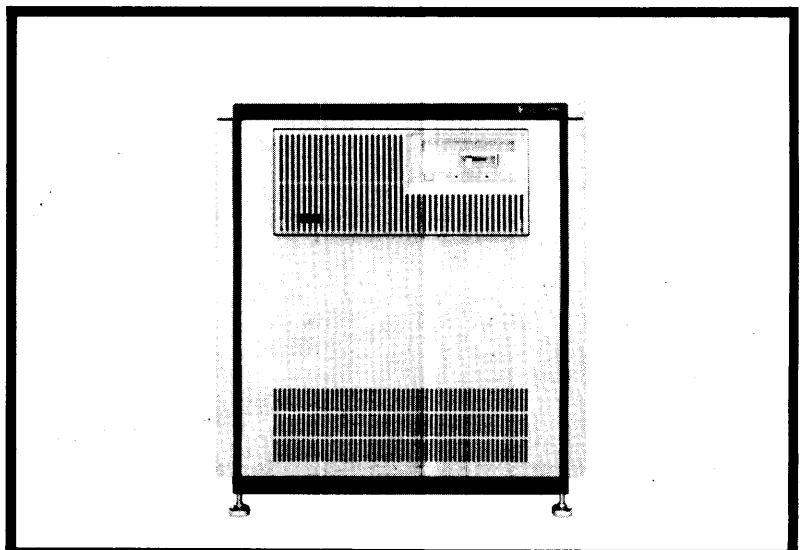
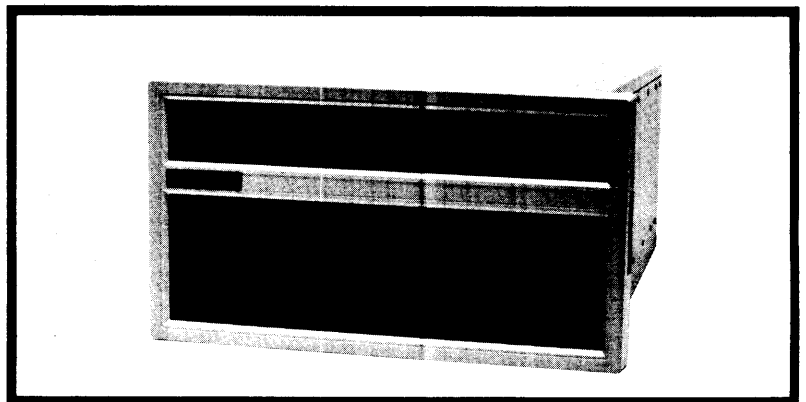
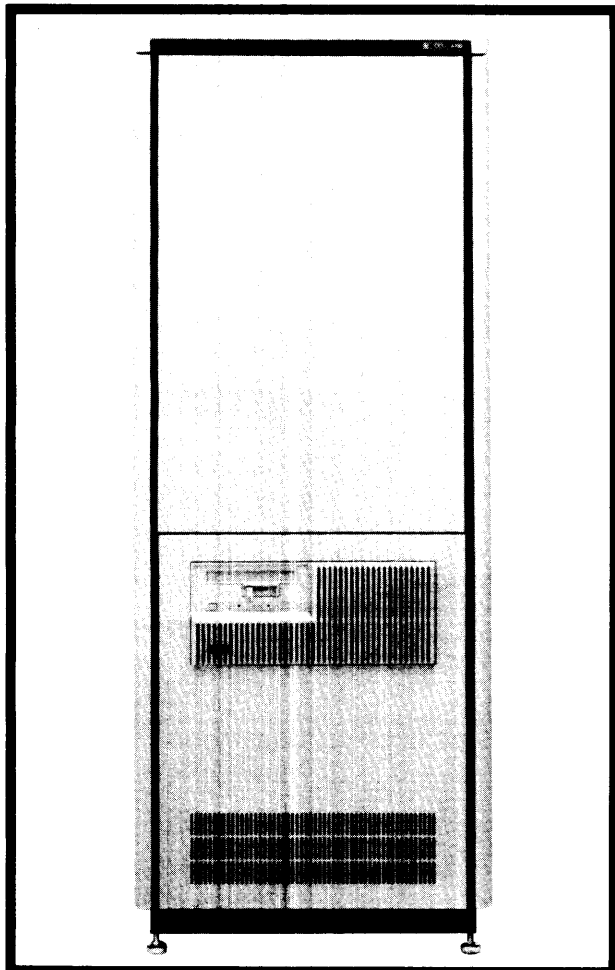


HP 1000 Model 26/27/29 Computer System

Installation and Service Manual

HP 1000 A-Series



HP 1000 Model 26/27/29 Computer System

Installation and Service Manual

FEDERAL COMMUNICATIONS COMMISSION RADIO FREQUENCY INTERFERENCE STATEMENT

The Federal Communications Commission (in 47 CFR 15.805) has specified that the following notice be brought to the attention of the users of this product.

Warning: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for Class A computing devices pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.



PRINTING HISTORY

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

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

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

First Edition	Jun 1983	
Update 1	Dec 1983	
Update 2	Mar 1984	
Reprint	Mar 1984	(Updates 1 and 2 have been incorporated)
Update 3	Dec 1984	
Update 4	Feb 1985	
Update 5	May 1985	
Reprint	May 1985	Updates 3, 4, and 5 have been incorporated.

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SAFETY CONSIDERATIONS

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

SAFETY SYMBOLS



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



Indicates hazardous voltages.



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

WARNING

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

CAUTION

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

CAUTION

STATIC SENSITIVE DEVICES

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

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

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

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

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

SERVICING

WARNING

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

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

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

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

WARNING

EYE HAZARD

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

PREFACE

This manual provides installation and field service instructions for the Hewlett-Packard 1000 Model 26/27/29 Computer System. The Models 26, 27 and 29 Computer Systems are high technology products and the product design facilitates a module replacement philosophy that minimizes on-site repair time. In addition to this manual, supporting documentation for the Model 26/27/29 System is as follows:

- a. *HP 1000 A600/A600+ Computer Reference Manual*, part no. 02156-90001.
- b. *HP 1000 A600/A600+ Computer Installation and Service Manual*, part no. 02156-90002.
- c. *HP 1000 A700 Computer Reference Manual*, part no. 02137-90001.
- d. *HP 1000 A700 Computer Installation and Service Manual*, part no. 02137-90002.
- e. *HP 1000 A900 Computer Reference Manual*, part no. 02139-90001.
- f. *HP 1000 A900 Computer Installation and Service Manual*, part no. 02139-90002.
- g. *RTE-A Primary System Installation Manual*, part no. 92077-90038.
- h. *Getting Started With RTE-A*, part no. 92077-90039.

A list of HP Sales and Service Offices is provided at the back of this manual.

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1-1. INTRODUCTION

This section provides instructions that will enable you to install the HP 1000 Model 26/27/29 Computer System. These systems are based on the following system processor units (SPUs):

SYSTEM MODEL

NO.	SPU PRODUCT NO.
26	HP 2196C/D (includes A600/A600+ Computer)
27	HP 2197C/D (includes A700 Computer)
29	HP 2199C/D (includes A900 Computer)

The HP 2196C/97C/99C includes a tall cabinet; the HP 2196D/97D/99D includes a short cabinet.

Included in this section is information on the following:

- Unpacking and Inspection
- Claims Procedure
- Installation Procedure
- Performance Verification
- System Reconfiguration
- Repacking for Shipment.

Specifications for the Model 26 System are given in the *HP 1000 A600/A600+ Computer Reference Manual*, part no. 02156-90001. Specifications for the Model 27 System are given in the *HP 1000 A700 Computer Reference Manual*, part no. 02137-90001. Specifications for the Model 29 System are given in the *HP 1000 A900 Computer Reference Manual*, part no. 02139-90001. (Environmental and electrical specifications for the Model 26/27/29 Systems are listed at the end of this section.) Site preparation information for the systems is given in the *HP 1000 Computer System Site Preparation Manual*, part no. 02170-90016. The site should be inspected prior to system installation to ensure proper preparation; the customer should correct any deficiencies that are found.

NOTE

The site preparation manual is shipped several weeks before the system, and site preparation must be completed before the system is installed.

Installation service is included in the system purchase price. This service includes supervision of equipment unpacking, inventory, equipment set-up, and system

turn-on. The installation service does not include uncrating of equipment, equipment positioning, routing of cables in customer's ducts, adding on non-HP equipment, or programmer training. Also, the customer must provide assistance for the handling or racking of heavy instruments.

1-2. UNPACKING AND INSPECTION

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

Before unpacking any hardware items, open the shipping carton containing manuals. One of the items in this carton is the System Support Log which includes an Installation Record of equipment supplied. Compare this record against the purchase order to verify that the shipment is correct. Move the containers to the installation site and unpack the equipment, using the Installation Record for a detailed inventory of the equipment. Some printed circuit cards are installed in the computer card cage; these can be inventoried during system cabling. As each item is unpacked, inspect it for damage such as dents, cracks, scratches, breaks, etc. Open all doors or panels to look for damaged or missing parts. Check behind the computer front cover to see whether the labels for the 25 kHz and battery backup modules are affixed. Save the original container and packing material if the equipment is to be reshipped.

Check all device serial numbers and inspect all items for damage. If the visual inspection and inventory reveals damaged or missing items follow the claims instructions given in paragraph 1-4.

1-3. UNCRATING CABINETS

Cabinets are shipped in reuseable containers that have the uncrating and unpacking instructions in an envelope on the container; follow those instructions to unpack the cabinet.

ment or repair without waiting for settlement of claims against the carrier. In the event of damage in transit, retain the packing container and packaging materials for inspection.

1-5. INSTALLATION PROCEDURE

The installation procedure given in the following paragraphs sets up the Model 26/27/29 system for check-out with the Primary System software. The plug-in cards shipped in the computer card cage have been installed and tested at the factory. These cards should not be removed from the system nor should any of their switches be reset before the system has been checked out.

NOTE

For installation of the HP 219xC Option 070 SPU in the 7914ST/TD cabinets, refer to Appendix A.

1-6. MANUAL UPDATING

Before installing the Model 26/27/29 system, perform any updating that may be required for the system documentation. Updating instructions (if any) are provided in a supplement supplied with the appropriate document.

1-7. TOOLS REQUIRED

No installation tools other than ordinary handtools are required.

1-8. AC POWER CABLE CONNECTION

Connect the system cabinet to an ac power source having the electrical characteristics specified on the rear of the system. To connect an HP 2196D/2197D/2199D System to a 115-Vac power source, simply set the system Power switch to OFF and plug the power cord into the ac source. (The Power switch is located on the rear door of the system cabinet.)

To connect an HP 2196C/2197C/2199C System to a 115-Vac power source, or to connect a cabinet that requires 230 Vac to a 230- Vac power source, have an electrician connect the user-supplied power cord to the cabinet's Power Distribution Unit (PDU). Wiring information on the PDU is given in Figures 2-1 and 2-2. If two single-bay cabinets are tied together in a double cabinet configuration with a PDU in each section, there should be CAUTION labels installed above the circuit breaker WARNING labels (refer to the 40026A Tie-Together Kit manual, part no. 40026-90001).

The PDU is mounted on the inside of the rear door of the system cabinet. To gain access to the PDU, proceed as follows:

- a. Set the system Power switch to OFF.

- b. Remove the screws securing the inspection plate of the PDU to the bottom of the cabinet rear door. Remove the plate.

1-9. COMPUTER SELF-TEST AND POWER SUPPLY CHECK

The computer self-test automatically executes every time the computer is powered on. To verify the power supply voltages and the computer self-test operation, proceed as follows:

- a. Set the system Power Switch to ON. (The Power switch is located on the rear door of the system cabinet.)
- b. Perform the computer self-test and the power supply check as instructed in the computer installation and service manual.
- c. Set the system Power switch to OFF.

