HP 2000 SERIES
COMPUTER SYSTEM
(MODEL 19700B)

INSTALLATION MANUAL

Manual Part No. 19700-90007

Printed in U.S.A. 1/77

Including Add-on Multiple Disc Drives

LIST OF EFFECTIVE PAGES

The List of Effective Pages gives the most recent date on which the technical material on any given page was altered. If a page is simply re-arranged due to a technical change on a previous page, it is not listed as a changed page. Within the manual, changes are marked with a vertical bar in the margin.

All pages in this edition are original issue.

PRINTING HISTORY

New editions incorporate all update material since the previous
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contain additional and replacement pages to be merged into the
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but neither the date on the title page and back cover nor the
edition change.

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This manual shows Hewlett-Packard Customer Engineers how to install an HP 2000 Computer System (Model 19700B) following preparation of the system site by the customer. The manual also tells how to install Add-On Multiple Disc Drives (Model 19701A) to systems already in the field. Specifically, it explains how to:

- Supervise unpacking and inventory of the system by the customer, and report any damaged or missing items (Section I).

- Install the system cabinets, connect their electrical wiring, and verify the wiring connections (Section II).

- Install the peripheral devices used with the system (Section III).

- Turn on the power for the system and peripheral devices (Section IV).

- Install the operating system and other software required, and verify system operation by running various testing programs (Section V).

- Complete the installation and explain HP support services to the customer (Section VI).

This manual is intended only for Customer Engineers trained for the HP 2000 Series Computer System. Before installing the system, the Customer Engineer should also locate the following additional manuals among those shipped with the system:

Manual	Part No.
Systems Support Log	02000-90088
HP 29400B-Series Cabinets	02940-90256
HP 29400-Series Cabinets (for HP 2000 Series Computer Systems)	02940-90271
HP 29425A Cabinet Installation and Service Manual	29425-90001

In addition to the above manuals, the following manuals, used during site preparation, should already be available:

Manual	Part No.
HP Computer System Site Planning Workbook	19700-90004
HP 2000 Computer System Site Preparation Manual	19700-90005

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TABLES

RECEIVING THE SYSTEM

As the Hewlett-Packard Customer Engineer servicing an HP 2000 Computer Site, you are responsible for installing the system and ensuring that it operates according to factory specifications. Begin by supervising the unpacking and inventory. Then, install and check-out the system and finally show the new system operator how to operate it. Note that you are not responsible for the setup and cabling of any terminals other than the system console, unless this has been negotiated as a separate contract.

The customer is responsible for: inspecting the shipment upon its arrival, checking it against the packing list, moving the system to its final location, unpacking it and taking inventory under your supervision, disposing of non-reusable packing materials, reporting claims for damaged or missing items, connecting the system to the electrical supply, and cabling of terminals other than the console.

When the customer notifies you that his system has arrived, tell him to inspect the shipment, verify the packing list, and if no discrepancies are found, move the equipment to the installation site. Remind the customer that instructions on how to perform these tasks appear in the HP 2000 Computer System Site Preparation Manual (part no. 19700-90005). If damages or discrepancies are noted, have him notify you and the carrier or the carrier's agent. Inform the customer when you will arrive at the site to begin the installation, so that he can have appropriate personnel present to unpack the system.

Remind the customer that an electrician will be required to install the power cabling and connect it to the main power supply (as discussed in Section II). He should now arrange for the electrician to be available for this operation.

Any power isolation transformers should have been installed at the site prior to starting the installation. The system will be connected to the power panels as shown in figure 1-1.

1-1.   UNPACKING THE SHIPMENT

When you arrive at the site to install the system, begin by supervising its unpacking. Before the customer unpacks any hardware items, ask him to locate and unpack the carton marked "MANUALS". Several of the manuals will be required for installation activities.

POWER
SOURCE

SITE
MAINTENANCE
EQUIPMENT
POWER PANEL

CONVENIENCE OUTLETS
FOR SITE MAINTENANCE
EQUIPMENT, TYPEWRITERS,
ETC.

COMPUTER
PERIPHERAL
EQUIPMENT
POWER PANEL

POWER RECEPTACLES
FOR LINE PRINTER,
CARD READER PUNCH,
TERMINALS, ETC.

COMPUTER MAINFRAME
POWER PANEL
(WALL MOUNTED)

ISOLATION
TRANSFORMER(S)

HP 7905A
CARTRIDGE DISC
DRIVES

PCM

PDU

PDU

SYSTEM
CABINET

OPTIONAL
CABINET

*LOCATION OF ISOLATION TRANSFORMER RELATIVE
TO CIRCUIT BREAKERS DETERMINED BY LOCAL CODE

Figure 1-1. Computer System Power Isolation Plan

Ask the customer to begin unpacking the items furnished in any order he desires, using the Installation Record in the <u>Systems Support Log</u> (part no. 02000-90088) for a detailed inventory of the equipment. As he unpacks each item, he should check its contents for external or internal damage. For instance, he should look for broken controls, dents, cracks, scratches, or breakage; he should open all front and rear doors or panels to check for damaged or missing parts; he should check all device serial numbers against the packing list or the product identification cards; finally, he should inspect all software media (magnetic and paper tapes, disc packs, card decks, and so forth) for damage (such as torn tapes, broken reels, broken disc pack covers, or damaged cards).

1-2.   FILING CLAIMS

Ask the customer to report any flaw in the shipment to you and to the carrier (or his agent) immediately. Have nim save all crates, cartons, boxes, and packing materials for inspection. He should not make any verbal report of damaged or missing items without also supplying a written report.

You should report any problem found with the shipment, packing list, equipment, or supplies to the Order Processing Department at HP's General Systems Division. HP will replace missing or damaged items without waiting for settlement of claims.

1-3.   INSTALLATION SUMMARY

Proceed with the installation, following the steps discussed in the remainder of this manual and summarized below:

● Install the equipment cabinets by mechanically joining them and connecting the Power Control Module (PCM) and Power Distribution Unit (PDU) cabling; supervise the customer's electrician as he connects the PCM to the main power supply; and verify the electrical connections (described in Section II).

● Position and install all required and optional peripheral devices including the system console but excluding all other terminals, which are installed by the customer (Section III).

● Turn on the power for the main unit and peripheral devices (Section IV).

● Install the operating system and other software, verify system operation by running test programs, and execute diagnostic tests to analyze any problems revealed by the test programs (Section V).

● Provide for continued system support by showing the system operator the procedures for turning on the system and maintaining it on a daily basis, and showing the customer how to obtain various HP support services (Section VI).

The system is mounted in one double-bay HP 29404B Cabinet, optional single-bay HP 29402B Cabinets, and up to eight HP 29425A Cabinets. The installation of the HP 29404B and HP 29402B Cabinets, which house the main-frame components, is described in this section. The installation of the HP 29425A Cabinets, which house the HP 7905 Cartridge Disc Drives, is discussed in Section III (which covers peripheral devices).

2-1. EQUIPMENT

The system is assembled and thoroughly tested at the factory, and then partially disassembled for shipment to the customer. The HP 29404B Cabinet is shipped with both bays joined together and all equipment (power control module, power distribution unit, processors, and racked peripherals) installed. (See figure 2-1.) The HP 29402B Cabinets, if any are ordered, are packaged separately and shipped with their power distribution units installed. Extendable anti-tip legs, however, used to prevent cabinets from tipping over, are shipped dismantled; one pair of these legs is furnished with each system. All electrical connections between cabinets and bays, including power cables, are disconnected prior to shipment.

2-2. MINIMUM CONFIGURATION (MODEL HP 19700B)

The HP 2000 Computer System (Model 19700B) requires the following minimum equipment for operation:

- An HP 29404B Double-Bay System Cabinet that houses the major system components. The rightmost bay as you face the system contains:

    -- Two HP 21MX-E Series Minicomputers, one to serve as a system processor (SP) and the other to serve as an input/output processor (IOP).

    -- A power control module (PCM) for distributing ac power to the equipment in this bay and transmitting power to other HP 29000-Series bays in the system.

    -- A blower assembly for high-capacity cooling of the equipment in this bay.

    -- An emergency off-switch to allow users to immediately shut-down system power by opening the PCM circuit breaker.

The leftmost bay contains:

-- An HP 7970B or HP 7970E Magnetic Tape Unit for off-line
   storage of programs and data.

-- A power distribution unit (PDU) for distributing power
   transmitted from the PCM in the rightmost bay to equipment
   in this bay.

-- A fan to cool the equipment in this bay.

-- An HP 12920B Asynchronous Terminal Controller (ATC) with
   HP 30062A Terminal/Controller Multiplexor Panel to serve
   as a connecting point for user terminals.

-- An HP 13037A Cartridge Disc Controller to serve as a con-
   necting point for disc drives.

● An HP 29425A Single-Bay Cabinet containing an HP 7905A Car-
  tridge Disc Drive for mass storage of programs and data.

● An HP 2762A Console/Printer serving as the system console, and
  optionally, as a data communication console for communicating
  with a remote IBM, CDC, or HP 2000 Series Computer System.

● An HP 40021A System Desk, on which to place the console.

