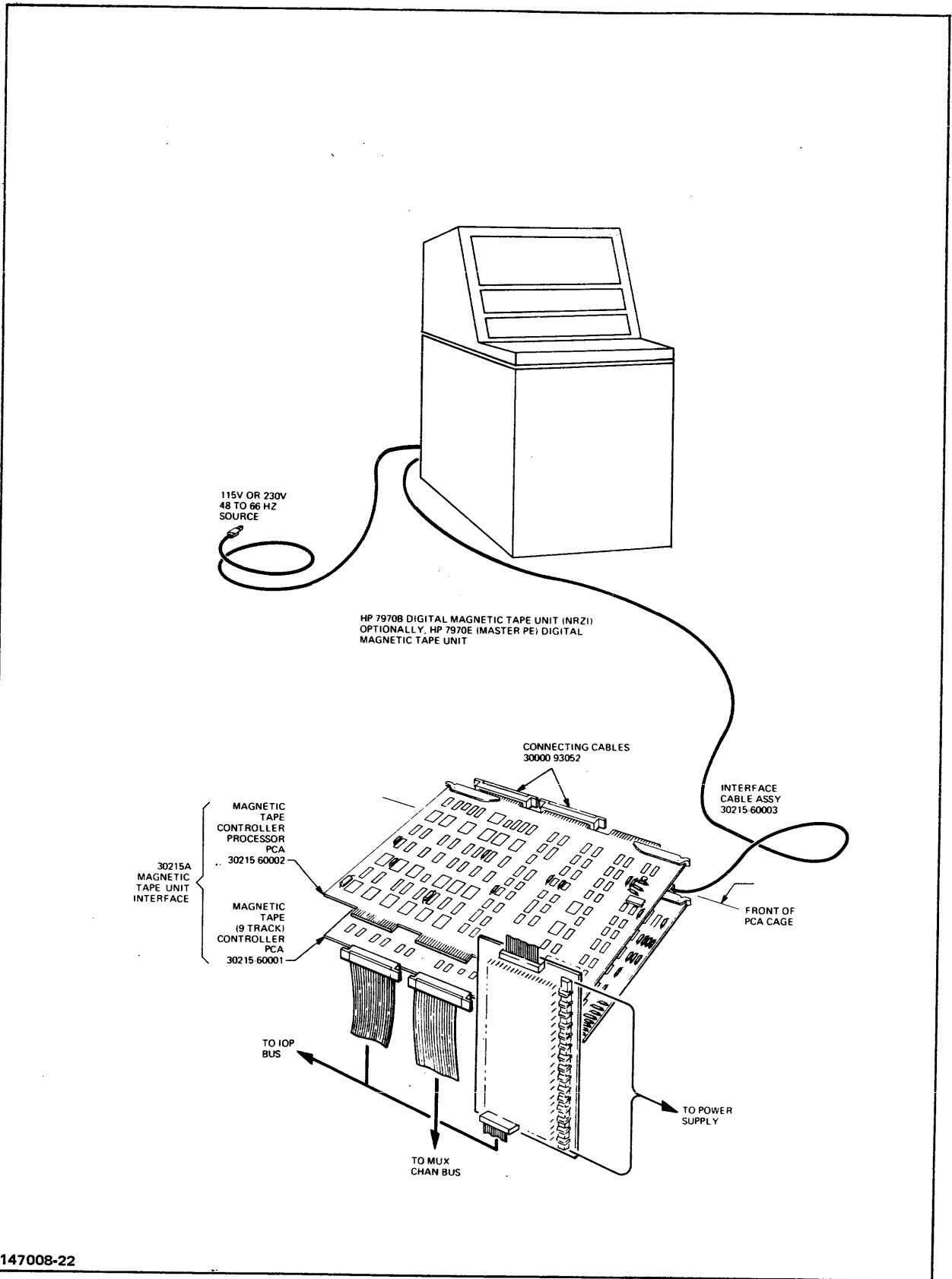


Figure 3-15. Tape Unit Interface

## Multi-Unit Configurations

A magnetic tape unit controller can control any combination of HP 7970E and HP 7970B tape units with a maximum of four tape units on one controller. Multi-unit installations are beyond the scope of this manual. There are 24 possible configurations for multi-unit magnetic tape units. Refer to the following list of manuals for multi-unit installation information.

### Note

The HP 7970B Tape Unit must be the first in line from the tape controller if it is used in a mixed configuration with an HP 7970E Tape Unit.

1. HP 13194A Multi-Unit Cable Accessory Kit Installation Manual, part no. 13194-90003
2. HP 7970B Digital Magnetic Tape Unit Operating and Service Manual, part no. 07970-90383
3. HP 7970E Digital Magnetic Tape Unit Operating and Service Manual, part no. 07970-90765

## Installation

Installation of an HP 7970E or HP 7970B Magnetic Tape Subsystem consists of connecting the interface cable assembly and the AC power cable. Proceed as follows:

1. The interface cable assembly is separately shipped and must be located. At the CPU bay, route the 50-pin connector end of the cable up the back of the cabinet and through the cable gap to the vicinity the Magnetic Tape Controller PCA, part no. 30215-60006. Connect the cable to PCA connector J1 as shown in Figure 3-15.
2. Place the cable in the cable run between the CPU bay and the magnetic tape unit and leave any excess cable at the magnetic tape unit end.
3. At the magnetic tape unit, route the cable to the appropriate connectors (Read, Write, and Control and Status). Connect the connectors to the appropriate connectors inside the magnetic tape unit as shown in Figure 3-16.
4. Be sure the POWER Switch on each unit is OFF. Then connect the AC power cord of the Master to one of the SWITCHED 120V receptacles on the rear of the CPU Bay, and the cords of the Slaves to wall outlets.



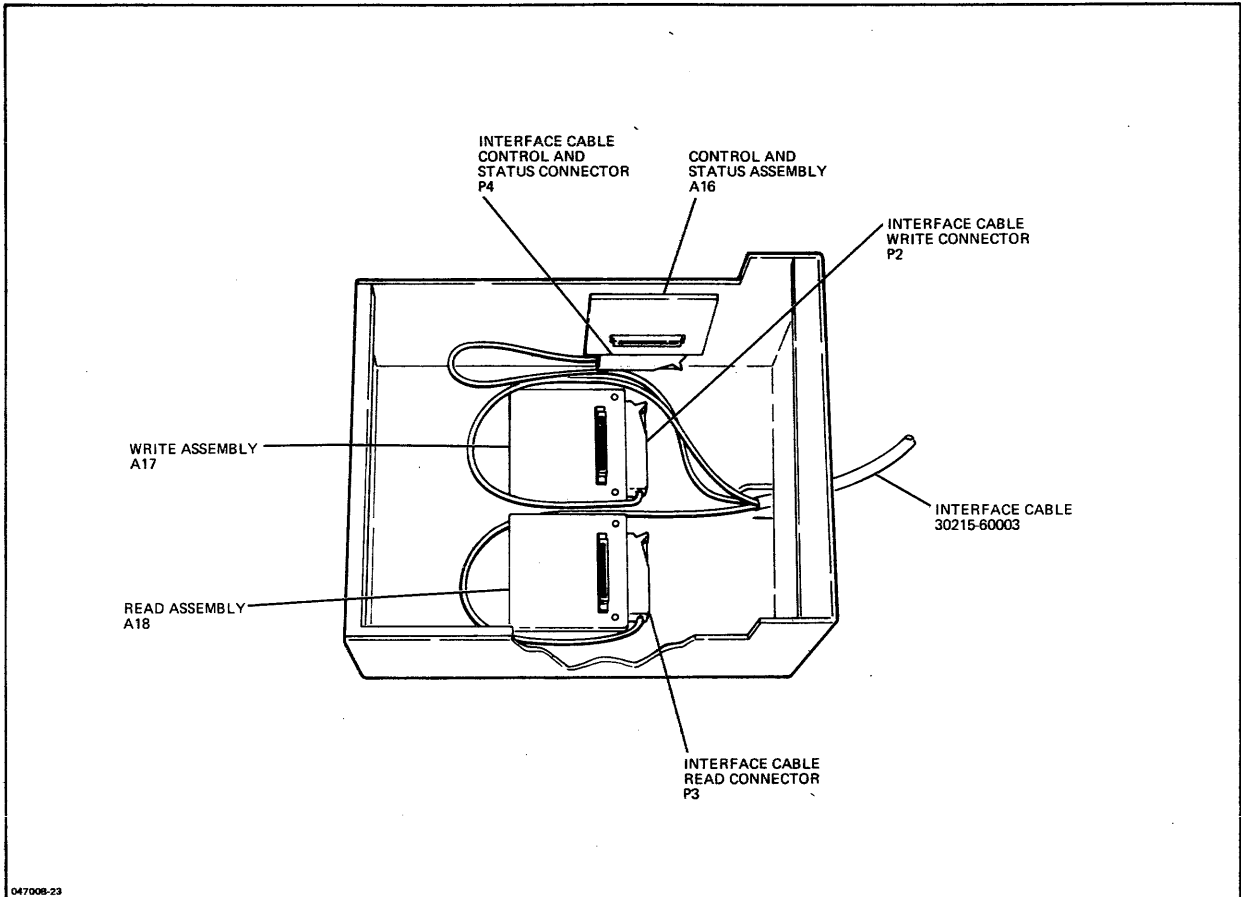


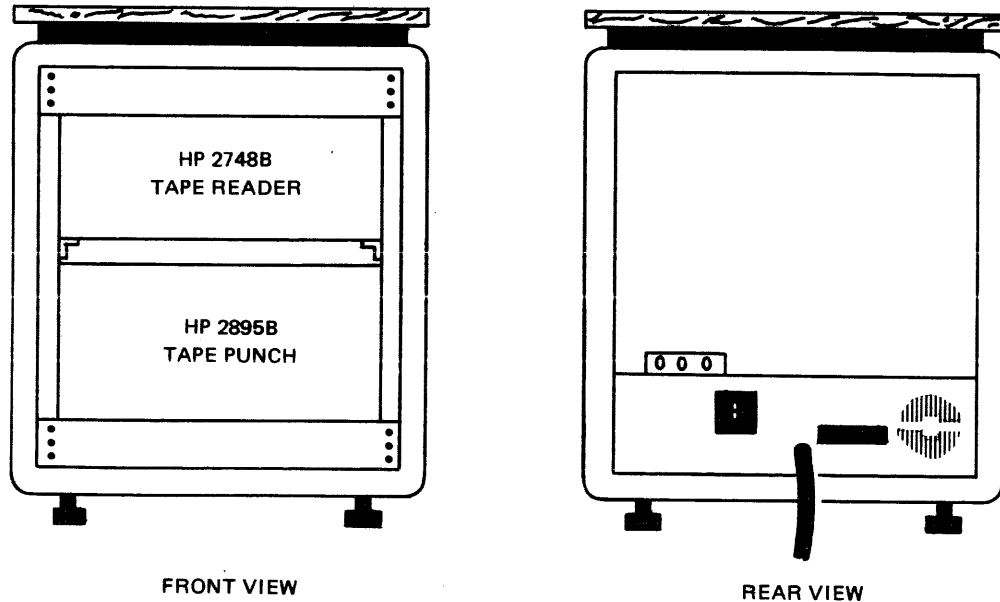
Figure 3-16. Cable Connections Inside the Mag Tape Unit

### 3-7. PAPER TAPE DEVICES

#### Minicabinet Housing

HP paper tape readers and punches are housed in the minicabinet shown in Figure 3-17, below.

The rear door has a cut out for the power cable and cables from the computer I/O area that pass through to the devices in the cabinet. If the paper tape device(s) were installed at the factory, the AC power cables have their slack distributed in the bottom of the cabinet and their plugs inserted in the utility strip along the top of the power distribution box. Bring the cables from the I/O interface PCAs in the I/O area of the computer, out the bottom of the cabinet, along the cable run, to the back of the minicabinet. Pull the cables through the cable port and distribute any slack in the bottom of the cabinet. Connect the cables to the paper tape reader and/or paper tape punch. Close the rear door of the minicabinet.



FRONT VIEW

REAR VIEW

(DOORS REMOVED FOR CLARITY)

147008-24

Figure 3-17. Minicabinet for Paper Tape Devices

## HP 2748B Tape Reader

The reader connects with its interface PCA via a 25 ft. (6.43 meter) cable assembly. Make the connection as shown in Figure 3-18 below. Then, ensure that POWER is OFF, and connect the AC power cord to an outlet.

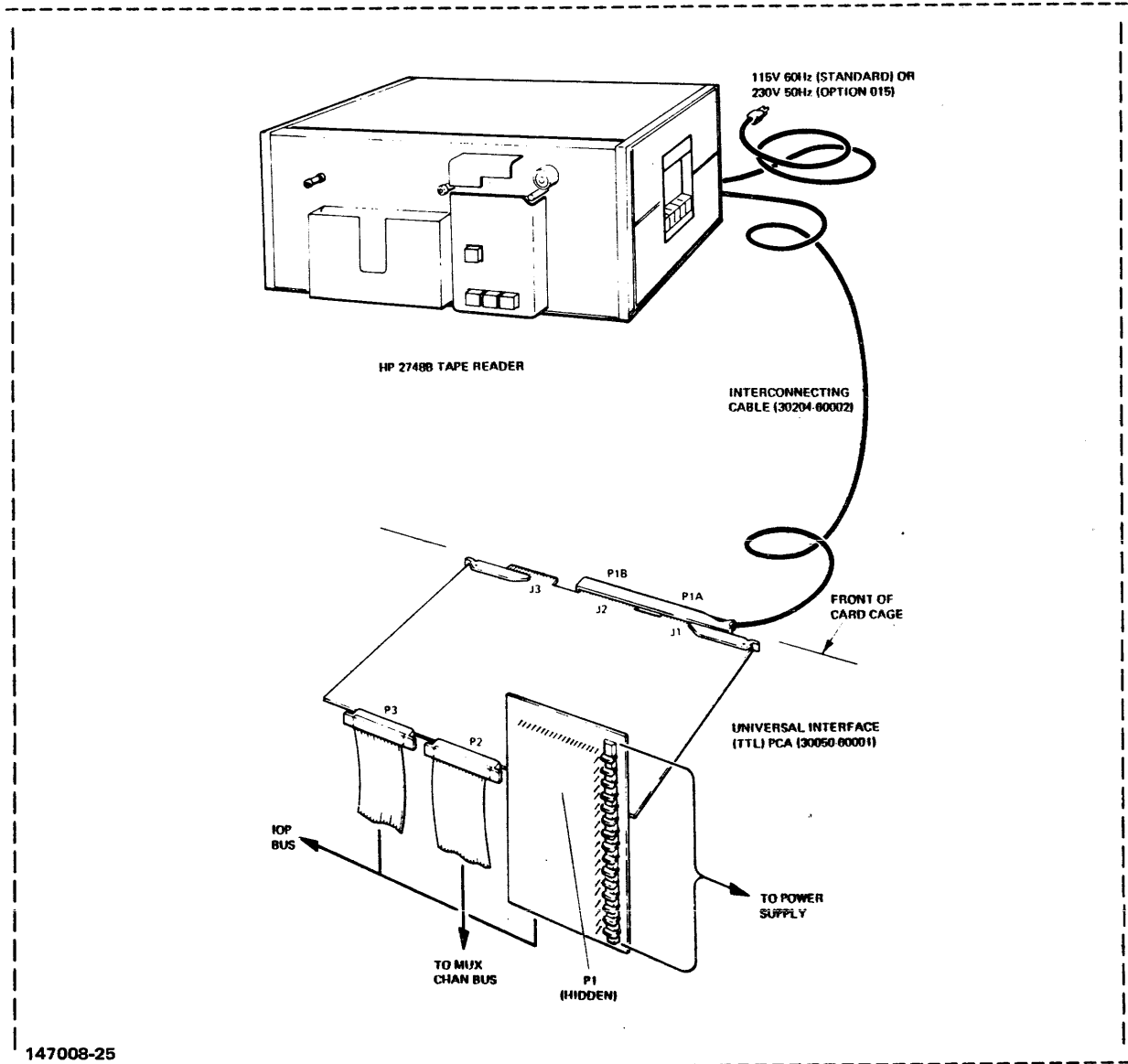


Figure 3-18. Paper Tape Reader

## HP 2895A Paper Tape Punch

The punch connects with its interface PCA via a 25 ft. (6.43 meter) cable assembly. Make the connection as shown in Figure 3-19 below. Then, ensure that POWER is Off, and connect the AC power cord to an outlet.