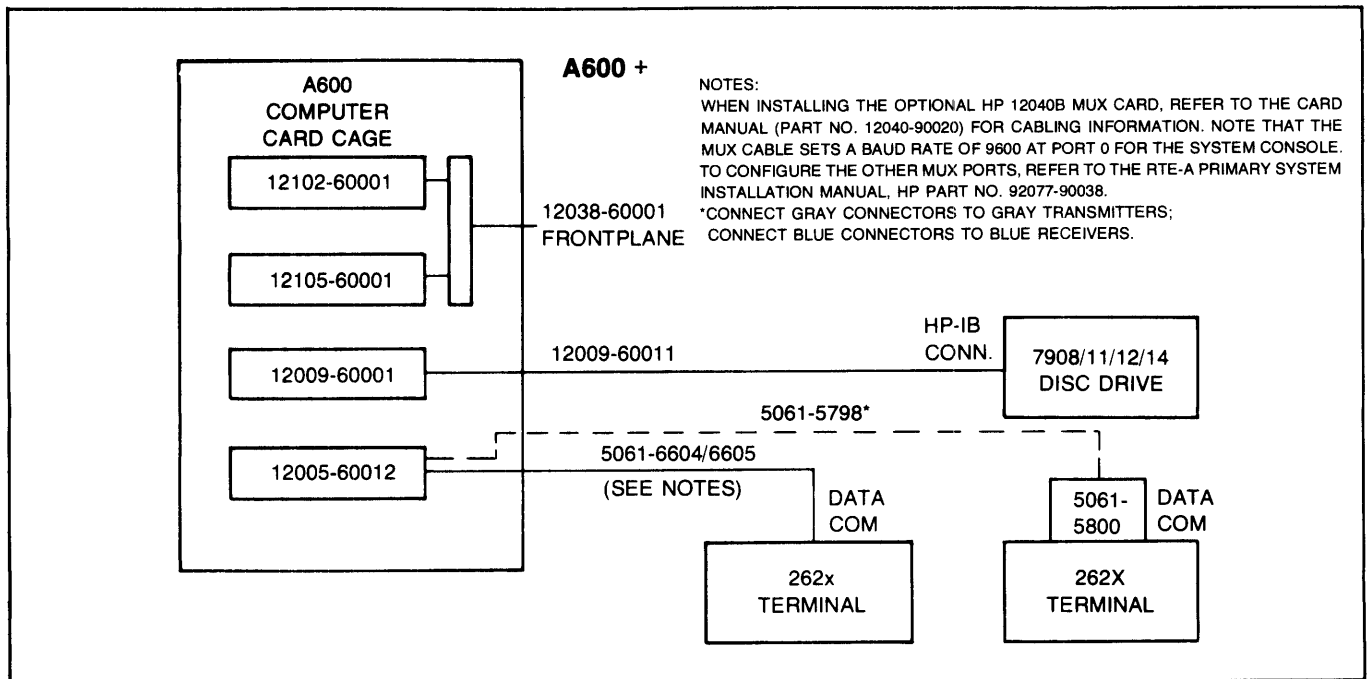
1-10. HP 262X TERMINAL (SYSTEM CONSOLE) INSTALLATION

Except for the cabling information given in this paragraph, all installation information for the HP 262x Terminal is given in the terminal owner's manual. Using the information in that manual, install the terminal. (Figures 1-1, 1-2, and 1-3 are cabling diagrams of the Model 26/27/29 systems.) To connect the terminal to the HP 12005B Asynchronous Serial Interface Card in the Model 26/27/29 system cabinet, proceed as follows:

- a. Set the system Power switch to OFF.
- b. Open the rear door of the system cabinet and open the computer card cage.
- c. If an electrical cable is being used to connect the terminal, connect the hooded connector of the cable to the HP 12005B ASIC Card with the cable extending to the bottom of the card cage.
- d. Connect the lug from the hooded cable-connector to the ground bus that extends across the card cage.
- e. If a fiber optic cable is being used to connect the terminal, connect the gray connector to the gray transmitter of the HP 12005B ASIC Card and connect the blue connector to the blue receiver.

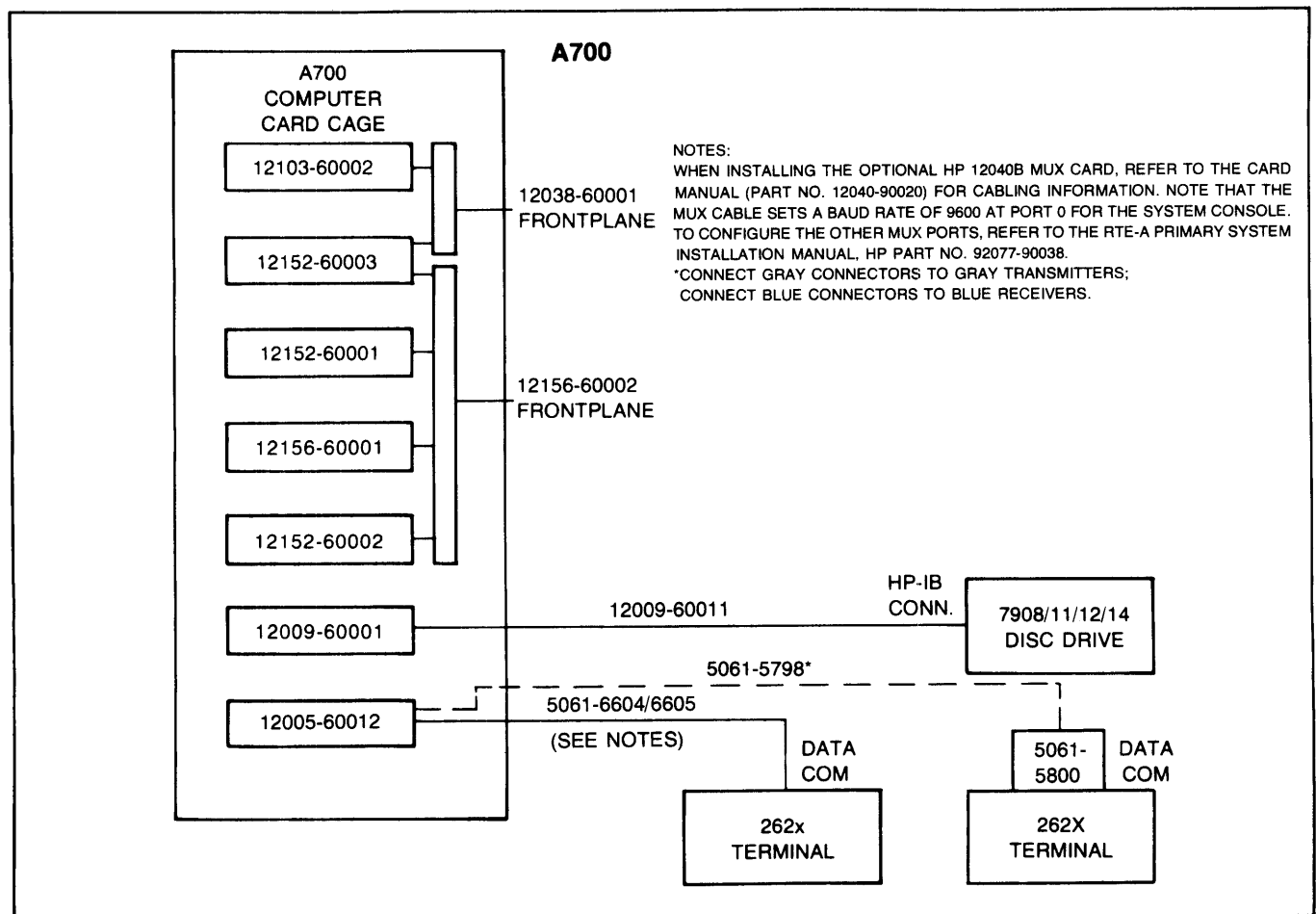
The system console must be configured for operation as indicated below. (Refer to the appropriate terminal owner's manual for the configuration procedure.)

- HP 2623A/2624A/2626A Terminal. REMOTE must be ON and baud rate must be 9600. All other functions must have their default values.



8200-165B

Figure 1-1. System Cabling Diagram (Standard HP 2196C/D)



8200-166B

Figure 1-2. System Cabling Diagram (Standard HP 2197C/D)

- HP 2621B Terminal. Set the switches on the rear of the terminal as follows:

Left switches: 1,2,3 Up
 Center switches: 1,6 Up
 Right switches: 3,4 Up
 All other switches Down.

- HP 2382A Terminal. Set the switches on the rear of the terminal as follows:

Group A (the side with no connectors): 1,4,5,8 Up
 Group B (center): 6 Up
 Group C (closest to the DATA COMM connector and Power switch): All Down.

All other switches Down.

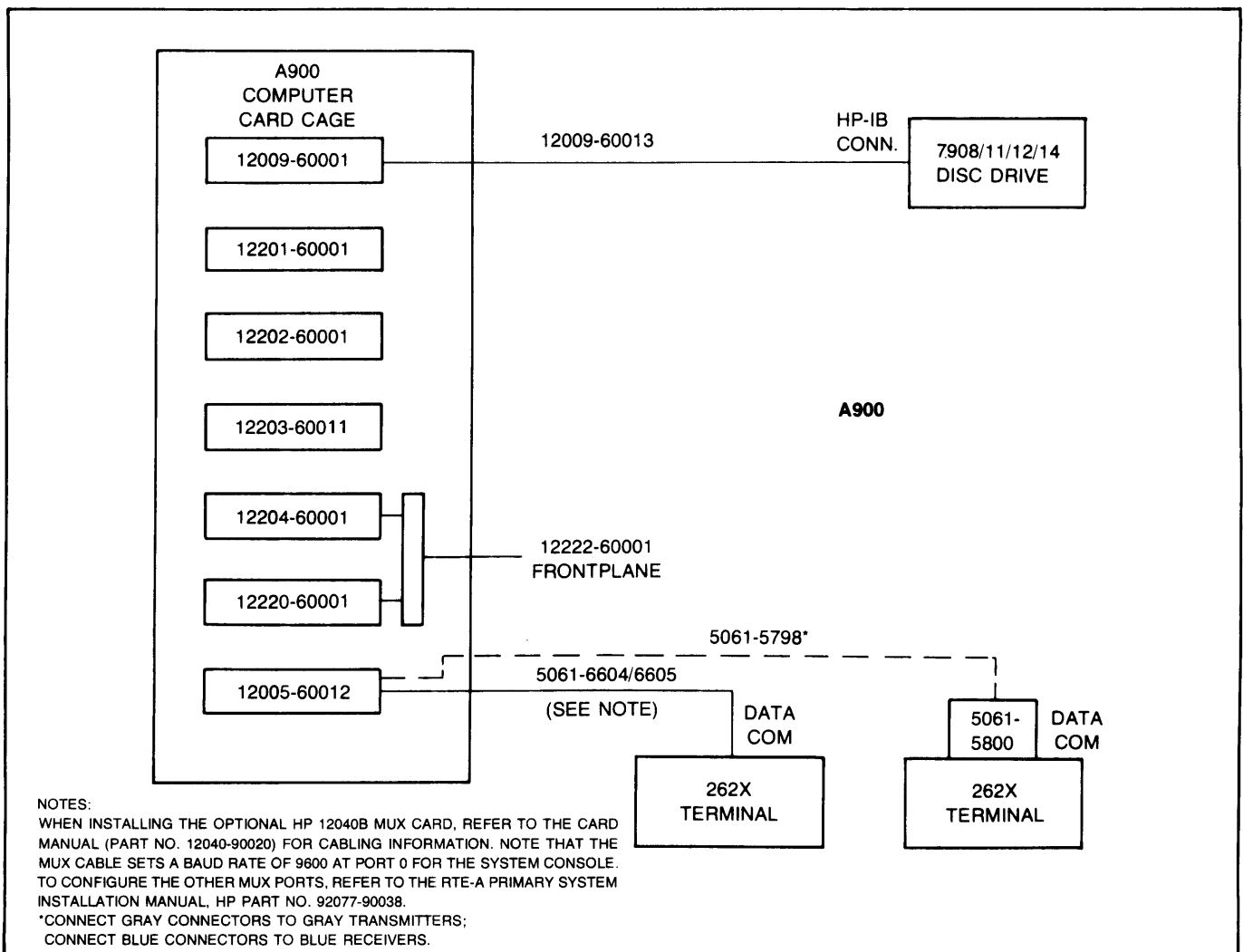
1-11. CS/80 DISC DRIVE INSTALLATION

General information for installing the CS/80 disc drive (HP 7908R/11R/12R/14R) is given in the appropriate disc drive installation manual listed in Table 1-1. Refer to that information and install the disc drive in the system cabinet as follows:

CAUTION

The CS/80 disc drive must be configured for operation with the appropriate line voltage.

- a. Set the system Power switch to OFF.
- b. Loosen the captive screw securing the right side of the cabinet lower front door and open the door.



8200-167B

Figure 1-3. System Cabling Diagram (Standard HP 2199C/D)

Table 1-1. Disc Drive Installation

HP DISC DRIVE	INSTALLATION MANUAL PART NO.	HP-IB ADDRESS*
7908R	07908-90902	0
7911R/12R/14R	07912-90902	0
* HP-IB address required for operation with the Primary System.		