● The HP 2000 Operating System (HP 22687A) software, including
  HP 2000 BASIC Interpreter.

● The FCOPY/2000 and EDITOR/2000 software subsystems.

● The system verification test and diagnostic programs.

● System and peripheral equipment manuals.

The minimum system configuration is illustrated in figure 2-1.

2-3.   MAXIMUM CONFIGURATION (MODEL HP 19700B)

Other hardware and software may be provided at the customer's
option. The maximum configuration possible, shown schematically
in figure 2-2, contains the following additional items. (In this
list, if a hardware item may be ordered as part of a subsystem,
the HP subsystem number appears first, followed by the HP model
number in parentheses. Otherwise, only the model number
appears.)

● 7 additional HP 7905A Cartridge Disc Drives (for a total of
  8). Each is housed in a separate HP 29425A Cabinet.

● 3 additional HP 12970A (HP 7970B) or HP 12972A (HP 7970E) Mag-
  netic Tape Unit Subsystems (for a total of 4).
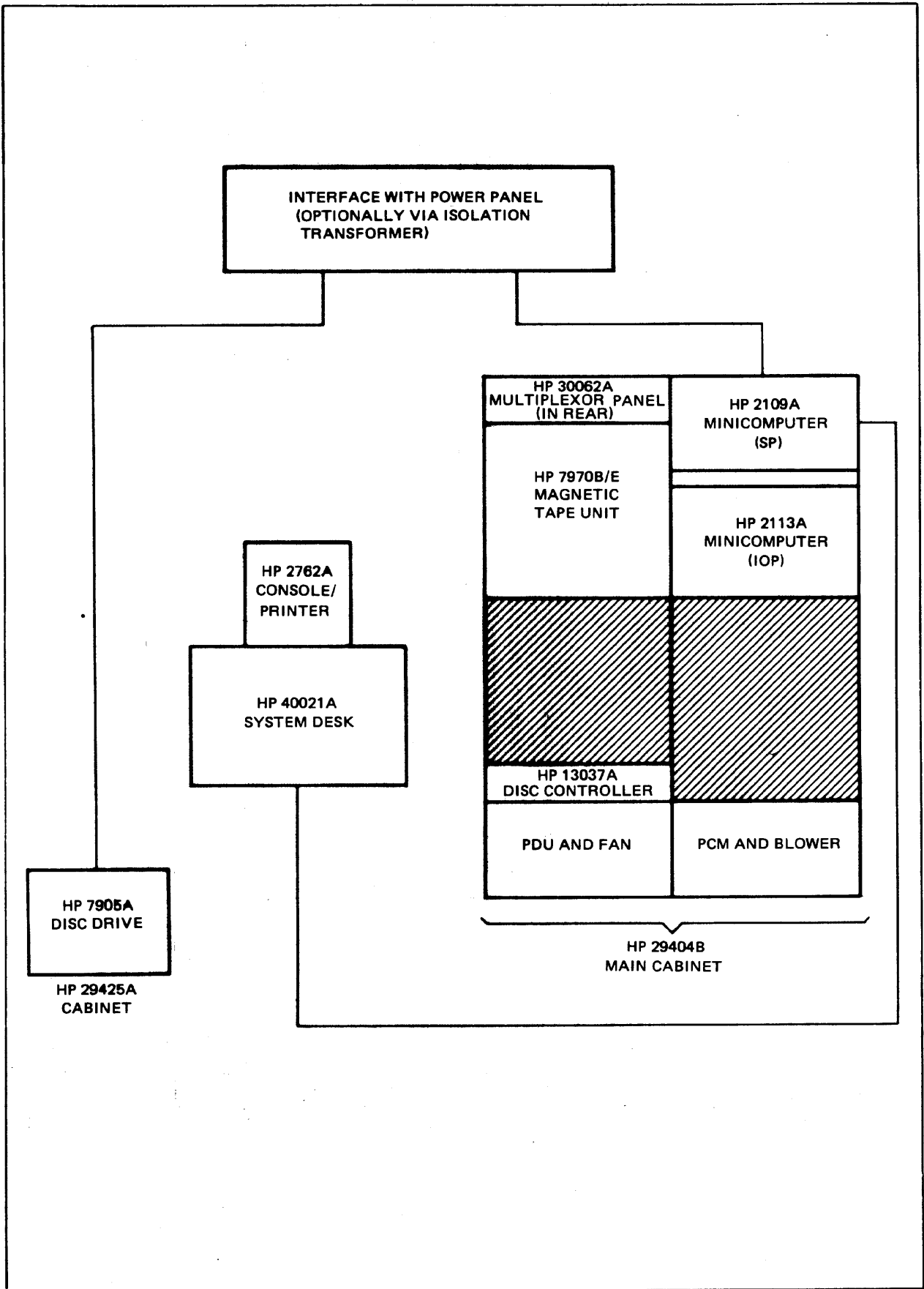
Figure 2-1. Minimum HP 2000 Series Computer System Configuration
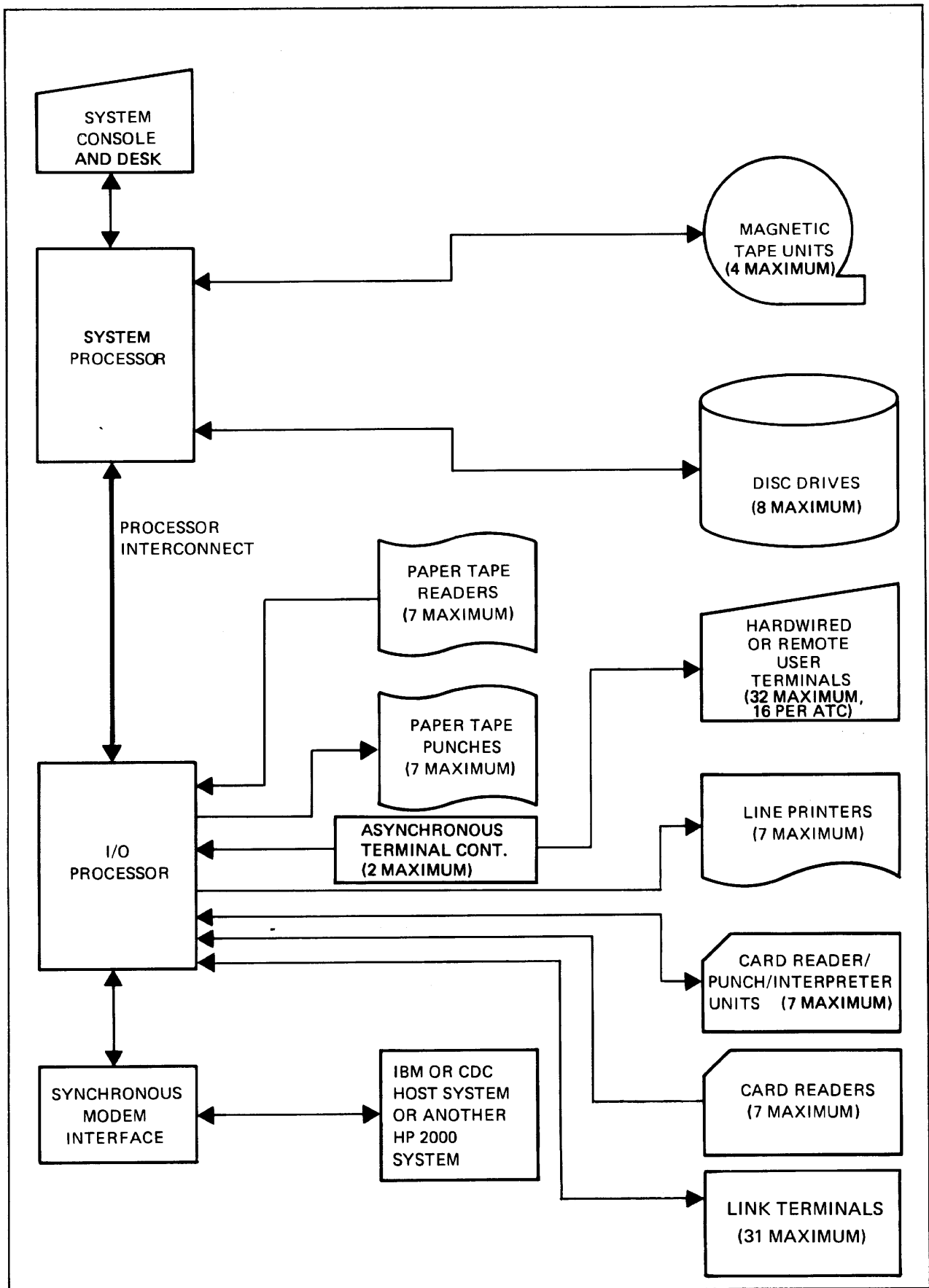
Figure 2-2. Maximum HP 2000 Series Computer System Configuration

- 1 additional HP 12920B ATC (for a total of 2); each ATC contains an HP 30062A Multiplexor Panel for serving up to 16 terminals.

- 7 HP 12925A (HP 2748B) Punched Tape Reader Subsystems.