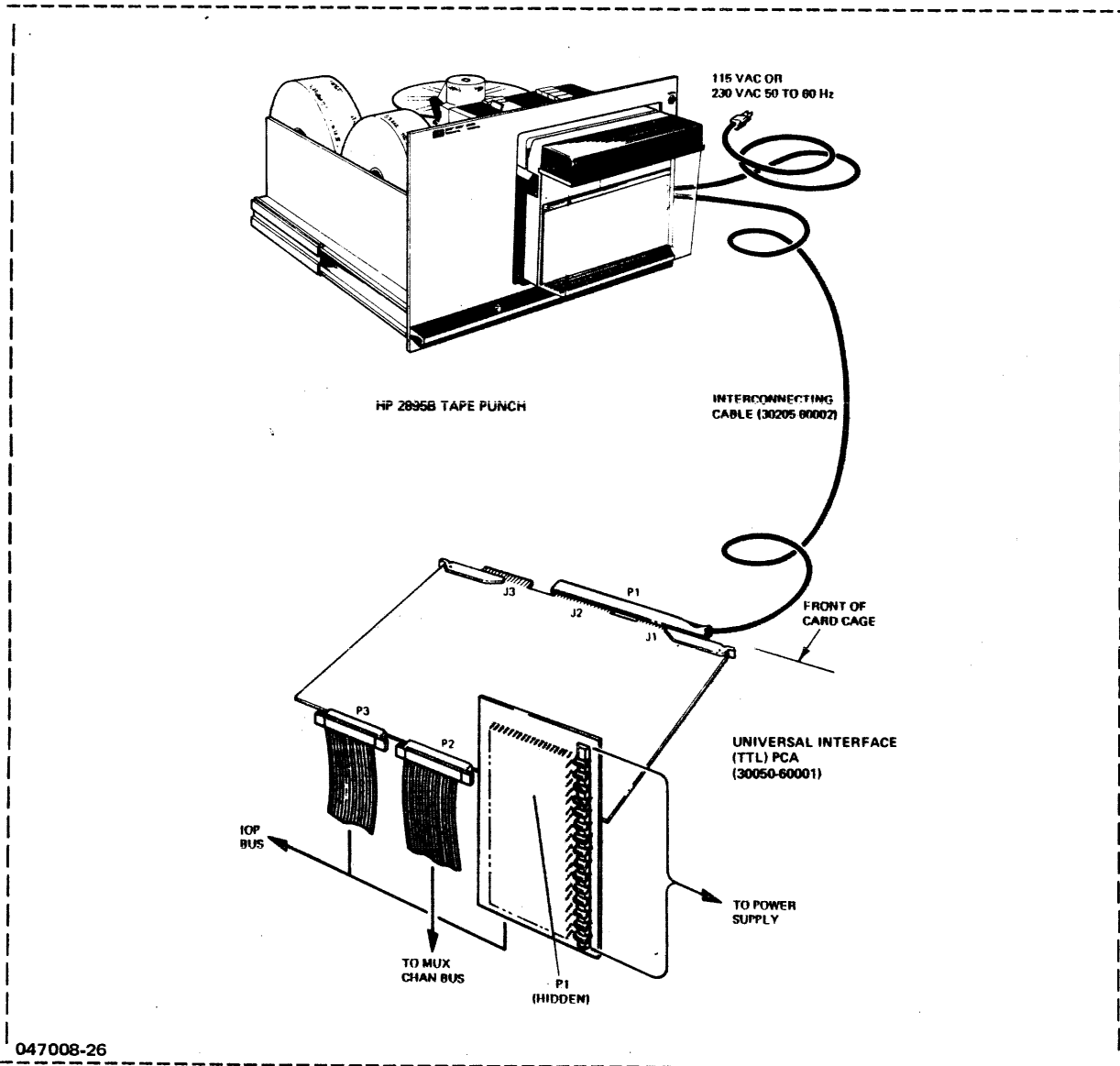


Figure 3-19. Paper Tape Punch

# POWERING UP THE NEW INSTALLATION

SECTION

IV

## 4-1. ISOLATION TRANSFORMER STRAPPING

Before you can power up the system and peripherals, you must ensure that the isolation transformer is properly strapped.

The line steady-state voltage, measured at the input of the isolation transformer, must fall within +4 to -10 percent of the RATED voltage. Acceptable steady-state ranges for the rated voltages are shown in Table 4-1. The voltages must meet these tolerances before you strap the isolation transformer. Additionally, transient voltages must not exceed +/-15 percent of the rated voltage and must return to the steady-state tolerance within one-half second.

Table 4-1. Line Voltage Limits

RATED Voltage	Acceptable Steady-State Voltage	
	From	To
200	180.0	208.0
210	189.0	218.4
220	198.0	228.8
230	207.0	239.2
240	216.0	249.6

The following steps are provided for restrapping the primary windings of the CPU Bay's isolation transformer, if restrapping is required to accommodate the customer's RATED input AC power. The transformer can be strapped for 200, 210, 220, 230, and 240 volt operation. STANDARD STRAPPINGS are 210 volts for 60 Hz and 230 volts for 50 Hz operation.

## Powering Up the New Installation

### Note

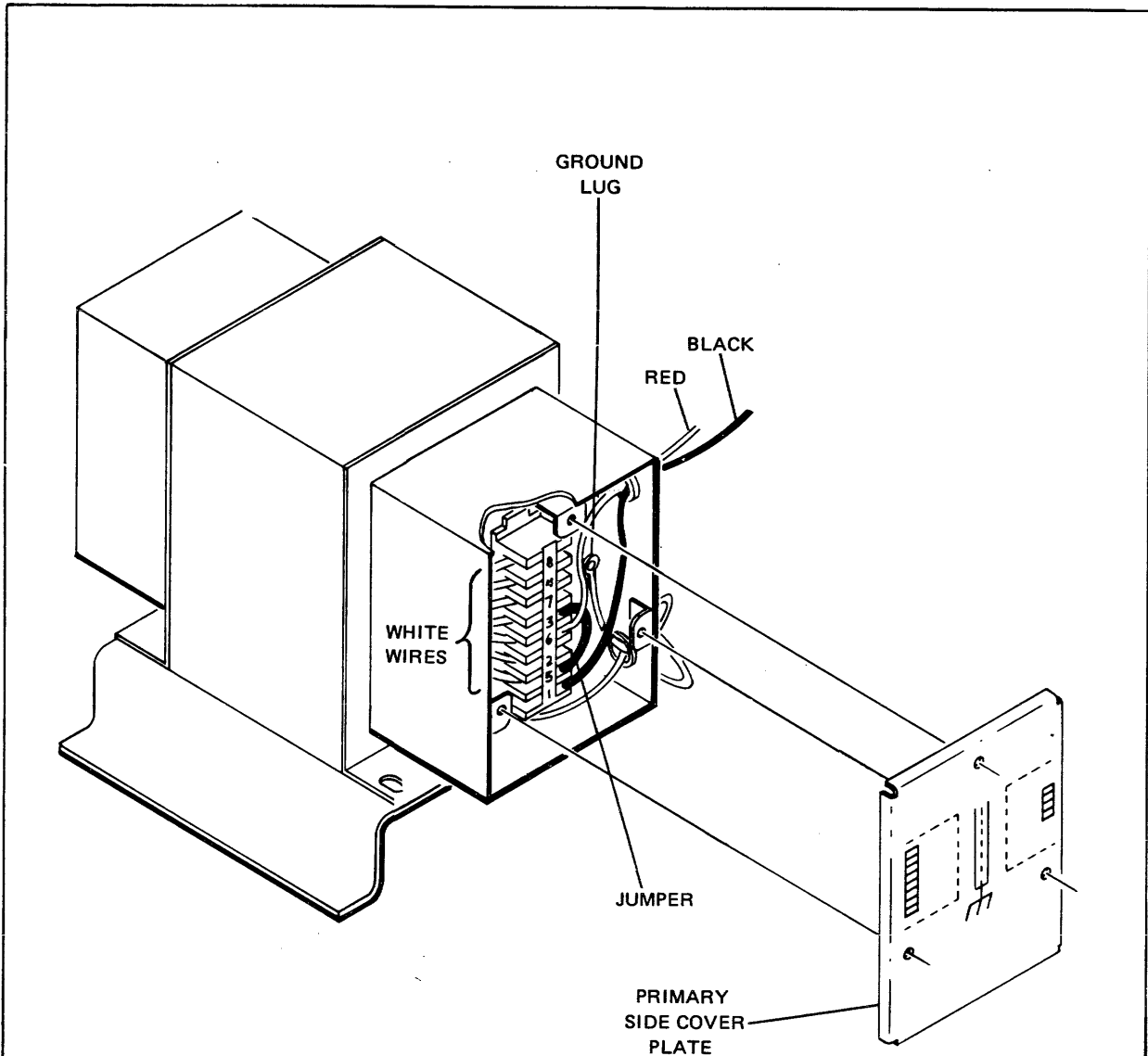
If 208 volts is being used on site, strap the isolation transformer for 210 volts.

The isolation transformer is located as shown in Figure 4-1.

### **WARNING**

Primary AC power is exposed when covers are removed. Ensure that the main power breaker is off and disconnect the system's power cord from the customer's receptacle.

1. Remove the cabinet's right side panel.
2. Remove the transformer primary winding cover plate.
3. Check strapping against table in Figure 4-1. Re-strap for your RATED voltage if necessary.
4. Ensure the connectors are tight and that no loose strands of wire are protruding from the terminal block.
5. Ensure that resistance between transformer connectors and ground lug measures open (infinite resistance).
6. Reconfigure input VAC rating plates (located under main breaker) to indicate present VAC strappings.
7. Reassemble.



**ADDITIONAL STRAPPING OPTIONS**

ISOLATION TRANSFORMER  
 (VIEWED FROM RIGHT SIDE OF  
 ELECTRONIC MAINFRAME. ACCESS  
 PANEL REMOVED FOR CLARITY:  
 TYPICAL 210 VOLT STRAPPING EXAMPLE)

VOLTAGE	WIRE BLACK	JUMPER		WIRE RED
200V	PIN 1	PIN 2	PIN 5	PIN 6
210V	PIN 1	PIN 3	PIN 5	PIN 6
220V	PIN 1	PIN 3	PIN 5	PIN 7
230V	PIN 1	PIN 4	PIN 5	PIN 7
240V	PIN 1	PIN 4	PIN 5	PIN 8

147008-27

Figure 4-1. Strapping Options

## 4-2. POWERING UP THE CPU BAY

With the isolation transformer strapped, proceed as follows:

1. Check that the DC POWER LOGIC and LOGIC & MEMORY Switches are set to DISABLE on the Power Control Panel at the bottom front of the CPU Bay.
2. Check that the MAIN POWER, INTERNAL POWER, and SWITCHED 120V OUTLET POWER circuit breakers (bottom back of the bay) are set to OFF. Connect the AC power cable to an outlet.
3. Set the MAIN POWER circuit breaker to ON, and then set the INTERNAL POWER circuit breaker to ON.
4. At the Power Control Panel, set the DC POWER LOGIC and LOGIC & MEMORY Switches to ENABLE.
5. Check that all LEDs on the Power Control Panel are lighted. The BCHG indicator will be flashing slowly, or, if the battery is fully charged, will be lighted continuously. If any of the LEDs are not lighted, refer to Appendix B for troubleshooting help.
6. On the inside top of the front door, set the PANEL Switch to ENBL (enable) and PF/ARS (Power Fail/Automatic Restart) Switch to ENBL (enable).
7. Measure the levels at the DC VOLTAGES test points, to ensure they are within the limits listed in Table 4-2. If they are not, refer to Appendix B for trouble isolation information.



Table 4-2. Test Point/Voltage Relationships

LED/TP	Range		Source (Note 1)	Supplies (Note 2)
	Min.	Max.		
+15	+14.5	+16.5	P02	CC3-6
+12B	+11.9	+12.1	P07	CC2-6
+5CPU	+5.17	+5.17	P41	CC1-2
+5B	+5.0	+5.25	P07	CC2
+5-V1	+5.0	+5.25	P02	CC3
+5-V2	+5.0	+5.25	P09	CC4
+5-V3	+5.0	+5.25	P41	CC5-6
TEMP				Note 3
-5B	-5.0	-5.25	P07	CC2-6
-5	-4.5	-5.5	P09	CC3-6
-15	-14.5	-15.5	P02	CC3-6

Notes: 1. P02 = HP 63312F-P02  
P07 = HP 61315D-P07  
P09 = HP 61312F-P09  
P41 = HP 62605M-P41

2. CC = Card Cage  
CC5-6 are in I/O bay Option 200

3. Sense line for TEMP goes through a thermal switch on the cabinet fan panel to +5-V2 in CC4. High temperatures open the switch simulating a power failure. If +5-V2 fails, the +5-V2 and TEMP LED's may both light. Also, the TEMP LED may remain lighted with the +5-V2 LED not lighted.

### 4-3. POWERING UP THE PERIPHERALS

In general, peripherals not receiving power from the CPU Bay Power Control Module require a steady-state line voltage from 108.0V for 60-Hz sites and from 207.0V to 239.2V for 50-Hz sites. However, power options are available for most HP peripherals. Regardless of what power option is present, the measured steady-state voltage must fall within +4 to -10 percent of the RATED voltage.

#### System Console

If the system console is a CRT Terminal (2621 or 264X-series), set the AC POWER Switch ON and allow 15 seconds warm-up time. Then press the SHIFT and/or TEST keys; if beeping is heard and one or more character sets appear on the screen, the terminal is ready for use. Some terminals display the message "TERMINAL READY."

If the system console is a printing terminal (2635A), press "1" on the POWER Switch to turn power ON.

If the terminal is a 2621A, it must now be configured. The following is a brief step-by-step procedure. For further details and/or explanations, see the 2621A Owner's Manual, No. 02620-90001.

1. Press SHIFT and (HOME-UPPER-LEFT symbol) keys, to select the Configuration Mode. The screen will display:

BAUD RATE PARITY DUPLEX STRAPS HANDSHAKE HZ START COL RETURN  
This will show across the top of the screen, and a list of functions will be displayed across the bottom. THESE FUNCTIONS ARE ASSIGNED TO THE HOMING-ARROW SYMBOLS, THE ROW OF KEYS AT THE TOP OF THE KEYBOARD. The regular functions of these keys are suspended while you remain in the configuration mode.

2. Press SHIFT and "NEXT" (HOME-LOWER-LEFT) keys to cycle through the baud rates. Halt on 2400.
3. Press TAB key to move to Parity. Press SHIFT and "NEXT" (HOME-LOWER-LEFT) keys to cycle through the parity selection list. Halt on NONE (0).
4. Press TAB key to move to Duplex. Press SHIFT and NEXT to move to FULL.
5. Press TAB key three times to move to HZ. Press SHIFT and "NEXT" to move to your input power frequency.

6. Press TAB three times to return to BAUD RATE.
7. Press SHIFT and "REMOTE" keys until an asterisk appears after the REMOTE label.
8. If you desire ALL CAPS, press SHIFT and "CAPS LK" keys until an asterisk follows the label.
9. If you desire automatic line feed, press SHIFT and "AUTO LF" until an asterisk follows the label.
10. Press SHIFT and "EXIT" keys to return to the text (normal) mode.

### **Magnetic Tape Drives**

Set the SWITCHED 120V (230V, if European) POWER circuit breaker on the rear of the CPU bay to ON. Open the top door of the tape drive and set the POWER switch to ON.

### **Disc Drives**

Ensure that the RUN Switch is set to OFF. Then, set AC POWER circuit breaker to ON. Set the POWER switch on the disc drive unit to ON. Install a disc pack and set the RUN/STOP switch to RUN. After the start-up sequence, check that the DRIVE READY indicator lights.

### **Line Printers**

For Model HP 2608A, press ON and ON LINE Switches.

For Models HP 2613A or 2617A, press POWER ON. Press ON/OFF LINE READY Switch to light the READY indicator.

For Model HP 2618A, open the access panel on top of the printer and set the POWER Switch to ON. Then operate the ON/OFF LINE Rocker Switch to light the ON LINE indicator.

For Model HP 2619A, set the main circuit breaker (accessible through an opening at the lower, left rear of the cabinet) to ON. Set the REMOTE/LOCAL Switch (accessible through an opening at the lower rear of the cabinet) to REMOTE.

### **Card Readers**

Set the POWER Switches ON.

# SYSTEM VERIFICATION

SECTION

V

This section is organized to help you verify the system logically.

First, use off-line diagnostics to test the major components individually.

Next, cold load the system, and configure the peripherals into the I/O Configuration Table.

Then, use on-line diagnostics to verify that the components work together as a "system."

## 5-1. OFF-LINE DIAGNOSTICS

### Micro Diagnostics

Run the micro diagnostics, as described in Appendix D.

### Stand-Alone Diagnostics

Run the applicable stand-alone diagnostics. Refer to Table 5-2.

### SLEUTH

Cold load SLEUTH from magnetic tape and run an I/O configuration test, using the CONF Command as described in the SLEUTH Diagnostic Manual, part no. 03000-90123. Use the SLEUTH numbers supplied in Table 5-1 of this manual.

While in SLEUTH, each Disc Pack/Cartridge must be formatted and all defective tracks flagged. The procedure for flagging defective tracks is found in the CE Handbook.

## 5-2. COLD LOAD THE SYSTEM AND CONFIGURE THE PERIPHERALS

Because of coordinated shipments, the I/O Configuration Table present in the system software when it leaves the factory does not include the particular peripherals your customer has ordered. Thus, you will have to add/modify the system's I/O Configuration Table.

First, mount the Installation Tape on the Unit 0 Mag tape Drive, and set the drive ON-LINE.

Then, enter %3006 in the System Switch Register (on the CPU Bay). Press ENABLE and LOAD. Wait for the RUN Light to go out, and the motion of the tape to stop. Press RUN on the CPU panel, then Carriage Return on the system console.