WARNING

To prevent the cabinet from tipping over, you must install the cabinet anti-tip legs before installing the 7911R/12R/14R Disc Drive in the cabinet.

- c. For the 7911R/12R/14R Drive, install the HP 40024A Cabinet Anti-Tip Legs. Refer to the 40024-90001 instruction sheet for installation procedures.
- d. For the 7911R/12R/14R Drive, remove the mounting rails from the cabinet and install the rack-mounting slides as described in the disc drive installation manual. Use the mounting holes and Tinnerman nuts located immediately above those used for the mounting rails.

WARNING

Each 7911R/12R Disc Drive weighs 67.3 kilograms (148 pounds), and each 7914R Disc Drive weighs 85.3 kilograms (188 pounds); two or more persons are required to lift one of these disc drives.

- e. Install the drive in the system cabinet.
- f. Open the rear door of the cabinet and set the disc drive's HP-IB Address switch to 0. (This address is required for operation of the disc drive with the Primary System.)
- g. Connect the disc drive interface cable (12009-60006) between the HP-IB connector on the drive and the HP 12009 HP-IB interface card in the computer card cage.
- h. Connect the lug from the hooded cable-connector to the ground bus that extends across the card cage.
- i. Connect the drive power cord between the drive and a power receptacle on the PDU. Tighten the retaining clamp.

- j. Set the ~LINE switch on the rear of the disc drive to 1 (ON).
- k. Set the cabinet Power switch to ON and ensure that the drive (and tape unit) passes its self-test. (Refer to the disc drive manual.)
- l. Close the card cage covers and secure them in place.
- m. Close and secure the cabinet front and rear doors. (The terminal interconnecting cable must pass under the rear door.)

1-12. SYSTEM TURN-ON AND BOOTUP

After the Model 26/27/29 system has been installed as described in the preceding paragraphs, turn on the system, following the instructions given in the RTE-A Primary System Installation Manual. Within 10 seconds the system will display the WELCOM file message (see Figure 1-4).

1-13. SYSTEM VERIFICATION

To verify proper operation of the Model 26/27/29 System, run the system functional test (FTEST) as described in the RTE-A Primary System Installation Manual. For a more thorough test of the system, run the Kernel and I/O diagnostics in the HP 24612A Diagnostic Package. FTEST should be run when the system is initially installed and when peripheral devices are added to the system.

1-14. PRIMARY SYSTEM BACKUP

A backup copy of the Primary System tape cartridge should be created on a formatted (certified) CS/80 tape cartridge and left with the System Manager. To format a new tape cartridge and copy the Primary System, proceed as follows:

- a. Using the tape cartridge loading instructions given in the CS/80 disc drive manual, insert a new tape cartridge (part no. 9164-0156) into the tape drive of the CS/80 drive.
- b. Run the FORMC utility program by entering the following command sequence:

```
RU,FORMC:1H,1,FO,24
```

The FORMC program will format the tape in about 27 minutes. (For more information on FORMC, refer to the RTE-A Utilities Manual, part no. 92077-90004.)

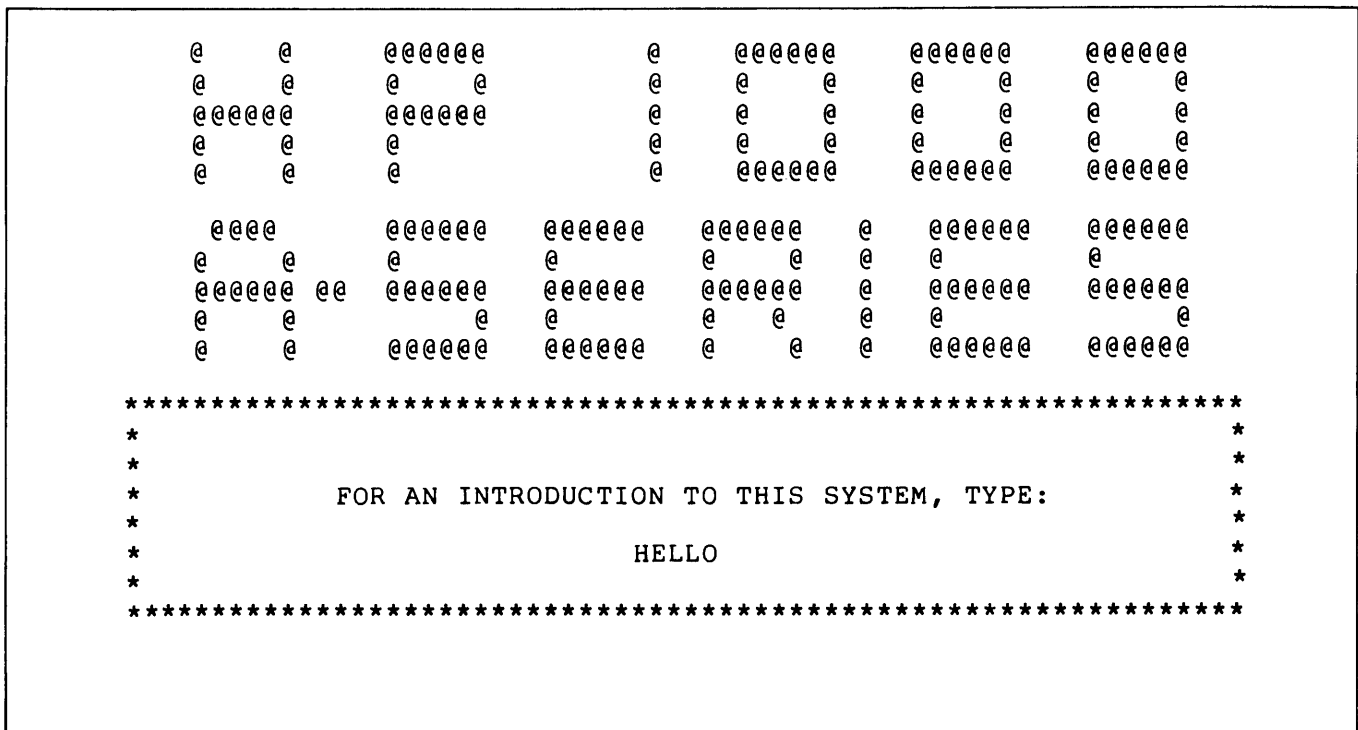


Figure 1-4. Typical WELCOM File Message

- c. Press and hold the SAVE switch on the drive until the BUSY light begins to flicker. Then release the switch and momentarily press it again within three seconds; this starts the backup process. The backup completes in about eight minutes; the BUSY light remains on during the backup process.
- d. On the HP 7914R, the BUSY light flickers when the backup is complete. Press the UNLOAD switch twice within five seconds to unload the tape cartridge.

It is advisable that peripherals be added to the system in accordance with the Primary System Configuration shown in the RTE-A Primary System Installation Manual.

1-15. SYSTEM RECONFIGURATION

The plug-in cards in the computer card cage have small switches that must be set as appropriate for a particular system configuration. If the system is to be reconfigured, check with the System Manager to determine the proper settings for the switches. (If hardware changes require the reassignment of select codes, or the addition or deletion of interfaces or devices, a new system must be generated.) For information on HP-IB address switches of the disc drive, refer to the appropriate disc drive documentation.

NOTE

The system should be installed and checked out as described in preceding paragraphs before it is reconfigured or any new interface cards are added to it. (All plug-in cards must be installed with their component side to the right.)

1-16. FACTORY SETTINGS FOR PLUG-IN CARD SWITCHES

The factory settings of the switches on the plug-in cards in the computer card cage enable system operation with the Primary System. These switch settings are as follows:

- a. 12102 or 12110. *HP 2196C/D only.* Memory controller card switch S1 is set to BAT.
- b. 12105-60001. *HP 2196C/D only.* Processor card switches U1S1-S8 (BOOT SEL and M) are set to cause the computer to execute the VCP routine after the self-tests execute. (U1 switches are OCCCCCO; where O = open and C = closed.)
- c. Frontplane. *HP 2197C/D only.* Switches BOOT SEL and M are set to cause the computer to execute the VCP routine after the self-tests execute. (Switches are OCCCCCO; where O = open and C = closed.)

NOTE

For the 2197C/D, frontplane switches SLFTST *must* all be closed (down) in order to prevent degraded computer performance.

- d. 12156-60001. *HP 2197C/D only.* Rocker switches 1 through 6 (000UJF) are set to enable the Jump Table overlay and the floating-point/SIS/VIS ROMs. The switches are OOOOCC; where O = open, and C = closed. Switches 7 and 8 are not used and may be open or closed.

NOTE

The 12156-60001 rocker switch settings *must* be as given above in order for the computer floating point instructions to be processed by the floating point hardware.

- e. 12201-60001. *HP 2199C/D only.* Sequencer card switches U0204S1-S5 are all closed.
- f. 12202-60001. *HP 2199C/D only.* Data path card switches U0101S1-S8 (BOOT SEL and M) are set to cause the computer to execute the VCP routine after the self-tests execute. (U0101 switches are OCCCCCO; where O = open and C = closed.)
- g. 12009-60010. Switches U16 and U1 are set for the HP-IB card to function as HP-IB system controller with high-speed data transfers and select code 27 octal. (U16 switches are all closed (down). U1 switches are OCCOCCOO; where O = open (up) and C = closed.) (The load resistors are installed on the 12009 Card).
- h. 12005-60012. Switches U21S1-S8 provide 9600 baud operation with one stop bit and odd parity. (U21 switches are OOOOCCX; where O = open (up), C = closed, and X = don't care.) Switches U1S1-S8 provide VCP interfacing and select code 20 octal. (U1S1-S8 are CCCOCCCO.)
- i. 5061-3427 (HP 12040B, Optional). Switches U1S1-S8 provide VCP interfacing and select code 23 octal. U1 switches are COCOCCOO; where O = open (up) and C = closed.

Tables 1-2, 1-3, and 1-4 summarize the factory settings of the plug-in card switches in the 2196C/D, 2197C/D, and 2199C/D, respectively. For complete information on the interface cards' switches, refer to the appropriate interface card reference manuals. Refer to the computer installation and service manual for information on the switches mounted on the following cards:

- a. Processor card (A600/A600+ only).
- b. Memory controller card (A600/A600+ only).
- c. Processor frontplane (A700 only).
- d. Data path card (A900 only).
- e. Sequencer card (A900 only).

1-17. BATTERY BACKUP SWITCH

The battery BACKUP switch is a two-position switch mounted on the rear of the system computer. When the

system is shipped from the factory this switch is set to the DISABLE position, which prevents the optional battery pack from sustaining computer memory. Refer to the computer installation and service manual for a description of the BACKUP switch.

1-18. INTERFACE CARD SWITCHES

Assign each I/O interface card to be installed in the computer a unique select code by appropriately setting the select code switches on the interface cards. Refer to the interface card reference manuals for select code switch information and for information on any other card switches that must be set.

Table 1-2. Summary of Factory Switch Settings (HP 2196C/D)

CARD	SWITCH SETTINGS
Memory Controller 12102-60001 12102-60002 12110	Switch S1 = BAT Switch S1 = BAT Switch S1 = BAT
Processor 12105-60001	U1 switches = OCCCCCO*
HP-IB Interface 12009-60001	U16S1-S8 = all closed (down) U1 switches = OCCOCCOO*
Async. Serial Interface 12005-60012	U21 switches = OOOOCCX* U1 switches = CCCOCCCO*
12040B MUX Card 5061-3427 (optional)	U1 switches = COCOCCOO
* O = open (up); C = closed (down); X = don't care.	

Table 1-3. Summary of Factory Switch Settings (HP 2197C/D)

CARD	SWITCH SETTINGS
Frontplane 12156-60002	BOOT SEL & M = OCCCCCO* SLFTST = all closed (down)
Floating Point 12156-60001	000UJF = OOOOCC*
HP-IB Interface 12009-60001	U16S1-S8 = all closed (down) U1 switches = OCCOCCOO*
Async. Serial Interface 12005-60012	U21 switches = OOOOCCX* U1 switches = CCCOCCCO*
12040B MUX Card 5061-3427 (optional)	U1 switches = COCOCCOO
* O = open (up); C = closed (down); X = don't care.	

Table 1-4. Summary of Factory Switch Settings (HP 2199C/D)

CARD	SWITCH SETTINGS
Sequencer 12201-60001	U0204S1-S5 = all closed
Data Path 12202-60002	U0101S1 switches = OCCCCCCO*
HP-IB Interface 12009-60001	U16S1-S8 = all closed (down) U1 switches = OCCOCOOO*
Async. Serial Interface 12005-60012	U21 switches = OOOOCCX* U1 switches = CCCOCCCC*
12040B MUX Card 5061-3427 (optional)	U1 switches = COCOCCOO
* 0 = open (up); C = closed (down); X = don't care.	