- 7 HP 12926A (HP 2895B) Tape Punch Subsystems.

- 7 Line Printer Subsystems selected from the following: HP 12987A (HP 2607A), HP 12975A (HP 2613A), HP 13053A (HP 2617A), HP 12983A (HP 2618A), and HP 12984A (HP 2767A).

- 7 HP 12985A (HP 2892A) or HP 12986A (HP 7261A) Card Reader Subsystems.

- 7 HP 12989A (HP 2894A) Card Reader Punch Subsystems.

- 1 HP 12618A Synchronous Modem Interface, for communicating with other computer systems.

- 7 HP 92900A Serial Link Subsystems (with up to 31 HP 3070A Link Terminals).

- 32 CRT or hard-copy EIA-compatible terminals, with RS 232C connections and character-mode operation. These terminals include the HP 2640A CRT Terminal, HP 2644A Mini DataStation, HP 2749B Teleprinter, HP 2762A Terminal Printer, and HP 2762B Terminal Printer, among others. (For terminal characteristics, see HP 2000 Series Computer System Operator's Manual, part no. 22687-90005.)

- Various application programs.

Optional magnetic tape units can be racked by adding HP 29402B Single-Bay Auxiliary Equipment Cabinets to the basic double-bay cabinet.

The disc drives and magnetic tape units are connected to the system via the SP. All other devices are attached via the IOP.

2-4. ADD-ON MULTIPLE DISC DRIVES (MODEL HP 19701A)

Additional HP 7905A Cartridge Disc Drives may be added to systems already installed in the field, for a total of up to eight drives. These add-on drives are ordered under Model No. HP 19701A. (Site preparation and installation procedures for these disc drives are the same as for multiple disc drives furnished when the system is installed.)

2-5. MECHANICAL FEATURES

The HP 29404B Cabinet is a 56-inch double-bay unit that functions as the primary main-frame cabinet and contains the specific components shown in figure 2-3. The right bay (as you face the system) has a door hinged at the right, an emergency off-switch at

BAY NO. 2   BAY NO. 1

BLANK PANEL ─────────────────┤

                                              EMERGENCY OFF
                                              PUSH-BUTTON

                                              BLANK PANEL

                                              HP 2109A
HP 7970B/E ───────┤   SYSTEM PROCESSOR
MAGNETIC
TAPE UNIT   BLANK PANEL

                                              HP 2113A
                                              INPUT/OUTPUT
                                              PROCESSOR

                                              BLANK PANEL

                                              BLANK PANEL

HP 13037A ─────────┤   PCM/BLOWER
DISC DRIVE   FILTER
CONTROLLER

FRONT VIEW
(Without Doors)

BAY NO. 1   BAY NO. 2

HP 2109A ─────────┤   HP 30062A
PCAS   MULTIPLEXOR
                                              PANEL

HP 2113A ─────────┤
PCAS

                                              POWER
                                              DISTRIBUTION
                                              UNIT

POWER CONTROL ────┤
MODULE AND   FAN
BLOWER ASSEMBLY

BACK VIEW
(Without Doors)

Figure 2-3. HP 2000 Series Computer System Main Cabinet (HP 29404B)

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the top, and an open grill at the bottom. The system name plate
appears on this door. The left bay has a pop-open door with an
access panel at the top and a closed grill at the bottom. The
top covers are notched to accommodate the cabinet-connecting
hardware used if the HP 29402B Cabinet is added to the system.
(The two-notch top cover on the left bay is switched with the
four-notch top cover of the HP 29402B Cabinet when this is done,
so that both end bays have two-notch covers on top.)

The HP 29402B Cabinet is a 56-inch single-bay unit that, in addi-
tion to the PDU and fan always mounted at the rear, contains any
equipment configuration specified by the customer. It has a
pop-on front door with a closed grill, but provides no side
panels. The top cover is notched in four places to accommodate
the hardware for connecting this cabinet to the HP 29404B Cabi-
net. (This hardware is provided with the cabinet.)

2-6. ELECTRICAL FEATURES

Cabinets are available with input power configurations to match
local 50 or 60 Hz main power sources, as described in paragraph
2-7. All input power is brought into the PCM in the rightmost
bay of the HP 29404B Cabinet and distributed to the remainder of
the system through PDUs in each remaining bay (up to 30 amperes
per phase). (The PCM is illustrated in figure 2-4 and a PDU ap-
pears in figure 2-5.) The electrical system provides for inter-
ruption of all input leads from the main power source (except the
safety ground) in the event of a short-circuit in any bay. Only
24 volts (instead of the full main power source voltage) is
switched through the cabinet power switch, providing the site
with further protection from electrical shock.

In the PCM, main power is routed through a line filter to a cir-
cuit breaker. From the circuit-breaker, main power is routed to
a terminal block for connection to the PDU in the next bay, and
through fuses for internal cabinet connection to the service
strips. The PCM contains a 24-volt dc power supply used for ap-
plying +24 volts to a trip coil in the PCM power input circuit
breaker, thereby opening the breaker to shut down the main power
in emergencies. This voltage is actuated by pressing the EMER-
GENCY OFF push-button switch in the upper-right corner of the
right-most bay. The PCM also includes a relay that can be used
for remote indication of emergency power-off.

A blower is located in the right-most bay, and a cooling fan in
each of the other bays, to maintain internal cabinet temperature
within the operating range of the system components. Air is
drawn in through permanent snap-in filters and expelled through
openings in the top cover and top rear panel. The cabinet's in-
ternal temperature rise is less than 15°C over ambient tempera-
ture when equipment power consumption per bay does not exceed
2000 watts.
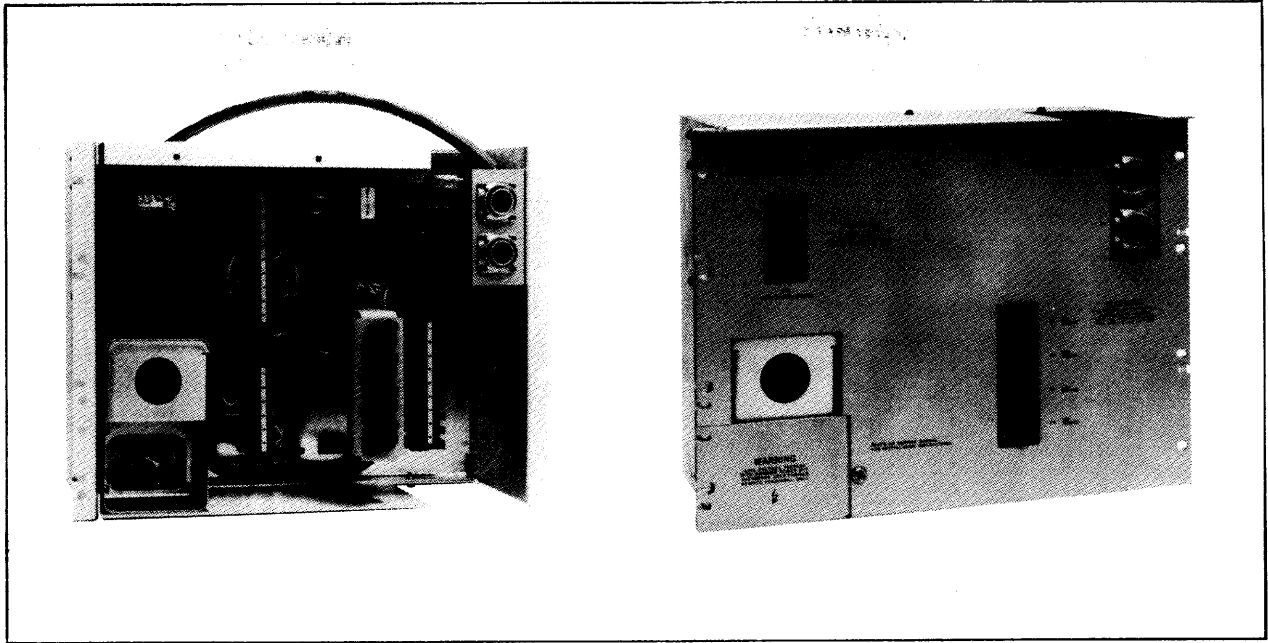
Figure 2-4. Power Control Module (PCM)