System Verification

Table 5-1. SLEUTH Numbers

Product No.	Description	SLEUTH Number
30036A/B	Multiplexer Channel	1
30135-60063	System Clock/FLI	8/24
30032B	Terminal Data Interface	6
30030B/C	Selector Channel	
30360A	Hardwired Serial Intfce	4
7970B/E	9-Track Mag Tape	18,19
30055A	SSLC	3
30055A	ASLC	3
30050A/51A	Card Reader Punch	10
30032B--Opt's 001 / 002	Terminal Ctrl Interface	7
30226A	Calcomp Plotter	22
2635A	Printer Terminal	
30129	7920/7925 Disc Interface	12/11
30104A	Paper Tape Reader	20
30105A	Paper Tape Punch	21
30106/7A	Card Reader	2
All printers	All printers	5

Table 5-2. Stand-Alone Diagnostics

Product No.	Diagnostic No.	Description	Diagnostic Manual Part No.
SLEUTH	PD411A	SLEUTH	03000-90123
30036A/B	PD422A	Multiplexer Channel	30036-90001
30135-60063	PD426A	System Clock/FLI	32230-90005
30032B	PD427A	Terminal Data Intfc	30032-90011
30030B/C	PD429A	Selector Channel	30030-90011
---	PD430B	Memory	30000-90004
30012A	PD431A	Extended Inst. Set	30012-90001
30360A	PD432A	Hardwired Serial Intfc	30360-90007
7970B/E	PD433A	9-Track Mag Tape	30115-90014
30055A	PD434A	SSLC	30055-90008
30055A	PD434B	ASLC	30055-90008
30050A/51A	PD435P	Card Reader Punch	30050-90012
30061A	PD438A	Terminal Controller	30061-90003
30226A	PD439A	Calcomp Plotter	30226-90009
7920/7925	SLEUTH07	Disc Drives	32330-90002
32234A	PD441A & PD442A	Cobol II	32233-90002

## Note

The following example of the dialog you will enter with the system at this time is provided only as a "reminder." A detailed dialog is provided in the System Manager/System Supervisor Reference Manual, part no. 30000-90014.

```

WHICH OPTION `COLDSTART/RELOAD/UPDATE"? RELOAD
ANY CHANGES? YES
LOAD MAP? return
MEMORY SIZE=nnn.? return
I/O CONFIGURATION CHANGES? YES
LIST I/O DEVICES? YES
LIST CS DEVICES? YES
HIGHEST DRT?=nnn.? return or highest number
LOGICAL DEVICE #? nnn
DRT #? nnn
UNIT #? nnn
SOFTWARE CHANNEL #? n
TYPE?
SUB TYPE?
RECORD WIDTH?
OUTPUT DEVICE?
ACCEPT JOBS/SESSIONS? YES or NO
ACCEPT DATA? YES or NO
INTERACTIVE? YES or NO
DUPLICATIVE? YES or NO
INITIALLY SPOOLED? YES or NO
INPUT OR OUTPUT? IN or OUT (Spooled devices only)
DEVICE CLASSES? device class name
LOGICAL DEVICE #? return
MAX # OF OPEN SPOOLFILES=nn.? return
LIST I/O DEVICES? return
LIST CS DEVICES? return
CLASS CHANGES? return
LIST I/O DEVICES? YES
DISC VOLUME CHANGES? return
MAX # OF SPOOLFILES KILOSECTORS=nnn? return
RECOVER LOST DISC SPACE? return

```

### 5-3. ON-LINE DIAGNOSTICS

#### Workout 2

WORKOUT2 exercises the disc and mag tape drive units. It is found on Mag Tape Part No. 32230-10005 for 800 BPI Mag Tape Units, and No. 32230-11005 for 1600 BPI Units.

## System Verification

Operator entries are underlined in the following example.

-----  
THE DEFAULT RESPONSE, WHEN WANTED, IS IMPLEMENTED BY STRIKING THE CARRIAGE RETURN.

### Note

If you enter an invalid response to any of the computer prompts below, the program allows ONLY ONE more try. For example, note in the comments following "NUMBER OF DISC FILES?" that your entry must be from 0 to 64. If you entered 66, the computer would respond, "BAD INPUT--TRY ONCE MORE." If you again entered 66, the program would respond "SORRY-YOU LOSE," and terminate.

:HELLO FIELD.SUPPORT,HP32230  
-----

:LISTF  
-----

(Check to ensure that WORKOUT2 is included in the listed files. If it is not, Restore it from tape.)

:RUN FREE2.PUB.SYS  
-----

(Examine the "Free" sectors shown. Each WORKOUT2 file requires 4096 sectors; smaller fragments cannot be used. For example, if 8000 sectors are available, only one WORKOUT2 file will fit. If the disc is heavily-fragmented, it may be necessary to do a Coolstart and "Recover Lost Disc Space," or a Reload.)

:SWITCHLOG  
-----

LOG FILE LOGXXXX IS ZZ% FULL  
LOG FILE NUMBER AAAA ON

(You have closed File #XXXX, and opened File #AAAA. It is a good idea to make a written note of the number AAAA, as errors detected during WORKOUT2 will be recorded there. When WORKOUT2 is completed, AAAA will be interrogated with LISTLOG2. After the computer message "LOG FILE NUMBER AAAA ON," the display DOES NOT automatically return the cursor to the left margin and issue a ":" prompt. The operator must strike the Carriage Return.)

:RUN WORKOUT2[;PARM=]

-----  
 (Three options, none of them mandatory, are available.  
 ;PARM=1 eliminates comparing data buffers after each  
 read, and should not be used except for per-  
 formance measurement.  
 ;PARM=2 causes END OF PASS messages to be displayed  
 at the system console as well as the \$STDLIST.  
 ;PARM=3 accomplishes both of the above.)

NUMBER OF DISC FILES?2

-  
 (Assuming sufficient space was shown in the Free2 run  
 above, enter any number from 0 to 64. WORKOUT2 will  
 attempt to open that many files. Default is 0.)

LDN FOR FILE #1?1

-  
 LDN FOR FILE #2?1

-  
 (In entering "1" as the LDN for both files, we are as-  
 suming that the System Disc is the only disc on-line at  
 the time. If more exist, a number up to 255 may be  
 entered. If 0 is entered, WORKOUT2 spreads its files  
 over ALL devices in Class DISC. Default is 0.)

IS A SORT TO BE DONE? YES

---  
 (This will be asked only if your response to "NUMBER OF  
 DISC FILES?" above was 2 or greater. A YES entry caus-  
 es File #1 to be sorted and written to file #N, where N  
 is the last file specified. For example, if you an-  
 swered "NUMBER OF DISC FILES?" above with "2," and now  
 replied YES to "IS A SORT TO BE DONE?" WORKOUT2 would  
 write to File 1, read back the information, sort it,  
 then write it to File 2. Default is No.)

NUMBER OF TAPE FILES?1

-  
 (Enter a number from 0 to 4. Default is 0.)

NUMBER OF PASSES?1

-  
 (Any number from 0 to 32766 may be entered. Default,  
 which is 0, causes the program to terminate immedi-  
 ately.)

?TIME/SESSION#/PIN#/LDEV # FOR "WORKTAPE1" ON TAPE (NUM)?

=REPLY PIN#,LDEV#

-----  
 (BE SURE you load a "scratch" tape, i.e., a blank one  
 or one whose current contents you do not object to los-  
 ing.)



# System Verification

TIME START

(WORKOUT2 now attempts to open the files. If all are successfully opened, NO message will appear. If any file CANNOT be opened, a message to that effect will appear, followed by a message telling how many files WERE successfully opened.)

TIME END OF PASS 1

END OF PROGRAM

:LISTF LOG@.PUB.SYS

-----  
(The purpose here is to learn if there have been any new Logs started subsequent to Number AAAA [the number you wrote down], above.)

:HELLO MANAGER.SYS

-----  
(In order to run LISTLOG2, below, you must have System Manager capability. Thus we exited out of Field .Support and logged into Manager.Sys.)

:RUN LISTLOG2.PUB.SYS

-----  
(The output of LISTLOG2 will be directed to the line printer. For more LISTLOG2 information refer to the MPE System Utilities Reference Manual, part no. 30000-90044.)

ENTER FIRST AND LAST LOG FILE TO BE ANALYZED.

FIRST? \_\_\_\_\_

(Enter #AAAA from above.)

LAST? \_\_\_\_\_

(If no new log files have been opened subsequent to Number AAAA, the LAST will ALSO be AAAA).

ENTER EVENTS TO BE PRINTED

TYPE NO.	EVENT
0	LOG FAILURE
:	:
:	:
11	I/O ERRORS
:	:
:	:

ENTER EVENT NUMBERS SEPARATED BY COMMAS. A CARRIAGE RETURN ASSUMES ALL WILL BE EVALUATED.

11 (Operator's Entry)

--

(An entry of 11 is shown, as we are interested only in I/O errors.)

DO YOU WANT TO PURGE LOG FILES? NO

--

(If the above Free2 listing indicated the disc was getting low on space, you may want to enter YES here to purge old log files.)

DO YOU WISH TO RUN AGAIN (Y OR N)? N

-

END OF PROGRAM

## Power Fail Test

Now that WORKOUT2 has completed one pass, run it again, this time doing a POWER FAIL test, as follows:

First, locate the MAIN CIRCUIT BREAKER for the Computer System Facility Main Power Panel. Warn people who will be affected that you will be tripping it and give them time to prepare for the power outage.

Next, disconnect the mag tape drive's power plug from the SWITCHED 120V/230V outlet on the Power Control Module (PCM) on the back of the CPU Bay.

Connect the system console's power plug in its place. (Now, the console and the system disc are connected to the SWITCHED 120V/230V outlets on the PCM.)

Now start WORKOUT2 again. Use the same procedure as previous, only this time enter "2" or "3" for "NUMBER OF PASSES," instead of "1." This is to ensure that you have plenty of time for the power fail test.

Once WORKOUT2 has begun, power fail the system, by tripping the Computer System Facility Main Power Panel's MAIN CIRCUIT BREAKER, or by removing the CPU Bay's AC power plug.

### Note

The power fail test MUST be done in this fashion to be valid. It is NOT sufficient to trip the "Main Power" Switch on the PCM; in fact, doing that will shut off the backup DC to Memory. If it is absolutely infeasible from the customer's viewpoint to trip the main circuit breaker for the Computer System Facility Main Power Panel, you may do the test by pulling the AC power plug from the outlet.

## System Verification

With power disconnected, wait 30 seconds.

Reset the power. Now check to ensure that a Power Fail message is displayed on the console, and that WORKOUT2 continues execution. Allow it to run to completion.

At this point, if it is convenient for you and the customer, you may wish to start WORKOUT2 again, and leave the system running the program overnight. For "NUMBER OF PASSES?" you may enter any number up to 32766.

In any case, when you have completed the power fail test, return the system console and mag tape AC power cords to their original plug-ins (console to wall outlet; mag tape to SWITCHED 120V on the PCM).

## Peripheral Verifiers

If the system includes any 26XX Line Printer, run the Line Printers Diagnostic, No. PD466A, Diagnostic Manual part no. 30209-90007.

If the system includes a 2635A Printer Terminal, run the Printer Terminal Diagnostic, No. PD474A, Diagnostic Manual part no. 32230-90004.

If the system includes the HP 30010A Intelligent Network Processor (INP), press the red, spring-loaded RESTART Switch on the front edge of the INP-MPU PCA, part no. 30010-60001. At the end of the test (approximately 2 seconds), the two end LED's on the front edge of the PCA (numbers 0 and 7) should be lighted. All others should be off. If any other pattern is displayed, the INP is malfunctioning. To troubleshoot, refer to the INP Installation and Service Manual, part no. 30010-90001.

## 5-4. BEFORE YOU LEAVE ...

### Installation Report

Fill out the GSD System Installation Report in the System Support Log and mail it as soon as possible.

### Customer Training

Familiarize the customer with the operation and periodic maintenance of the system. Be sure to include the following:

- Power on/off.
- Front panel operation.
- Daily maintenance.
- Connecting new terminals.
- System startup.
- Shutdown.

## System Verification

Memory dumping.

System backup.

Changing disc packs.

Loading line printer paper, changing paper, etc.

In particular, here, if the customer has an HP 2619A Line Printer, be sure to caution him NOT to change the PAPER SLEW SPEED while the paper is in motion.

# INSTALLING APL HARDWARE

APPENDIX

A

Before APL (A Programming Language) can be used, two PCA's must be modified. They are:

CIR PCA 30003-60006  
EIS PCA 30012-60001

## A-1. MODIFYING THE CIR PCA 30003-60006

Remove jumper W2 from the CIR PCA to enable the APL instructions. Note that jumpers W1 and W8 are also removed from this PCA when the EIS PCA is installed in the system. Figure A-1 illustrates the location of the CIR PCA jumpers.

## A-2. MODIFYING THE EIS PCA 30012-60001

Modify the EIS PCA by inserting eight IC's into the locations shown in figure A-2 as listed below. When finished, attach the APL label (part no. 7120-5695) to the PCA stiffener as shown in figure A-2.

IC LOCATION	IC PART NUMBER
U14	1816-0976
U34	1816-0977
U54	1816-0978
U74	1816-0979
U94	1816-0980
U114	1816-0981
U134	1816-0982
U154	1816-0983