NOTE

All plug-in cards must be installed with their component side to the right.

If an external device is to be interfaced as a Virtual Control Panel (VCP), refer to the device's interface card manual for VCP interfacing information. Note that only one VCP can be configured into the system. (Normally, the system console is the VCP.)

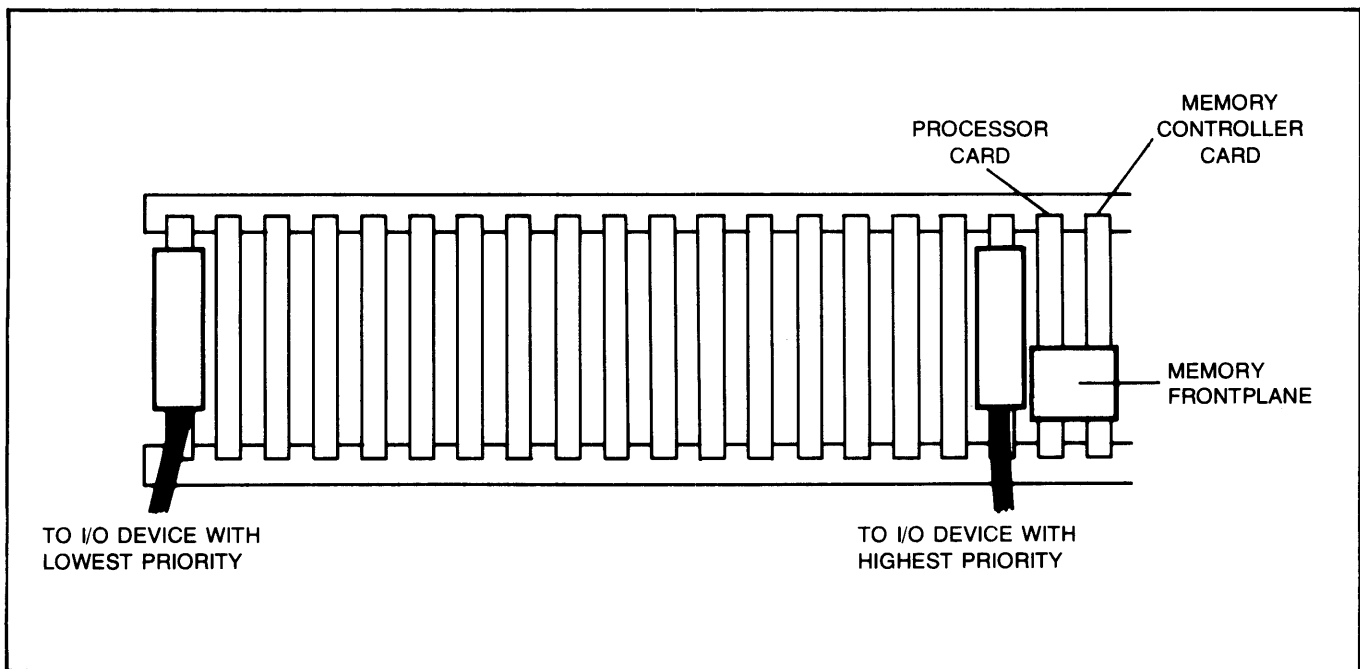
1-19. I/O PRIORITY ASSIGNMENT

Each peripheral device in the system must be connected to the computer system through an interface card installed in the card cage. A priority chain connects all interface cards in series to prioritize simultaneous interrupt requests from two or more peripherals. The priority of an interface card is determined by the slot that the card occupies, with the I/O slot nearest the processor card having the highest priority and slot 20 having the lowest priority. (See Figures 1-5 through 1-7.) Interrupts from a higher priority device inhibit lower priority interrupts by breaking the priority chain. From the standpoint of system response time, it is more efficient to assign the higher priorities to high-speed peripheral devices.

NOTE

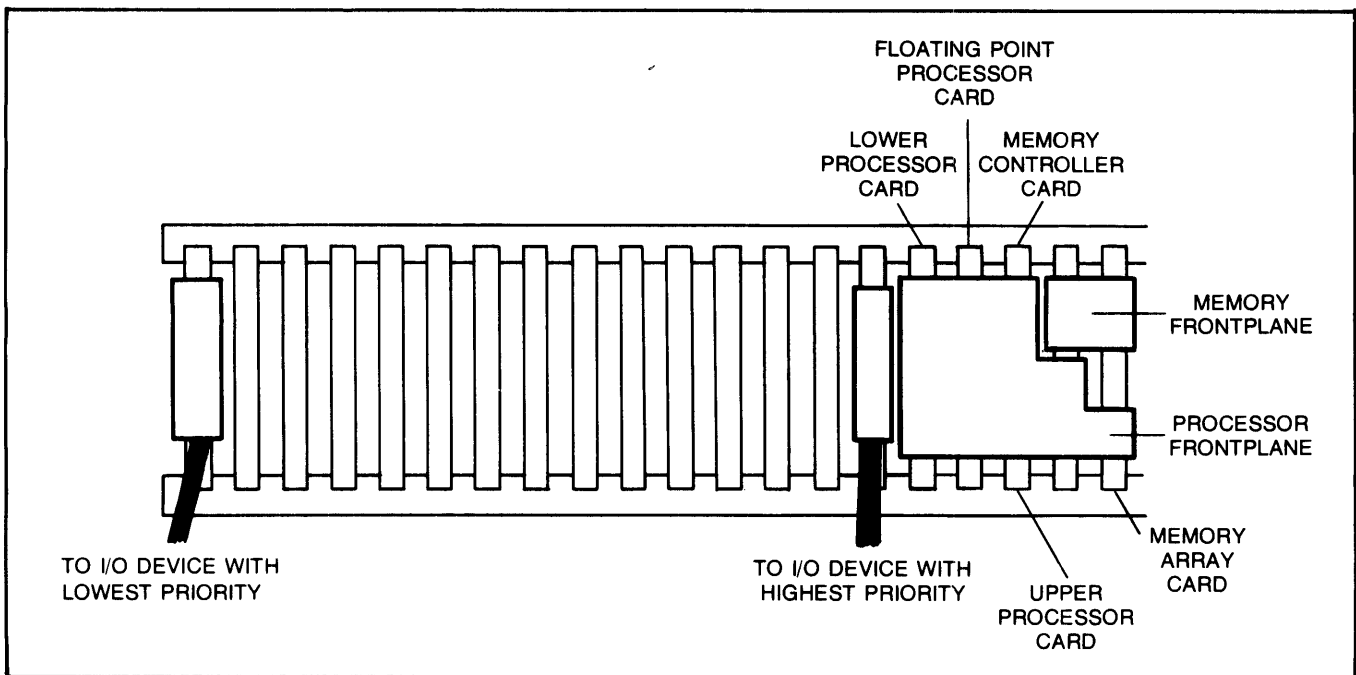
Correct computer operation requires that there not be any vacant slots between plug-in cards. Also, in the A900 computer the far right-hand slot has the highest interrupt priority and *must* be occupied.

Refer to the individual interface card documentation for installation details concerning card switches and priority considerations. Then consult the System Manager to establish I/O device priority and install the interface cards accordingly.



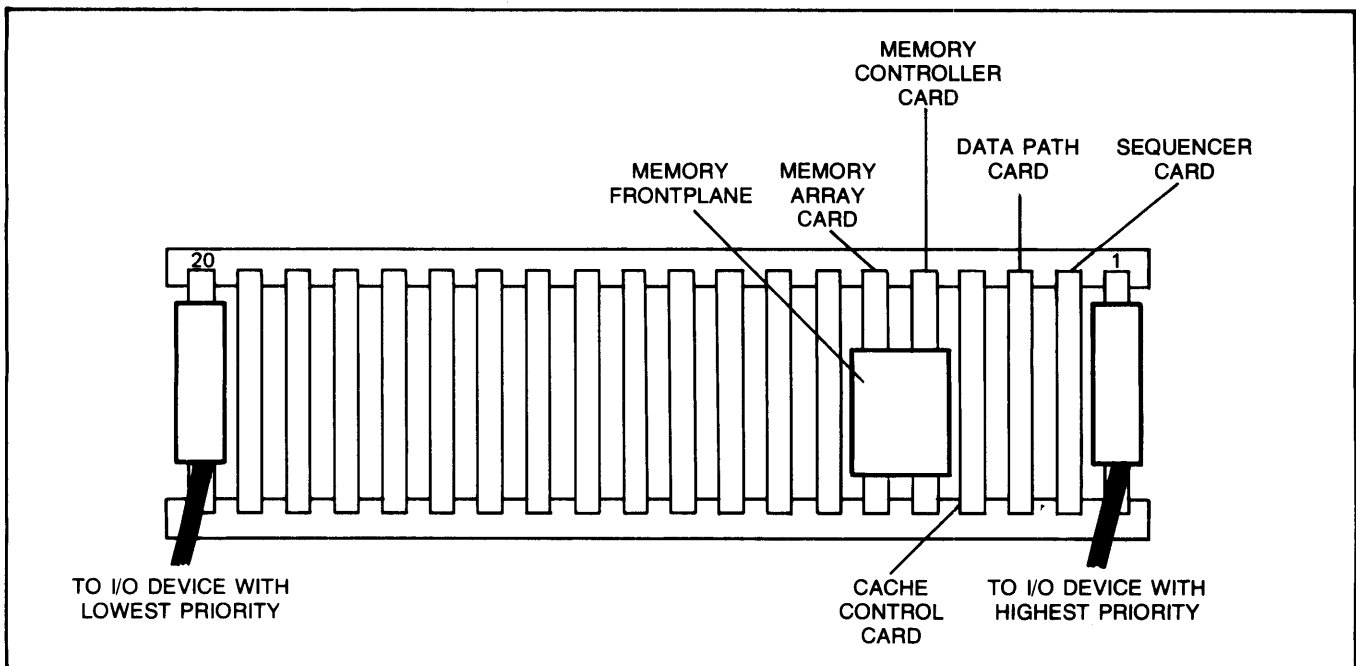
8200-33A

Figure 1-5. System Cards and I/O Priority Assignments (Standard 2196C/D)



8200-63

Figure 1-6. System Cards and I/O Priority Assignments (Standard 2197C/D)



8200-135A

Figure 1-7. System Cards and I/O Priority Assignments (Standard 2199C/D)

1-20. MEMORY CONFIGURATIONS

There are several memory configurations available for the system computers. For information regarding the memory configurations, refer to the computer installation and service manual.

1-21. INTERFACE CABLING

CAUTION

When connecting cables to the plug-in cards in the card cage, be sure to connect each cable to its appropriate card.

Cable requirements to interconnect interface cards and associated peripherals are specified in the appropriate interface documentation. After all interface cables have been assembled, set the computer ~LINE switch to OFF and open the card cage covers. Install the hooded connector of each cable onto the edge connector of the appropriate interface card, with the cable extending to the bottom of the card cage. Connect the other end of each cable to the appropriate peripheral device. Close and secure the card cage covers and set the ~LINE switch to ON. Close and secure the cabinet rear door, with the cables passing under the door. When installing each I/O cable on an I/O card, be sure to connect the lug from the hooded connector to the ground bus that extends across the card cage. This is necessary to ensure electromagnetic emissions compatibility.

The reconfigured system can be checked out by executing the FTEST program (as described in the RTE-A Primary System Installation Manual) and the appropriate diagnostics.

1-22. REPACKING FOR SHIPMENT

Repacking of the Model 26/27/29 system cabinet requires the use of the original container and packing material. If the container is not available, consult your local Hewlett-Packard Sales and Service Office to obtain a container or instructions for fabricating an acceptable alternate. Before shipment, the cabinet should have a tag identifying the owner and stating the service or repair to be accomplished. Include the system model number and full serial number.

To package the system, proceed as follows:

- a. Place the ramp on the front of the container base.
- b. Thread the leveling feet into the cabinet to allow freedom of movement of the cabinet.
- c. Position the system at the ramp with the rear of the cabinet facing the container base.
- d. Carefully roll the system onto the container base via the ramp.
- e. Reinstall the upper front of the container base.
- f. Place padding on top of the system. Place the ramp on top of the padding and secure in place with tie wrap material.
- g. For the 720-mm cabinet, place the container over the cabinet and secure the container to the base with two straps.
- h. For the 1613-mm cabinet, wrap the container around the cabinet and secure it with four crimp fasteners. Place the container top cover on the container and secure the container to the base with two straps.
- i. Mark the container "FRAGILE".