OVERALL VIEW

FRONT VIEW, COVER REMOVED
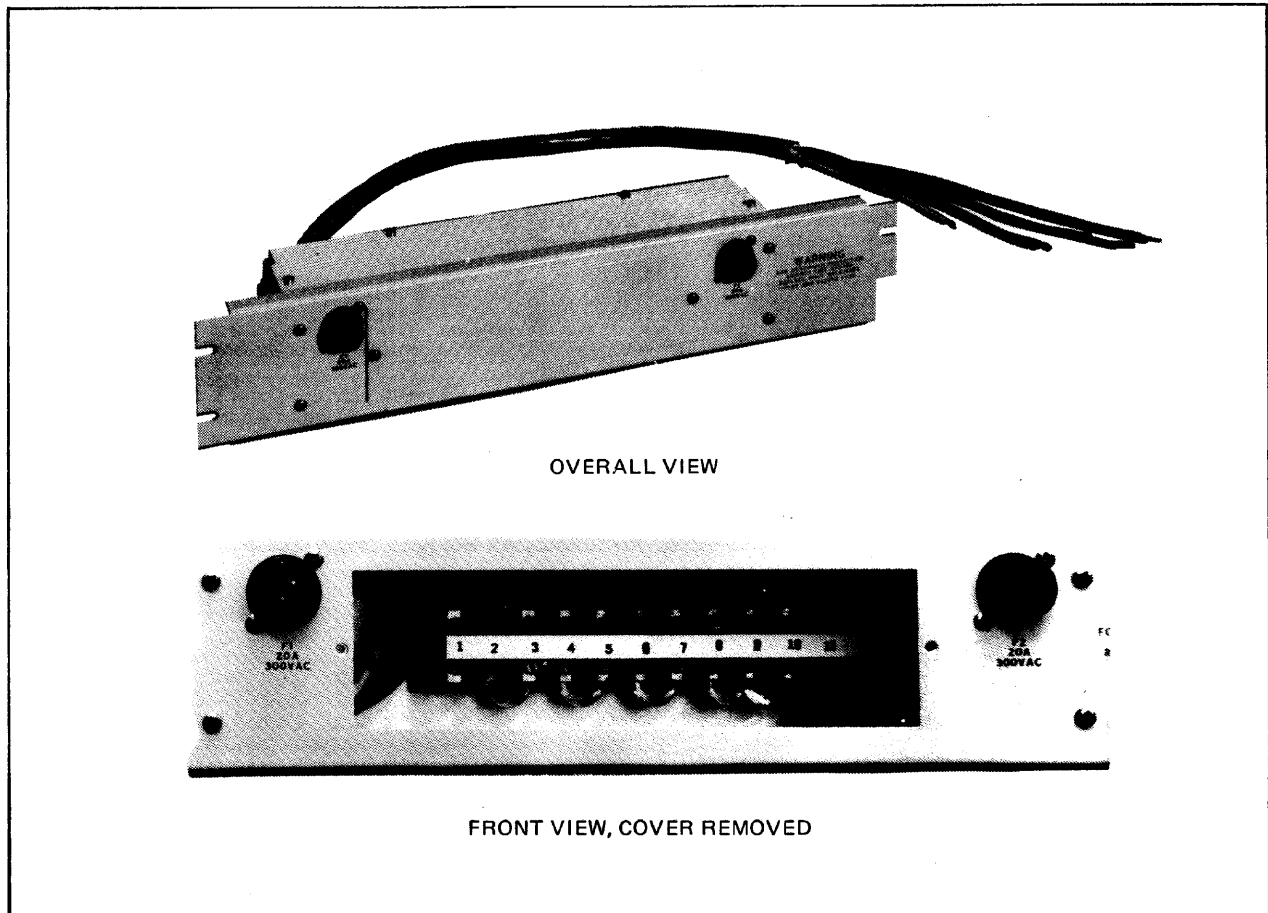
Figure 2-5. Power Distribution Unit (PDU)

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2-7.   POWER REQUIREMENTS FOR SITE

To operate the system, the site must be wired for one of the fol-
lowing types of ac power:

a.   120/208 volts, 60 Hz, 3 phase, 4-wire plus earth wire.
b.   120/240 volts, 60 Hz, split-phase, 3-wire plus earth wire.
c.   230 volts, 50 Hz, 1 phase, 2-wire plus earth wire.

Power input and strapping connections for the PCM are shown in
figure 2-9 on Page 2-18. The site should already be prepared as
discussed in HP 2000 Computer System Site Preparation Manual
(part no. 19700-90005) by the time you begin the installation.

<div style="text-align:center">

WARNING

</div>

        Do not connect any ac power cables for the system
        to any ac power source until you are told to do so
        in this manual. Failure to heed this warning may
        result in injury or death.

2-8.   POWER CONDUIT

Conduit or other suitable methods to route the ac power wiring to
the installation site are to be furnished by the customer's qual-
ified electrician or contractor, as described in the Site Prepa-
ration Manual. Specifically:

● The cable that connects the computer system mainframe to the
   power source must be furnished by the customer and must comply
   with local electrical codes. The minimum wire size recommend-
   ed is number 8 AWG. (The absolute minimum is number 10 AWG.)
   The wires should be terminated with crimped or soldered ring
   lugs for connection to the line filter in the PCM.   Standard
   conduit (typically 1-1/4 inch when acceptable to local code)
   should be used to bring the wires to the location where the
   computer main frame cabinets will be installed. For ease of
   maintenance, approximately the last 3 to 4 feet (1 meter)
   should be flexible conduit.

● The disc power cable and connector for the HP 29425A Disc
   Drive Cabinets (Section III) are supplied by HP for 60-Hz in-
   stallations but must be furnished by the customer at 50-Hz
   sites.

2-9. POSITIONING AND JOINING THE CABINETS

The HP 29404B Cabinet is shipped with both bays joined together and all standard equipment installed. The cabinet arrives with twin HP 40010A Lifting Bars attached on either side at the top, used to accommodate hoisting hooks when the customer transports the cabinet to its final location. Ensure that the customer has removed these lifting bars after transporting the cabinet.

CAUTION

If the customer does not remove these lifting bars, the ventilation holes in the top of the cabinet are blocked, preventing adequate system ventilation and possibly resulting in damage to the equipment.

Move the HP 29404B cabinet into the exact desired position by carefully pushing it on its casters, and install the anti-tip base extension legs as directed below. Once these legs are installed, the cabinet should not be moved any lengthy distance because of the danger of breaking the leveling feet off the legs if they strike an obstruction.

WARNING

When you move the HP 29404B Cabinet on its casters, be very cautious. Push the cabinet from one end while another person guides it from the opposite end. Push slowly, using extreme care to avoid jamming the casters on debris or in seams or cracks in the floor. Do not slide out or swing out any equipment from the cabinet until all bays are connected, the anti-tip base extension legs are installed and extended, and cabinet feet are lowered. If you do not heed these warnings, the cabinet may tip over, possibly resulting in injury or death, and severe damage to equipment.

Ask the customer not to connect the system to its main power supply until all main units and peripheral devices have been safely installed. This will minimize the danger of someone turning the system on accidentally.

To install the anti-tip legs:

a. Remove the yellow tape surrounding the base of the cabinet.

b. Insert an extendable anti-tip leg into the opening at the lower right front corner of the cabinet. Push the leg until it is stopped by the locking pin. (See figure 2-6.)
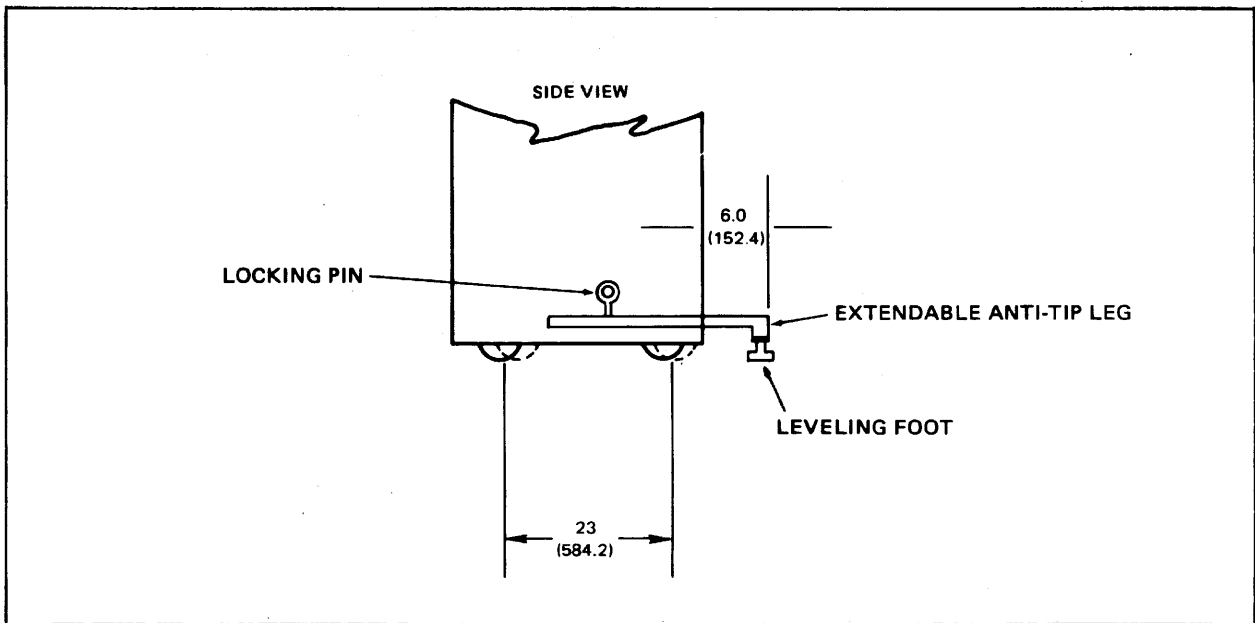
Figure 2-6. Anti-Tip Base Extension Leg

c. Have another person reach inside the cabinet and raise the locking pin, which is spring-loaded and fitted with a ring for lifting. This pin is located near the base of the side panel.