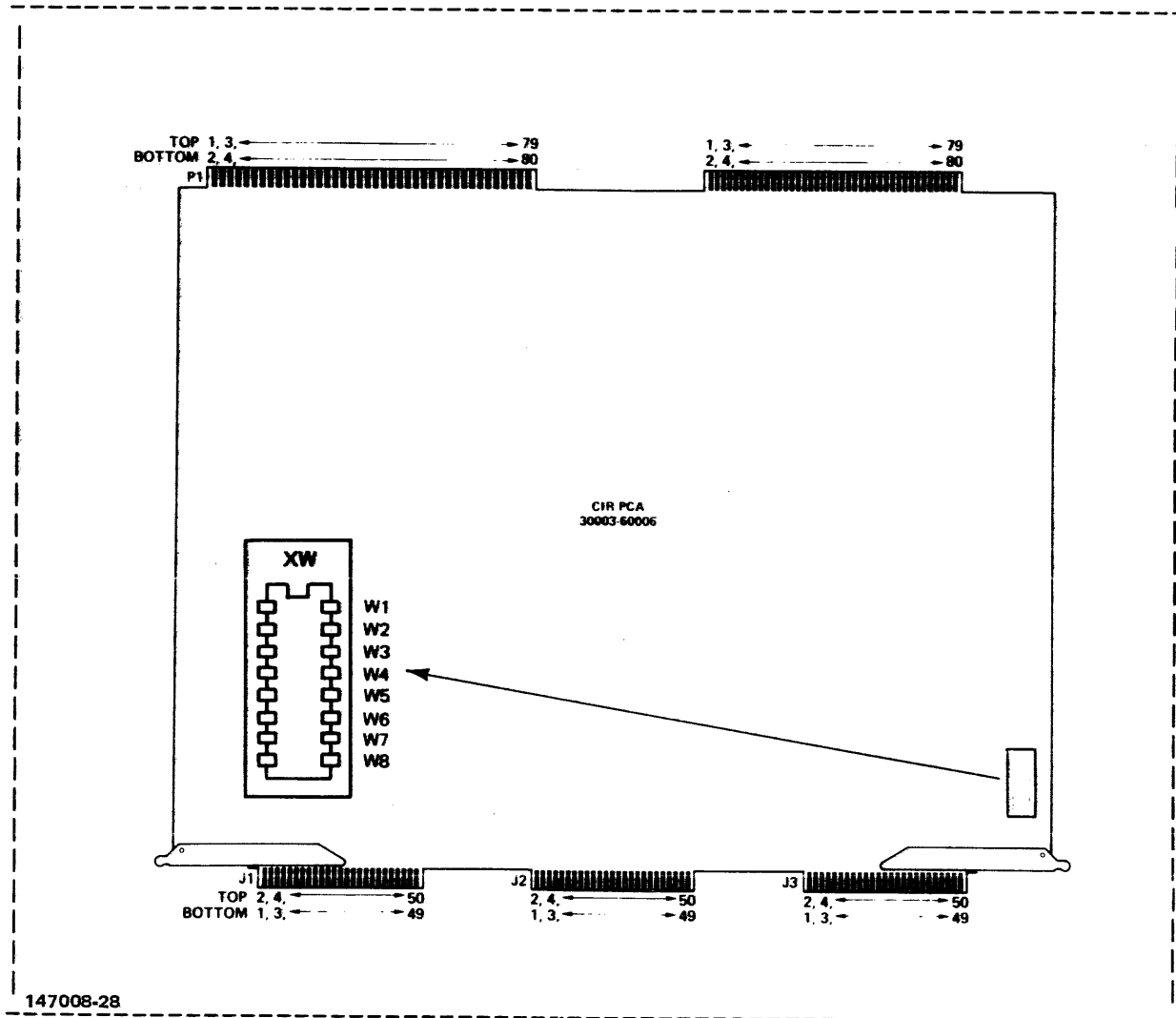


Figure A-1. CIR PCA Jumper Locations

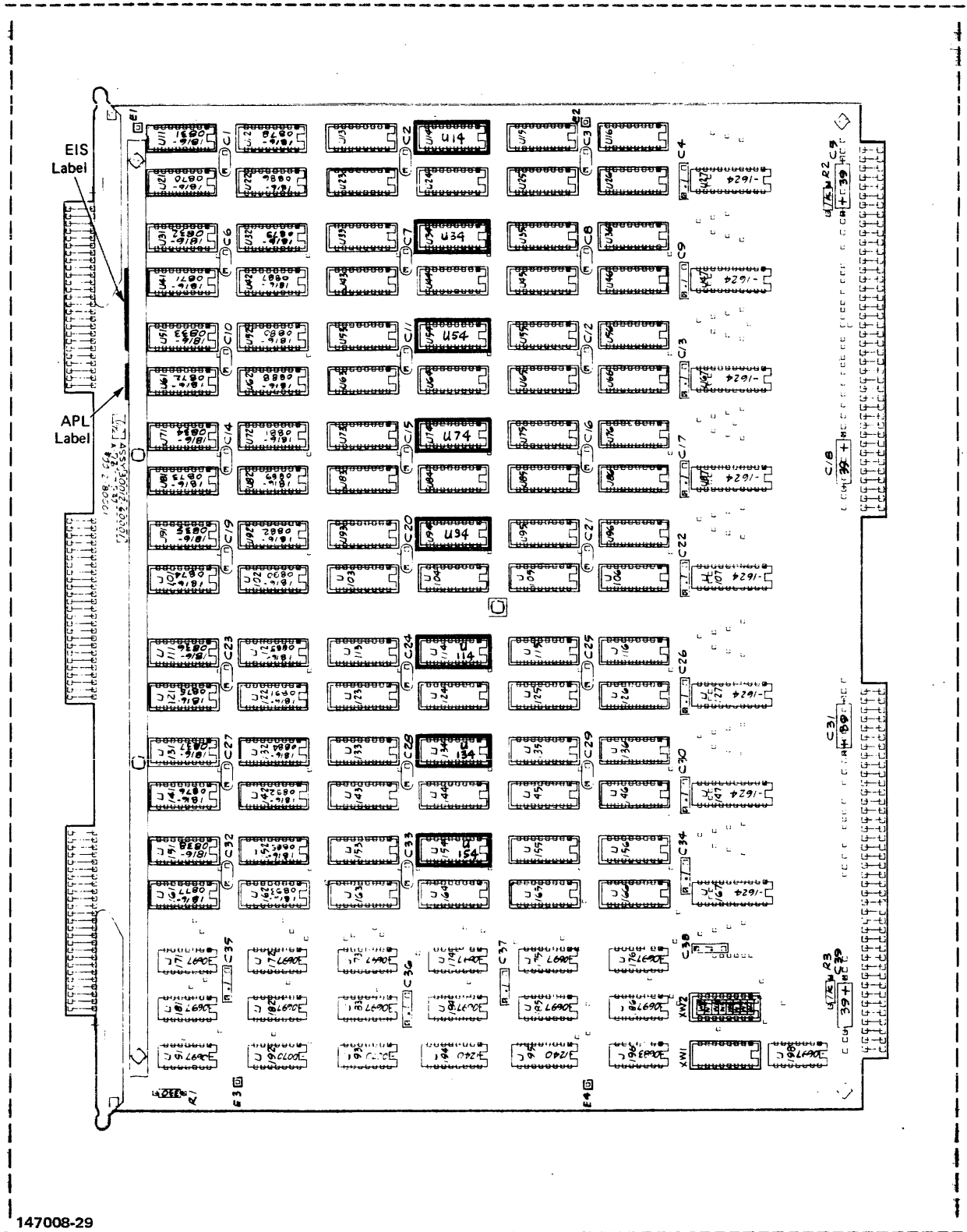


Figure A-2. EIS PCA IC Locations

# POWER SUPPLY TROUBLE ISOLATION

APPENDIX

B

The power control and display panel, figure B-1, is located at the lower front of the CPU bay. This panel has a test point for each of the system voltages plus a common ground test point. Each voltage test point has a LED indicator immediately below it. There are three more DC STATUS indicators and two DC POWER control switches with the following functions:

## DC STATUS Indicators

- BCHG On steady for fully charged, blinking slowly for charging, or blinking quickly for discharging. OUT for completely discharged battery or for no battery.
- PFW Lights when the input AC power is within specifications. When not lighted, the AC power has dropped below specifications and the DC voltages from the power supplies may begin to decay.
- PCN Power on (PCN) is lighted if AC power is applied to the power supplies and the power supplies are operating properly. PCN goes low (off) when DC voltages decay due to loss of AC power or a power supply failure.

## DC POWER Control Switches

- LOGIC Set to DISABLE to remove DC power from all but memory PCA's. This permits removal and replacement of PCA's in the CPU and I/O areas without destroying memory. Set to ENABLE to restore power.
- LOGIC AND Set to DISABLE to remove ALL DC power. Set to ENABLE AND to restore all DC power (provided the LOGIC switch is MEMCRY also set to ENABLE).

When the LOGIC switch is set to DISABLE, PFW will go low, quickly followed by PCN going low. This simulates a power fail so that memory contents will not be lost. In addition, all of the DC VOLTAGE LED's are reset to the ON (lighted) condition. These LED's DC NOT follow the power supply voltages. They only have meaning when a power supply fails. The test points are directly connected to the backplane voltages thru a 1K resistor and can be used to measure backplane voltages without entering the rear of the cabinet.

When the DC POWER switches are set to ENABLE, PFW lights immediately if the AC power is within specifications. PCN lights after approximately one or two seconds if all the DC voltages are present. If PCN does not light, one or more of the DC voltages have



## Appendix B

failed. The LED that remains lighted indicates the voltage source that has failed. At this time, all supplies except memory backup are shut down and these voltages are NOT present at the DC VOLTAGES test points.

Figure B-2 illustrates the locations of the system power supplies. Table B-1 lists the associated LED's and test points for the outputs of the power supplies. Table B-1 also lists the permissible minimum and maximum voltage levels at the test points.

It should be noted that if the I/O bay (Option 200) is not installed, +5-V3 is connected internally to +5-V2 and one or both LED's will light if +5V-2 fails.

If a power supply fails, it is immediately apparent by examining the LED's on the DC Power Control and Display Panel. Proceed as follows:

### **WARNING**

All power supplies operate with high AC voltage at their input. Use extreme caution when troubleshooting the power supply circuits and ensure that all AC power is removed from the system before attempting to remove a power supply. Failure to comply may result in serious injury or death.

1. Check that the DC POWER LOGIC and LOGIC AND MEMORY Switches are set to ENABLE.
2. The PON LED is not lighted and the PFW LED is lighted.
3. Some DC VOLTAGES LED's are lighted and some are not lighted. Note the LED's that ARE LIGHTED.
4. Using table B-1, determine which power supply is the power source for the voltages indicated by lighted LED's.
5. Use figure B-2 to determine the location of the faulty power supply.
6. Attempt to locate the trouble by following standard troubleshooting procedures such as checking for disconnected or loose wires, open fuses, out-of-tolerance voltage levels, etc.

## Note

The shutdown function of the Power Supply Control PCA can be disabled by connecting a jumper from GND to M.A. (Maintenance Aid) on the display panel (see Figure B-1). If the power supplies operate properly with these points jumpered, the problem is in the Power Supply Control PCA, and NOT in one of the supplies. If a Control PCA (30135-60017) must be replaced, be sure the new one has a date code of 1925 or newer.

7. If necessary, replace the defective power supply.

Table B-1. Test Point/Voltage Relationships

LED/TP	Range		Source (Note 1)	Supplies (Note 2)
	Min.	Max.		
+15	+14.5	+16.5	P02	CC3-6
+12B	+11.9	+12.1	P07	CC2-6
+5CPU	+5.17	+5.17	P41	CC1-2
+5B	+5.0	+5.25	P07	CC2
+5-V1	+5.0	+5.25	P02	CC3
+5-V2	+5.0	+5.25	P09	CC4
+5-V3	+5.0	+5.25	P41	CC5-6
TEMP				Note 3
-5B	-5.0	-5.25	P07	CC2-6
-5	-4.5	-5.5	P09	CC3-6
-15	-14.5	-15.5	P02	CC3-6

Notes: 1. P02 = HP 63312F-P02  
P07 = HP 61315D-P07  
P09 = HP 61312F-P09  
P41 = HP 62605M-P41

2. CC = Card Cage  
CC5-6 are in I/O bay Option 200

3. Sense line for TEMP goes through a thermal switch on the cabinet fan panel to +5-V2 in CC4. High temperatures open the switch simulating a power failure. If +5-V2 fails, the +5-V2 and TEMP LED's may both light. Also, the TEMP LED may remain lighted with the +5-V2 LED not lighted.

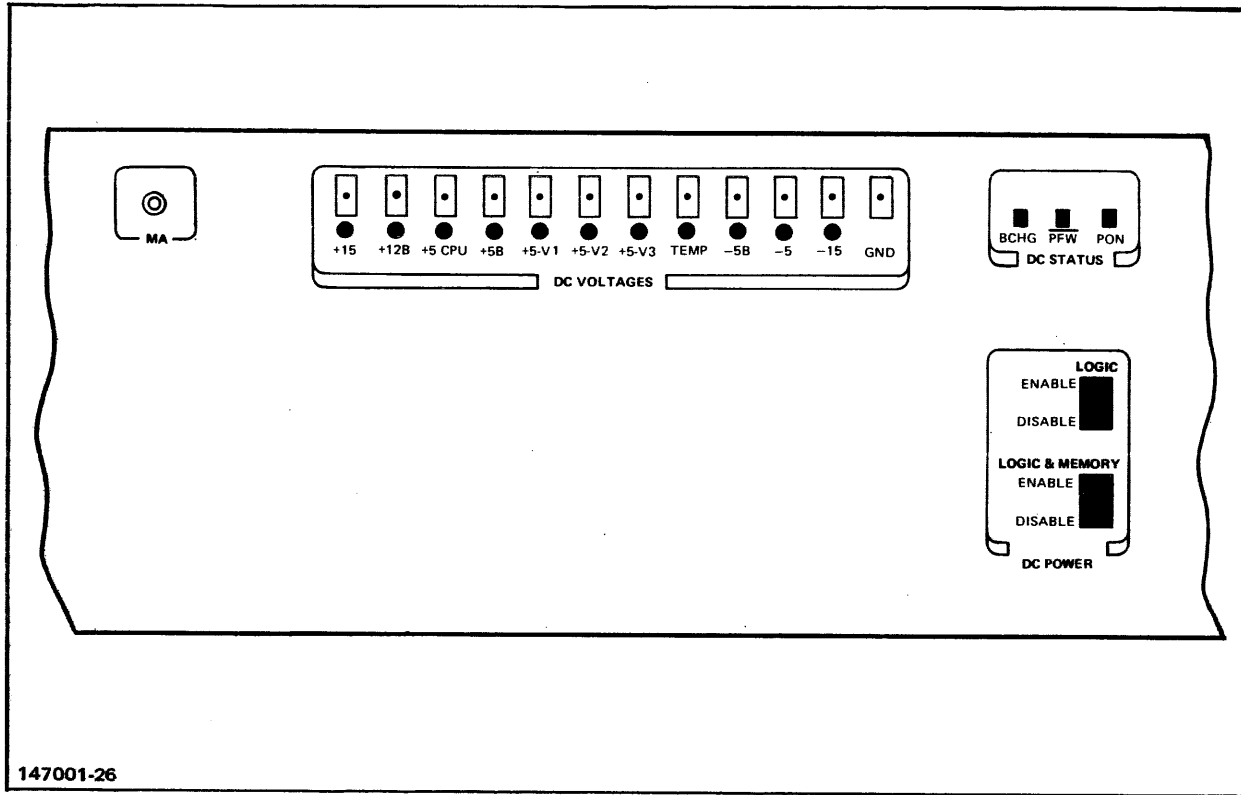


Figure B-1. DC Power Control and Display Panel

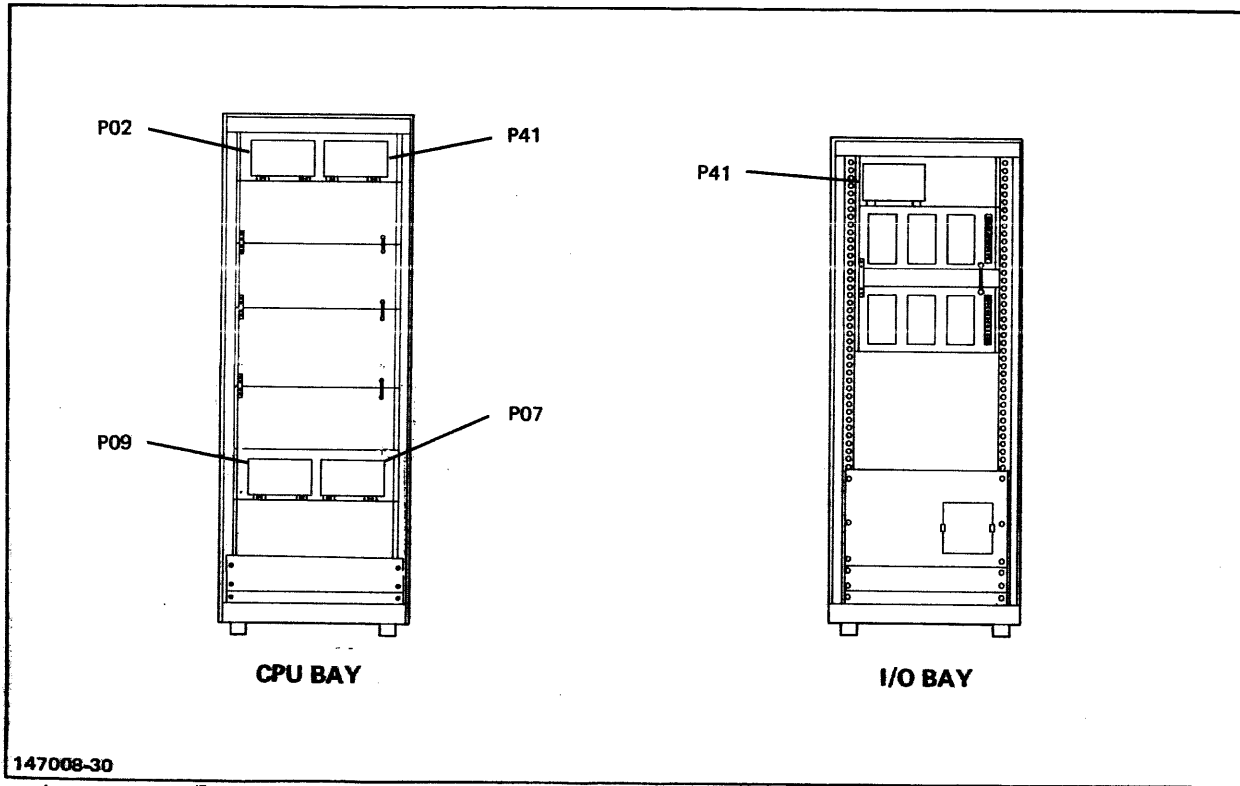


Figure B-2. Rear View of System Bays Showing Location of System Power Supplies

# MEMORY CONFIGURATION

APPENDIX

C

## GENERAL

This appendix provides PCA switch data for switches that are subject to change with a change in memory size. The positions and functions of other switches on the affected PCAs are also included. Figure C-1 shows approximate location of the switches.

## PORT SELECTOR PLUG

The Selector Channel Register PCA in slot A5 of card cage No. 3 must have its port selector plug in socket XW1.

## MEMORY SIZE

Memory size affects switch S3 on the S-Bus PCA, IOP PCA, and Selector Channel Register PCA. Switch S3 is positioned according to memory size in words as follows:

1	128K	3	384K	5	768K
2	256K	4	512K	6	1024K

## MEMORY INTERLEAVING

Switches S1 and S2 on the S-Bus PCA, IOP PCA, and Selector Channel Register PCA are configured as follows:

Mode	S1						S2					
	1	2	3	4	5	6	1	2	3	4	5	6
Non-Interleaving	C	C	C	C								C
												*

\*Applies to IOP PCA only.

On each PCA, open all switch positions of S1 and S2, then close switch positions according to mode where a C appears in the above table.

NOTE

All systems are presently configured by switches S1 and S2 for the non-interleaving mode.

**ERROR LOGGING ARRAY CLEAR**

The error logging array on the Memory Control and Logging PCA can be cleared by using the momentary switch S1 on the front edge of the PCA. The array is normally cleared by software or at system turn on.

**READY/ENABLE SELECT**

This switch S2 is set to position A on the Memory Control and Logging PCA in the top half of card cage No. 2 and to position B of the Memory Control and Logging PCA in the bottom half of card cage No. 2.

NOTE

This is a convention used in the factory; one switch must be set to A and one to B.