Repacking instructions for the system accessories are contained in the installation and service manuals for the accessories.

Table 1-5. System Electrical and Environmental Specifications

ELECTRICAL SPECIFICATIONS	
Standard Line Voltage and Line Frequency	
Line Voltage (With HP 7908R):	88-127V (115V nominal).
Line Voltage (With HP 7911R, HP 7912R, or HP 7914R):	90-105V (100V nominal) or 108-126V (120V nominal).
Line Frequency:	With HP 7908R: 47.5 to 66 Hz With HP 7911/12R/14R: 54 to 66 Hz
Option 015 Line Voltage and Line Frequency	
Line Voltage (With HP 7908R):	187-253V (230V nominal)
Line Voltage (With HP 7911R, HP 7912R, or HP 7914R):	198-231V (220V nominal) or 216-252V (240V nominal).
Line Frequency:	With HP 7908R: 47.5 to 66 Hz With HP 7911/12R/14R: 48 to 55 Hz

Table 1-5. System Electrical and Environmental Specifications (Continued)

Power Requirements:	Requires at least 20-ampere grounded power receptacle for 115 VAC operation, or at least 10-ampere grounded power receptacle for 230 VAC operation (option 015). The HP 2196C/97C/99C requires split-phase power; the HP 2196D/97D/99D requires single-phase power. An additional receptacle is required for the system console.
Maximum Current Required:	HP 2196C/97C/99C: 16 amperes per phase HP 2196D/97D/99D: 16 amperes
Ventilation:	Perforations in the HP 2196D/97D/99D cabinet and in the lower part of the HP 2196C/97C/99C cabinet facilitate front-to-rear ventilation driven by the fans in the computer and system disc. Four 120 CFM fans at the top rear of the HP 2196C/97C/99C cabinet draw in air through a filter at the bottom rear of the upper section, providing bottom-to-top air-flow of approximately 11.3 cm per minute (400 CFM). The actual value of air flow depends upon the configuration of user equipment racked in the upper section of the cabinet.
PHYSICAL CHARACTERISTICS	
Dimensions	
Height:	Model 26/27/29 (HP 2196C/97C/99C): 1613 mm (63.4 in) Model 26/27/29 (HP 2196D/97D/99D): 720 mm (28.3 in)
Width:	634 mm (25 in)
Depth:	813 mm (32 in)
ENVIRONMENTAL SPECIFICATIONS	
Temperature	
Operating (SPU only):	0° to 55°C (32° to 131°F) up to 3.1 km (10,000 ft); 0° to 45°C (32° to 113°F) up to 4.6 km (15,000 ft).
Operating (79xxR Disc):	0° to 40°C (50° to 104°F), rate of change <10°C (18°F) per hour.
Non-operating:	-40° to 60°C (-40° to 140°F)
Relative Humidity	
SPU only:	5% to 95% with maximum wet bulb temperature not to exceed 25.6°C (78.1°F), excluding all conditions which cause condensation.
7908R/11R/12R/14R Disc:	20% to 80% non-condensing.
Altitude	
Operating:	To 4.6 km (15,000 ft)
Non-operating:	To 15.3 km (50,000 ft)
Vibration and Shock:	HP 1000 A-Series products are type tested for normal shipping and handling shock and vibration. (Contact factory for review of any application that requires operation under continuous vibration).

2-1. INTRODUCTION

This section includes preventive maintenance, troubleshooting information for isolating malfunctions to the assembly level, and procedures for removing and replacing various assemblies of the Model 26/27/29 Computer System. The system is designed to operate over a wide range of conditions. However, to reduce costly down time, a maintenance agreement is advisable. (HP Maintenance Agreements are available for those who desire to contract for this service.) Personnel in charge of the system should become familiar with the hardware and software to be able to quickly place it back in operation.

2-2. ELECTRICAL SAFETY

Before proceeding with any maintenance or service on the system which requires physical contact with electrical or electronic components, be sure that either power is removed or that safety precautions are followed to protect against shock. Heed all "WARNING" signs on equipment. All service work must be done by qualified personnel.

2-3. CUSTOMER MAINTENANCE

WARNING

High voltages are present in the system equipment. Always disconnect power before performing any maintenance. Failure to do this could result in serious injury.

The customer should set up maintenance schedules according to the quality of the environment in which the system is operating. A system in a clean and air-conditioned atmosphere requires much less care than one which is located in an atmosphere with an unusual amount of dust, smoke, moisture, or other foreign matter. The user should consult the installation/service manuals for the system disc drive and peripherals for the procedures required for a preventive maintenance schedule. For the system cabinet, perform the following steps as often as necessary:

- a. Clean cabinet exterior and interior.
- b. Check ventilating fans for proper operation.

The ventilating fans in the system cabinet (HP 2196C/97C/99C) have sealed bearings and require no lubrication. The air filters in the computer and the cabinet should be cleaned periodically to ensure that the equipment remains free of dust. Clean the cabinet filter by removing it and vacuuming its intake surface.

2-4. TROUBLESHOOTING

The following paragraphs provide information for troubleshooting the system. To troubleshoot the disc drive, refer to the the appropriate disc drive service manual.

System malfunctions can be isolated to the assembly level by sequentially performing the following tests:

- a. Computer power supply check.
- b. Computer self-test.
- c. Peripheral self-test.
- d. FTEST program (RTE-A Primary System Installation Manual).
- e. Diagnostics (paragraph 2-9).

When a malfunction is encountered, replace the assembly indicated in the test procedure. After the malfunction is corrected, contact your nearest Hewlett-Packard Sales and Service Office for instructions regarding shipment of the defective assembly.

2-5. COMPUTER POWER SUPPLY CHECK

Verify the computer power supply operation by using the power supply test procedure given in the computer installation and service manual.

2-6. SELF-TESTS

Execute the self-tests for the computer and the system peripherals. Self-test information is given in the computer installation and service manual and in the appropriate manuals for the peripherals. When troubleshooting the system, make sure that the terminal configuration is correct. (Refer to paragraph 1-10.)

NOTE

You *must* check the HP-IB interface card for the correct select code and the disc drive for the correct HP-IB address! An incorrect select code or HP-IB address will *not* be detected by either the computer's or the disc drive's self-test! Similarly, if a disc drive is replaced, you must correctly set the new drive's HP-IB address!

2-7. MEMORY CARD LEDS

In the HP 2196/97 Systems, memory parity status is indicated by a green LED on the front of each parity memory card. When the LEDs are lit, a memory parity error has not occurred; when an LED is off, a parity error has occurred. A parity error indication (LED off) can be cleared by cycling the computer ~LINE switch, or entering the %T or %P command on the VCP, or pressing the RESET switch on the frontplane or processor card. Frequently recurring parity errors can be eliminated by replacing the memory card having the error.

If error-correcting memory cards are installed in the HP 2197C/D System, the eight red LEDs on each card identify the faulty memory chip for single-bit errors. The single green LED, if off, indicates a multiple-bit (non-correctable) error. Refer to the A700 computer installation and service manual for details.

In the HP 2199C/D System, each memory array card has a green LED which, when off, indicates that a multiple-bit (non-correctable) error has occurred on that card since the last power-on.

2-8. FTEST PROGRAM

The FTEST program should be run when the computer self-test fails to detect a suspected system malfunction. FTEST is described in the RTE-A Primary System Installation Manual.

2-9. DIAGNOSTICS

The diagnostics in the HP 24612A and 24398B Diagnostic Packages should be used for testing when the various self-tests and the FTEST program cannot detect a system malfunction. The processor and memory diagnostic in the 24612A package tests the processor card, the memory, and the I/O Master on each I/O card. Interface diagnostics test the individual interface cards. The 24398B package provides diagnostics for hard disc drives and magnetic tape units. The HP 24613A Diagnostic Package (not supplied with the system) provides diagnostics for measurement and control interfaces. Instructions for

running the diagnostics are given in operating manuals included in the diagnostic packages. For the Model 26/27/29 system, the HP 24612A and 24398B diagnostic software is included on the same CS/80 tape cartridge as the Primary System, and the diagnostic manuals are supplied with the system.

2-10. UNIT REMOVAL AND REPLACEMENT**WARNING**

Hazardous voltages are present inside the system cabinet. Heed all WARNING - HAZARDOUS VOLTAGE labels.

CAUTION

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

The following paragraphs describe procedures for removing and replacing the computer, the disc drive, and the cabinet fans. (Refer to Section III for front and rear views of the Model 26/27/29 systems.)

2-11. COMPUTER

2-12. REMOVAL. Remove the computer from the cabinet as follows:

- a. Set the system Power switch to OFF.
- b. Open the rear door of the system cabinet and disconnect the computer power cord from the computer.
- c. Open the computer card cage covers and disconnect all interface cables from the I/O cards in the card cage. Close the cage covers.
- d. Open the lower front door of the system cabinet.
- e. Remove the front cover of the computer by grasping it firmly and pulling.
- f. Remove the four screws securing the computer in the cabinet. Remove the computer by sliding it out of the cabinet.

2-13. REPLACEMENT. Replace the computer by reversing the removal procedure.

2-14. DISC DRIVE

2-15. REMOVAL. Remove the disc drive from the system cabinet as follows:

WARNING

To prevent the cabinet from tipping over, you must install the cabinet anti-tip legs before removing the HP 7911R/12R/14R Disc Drive from the cabinet.

- a. For the 7911R/12R/14R Drive, install the HP 40024A Cabinet Anti-Tip Legs. Refer to the 40024-90001 instruction sheet for installation procedures.
- b. Set the system Power switch to OFF.
- c. Open the rear door of the system cabinet and disconnect the disc drive power cord from the disc drive.
- d. Disconnect the HP-IB cable from the rear of the disc drive.
- e. Open the lower front door of the system cabinet.
- f. Remove the front panel of the disc drive by grasping it firmly and pulling.
- g. Remove the four screws securing the disc drive in the cabinet.
- h. For the HP 7908R Drive, remove the drive by sliding it out of the cabinet.

WARNING

Each 7911R/12R Disc Drive weighs 67.3 kilograms (148 pounds), and each 7914R Disc Drive weighs 85.3 kilograms (188 pounds); two or more persons are required to lift one of these disc drives.

- i. For the 7911R/12R/14R Drive, pull the drive out of the cabinet. Following the instructions given in the disc drive manual, disengage the drive from its slides and set it on a sturdy work bench or table.

2-16. REPLACEMENT. Replace the disc drive by reversing the removal procedure.

2-17. CABINET FANS (HP 2196C/97C/99C)

2-18. REMOVAL. Remove a cabinet fan from the HP 2196C/97C/99C (1613 mm) cabinet as follows:

- a. Set the system Power switch to OFF.
- b. Open the rear door of the system cabinet.
- c. Disconnect the fan power cable from the fan assembly.
- d. Remove the four screws securing the fan assembly. Remove the assembly and place it on a workbench.
- e. Remove the inside fan cover and four fan guards by removing the 16 screws, 16 nuts, and 16 washers securing the cover and guards.
- f. Disconnect power cord from defective fan and remove fan.

CAUTION

When installing a fan, be sure to orient the fan so that the direction of air flow is *out* of the cabinet. Air flow direction is indicated on the fan.

2-19. REPLACEMENT. Replace the cabinet fan by reversing the removal procedure.

2-20. 115/230 VAC RECONFIGURATION (HP 2196D/97D/99D ONLY)

CAUTION

The following 115/230 Vac reconfiguration procedure applies *only* to the HP 2196D/97D/99D System and *not* to the HP 2196C/97C/99C System. If it is necessary to reconfigure a 2196C/97C/99C System, contact the nearest Hewlett-Packard Sales and Service Office listed in the rear of this manual.

This paragraph provides procedures for reconfiguring the HP 2196D/97D/99D System (i.e., 720 millimeter cabinet) to operate from the alternative ac power source (115 Vac

or 230 Vac). Wiring information on the Power Distribution Unit (PDU) in the system cabinet is given in Figures 2-1 and 2-2. To convert the system to 115- or 230-Vac operation, proceed as follows:

WARNING

System reconfiguration for operation from 115 or 230 Vac line voltage must be done only by qualified personnel. Before changing from 115 Vac to 230 Vac configuration, or vice versa, set the Power switch on the rear of the system cabinet to OFF and disconnect the power cord from the power source. Failure to observe this precaution may result in serious injury.