WARNING

> If it is necessary to slide or swing equipment out from the cabinet to gain access to the spring-loaded locking pin, use extreme care to slide or swing the equipment out only far enough to let a person reach this pin. If the equipment is extended too far out from the cabinet when the anti-tip legs are not installed and fully extended, the cabinet may tip over. This could result in injury or death, and equipment damage.

d. While the locking pin is raised, push the anti-tip leg into the cabinet as far as it will go.

e. Have the person holding the locking pin release it. Then, slowly pull the anti-tip leg outward until the locking pin snaps into position. This locks the leg in place.

f. With a wrench, lower the leveling foot on the anti-tip leg until the foot rests firmly on the floor.

g. If you do not plan to join the HP 29404B Cabinet to an HP 29402B Cabinet, repeat steps b through f, above, for the left anti-tip leg. Otherwise, leave this leg off and attach it to the HP 29402B Cabinet as directed in paragraph 2-10.

h. Lower the leveling feet on the rear of the cabinet.

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The HP 29402B Cabinet, if supplied, is shipped as a separate
unit. Move this cabinet into place immediately to the left of
the HP 29404B Cabinet. Then, join the two cabinets mechanically
as directed below, repeating this procedure for any additional HP
29402B Cabinets supplied.

WARNING

When you move the HP 29402B Cabinet about on its
casters, push only on the front of the cabinet,
moving it backward; NEVER push on the back or sides
of this cabinet. Push the cabinet slowly, applying
pressure at a relatively low point and using ex-
treme care to avoid jamming the casters on debris
or in seams or cracks in the floor. Do not slide
out or swing out any equipment from the cabinet
until all bays are connected, the anti-tip base
extension legs are installed and extended, and cab-
inet feet are lowered. If you do not heed these
warnings, the cabinet may tip over, possibly re-
sulting in injury, loss of life, or equipment
damage.

2-10. MECHANICAL CONNECTION

To mechanically join the HP 29404B and HP 29402B Cabinets:

a. Locate the Tie-Together Kit (accessory no. 40011A) in a pack-
   et in the HP 29402B Cabinet. Then proceed with the next
   steps, referring to figure 2-7 for guidance.

b. Remove the top covers from both cabinets. (These covers are
   attached with screws.)

c. Remove the rear doors of each bay. (Hinge pins for these
   doors are held in place by springs, and can easily be pulled
   up or down for removal.)

d. Remove the left side panel from the HP 29404B Cabinet. To do
   this, remove the screws that fasten the adjacent side of the
   top frame, lift this side of the frame, carefully insert a
   screwdriver between the top frame and the side panel, and pry
   the side panel free of the cabinet columns. Then, remove the
   side panel from the columns by hand. Finally, retighten the
   bolts that fasten the top frame.

e. Install an insert (part no. 40011-20001) into the top frame
   of one of the cabinets at a point where the cabinet is to
   join the neighboring cabinet. Then, insert a bolt (1/4-20 x
   1-1/2 inch) through a steel plate, through the top frame, and
   into the insert. (See figure 2-7, detail A.)

BOLTS
1/4-20
1-1/2 INCH

STEEL PLATE

BOSS

TOP FRAME

INSERT
(40011-20001)

DETAIL A

TOP COVER

COLUMN

TOP FRAME

ANTI-TIP BASE
EXTENDABLE LEG

BOLT
1/4-20

BRACKET

CHANNEL NUT

DETAIL B

COLUMN

LOCK WASHER

THREADED
STANDOFF
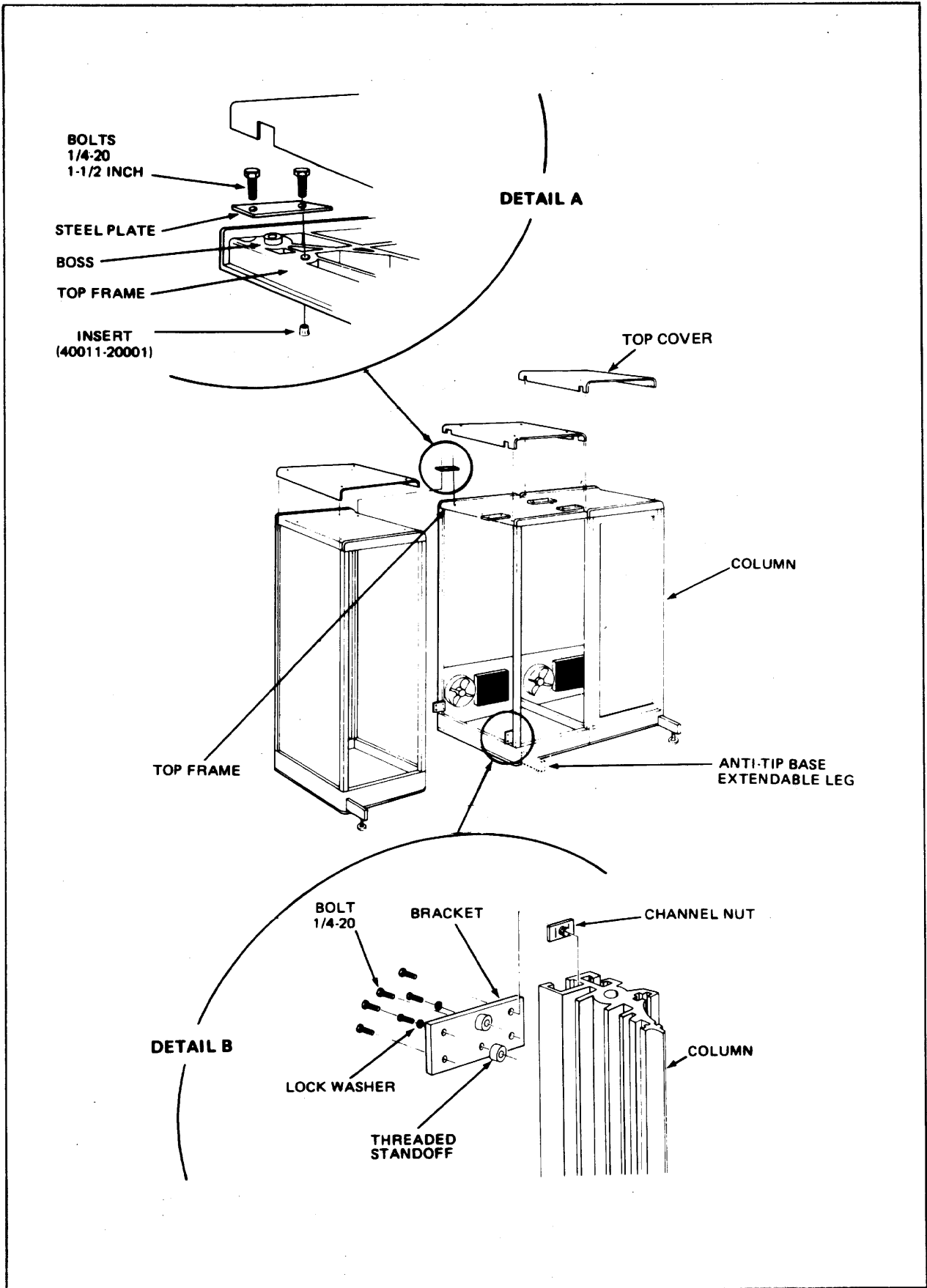
Figure 2-7.   Using the Tie-Together Kit

f. Repeat step e, above, for the adjacent cabinet.

g. Repeat steps e and f for all adjoining corners of all HP 29402B Cabinets to be included in the system.

h. Locate two channel nuts in one of the cabinet support columns, placed there prior to shipment. (See figure 2-7, detail B.) Position these nuts in the column with their spring sides against the column wall, as shown in detail B.

i. Install two bolts (1/4-20 x 1-1/2 inch) through a bottom bracket and into threaded stand-offs (figure 2-7, detail B).

j. Repeat steps h and i for the adjacent column in the adjacent cabinet, and then for all columns where any other cabinets are joined.

k. Install four bolts (1/4-20 x 1-1/2 inch) through each bottom bracket, and into the channel nuts installed in steps h and j. (This operation is required in two instances for each cabinet.)

l. Repeat step k until all cabinet bottoms are joined together.

m. Securely tighten all bolts installed in the above steps.

n. Install the side panel (removed from the HP 29404B Cabinet in step d) on the left end of the left-most HP 29402B Cabinet.

o. Replace the top covers, matching their notches to the steel plates installed in steps e and f. The two-notched covers should be placed on the right-most and left-most bays (un-notched edges outward), with the four-notched covers on intervening bays. Fasten the covers with the screws removed in step b.

p. Install an anti-tip base extension leg in the left front side of the left-most HP 29402A Cabinet. Now, there should be one anti-tip leg at the left side of the system main-frame and one at the right.

q. Lower the leveling foot on the above anti-tip leg; then lower the leveling feet at the rear of the cabinet.

r. Leave the rear doors off to facilitate the electrical connections described below.