**BOARD SELECT**

Each Semiconductor Memory Array PCA has a four-position switch S1 that is set according to its location in the card cage as follows:

Card Cage No. 2			
SLOT	POSITION	SLOT	POSITION
A1	0	A7	3
A2	1	A8	2
A3	2	A9	1
A4	3	A10	0

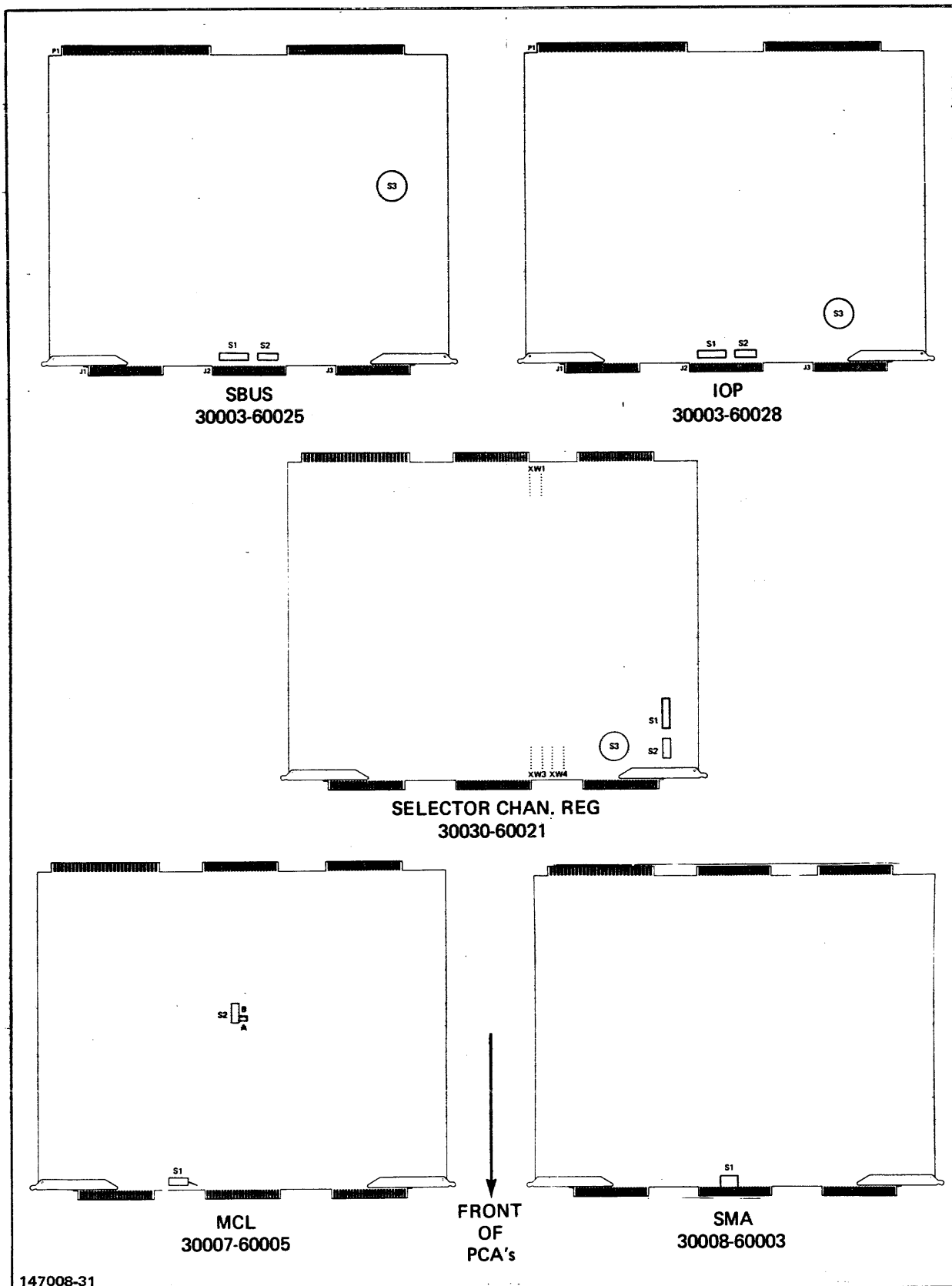


Figure C-1. Memory Associated PCAs

## D-1. CONTROL PANEL TESTS AND FUNCTIONS

Stored in the microcode are diagnostics to test the CPU registers, memory, I/O channels, magnetic tape subsystem, and the asynchronous terminal data PCAs. Diagnostics are executed from the system's control panel. The microcode also provides the following functions:

- a. Display Memory Logging Errors
- b. Read/Write Memory
- c. Display Register Contents

## D-2. CPU REGISTER TEST

Proceed as follows to test the various CPU registers.

- a. Set the SYSTEM SWITCH REGISTER to %000001.
- b. Press the ENABLE and LOAD switches.
- c. The program runs continuously until the HALT switch is pressed or until an error occurs.

Upon detection of an error, the test pauses in the run mode with the CURRENT INSTRUCTION REGISTER (CIR) displaying "bad bits". Press the RUN/HALT switch to obtain a code designating the failing register. Decode the display using table D-1.

Table D-1. CPU Register Codes

CIR	REGISTER	LOCATED ON
00	SP1 (Note)	R-Bus PCA
01	PL	R-Bus PCA
02	Z	R-Bus PCA
03	X	R-Bus PCA
04	RD (R-Bus)	R-Bus PCA
05	RC (R-Bus)	R-Bus PCA
06	RB (R-Bus)	R-Bus PCA
07	RA (R-Bus)	R-Bus PCA
10	SPO	R-Bus PCA
11	CRTL	S-bus PCA
12	P	S-Bus PCA
13	Q	S-Bus PCA
14	DB	S-Bus PCA
15	SM	S-Bus PCA
16	STA	SSF and S-Bus PCA's
17	SP3	S-Bus PCA
20	OPND	CIR PCA
21	DL	S-Bus PCA
22	SP2	S-Bus PCA
23	PB	S-Bus PCA
24	PCLK	S-Bus PCA
25	RD (S-Bus)	S-Bus PCA
26	RC (S-Bus)	S-Bus PCA
27	RB (S-Bus)	S-Bus PCA
30	RA (S-Bus)	S-Bus PCA
31	CTRH	S-Bus PCA
32	ABS BANK	SSF PCA
33	PB BANK	SSF PCA
34	DB BANK	SSF PCA
35	S BANK	SSF PCA

## NOTE

SP1 is the first register tested and the problem may not necessarily be in SP1 but somewhere previous in the data path (Store logic, Shifter, ALU, etc.)



**D-3. MEMORY PATTERN TEST**

This test writes then immediately reads back any bit pattern entered into the SYSTEM SWITCH REGISTER. The pattern pervades all of memory. The initial pattern is 100000. The current pattern is displayed in the CIR. Invoke the test as follows:

- a. Set the SYSTEM SWITCH REGISTER to %100000.
- b. Press the ENABLE and LOAD switches.
- c. The test runs continuously until an error occurs or if the RUN/HALT switch is pressed until the end of a pass.

If an error is detected, the test halts and the CIR displays the error type as follows:

```
CIR = 0      Data Compare Error
CIR(4) = 1   System Parity Error
CIR(5) = 1   Address Parity Error
CIR(6) = 1   Multiple-Bit Error
```

Press the RUN/HALT switch for a CIR display of memory bank number, press again for address, and press again for expected data XOR actual data (bad bits).

**D-4. MEMORY ADDRESS TEST**

This test loads the memory with address dependent data then checks it while reading it back. Perform this test as follows:

- a. Set the SYSTEM SWITCH REGISTER to %000000.
- b. Press the ENABLE and LOAD switches.
- c. The test runs continuously until an error occurs or if the RUN/HALT switch is pressed until the end of a pass.

If an error is detected, the test halts and the CIR displays the error type as follows:

```
CIR = 0      Data Compare Error
CIR(4) = 1   System Parity Error
CIR(5) = 1   Address/Data Bus Parity Error
CIR(6) = 1   Multiple-Bit Error
```

Press the RUN/HALT switch for a CIR display of memory bank number, press again for address, press again for actual data, and press again for expected data.

### **D-5. I/O TEST (TIO)**

This test sends a TIO command to device numbers octal 2 through 177 in turn, then pauses with the TIO status of each responding device in the CIR. Pressing the RUN/HALT switch advances to the next device. Perform the test as follows:

- a. Set the SYSTEM SWITCH REGISTER to %000002.
- b. Press the ENABLE and LOAD switches. The test pauses with 000002 in the CIR. This is the device number of the FLI PCA.
- c. Press the RUN/HALT switch to display TIO status of that device.
- d. Press the RUN/HALT switch for the device number of the next responding device, then once more for TIO status of that device.
- e. Repeat step "d" until the CIR displays %000200 and the SYSTEM HALT light is lit.

### **D-6. I/O TEST (SIO)**

This test executes an SIO program consisting of only an END-ORDER for all devices in turn that have the SIO OK bit set in the TIO status word. It pauses for each with the END-ORDER status in the CIR. Press the RUN/HALT switch to advance to the next device. Perform the test as follows:

- a. Set the SYSTEM SWITCH REGISTER to %100002.
- b. Press the ENABLE and LOAD switches.
- c. The CIR displays the device number of the first responding device that has the SIO OK bit set in its TIO status. Press RUN/HALT to display SIO END-ORDER status for that device.
- d. Press the RUN/HALT switch for the device number of the next responding device, then once more for SIO status of that device.
- e. Repeat step d until the CIR displays %000200 and the SYSTEM HALT light is lit.

## D-7. START I/O TEST

This function issues a start I/O (SIO) command to a device then waits for an interrupt from that device. A RIL is sent to any other interrupting devices. After receiving the interrupt, the function system-halts with the CIR displaying TIO status from the device if the command succeeded or 030370 if the command failed.

This function assumes that an SIO program is already in memory and that the DRT pointer at DEVNO\*4 has been initialized.

Use the function as follows:

- a. Set the SYSTEM SWITCH REGISTER to %005000.
- b. Press the ENABLE and LOAD switches. The system pauses with 005000 in the CIR.
- c. Set the SYSTEM SWITCH REGISTER bits 9 through 15 to the device number.
- d. Press the RUN/HALT switch to send the SIO command to the device.

## D-8. MAG-TAPE TEST

This test writes a 4K-word record to tape from each memory bank correcting for tape errors by issuing a backspace record followed by a write gap and then retrying. After this writing operation, the tape is rewound and each 4K-word record is read into another area of its source memory bank. The data written is compared with the data read and the test halts if an error is detected. The test runs continuously if no error is found. If the SIO command to the tape unit fails, the test halts with 030370 in the CIR. Invoke the test as follows:

- a. Set the SYSTEM SWITCH REGISTER to 006000.
- b. Press the ENABLE and LOAD switches. The test pauses with 006000 in the CIR.
- c. Set bits 7 through 15 of the SYSTEM SWITCH REGISTER to the device number of the tape drive to be tested.
- d. Press the RUN/HALT switch to start the test.

On a halt, the CIR displays the current bank in bits 0 through 3 and the mag tape command in bits 12 through 15. The test halts if an error is detected or if the RUN/HALT switch is pressed until a pass is completed. If the test halts on an error, subsequent pressing of the RUN/HALT switch causes the following sequence of displays.

## Appendix D

1	STATUS	Privileged mode, enable interupt, CST #1*
2	SP1	Data word written
3	SP2	Data word read
4	TOS	Not used
5	PB-BNK	Current I/O bank address
6	PB	SP1 XOR SP2 (failing bit)
7	P	Write buffer address
8	PL	Read buffer offset
9	DB-BNK	Not used
10	DB	Device number under test
11	S-BNK	Always 0
12	DL	CCPX parameter word
13	Q	Device number times 4 (DRT)
14	SM	Used as address pointer to build SIO program.
15	Z	I/O bank in bits 0, 1, and 2
16	INDEX(X)	Interrupting device number
-----		
	* 14001	

### D-9. ASYNCHRONOUS TERMINAL CONTROLLER SUBSYSTEM

This test causes characters typed on a selected terminal to be echoed and the ASCII code of the character to appear in bits 7 through 15 of the CIR. A non-responding device halts the test with 030370 in the CIR. Run the test as follows:

- a. Set the SYSTEM SWITCH REGISTER to %007000.
- b. Press the ENABLE and LOAD switches. The test pauses with 007000 in the CIR.
- c. Enter the device number of the asynchronous terminal controller in bits 7 through 15 and the port number in bits 3, 4, 5, and 6.
- d. Press the RUN/HALT switch. The test pauses with the CIR equal to the switch register.
- e. Enter the character size parameter into bits 5, 6, and 7 and the baud rate parameter into bits 8 through 15.
- f. Press the RUN/HALT switch. The test pauses with the CIR equal to the switch register.
- g. Press the RUN/HALT switch.
- h. Strike keys on the terminal's keyboard and observe that the characters are echoed correctly and the ASCII code for each character is displayed in bits 7 through 15 of the CIR.

The character size parameter is the three least significant bits of the sum of the number of start, parity, data, and stop bits in a transmitted character less one.

To calculate the baud rate parameter divide decimal 14400 by the device bit rate, round off to the nearest integer, and subtract one. Convert the decimal answer to octal.

Some octal examples of character size and baud rate parameters are as follows:

DEVICE	CHARACTER PARAMETER	BAUD PARAMETER	OVERALL() SETTING
ASR 33 Teletype	2	202	1202
30-CPS Terminal	1	057	457
60-CPS Terminal	1	027	427
120-CPS Terminal	1	013	413
240-CPS Terminal	1	005	405

## D-10. DISPLAY MEMORY LOGGING ERRORS FUNCTION

This function transfers the contents of the error logging arrays (one error logging array is on each of up to two MCL PCAs) to the I/O logging array on the fault logging interface (FLI) PCA. It then interrogates the FLI PCA and displays the diagnostic status word in the CIR for each error logged. The diagnostic status word, figure D-1, contains the information needed to find failing RAMs. Use this function as follows:

- a. Set the SYSTEM SWITCH REGISTER to %001000.
- b. Press the ENABLE and LOAD switches. The test pauses with 001000 in the CIR.
- c. Press the RUN/HALT switch to observe the RIO status word for the first error logged. If no errors are logged, the CIR display is %000000 and the SYSTEM HALT light is lit.
- d. Press the RUN/HALT switch again for the next and subsequent errors. When the CIR display is 000000 and the SYSTEM HALT light is lit, all errors have been observed.

The function system halts with 030370 in the CIR if the FLI PCA does not respond. When an error is detected, use the flowchart, figure D-2, to isolate the error to a single bit error, a double bit error, or more than a double bit error. Table D-2 is used with Figure D-2.