- a. Set the Power switch on the rear of the cabinet to OFF and disconnect the power cord from the power source.
- b. On the cabinet rear door, remove the screws securing the inspection plate of the PDU and remove the plate.
- c. Loosen the captive screw securing the right side of the cabinet rear door and open the door.
- d. Install the appropriate system power cord. For 230-Vac operation an electrician must install a user-supplied power cord.
- e. Perform the computer 115/230-Vac reconfiguration procedure given in the computer installation and service manual.
- f. For the HP 7908R Disc Drive, remove the drive from the system cabinet by using the procedure given in paragraph 2-14.

WARNING

To prevent the cabinet from tipping over, you must install the cabinet anti-tip legs before sliding the HP 7911R/12R/14R Disc Drive out of the cabinet.

- g. For the 7911R/12R/14R Drive, install the HP 40024A Cabinet Anti-Tip Legs. Refer to the 40024-90001 instruction sheet for installation procedures. Slide the drive out of the cabinet.

- h. Perform the disc drive line voltage reconfiguration procedure given in the disc drive installation manual.

When the system is reconfigured, the voltage rating tag on the rear of the system cabinet must be removed and replaced with one that shows the appropriate voltage selection.

2-21. TERMINAL INTERFACE CABLE WIRING

Tables 2-1 and 2-2 give the pin numbers for continuity checks of the terminal interface cables, 5061-6604 and 5061-6605.

Table 2-1. Continuity for Terminal Interface Cable (5061-6604)

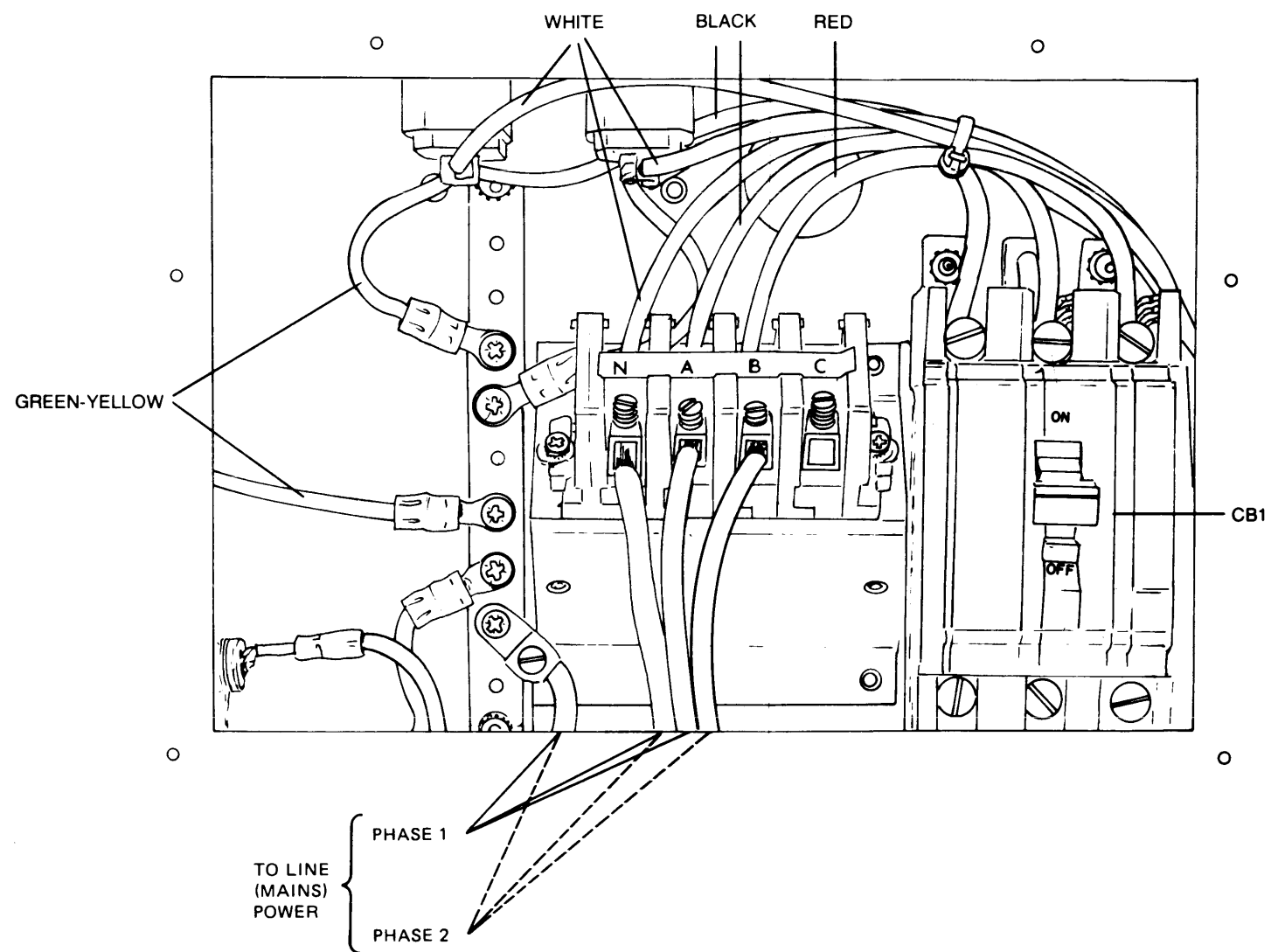
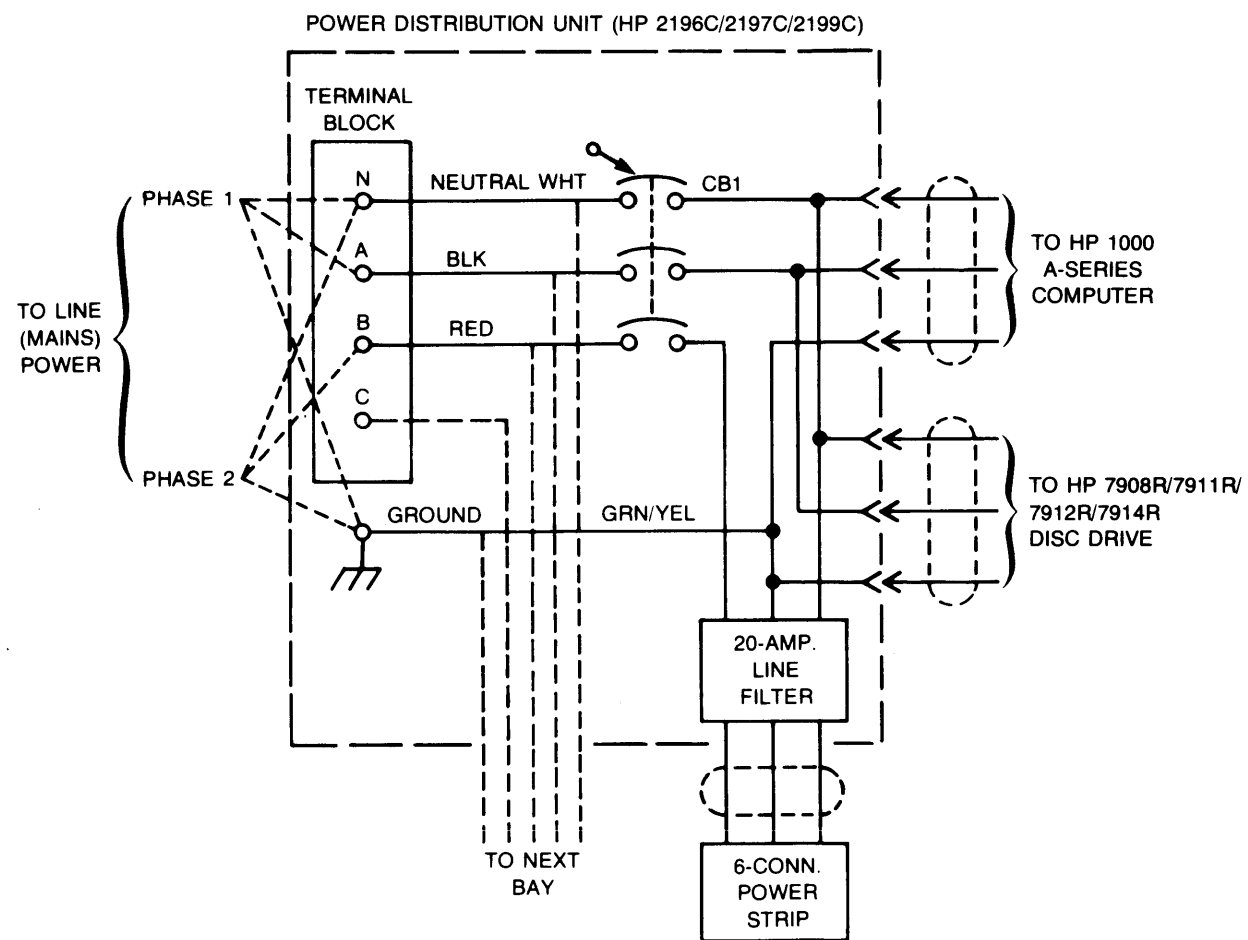
SIGNAL NAME	SIGNAL DEFINITION	12005 CONN.	TERMINAL CONN.
RS (U)	Request to Send (U)	E	44
RD (B)	Receive Data (B)	S	12
SD (U)	Send Data (U)	W	42
GND	Common	U,BB,24	48

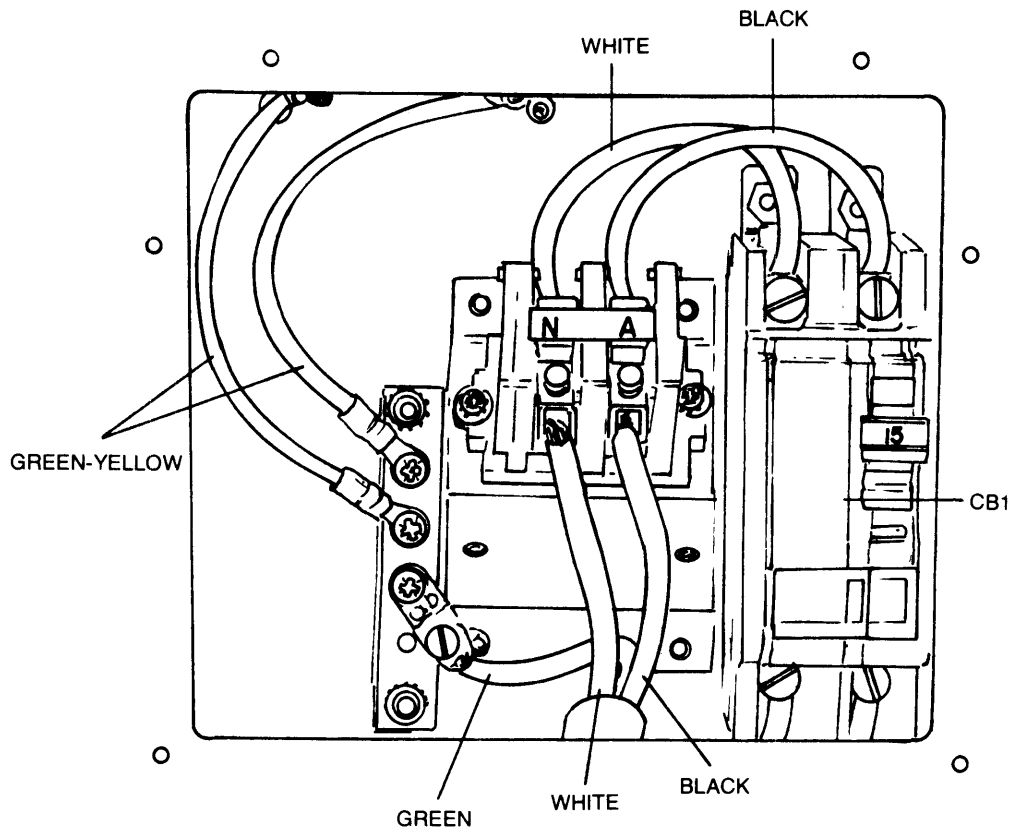
Table 2-2. Continuity for Terminal Interface Cable (5061-6605)

SIGNAL NAME	SIGNAL DEFINITION	12005 CONN.	TERMINAL CONN.
RS (U)	Request to Send (U)	E	5,6
TR	Terminal Ready	M	8
RD (B)	Receive Data (B)	S	2
SD (U)	Send Data (U)	W	3
CS (A)	Clear to Send (A)	X	4
GND	Common	U,Y,BB,24	7

2-22. POWER DISTRIBUTION DIAGRAMS

Figure 2-1 is the power distribution and wiring diagrams for the HP 2196C/97C/99C System, and Figure 2-2 is the power distribution and wiring diagrams for the HP 2196D/97D/99D System.