NOTE

The HP 29425A Disc Cabinets are free-standing and are not joined together. Simply roll them into the desired positions. The electrical installation for these units is described in Section III.

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CAUTION

Do NOT lift an HP 29425A Cabinet by its table top -- this may result in damage to the cabinet and the equipment inside.

2-11. ELECTRICAL CONNECTION

To join the cabinets electrically, you must connect the cabling that joins the PDUs to one another and to the PCM. Then, the customer's electrician may connect the PCM to the primary power source.

2-12. POWER DISTRIBUTION UNIT. Perform these steps for each PDU in the system:

a. Be sure that no ac power cables for the system are connected to any ac power source and that the circuit breaker on the PCM is OFF.

b. Remove the access plate from each PDU by loosening the two fastening screws and lock-washers.

c. Connect the strips between the terminals of Terminal Board No. 1 (TB1) in each PDU according to the available primary power and bay positions relative to the PCM bay, as listed in table 2-1. (The bays are numbered from right to left as you face the cabinets, beginning with the bay containing the PCM designated as Bay 1.)

Table 2-1. PDU Strapping Connections

	INPUT VOLTAGE					
	120/208V 3PH, 60 Hz			230V 1PH, 50 Hz	120/240V SPLIT PH, 60 Hz	
BAY POSITION RELATIVE TO PCM (E.G., PCM = 1)	2,5,8,11, etc.	3,6,9,12, etc.	4,7,10,13, etc.	2,3,4,5, etc.	2,4,6,8, etc.	3,5,7,9, etc.
Strapping at TB1 (pin-to-pin)	2-3 4-5 6-7 8-9 9-10	1-2 4-5 7-8 8-9 10-11	1-2 3-4 6-7 8-9 9-10	1-2 5-6 9-10	1-2 3-4 6-7 7-8 9-10	1-2 3-4 6-7 8-9 9-10

d.   Connect the five-wire harnessed cable between the PDU in Bay 2 and the PCM in Bay 1, according to table 2-2.

Table 2-2.   PDU/PCM Wiring Connections

WIRE	PDU	PCM
blk	TB1-1	TB3-6
red	TB1-3	TB3-7
orn	TB1-5	TB3-8
wht	TB1-12	TB3-9
grn-yel	earth-bus	earth-bus

e.   Connect the PDUs in any other adjacent cabinets in accordance with the wiring diagram in figure 2-8.

2-13.   POWER CONTROL MODULE.   Perform these steps for the PCM in Bay 1:

a.   Remove from the PCM the large and small panels seen from the rear of Bay 1.   (These panels are attached with nine sets of screws, filler cups, and cup washers.)   Save all hardware.

b.   Verify that jumpers have been correctly installed on TB1 and TB2, as shown in figure 2-9.

c.   Connect the primary power straps to accommodate available power as listed in table 2-3.

Table 2-3.   PCM Primary Power Terminal Block
Strapping Configurations

TERMINAL BLOCK	120/208V, 3PH, 60 Hz	230V 1PH, 50 Hz	120/240V SPLIT PH, 60 Hz
TB1	1 to 2	2 to 3	1 to 2
TB1	3 to 4	5 to 6	3 to 4
TB1	4 to 5	--	4 to 5
TB2	4 to 5	5 to 6	4 to 5

d.   Have the customer's electrician connect the primary ac power cable wires to the PCM line filter terminals as shown in figure 2-10.   (Also, refer again to figure 2-9.)

Figure 2-8. Power Distribution Unit Wiring Diagram
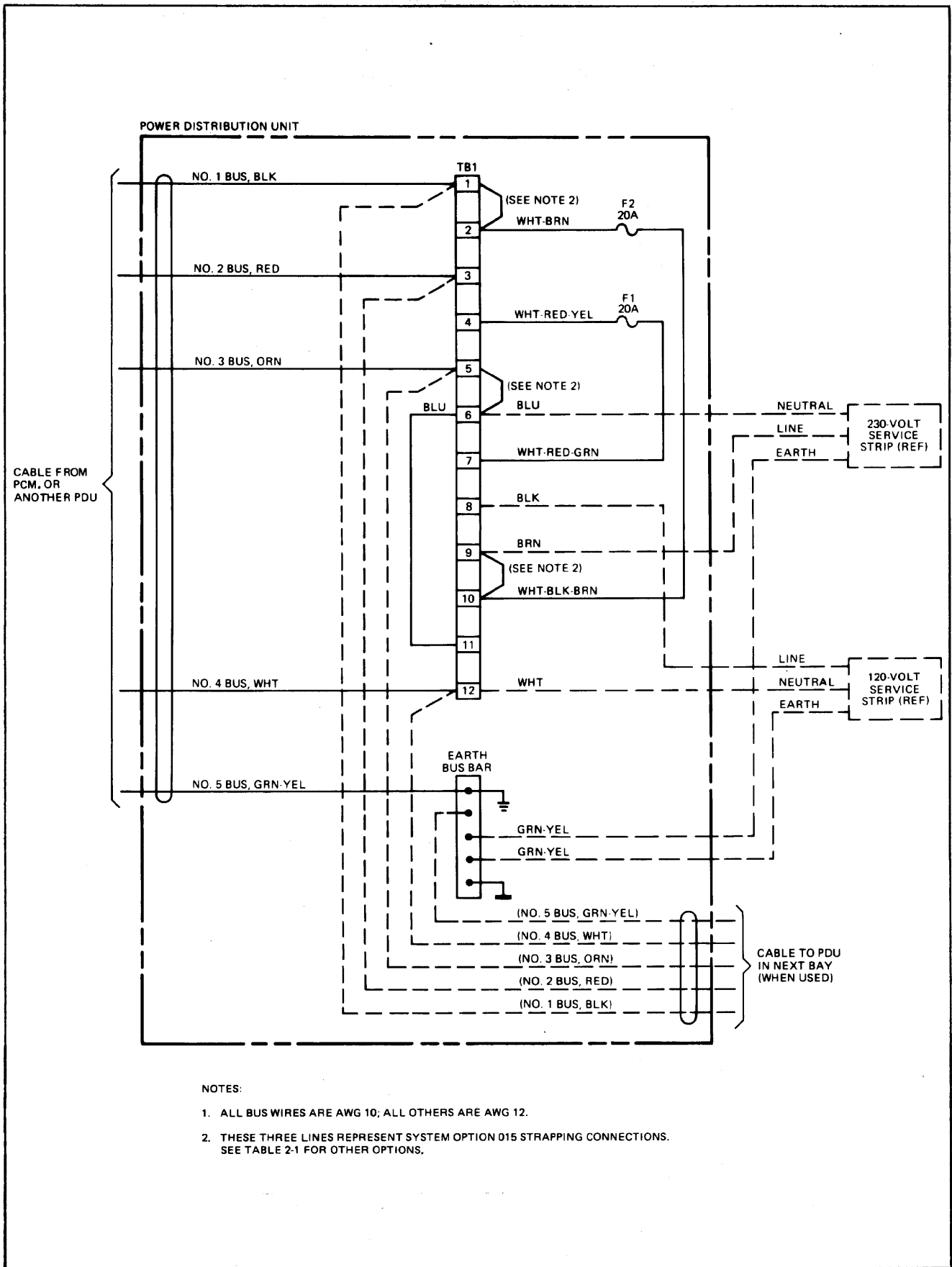
NOTES:

1. ALL BUS WIRES ARE AWG 10; ALL OTHERS ARE AWG 12.

2. THESE THREE LINES REPRESENT SYSTEM OPTION 015 STRAPPING CONNECTIONS.
   SEE TABLE 2-1 FOR OTHER OPTIONS.

Figure 2-9. PCM Schematic Diagram
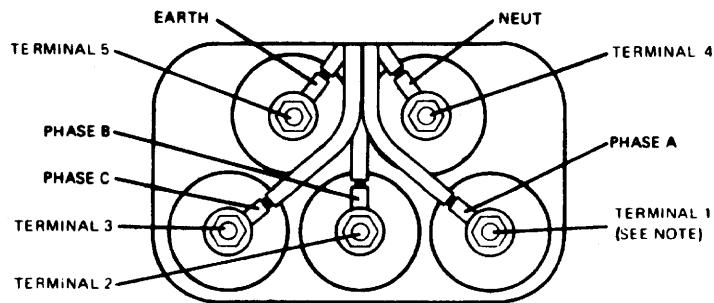
A. 120/208V, 3ph, 60-Hz
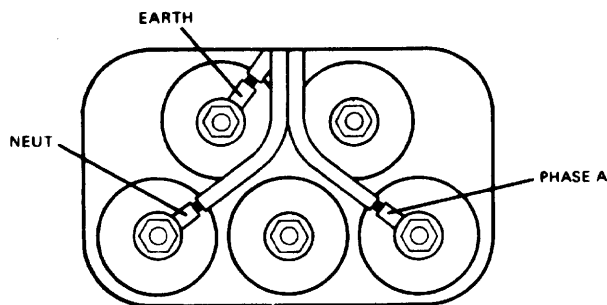
B. 230V, 1-ph, 50-Hz
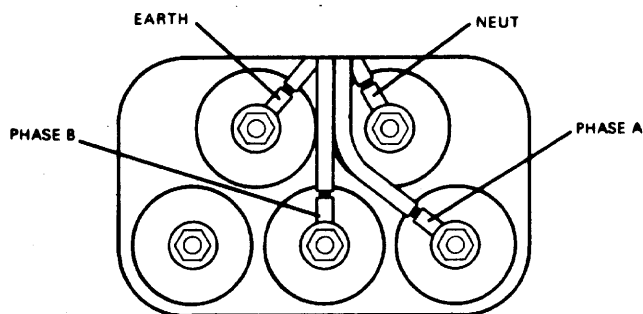
C. 120/240V, split-ph, 60-Hz
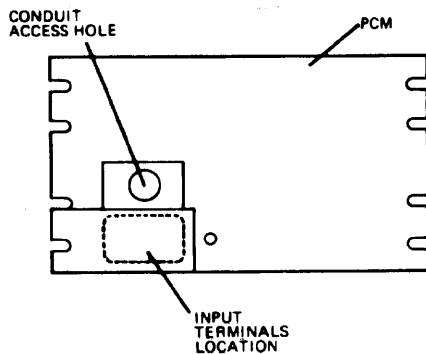
NOTE:
TERMINAL NUMBERS ARE THE SAME IN EACH CONFIGURATION.