Figure D-1. Diagnostic Status Word

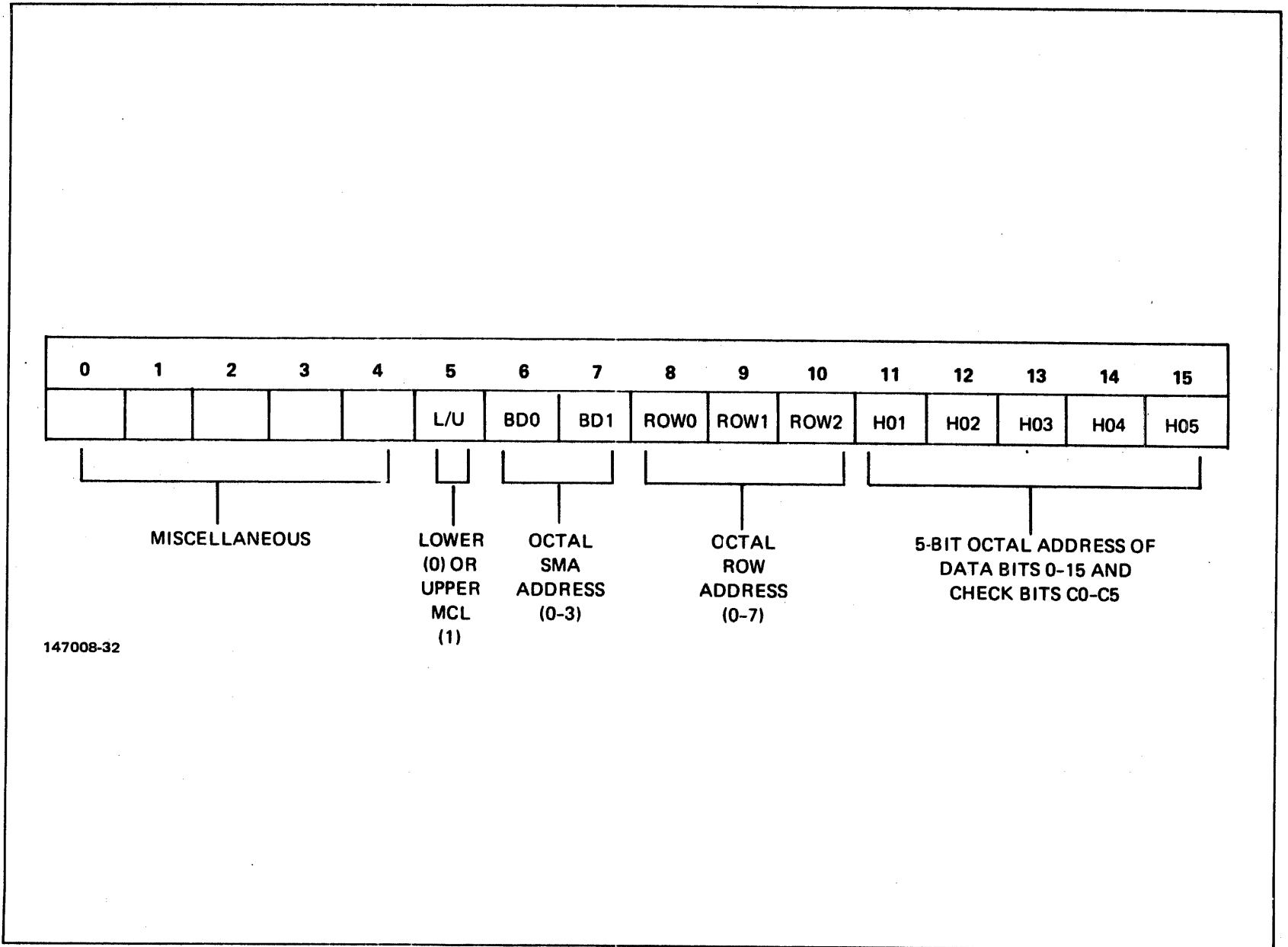
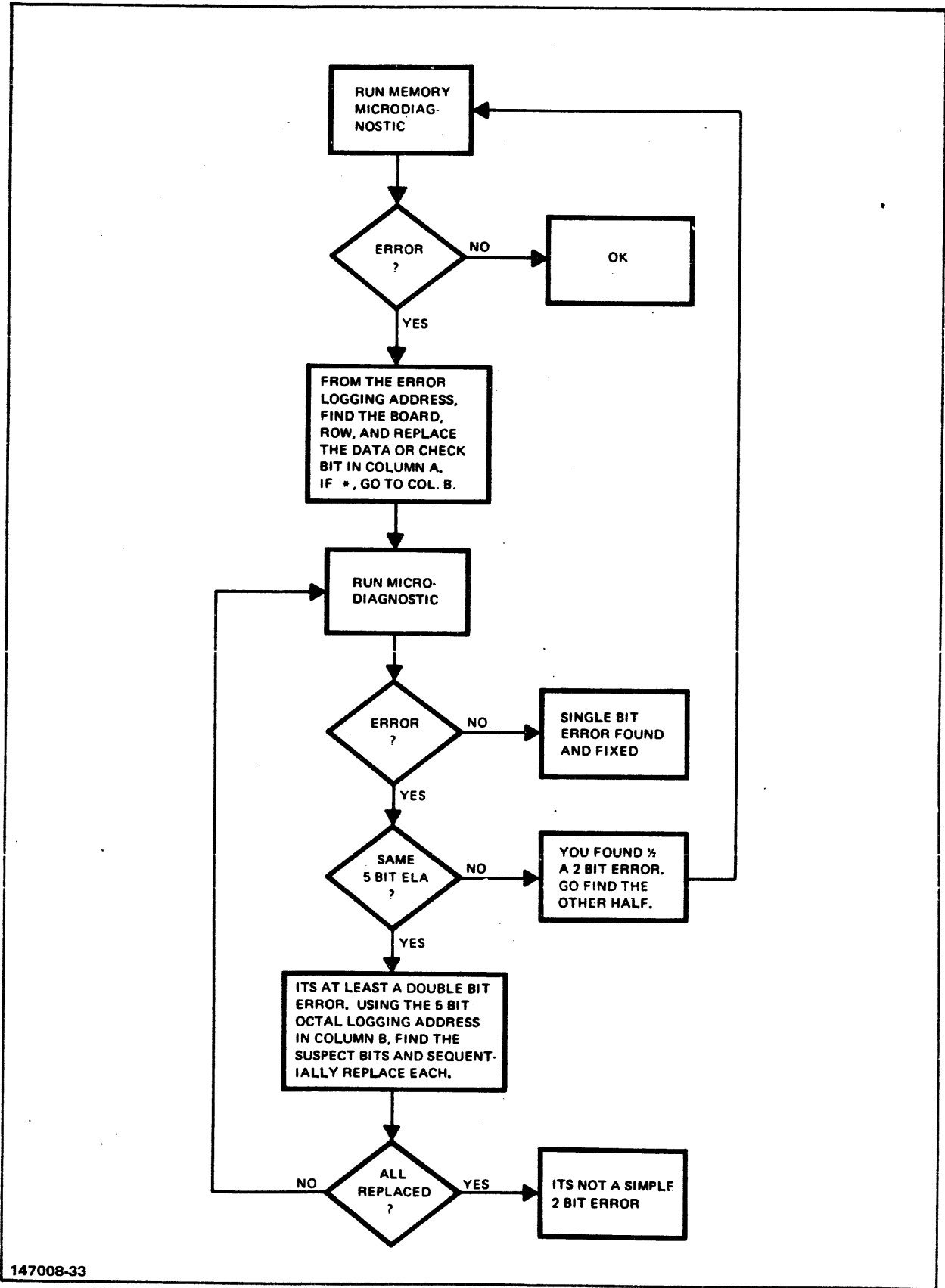


Table D-2. 5-Bit Octal ELAD to Data or Check Bits Conversion  
(More than Single Bit Errors)

H01-H05	A	B
	BIT	BITS
00	C0	-
01	C5	D0,2,3,4,5,6,7 -
02	C4	D1,2,3,8,9,10,11 -
03	D3	D0,1,2,4,7 C5
04	C3	D0,4,5,9,12,13,14 -
05	*Note 1	D0,1,3,4,5,6,7 C5
06	D9	D0,1,2,8,10,11 C4
07	D0	D1,2,3,5,6,9 -
10	C2	D1,6,8,10,12,13,15 -
11	D6	D0,1,2,4,5,7 C5
12	*Note 2	D0,1,3,8,9,10,11 C4
13	D1	D0,2,3,4,6,7 -
14	D13	D0,4,8,12,14 C3
15	D4	D1,3,5,6,13 -
16	D8	D0,3,9,10,11,13 -
17	*	D0,1,2,3,4,5,6,8 -
20	C1	D2,7,11,12,14,15 -
21	D7	D1,2,3,4,5,6 C1
22	D11	D0,2,3,8,9,10 C1
23	D2	D0,1,3,5,6,7,11 -
24	D14	D0,5,8,9,12,13 C1
25	D5	D0,2,4,6,7,14 -
26	*	D0,3,8,9,10,11,14 -
27	*	D0,1,2,3,4,5,7 -
30	D15	D1,4,6,10,12,13 C1
31	*	D1,3,4,5,6,7,15 -
32	D10	D1,2,8,9,11,15 -
33	*	D0,1,2,3,5,6,10 -
34	D12	D12 D4,5,8,9,13,14,15 -
35	*	D0,2,4,5,6,7,12 -
36	*	D1,2,8,9,10,11,12 -
37	*	D1,2,3,4,7 -

COLUMN A IS FOR SINGLE CHECK OR DATA BIT ERRORS.  
COLUMN B IS FOR MULTIPLE CHECK OR DATA BIT ERRORS.

Notes: 1. Forced Double Error Write.  
2. Missing Array Board.



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Figure D-2. Faulty Chip Locating Flowchart



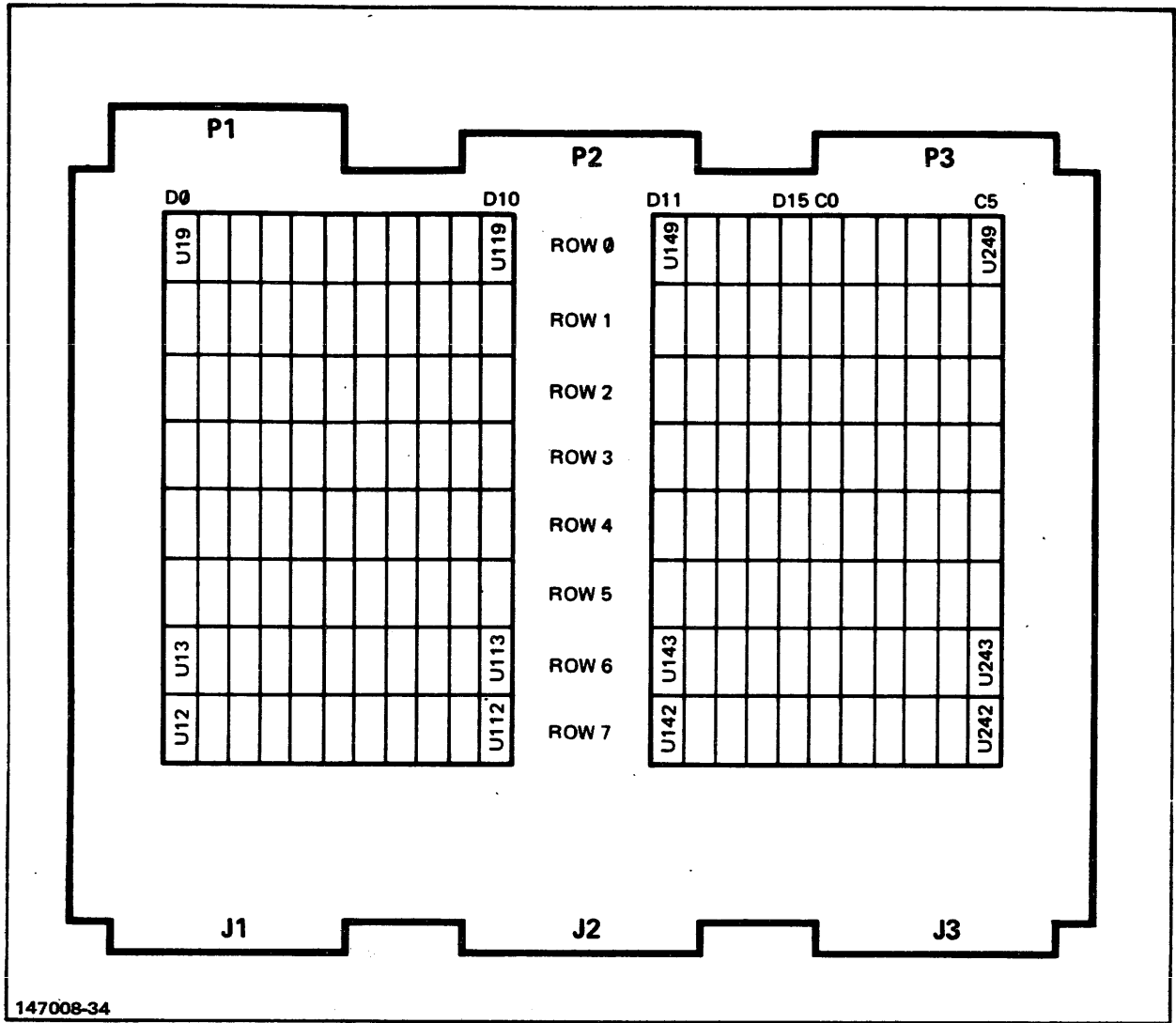


Figure D-3. Row and Chip Locator

## D-11. CONTROL PANEL READ/WRITE MEMORY FUNCTION

This function allows memory to be written or read from the system control panel on a word-by-word basis. The function allows reading and writing while incrementing memory addresses or decrementing memory addresses. To use this function, set one of the following bit patterns into the SYSTEM SWITCH REGISTER.

1. To write while incrementing memory: 002000
2. To read while incrementing memory: 003000
3. To write while decrementing memory: 102000
4. To read while decrementing memory: 103000

Then proceed as follows:

- a. Press the ENABLE and LOAD switches. The system pauses with the CIR equal to the switch register.
- b. Enter the selected bank address (%0 - %17) in bits 12 thru 15 of the SYSTEM SWITCH REGISTER.
- c. Press the RUN/HALT switch. The system pauses with the bank number in the CIR.
- d. Enter the starting address (%0 - %177777) in the SYSTEM SWITCH REGISTER.
- e. Press the RUN/HALT switch. The system pauses with the starting address of the read or write operation in the SYSTEM SWITCH REGISTER.

For a memory write, set the data word to be written into the SYSTEM SWITCH REGISTER. Press the RUN/HALT switch to write the first data word at the starting address. If required, change the data word in the SYSTEM SWITCH REGISTER and press the RUN/HALT switch to write the data word at the incremented or decremented memory address. The data word is displayed in the CIR after it is written into memory.

For a memory read, press the RUN/HALT switch to read the data word at the starting address. The data word is displayed in the CIR. Press the RUN/HALT switch again to read the data word at the incremented or decremented address.

Addresses do not cross bank boundaries, address 000000 follows address 177777.

A SYSTEM/HALT occurs if an attempt is made to read or write non-existent memory.

**D-12. DISPLAY REGISTER FUNCTION**

This function displays the contents of most of the CPU registers and also the contents of the top-of-stack in memory. Pressing the RUN/HALT switch causes the CIR to display the contents of the following registers in the order shown below:

00 - STATUS	10 - DB bank
01 - SP1	11 - DB
02 - SP2	12 - S bank
03 - TOS = MEM(SM)	13 - DL
04 - PB bank	14 - Q
05 - PB	15 - SM
06 - P	16 - Z
07 - PL	17 - X

To use this function, proceed as follows:

- a. Set the SYSTEM SWITCH REGISTER to 004000.
- b. Press the ENABLE and LOAD switches. The system pauses with 004000 in the CIR.
- c. Press the RUN/HALT switch as needed to observe register contents.

The function will SYSTEM HALT when the index register (X) has been displayed.

# I/O PCA CONFIGURATION

APPENDIX

E

The figures of this appendix show the locations of wire jumpers and switches for the PCAs located in the I/O related slots of the computer card cages. Table E-1 cross references interface PCA's to figures in this appendix.

Table E-1. PCA Jumpers

Interface PCA	HP Number	See Figure
7920/7925 Disc Drive	30 229-60001	E-1
Hard-Wired Serial Interface	30 360-60001	E-2
Magnetic Tape Controller	30 215-60006	E-3
Terminal Data	30 032-60001	E-4
Terminal Control	30 061-60001	E-5
Card Reader	30 050-60001	E-6
Multiplexer Channel	30 036-60002	E-7
Synchronous Single-Line Cntrlr	30 055-60001	E-8
Paper Tape Reader	30 050-60001	E-9
Paper Tape Punch	30 050-60001	E-9
Card Reader/Punch	30 050-60008	E-9
Calcomp Plotter	30 226-60001	E-10
Programmable Controller	30 051-60001	E-11
Line Printers (All)	30 051-60001	E-11
Intelligent Network Processor-MPU	30 010-60001	E-12

## SWITCHES AND JUMPERS FOR SYSTEM CONFIGURATION

There are switches and sockets for jumper installation that appear frequently on I/O interface PCA's that have the same general function. These switches and jumpers are discussed in the following paragraphs.

### Device Number

Device numbers are assigned to PCA's via rocker-arm switches or wire jumper-sets. On the PCA's with SWITCHES, a CLOSED switch indicates logic 0; an OPEN switch indicates logic 1.

On the PCA's with WIRE JUMPER-SETS, the PRESENCE of a wire indicates logic 0; the ABSENCE of a wire indicates logic 1.

As an example, turn to Figure E-4, the Terminal Data Interface PCA. The standard device number assignment for this PCA is %7. Therefore, switches 6, 7 and 8 (the three Least Significant Bits) should be OPENED, and 1 through 5 should be CLOSED.

### Note

The SYSTEM CLOCK/FLI PCA is a sole EXCEPTION to the above rules. On this PCA, a logic 1 is indicated by the PRESENCE of a wire; the ABSENCE of a wire indicates logic 0. HOWEVER, the CE NEED NOT be concerned with the Device Number on this PCA, as it is HARD-WIRED at the factory, and SHOULD NOT be changed.

### DRT Address Odd Parity :

This jumper or switch is used with the Device Number jumpers/switches to ensure odd parity of the bit pattern representing the DRT address.

On PCA's with SWITCHES, if the number of OPEN DRT Switches, after you have set the Octal DRT number in place, is ODD, leave the Parity Switch CLOSED. If the number of OPEN switches is EVEN, then OPEN the Parity Switch, making the TOTAL number of OPEN switches ODD.

Likewise, on PCA's with WIRE JUMPERS, use the Parity Jumper position to make the TOTAL number of ABSENT jumpers an ODD number.

### Multiplexer Channel Service Request

The multiplexer channel has priority encoder logic which monitors the Service Request (SR) lines from up to 16 device controllers. Each device controller is assigned data service priority by being assigned one of these SR lines. The assignment is made by the installation of a jumper in one of 16 possible positions at the device controller's interface. Position 0 assigns the highest priority; position 15 assigns the lowest.

### Interrupt Mask

This jumper must be set to the ENABLE position in all HP 3000 Series III systems.

### CONVENTIONS USED IN THIS GUIDE

1. All PCA's are shown component side up with power edge connector at the top left.
2. To enhance visibility, the jumpers and their positions are larger in proportion to the PCA's on which they are shown mounted.

### 7920/7925 CARTRIDGE DISC INTERFACE PCA (FIGURE E-1)

- W1 Preset Disable. W1 is installed in all HP 3000 Systems.
- W2 Interrupt Mask. Set to E.
- S1 Device Number. Seven-switch, rocker-arm unit. Open switch #3, close all others, for device number %4.
- S2 Interface Address. Close all switches for an interface address of %0.