POWER DISTRIBUTION UNIT (HP 2196D/2197D/2199D)

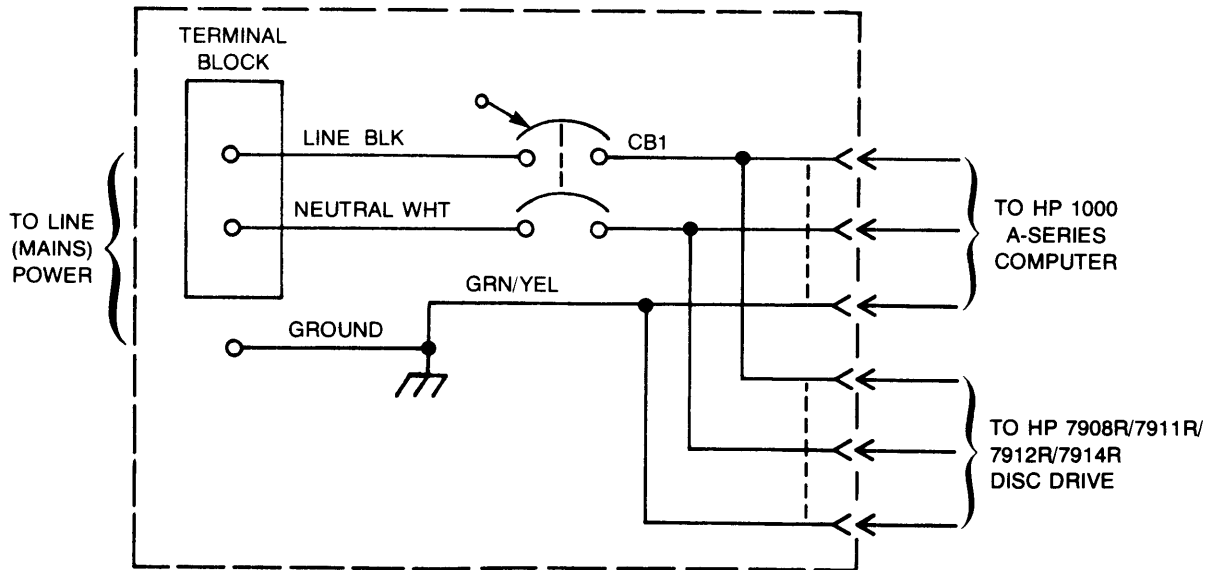


Figure 2-2. HP 2196D/2197D/2199D Wiring Diagrams

REPLACEABLE PARTS

SECTION

III

3-1. INTRODUCTION

This section provides information on field-replaceable parts of the system. Replaceable system assemblies are listed in Tables 3-1 through 3-3. Figures 3-1 and 3-2 are front and rear views of the Model 26, 27 and 29 Systems.

For parts lists of individual units (computer, subsystem, or interface), refer to the applicable installation and service manuals.

Table 3-1. Replaceable Parts (HP 2196C/D)

DESCRIPTION	HP PART NO.
Processor Card	12105-60001*
128k Byte Memory Controller Card	12102-60001*
512k Byte Memory Controller Card	12102-60002*
512k Byte EC Memory Cont. Card*	12110-60001
1024k Byte EC Memory Cont. Card*	12110-60002
128k Byte Memory Array Card	12103-60001
512k Byte Memory Array Card	12103-60003
1024k Byte Memory Array Card	12103-60004
512k Byte EC Memory Array Card	12111-60001
1024k Byte EC Memory Array Card	12111-60002
2048k Byte EC Memory Array Card	12111-60003
Frontplane for 1 Memory Array Card	12038-60001
Frontplane for 2 Memory Array Card	12038-60002
Frontplane for 3 Memory Array Card	12038-60003
Frontplane for 4 Memory Array Card	12038-60004
HP-IB Interface Card	12009-60010
Asynchronous Serial Interface Card	12005-60012
Cable, HP-IB Interface	12009-60011
Cable, ASIC Interface	5061-6604
Cable, ASIC Interface	5061-6605
Cable, Fiber Optic	5061-5798
Converter, ASIC Fiber Optic	5061-5800
Fan, Cabinet	3160-0315
Air Filter, Cabinet	3150-0421

* PROM chips are not included; refer to the computer installation and service manual for chip part numbers.

3-2. ORDERING INFORMATION

To order replaceable parts, address the order to the nearest Hewlett-Packard Sales and Service Office listed at the back of this manual. The following information should be included in the order for each replaceable part:

- Complete model number and serial number.
- Hewlett-Packard part number for each part.
- Complete description of each part.

3-3. REPAIR ALTERNATIVES

Many defective system assemblies (e. g., power supply, processor card, etc.) can be exchanged for an operative assembly. For the cost and other details of the exchange program, contact your nearest HP Sales and Service Office.

If desired, you can arrange for Hewlett-Packard to repair any defective system assembly. Contact your HP Sales and Service Office for details.

Table 3-2. Replaceable Parts (HP 2197C/D)

DESCRIPTION	HP PART NO.
Upper Processor Card	12152-60001
Lower Processor Card	12152-60002*
Memory Controller Card	12152-60003*
3-Connector Processor Frontplane	12156-60002
Floating Point Processor Card	12156-60001*
128k Byte Memory Array Card	12103-60001
256k Byte Memory Array Card	12103-60017
512k Byte Memory Array Card	12103-60003
1024k Byte Memory Array Card	12103-60004
512k Byte Error Corr. Memory Card	12104-60001
512k Byte EC Memory Array Card	12111-60001
1024k Byte EC Memory Array Card	12111-60002
2048k Byte EC Memory Array Card	12111-60003
Frontplane for 1 Memory Array Card	12038-60001
Frontplane for 2 Memory Array Card	12038-60002
Frontplane for 3 Memory Array Card	12038-60003
Frontplane for 4 Memory Array Card	12038-60004
HP-IB Interface Card	12009-60010
Asynchronous Serial Interface Card	12005-60012
Cable, HP-IB Interface	12009-60011
Cable, ASIC Interface	5061-6604
Cable, ASIC Interface	5061-6605
Cable, Fiber Optic	5061-5798
Converter, ASIC Fiber Optic	5061-5800
Fan, Cabinet	3160-0315
Air Filter, Cabinet	3150-0421

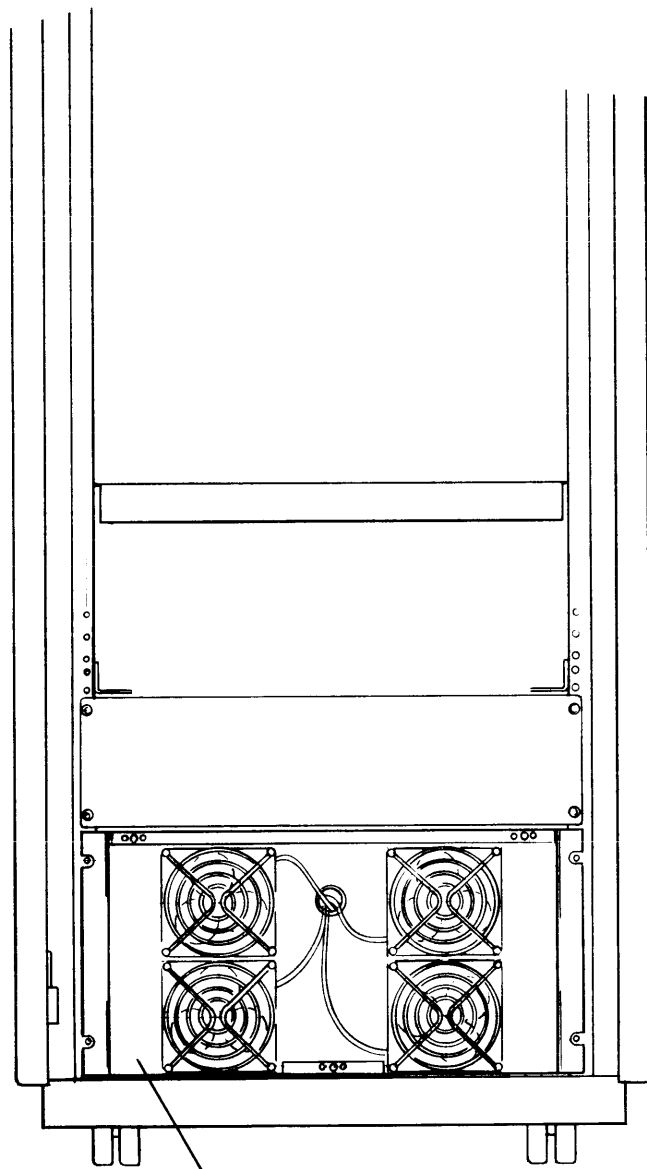
* PROM/SOS chips are not included; refer to the computer installation and service manual for chip part numbers.

Table 3-3. Replaceable Parts (HP 2199C/D)

DESCRIPTION	HP PART NO.
Sequencer Card	12201-60001*
Data Path Card	12202-60001*
Cache Control Card	12203-60011*
Memory Controller Card	12204-60003
768k Byte Memory Array Card	12220-60001
3M Byte Memory Array Card	12221-60001
Frontplane for 1 Memory Array Card	12222-60001
Frontplane for 2 Memory Array Cards	12222-60002
Frontplane for 3 Memory Array Cards	12222-60003
Frontplane for 4 Memory Array Cards	12222-60004
Frontplane for 5 Memory Array Cards	12222-60005
Frontplane for 6 Memory Array Cards	12222-60006
Frontplane for 7 Memory Array Cards	12222-60007
Frontplane for 8 Memory Array Cards	12222-60008
HP-IB Interface Card	12009-60010
Asynchronous Serial Interface Card	12005-60012
Cable, HP-IB Interface	12009- 113
Cable, ASIC Interface	5061-6604
Cable, ASIC Interface	5061-6605
Cable, Fiber Optic	5061-5798
Converter, ASIC Fiber Optic	5061-5800
Fan, Cabinet	3160-0315
Air Filter, Cabinet	3150-0421

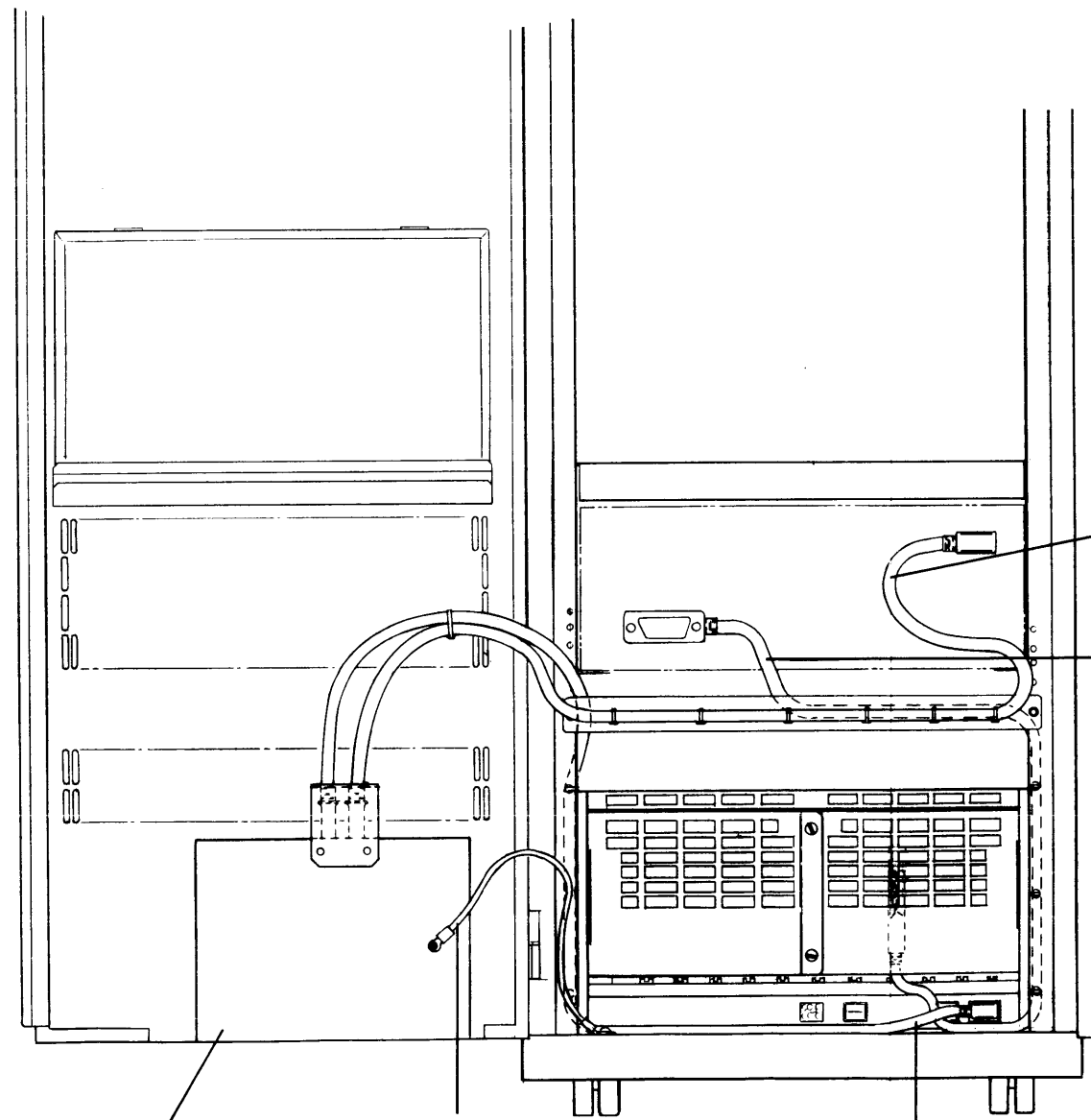
* PROM/SOS chips are not included; refer to the computer installation and service manual for chip part number.