Figure 2-10. PCM Primary Power Input Connections on Line Filter

2-14. VERIFYING ELECTRICAL CONNECTIONS

To verify the electrical connections just made, proceed as follows:

a. Disconnect all ac power connections from all ac power service strips in all bays.

b. Ensure that all main power and PCM circuit breaker switches are turned OFF. Then, ask the customer's electrician to connect the free ends of the primary power cable wires to the main power line.

c. Turn the main power ON.

d. With a voltmeter, verify the presence of proper voltage at each PCM line-filter terminal as indicated in table 2-4. (See figure 2-10 for terminal identification.)

Table 2-4. PCM Terminal Voltages at Line Filter

STRAPPING CONFIGURATION	PCM TERMINAL VOLTAGE
120/208-volt	208V between each phase 120V between each phase and neutral
230-volt	230V between phase A and neutral
120/240-volt	240V between phases A and B 120V between each phase and neutral

e. With an oscilloscope, verify that the voltage from neutral-to-ground on the PCM does not exceed 1 volt and that the fluctuation of the peak-to-peak value does not exceed 25 millivolts.

f. Check that the EMERGENCY OFF push-button/light at the top front of Bay 1 is lit. If it is not, press it once. If it fails to light, an error exists in that circuit or the bulb is defective.

CAUTION

Do not proceed further until the error has been corrected and the push-button lights. Otherwise, the cabinet may be damaged.

NOTE

All troubleshooting is to be charged to the HP warranty, not the installation.

g. If the EMERGENCY OFF push-button light is lit, turn the PCM circuit breaker ON. Then, check the power service strip in each cabinet with a voltmeter, as indicated in figure 2-8. Verify that the voltages correspond to the rated voltage for your particular PCM strapping configuration, within tolerances of +5 or -10 percent.

h. Turn the PCM circuit breaker OFF.

i. Replace the access covers on all PDUs and securely tighten the two fastening screws and lock-washers on each. (If you plan to use the PDU in the HP 29404B Cabinet as the common bonding point for the grounding cables from the HP 29425A Disc Cabinets, delay this step until you have connected these cables to the PDU. These cables are discussed in paragraph 3-6.)

j. Replace the large and small panels on the PCM and securely tighten the screws, filler cups, and washers on these panels.

k. Plug all fans and other devices in the cabinet into the proper service strips, and set the PCM circuit breaker ON.

l. Check all fans to ensure that they are operating.

m. Press and release the EMERGENCY OFF button, verifying that:

   1) The push-button light goes out.

   2) All fans in the card cages, cabinets, and other devices stop.

   3) The PCM circuit breaker trips to the OFF (downward) position.

n. Set the PCM circuit breaker ON.

Because the standard equipment supplied with all systems is already installed in cabinets when delivered, you need only be concerned with connecting certain cables on this equipment. These activities for the standard equipment are described in this section. The installation activities for optional equipment, however, are discussed in the manuals for each such device, furnished with the system and listed in the Installation Record of the System Support Log (part no. 02000-90088).

3-1. POSITIONING DEVICES AND ARRANGING CABLES

With the standard (minimum) system configuration, the only devices other than those in the main-frame cabinet are the HP 2762A Console/ Printer and the HP 7905 Cartridge Disc Drive. Move these free-standing devices into the locations around the main-frame cabinet planned for them in the Site Planning Workbook. You may place the console/printer on the HP 40021A System Desk. (The Cartridge Disc Drive is delivered installed in an HP 29425A "low-boy" cabinet; as an option, up to eight disc drives, each in its own cabinet, may be supplied.)

When these devices are in position, ensure that the overall appearance of the entire system is satisfactory and that there is enough clearance for preventive maintenance or servicing. Then run the cables that will connect these and other devices to the main-frame bays under flooring or through conduits provided during site-preparation. Bring these cables inside the cabinets where needed and place them near to the connectors they will use. (Gaps for the cables appear at the rear of each cabinet bay, below the doors.) Do not, however, install the cables on the connectors until:

a. You determine the neatest, most professional appearance for the entire set of cables, and

b. You are directed to install them in the following instructions.

3-2. CONNECTING DEVICES

Connect the peripheral devices as shown in the following paragraphs.

3-3. HP 2762A CONSOLE/PRINTER

The HP 2762A Console/Printer is used as the system console. The console is connected directly to the system processor (SP) rather than through the asynchronous terminal controller (ATC).

NOTE

It is your responsibility as Customer Engineer to set up and cable the system console. Installation and cabling of all other terminals, however, is the customer's responsibility, and is discussed in <u>User Terminal Installation Guide</u> (part no. 30062-90002).

To connect the console:

a. Connect the interface cable (part no. 12531-60026) to the console interface board in the system processor, unless the system is delivered with the cable already so connected. In most instances, the system is delivered with this cable already connected to the board and coiled up inside the cabinet.

b. Connect the plug on the opposite end of the interface cable to the console. (The connection is located on the rear of the console and is labeled "DATA SET".)

c. Plug the power cable on the console into the appropriate power source.

CAUTION

Do not turn on power to the console at this time.

3-4. HP 12970A (HP 7970B) OR HP 12972A (HP 7970E) MAGNETIC TAPE UNIT SUBSYSTEM

The single magnetic tape unit furnished as a standard item is installed and connected to the tape controller in the HP 29404B Cabinet at the factory. You need only ensure that the AC POWER toggle switch behind the front door of the tape unit is set to the OFF position.

The tape controller can service up to three additional units (for a total of four), in various possible configurations. These optional units are delivered unmounted. For instructions on how to install them, refer to:

- <u>HP 13194A Multiunit Cable Accessory Kit Installation Manual</u>, part no. 13194-90003.

- <u>HP 7970B Digital Magnetic Tape Unit Operating and Service Manual</u>, part no. 07970-90383.

- <u>HP 7970E Digital Magnetic Tape Unit Operating and Service Manual</u>, part no. 07970-90765.

3-5.   HP 7905A CARTRIDGE DISC DRIVES

One HP 7905A Cartridge Disc Drive Subsystem is always provided with the system; up to seven additional drives may be ordered as part of the initial system, or as units to be added to an existing system in the field, for a total of eight drives.

In the HP 7905A Cartridge Disc Subsystem provided in the standard (minimum) configuration, the following items are furnished:

- One HP 7905A Cartridge Disc Drive, installed in an HP 29425A Cabinet which includes an HP 40018A Plenum.

- One HP 13037A Disc Controller.

- One HP 13013A-002 Multi-Unit Cable, 18 feet long (part no. 13013-60003).

- One HP 13213A-001 Data Cable, 25 feet long (part no. 13213-60001).

- One Disc Controller Interface Printed Circuit Assembly (PCA) (part no. 13037-60003).

- One Grounding Cable, 10 feet long, (part no. 29425-60001).

- Diagnostic Software.

When additional disc drives are ordered as part of the initial system, the following items are furnished (in addition to those in the standard configuration):

- Up to 7 additional HP 7905A Cartridge Disc Drives, each installed in an HP 29425A Cabinet which includes an HP 40018A Plenum.

- One HP 13013A-003 Multi-Unit Cable, 8 feet long (part no. 13013-60004), for each disc drive.

- One HP 13213A-002 Data Cable, 50 feet long (part no. 13213-60003), for each disc drive.

● One Grounding Cable (same as with single-disc subsystem, above), for each disc drive.

When additional disc drives are added to systems already installed in the field, they are ordered under Model No. HP 19701A. These units are the same as the additional units (those other than the first disc drive) supplied with the system.

NOTE

The total combined length of all HP 13013A Option-002 and -003 Multi-Unit Cables in the system must not exceed 74 feet. (See figure 3-1, Note 1, for cable lengths.)