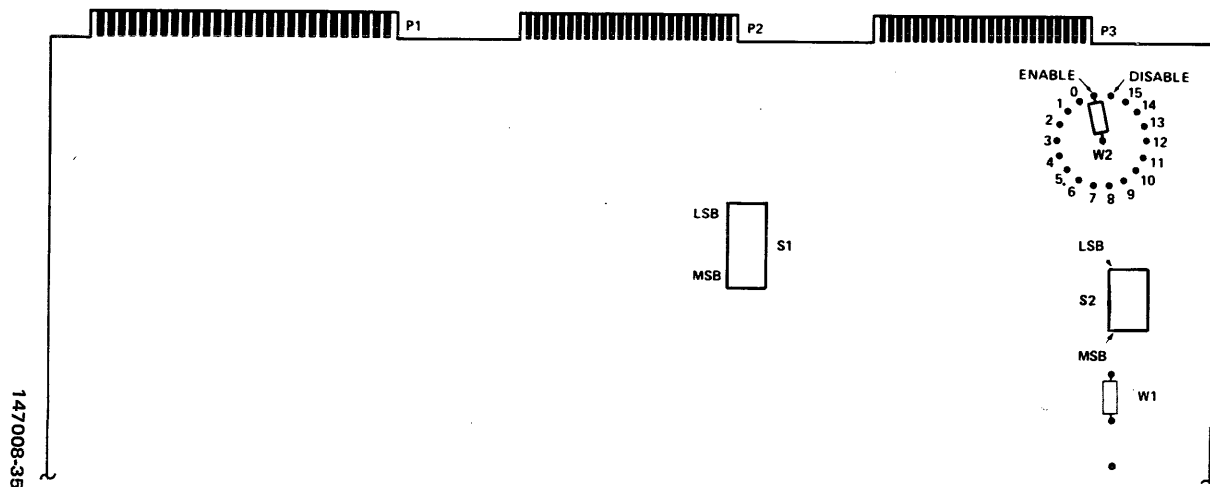


Figure E-1. 7920/7925 Disc Interface PCA

### HARDWIRED SERIAL INTERFACE PCA (FIGURE E-2)

- W1 Interrupt Mask.
- W2 Multiplexer channel service request is shown as 4.
- S1 Device Number. Eight-switch, rocker-arm unit. Open Bit 5, close all others, for device %20.

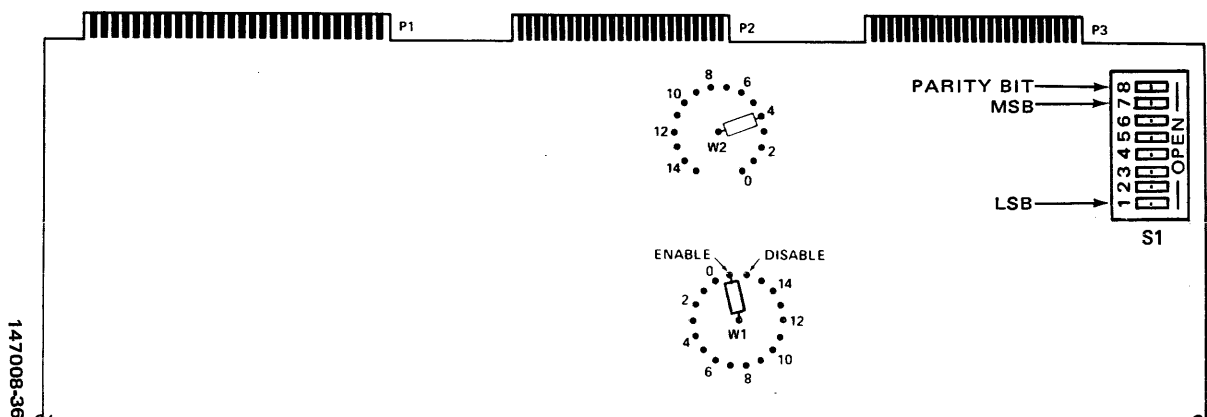
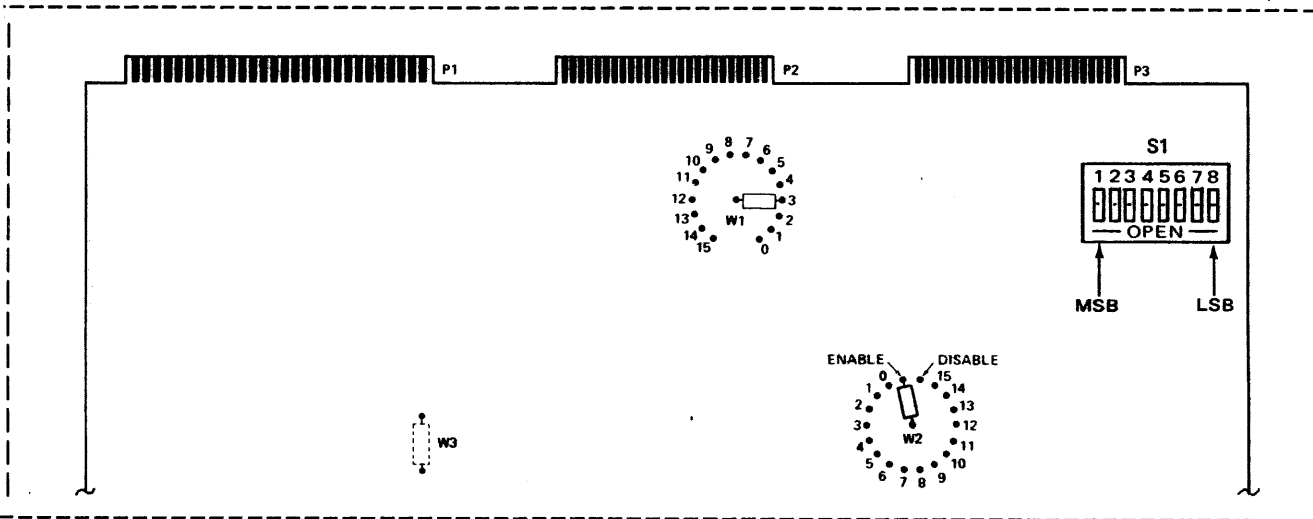


Figure E-2. Hardwired Serial Interface PCA

**MAG TAPE (9 TRK) CONTROLLER PCA (FIGURE E-3)**

- W1 Multiplexer channel service request is shown as 3.
- W2 Interrupt Mask.
- W3 DRT Address Odd Parity.
  
- S1 Device Number. Eight-switch, rocker-arm unit. Open switches 6 and 7, close all others, for device #6.

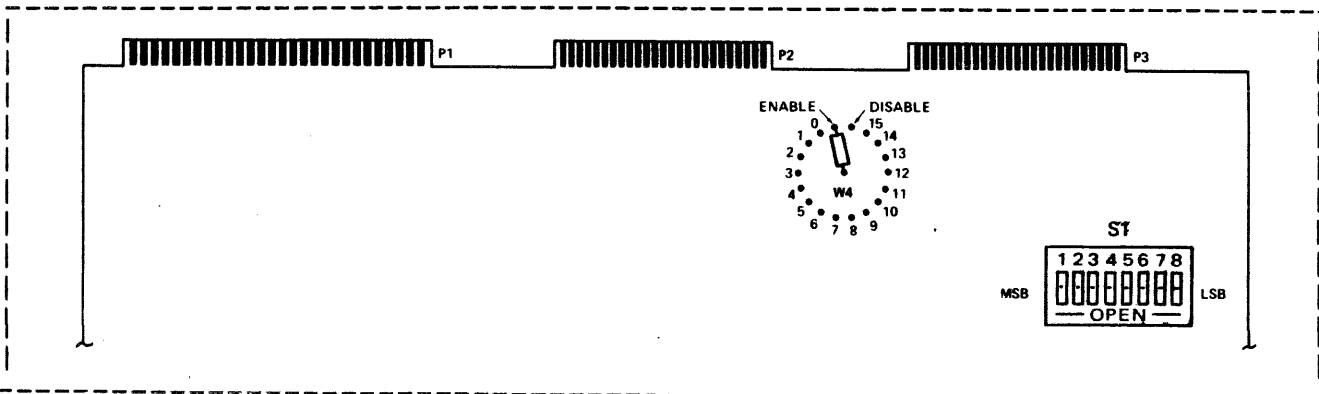


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Figure E-3. Mag Tape (9 Trk) Controller PCA

**TERMINAL DATA INTERFACE PCA (FIGURE E-4)**

- W1,W2,W3 These jumpers (not shown in figure E-4) are for factory use only.
- W4 Interrupt Mask.
  
- S1 Device Number. Eight-switch, rocker-arm unit. Open switches 6, 7 and 8, close 1 through 5, for device #7.



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Figure E-4. Terminal Data Interface PCA

**TERMINAL CONTROL INTERFACE PCA (FIGURE E-5)**

- W1 Interrupt Mask.
- S1 Device Number. Eight-switch, rocker-arm unit. Open switch 5, close all others, for device %10.

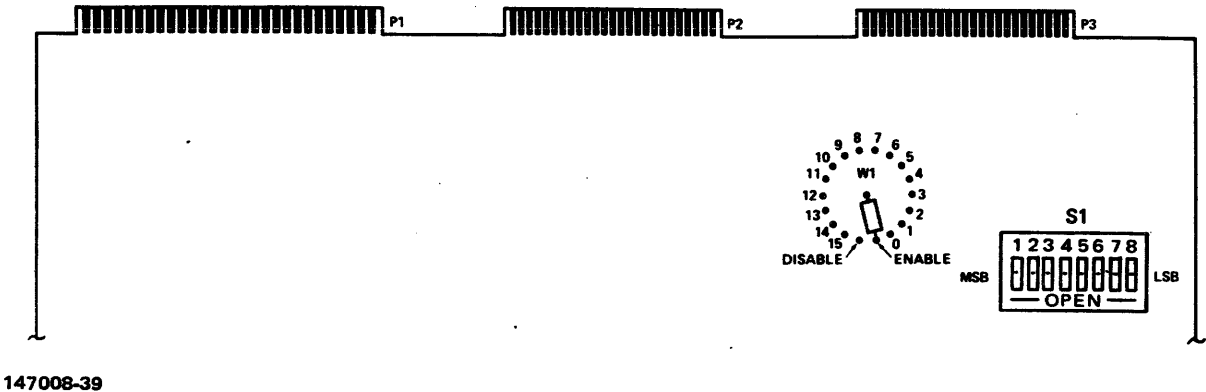


Figure E-5. Terminal Control Interface PCA

**CARD READER INTERFACE PCA (FIGURE E-6)**

- W1 DRT Address Odd Parity.
- W2 Multiplexer channel service request is shown as 6.
- W3 Interrupt Mask.
- W4 thru W11 Device number is shown as %15.

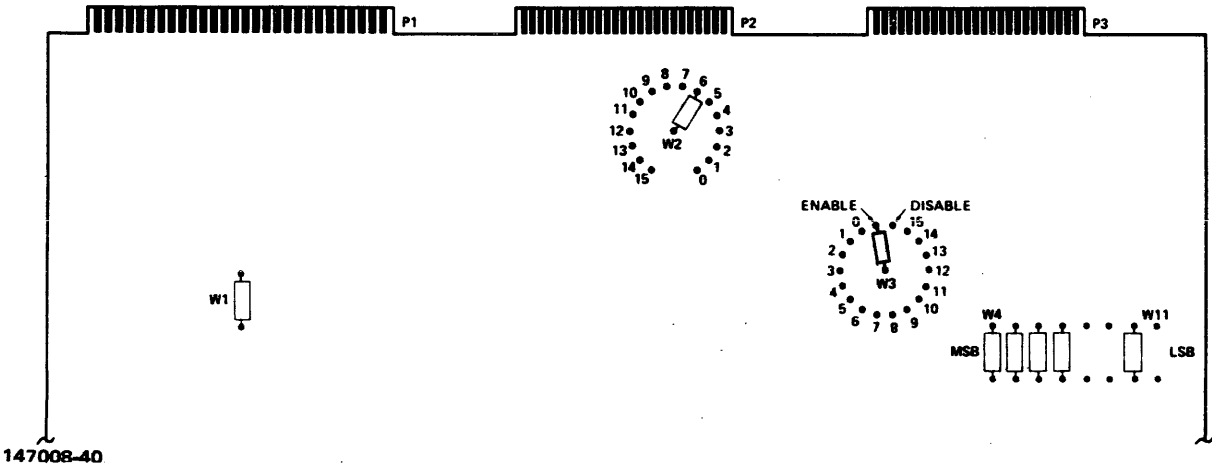


Figure E-6. Card Reader Interface PCA



### MULTIPLEXER CHANNEL PCA (FIGURE E-7)

W1 thru W7 Device number is shown as %177.

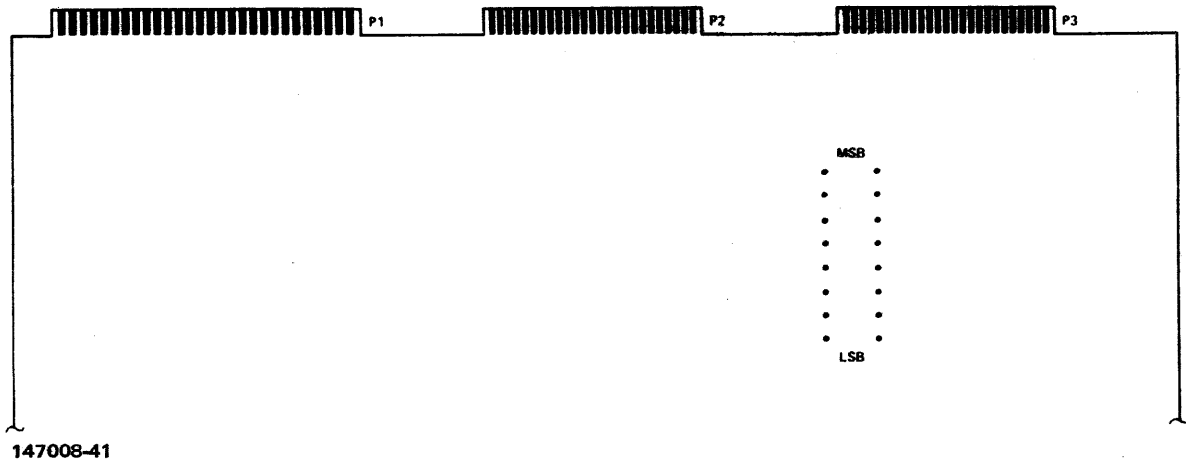


Figure E-7. Multiplexer Channel PCA

### SYNCHRONOUS SINGLE LINE CONTROLLER PCA (FIGURE E-8)

- W1 DRT Address Odd Parity.
- W2 Multiplexer channel service request is shown as 7.
- W3 Interrupt Mask.
  
- S1 Device Number. Eight-switch, rocker-arm unit. For a device no. of %22, open switches 4 and 7, close all others.

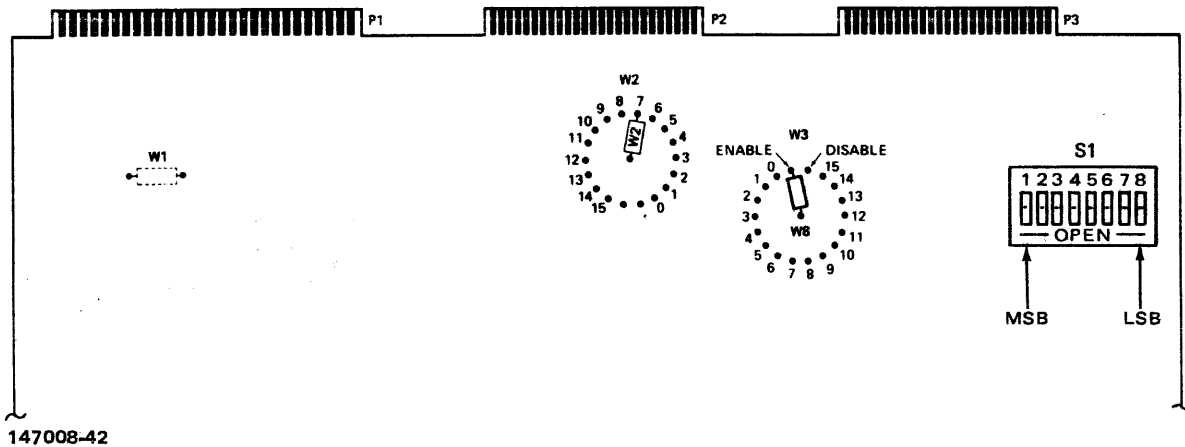
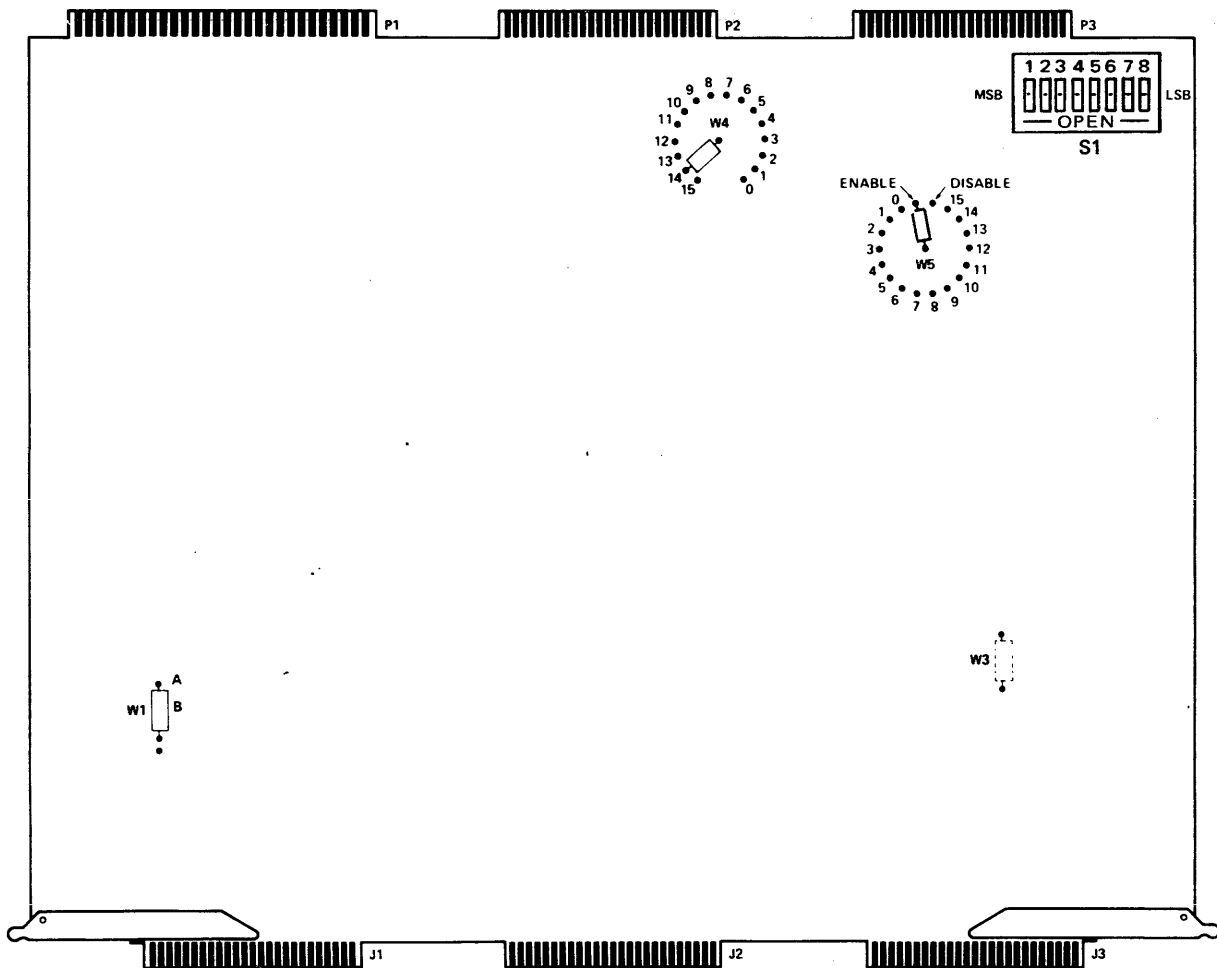