**FRONT VIEW
(DOOR REMOVED FOR CLARITY)**



COMPUTER (FRONT COVER REMOVED)

REAR VIEW



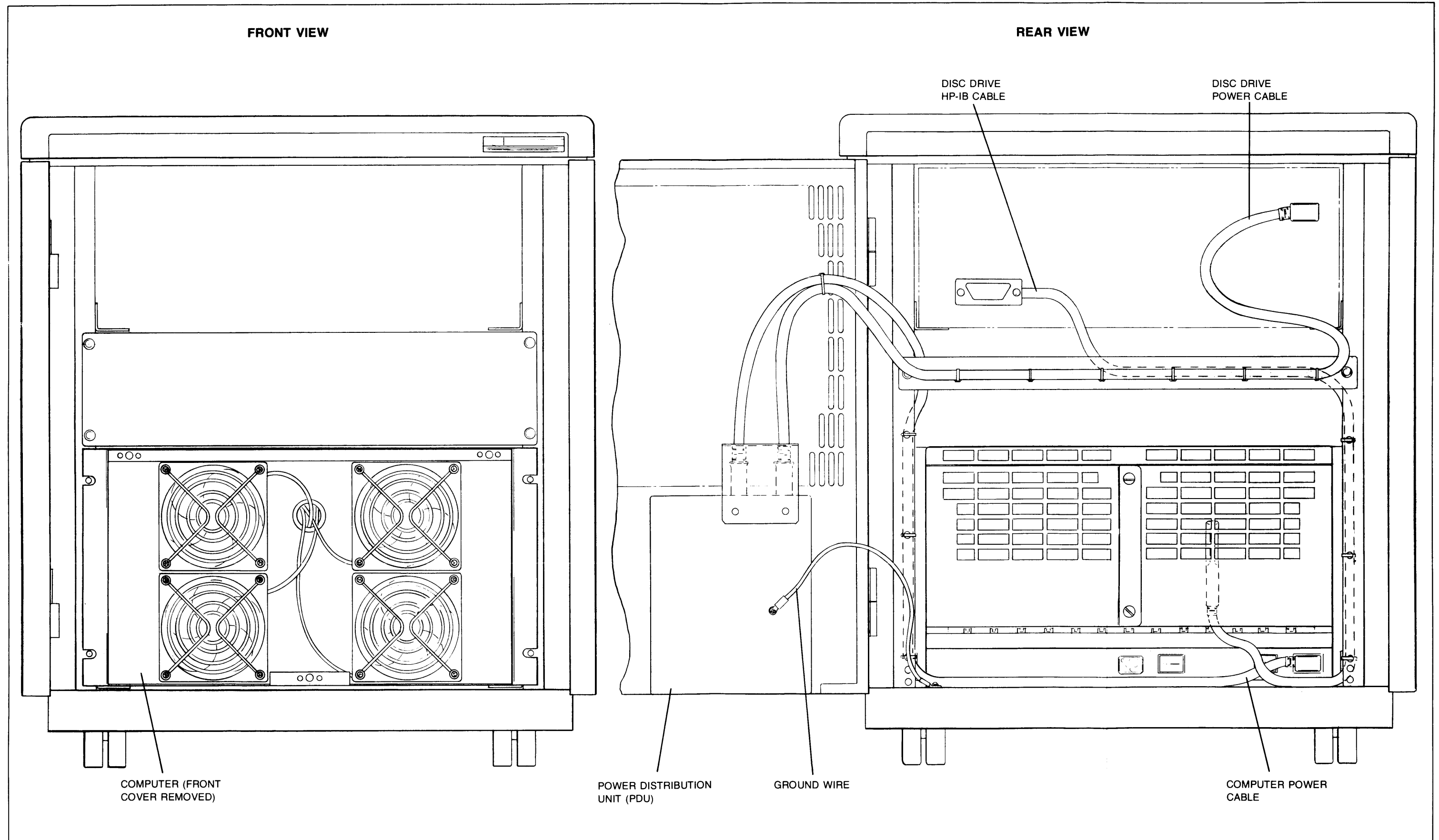
POWER DISTRIBUTION UNIT

GROUND WIRE

COMPUTER POWER CABLE

DISC DRIVE POWER CABLE

DISC DRIVE HP-IB CABLE



Option 070 SPU Installation

APPENDIX

A

A-1. INTRODUCTION

The HP 219xC SPU Option 070 deletes the cabinet from the 219xC SPU to permit racking in either the 7914ST or 7914TD Subsystem Cabinet, and provides an additional HP-IB interface for the magnetic tape unit included with the subsystem. The HP 7914ST and HP 7914TD Disc-Tape Subsystems are shipped with the magnetic tape unit and the CS/80 disc drive installed in the cabinets. Installation of the SPU is described in the subsequent paragraphs of this appendix.

NOTE

Only one MUX mounting bracket (HP P/N 12828-00004) can be installed on the 7914ST Subsystem cabinet. The bracket will accommodate two HP 12828 MUX panels (HP P/N 12828-60001). Install the MUX bracket on the rear of the cabinet directly behind the SPU, on the 7914ST. The MUX bracket may be installed either behind the SPU or behind the magnetic tape drive, on the 7914TD.

For operation of the magnetic tape unit with the Primary System:

Connect the magnetic tape unit and the disc drive to the same HP-IB interface card.

SUBSYSTEM: 7914ST

DEVICE	SELECT CODE	HP-IB ADDRESS
Magnetic Tape	27B	3
Disc Drive	27B	0

SUBSYSTEM: 7914TD

DEVICE	SELECT CODE	HP-IB ADDRESS
Magnetic Tape	27B	4
Disc Drive	27B	0

NOTE

For greater efficiency it is recommended that the magnetic tape unit and the disc drive be connected to separate HP-IB interface cards. (The additional HP-IB interface is supplied with Option 070.) This may necessitate regeneration of the Operating System.

A-2. COMPUTER RACK MOUNTING

NOTE

The HP 1000 A-Series computer may be installed in the 7914ST/TD subsystem cabinet directly below the HP 7914R CS/80 disc drive. All the necessary installation hardware is supplied with the computer. To install the computer, proceed as follows:

- a. Install the mounting brackets in the cabinet as illustrated in *figure A-1. HP 219xC Option 070 SPU Installation*. For more detailed information refer to the HP 12679C Rack Rail Installation Manual (P/N 12679-90001).

NOTE

The proper position for the mounting brackets in the 7914ST is the 11th hole up from the bottom of the cabinet, and in the 7914TD it is the 8th hole up from the bottom of the cabinet.

- b. Install the clip nuts at the proper locations on the outer vertical column of the inside flanges as shown in *figure A-1. HP 219xC Option 070 SPU Installation*.

The proper position for the clip nuts in the 7914ST are the 12th and 25th holes up from the bottom of the cabinet, and in the 7914TD they are the 9th and 22nd holes up from the bottom of the cabinet.

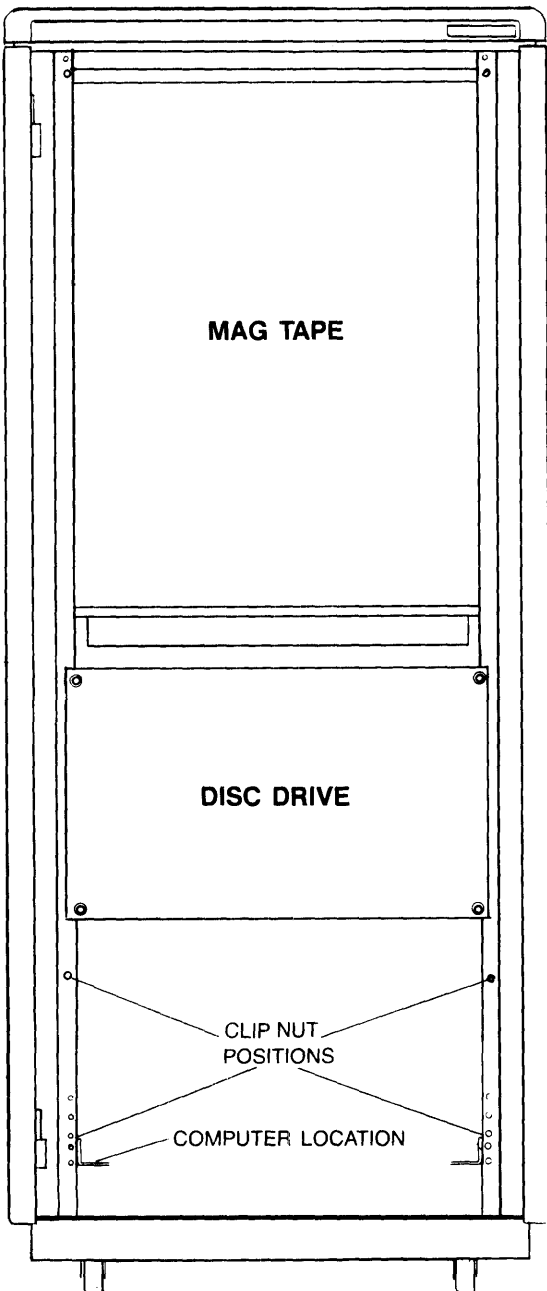
- c. Position the computer on the mounting brackets and slide the computer into the cabinet.
- d. Using the hardware supplied, insert the four mounting screws through the clip nuts and tighten them to secure the computer to the cabinet.
- e. For additional information on computer interconnection and configurations, refer to the appropriate computer manual:

A600+ Computer Installation and Service Manual, part number 02156-90002

A700 Computer Installation and Service Manual, part number 02137-90002

A900 Computer Installation and Service Manual, part number 02139-90002

**FRONT VIEW
(DOOR REMOVED FOR CLARITY)**



NOTE

1. Mount the rails on the inside vertical column:
 For the **7914ST**, at the 11th hole up from the bottom of the cabinet.
 For the **7914TD**, at the 8th hole up from the bottom of the cabinet.
2. Position the clip nuts for the computer on the outer column:
 For the **7914ST**, at the 12th and 25th holes up from the bottom of the cabinet.
 For the **7914TD**, at the 9th and 22nd holes up from the bottom of the cabinet.

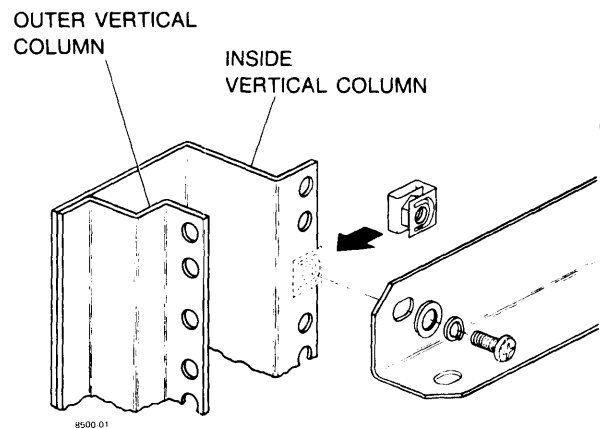


Figure A-1. HP 129xC Option 070 SPU Installation