Figure E-8. Synchronous Single Line Controller PCA

**PAPER TAPE READER, PAPER TAPE PUNCH, AND CARD READER/PUNCH PCA  
(FIGURE E-9)**

- W1 Diagnostic Hardware Logic. W1 is factory set to position A for negative true logic. Universal PCA's listed in table E-1 do not use position B for TTL positive true logic.
- W3 DRT Address Odd Parity.
- W4 Multiplexer channel service request is shown as 14.
- W5 Interrupt Mask.
  
- S1 Device Number. Eight-switch, rocker-arm unit. For a device no. of %24, open switches 4 and 6, close all others.



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Figure E-9. Universal Interface (TTL) PCA

## PLOTTER INTERFACE PCA (FIGURE E-10)

- W1 Clock. Remove to apply external clock at J1-29. If removed, the diagnostic hood jumpers this position to ensure internal full-step clock output.
- W2 These jumpers select the pen delay for the type plotter on THRU hand. If the pen rests on the plotting surface when power is off, install jumpers W4 and W5. If the pen is retracted from the plotting surface when power is off, install jumpers W2 and W3. If none of these jumpers are installed, no delay is programmed.
- W6 DRT Address Odd Parity.
- W7 Multiplexer channel service request is shown as 9.
- W8 Interrupt Mask.
  
- S1 Device Number. Eight-switch, rocker-arm unit. For a device no. of %27, open switches 4, 6, 7 and 8; close 1,2,3 and 5.

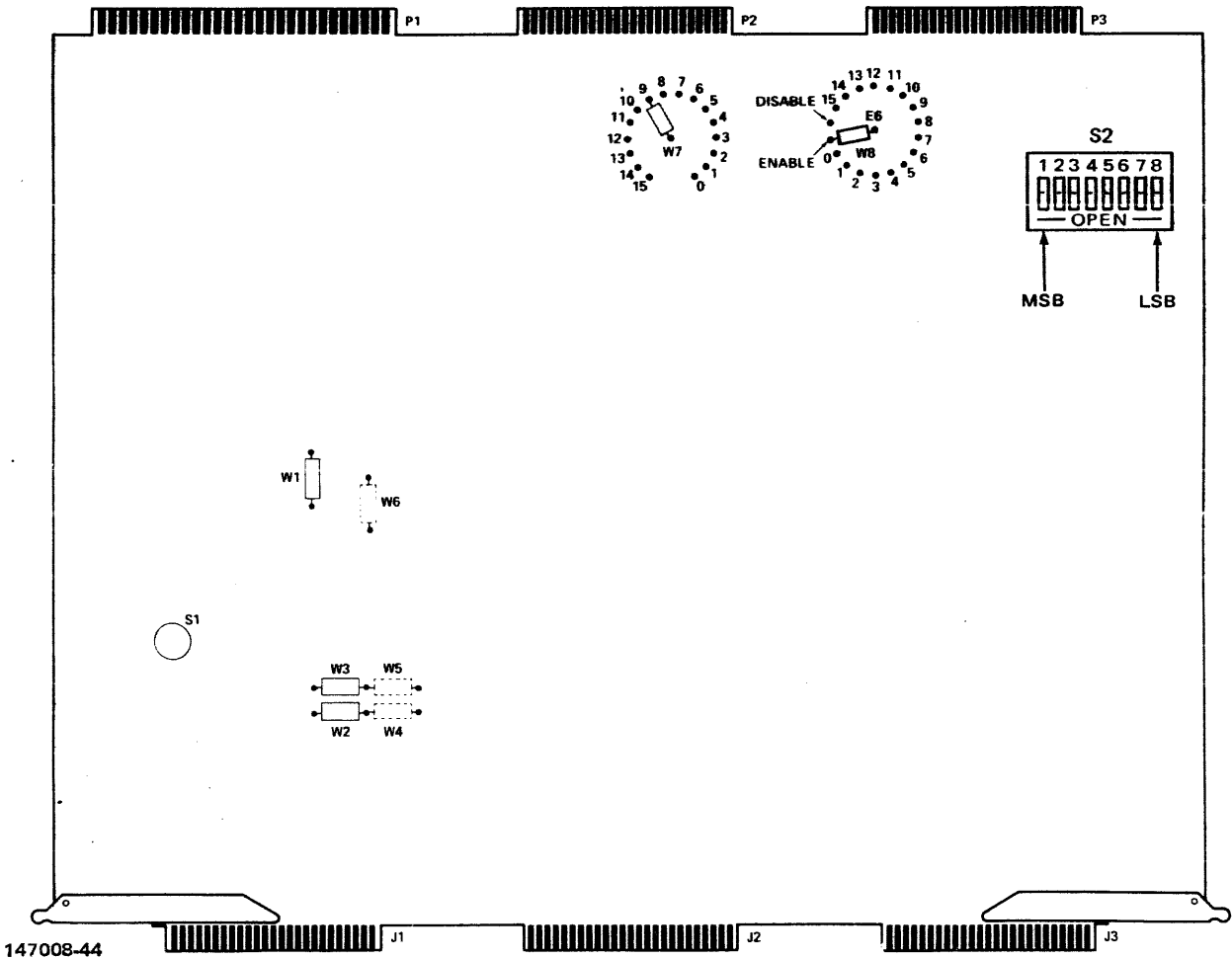


Figure E-10. Plotter Interface PCA

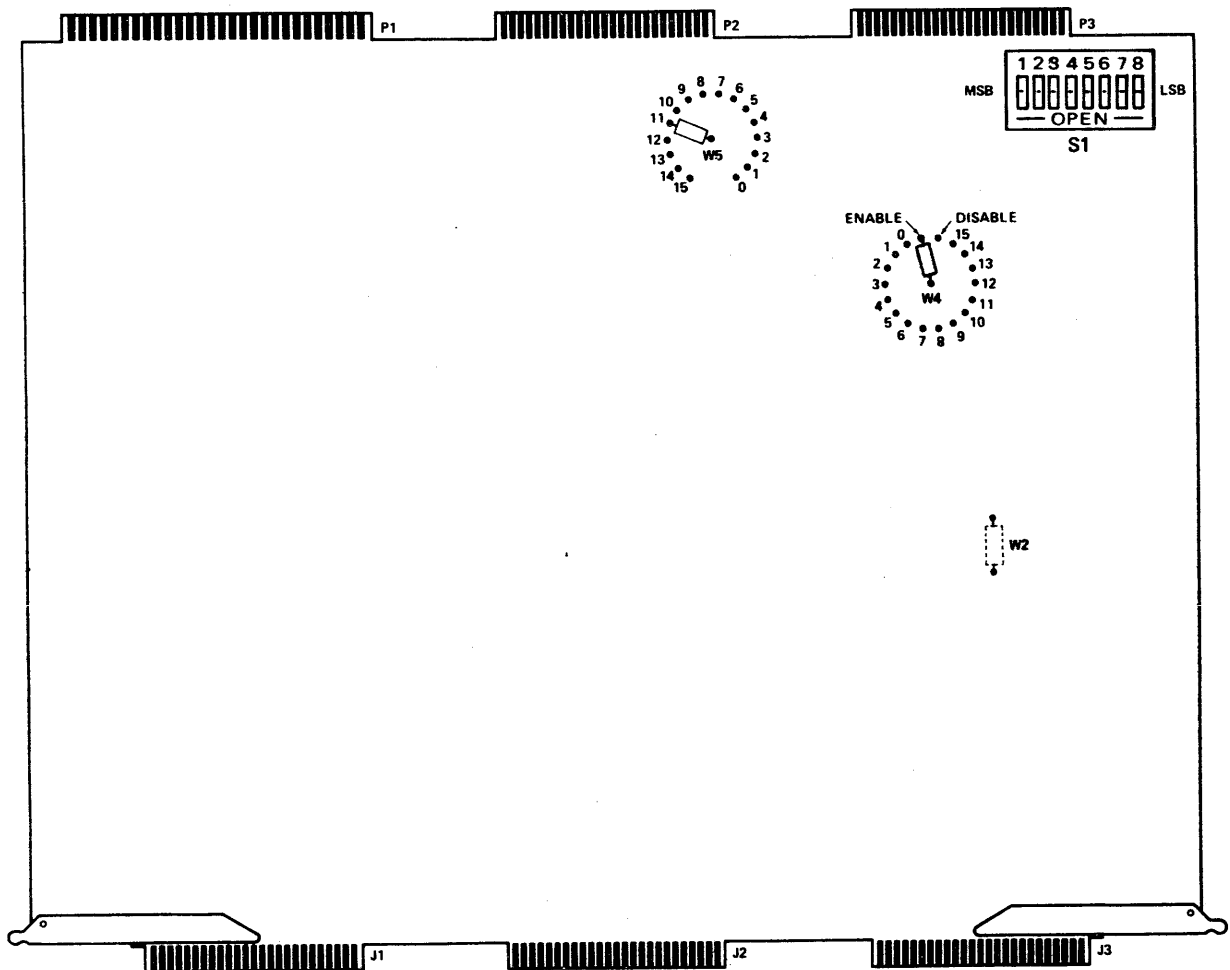
## ALL LINE PRINTERS PCA (FIGURE E-11)

W2 DRT Address Odd Parity.

W4 Interrupt Mask.

W5 Multiplexer channel service request is shown as 11.

S1 Device Number. Eight-switch, rocker-arm unit. For a device no. of 16, open switches 5,6 and 7; close all the others.



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Figure E-11. Universal Interface (Diff) PCA

## INTELLIGENT NETWORK PROCESSOR-MPU PCA (FIGURE E-12)

### Mux Service Request Switches

Positioning the PCA as shown in Figure E-12, use Table E-2, below, to determine which rocker switch to CLOSE for the Service Request (SR) No. you wish to enter. NOTE that the RECOMMENDED ("Typical") SR No. is 8 or 9.

Table E-2. INP-MPU PCA SR Switch Settings

Service Request No.	Rocker Switch to be Closed	Switch Block Location (Left or Right)
0	1	Right
1	2	Right
2	3	Right
3	4	Right
4	5	Right
5	6	Right
6	7	Right
7	8	Right
8	1	Left
9	2	Left
10	3	Left
11	4	Left
12	5	Left
13	6	Left
14	7	Left
15	8	Left

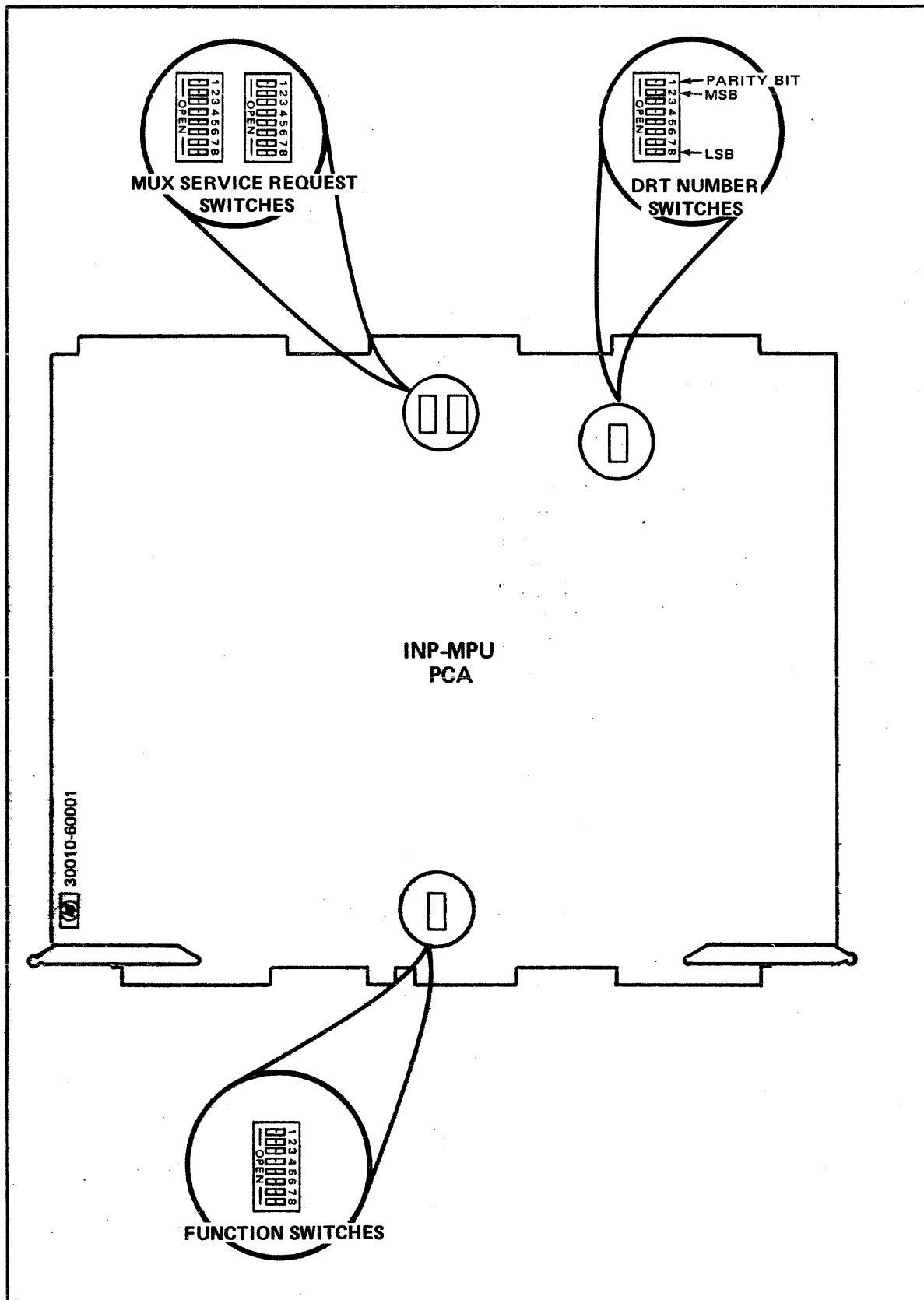
## DRT Numbers

Note in Figure E-12 that rocker-arm Switch 1 is the Odd Parity Switch; Switch 2 is the Most Significant (Octal) Bit; Switch 8 is the Least Significant Bit. Thus, to enter an Octal 25 (a recommended, i.e. "standard" no.), OPEN Switches 4, 6 and 8; CLOSE Switches 2, 3, 5 and 7. The Parity Bit Switch, no. 1, also would be CLOSED, since we have OPENED THREE switches, an ODD number.

## Function Switch Block

These special switches have been preset at the factory, but it is a good idea to check them. For an explanation of their meanings, refer to Table 2-2 in the INP Installation and Service Manual, part no. 30010-90001.

Switch No.	Normal Position
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1	Open
2	Closed
3	Closed
4	Closed
5	Closed
6	Closed
7	Closed
8	Open



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Figure E-12. INP-MPU PCA Switch Locations