When the system is delivered, the disc drives provided with it are already installed in their HP 29425A Cabinets and the disc controller is connected to its interface in the left bay of the HP 29404B Cabinet. You need only position the disc cabinets (paragraph 3-1), lower their leveling feet, connect a grounding cable from each HP 29425A Cabinet to the HP 29404B Cabinet, connect an HP 13013A multi-unit cable from the disc controller in the HP 29404B cabinet to one disc drive (and between any other disc drives joined in series), connect an HP 13213A data cable from the disc controller to each disc drive, and connect the ac power cable on each disc drive to the appropriate power source.

WARNING

Hazardous voltages are present in the main-frame. Before proceeding, set the main-frame power panel switch to OFF. Otherwise, injury or death may occur.

3-6.   GROUNDING CABLES. One grounding cable (part no. 29425-60001) is attached to each HP 29425A Cabinet at the factory. This is a flat, braided cable, ten feet long, covered with plastic. It is coiled and stored for shipment within the cabinet.

To connect this cable:

a.   Open the rear door of the HP 29425A Cabinet, locate the cable, and uncoil it.

b.   Run the free end of this cable to the mainframe and connect it to any convenient location in any bay. (The ground lug on the PDU in the HP 29404B Cabinet is both effective and convenient for this purpose.)

NOTE

In systems with more than one disc drive, you may
run the grounding cable from each drive to a single
common grounding cable (if furnished by the cus-
tomer), and connect this common cable to the main-
frame. Do NOT connect the grounding cables in
series by "daisy-chaining" them between units --all
cables should be grounded to one central point.

c. With an oscilloscope, verify that the resistance between the
PCM neutral and ground does not exceed 6 ohms, or the voltage
differential does not exceed 1 volt with no more than 25 mil-
livolts of ripple. Have the customer's electrician check the
ground system as directed in the Site Preparation Manual.

3-7. MULTI-UNIT AND DATA CABLES. One HP 13013A multi-unit
cable and one HP 13213A data cable are supplied for each disc
drive, and shipped coiled inside the main-frame bay housing the
disc controller. One of the multi-unit cables and all data
cables are attached to the disc controller at the factory. Un-
coil these cables, run their free ends to the HP 29425A cabinets,
and proceed as follows:

3-8. Standard Configuration (Provided with System). For sys-
tems installed with only one disc drive:

a. Connect the free end of the HP 13013A-002 multi-unit cable
to the right edge (seen from the rear) of the T-connector
(part no. 07905-60040) on the terminator bracket (part no.
07905-00050) in the disc drive cabinet. (See figure 3-1.)
For this purpose, the T-connector is fitted with a printed
circuit assembly (PCA) (part no. 07905-60039).

b. Attach the free end of the HP 13213A-001 data cable with the
cable clamp to the data connector (A7P4) on the rear of the
disc drive, and secure it with a screw. (See figure 3-1,
detail B.)
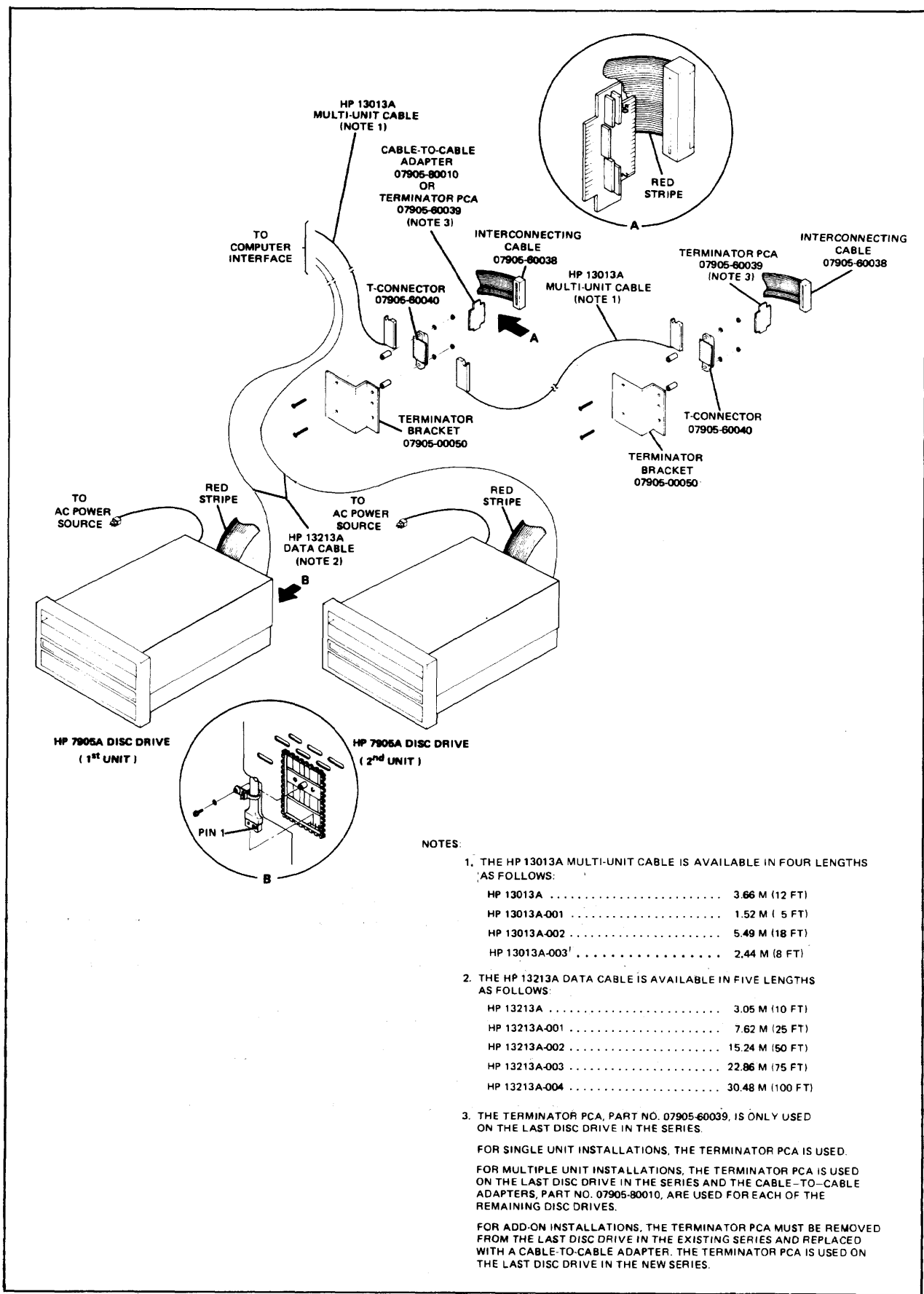
NOTES:

1. THE HP 13013A MULTI-UNIT CABLE IS AVAILABLE IN FOUR LENGTHS AS FOLLOWS:

   HP 13013A . . . . 3.66 M (12 FT)

   HP 13013A-001 . . . . 1.52 M (5 FT)

   HP 13013A-002 . . . . 5.49 M (18 FT)

   HP 13013A-003 . . . . 2.44 M (8 FT)

2. THE HP 13213A DATA CABLE IS AVAILABLE IN FIVE LENGTHS AS FOLLOWS:

   HP 13213A . . . . 3.05 M (10 FT)

   HP 13213A-001 . . . . 7.62 M (25 FT)

   HP 13213A-002 . . . . 15.24 M (50 FT)

   HP 13213A-003 . . . . 22.86 M (75 FT)

   HP 13213A-004 . . . . 30.48 M (100 FT)

3. THE TERMINATOR PCA, PART NO. 07905-60039, IS ONLY USED ON THE LAST DISC DRIVE IN THE SERIES.

   FOR SINGLE UNIT INSTALLATIONS, THE TERMINATOR PCA IS USED.

   FOR MULTIPLE UNIT INSTALLATIONS, THE TERMINATOR PCA IS USED ON THE LAST DISC DRIVE IN THE SERIES AND THE CABLE—TO—CABLE ADAPTERS, PART NO. 07905-80010, ARE USED FOR EACH OF THE REMAINING DISC DRIVES.

   FOR ADD-ON INSTALLATIONS, THE TERMINATOR PCA MUST BE REMOVED FROM THE LAST DISC DRIVE IN THE EXISTING SERIES AND REPLACED WITH A CABLE-TO-CABLE ADAPTER. THE TERMINATOR PCA IS USED ON THE LAST DISC DRIVE IN THE NEW SERIES.

Figure 3-1.   HP 7905A Disc Drive Connection

3-9.   Multiple-Drive Configuration (Provided with System).   For systems initially installed with more than one disc drive.

a. Connect the free end of the HP 13013A-002 multi-unit cable presently attached to the disc controller, to the right edge (seen from the rear) of the T-connector (part no. 07905-60040) on the terminator bracket (part no. 07905-60050) in one disc drive cabinet. (See figure 3-1.) Be sure that this first disc drive is one whose T-connector is fitted with a cable-to-cable adapter (part no. 07905-80010). The T-connectors on all but one disc drive are fitted with this adapter. The connector on the remaining drive is fitted with the Terminator PCA (part no. 07905-60039); this drive is to be the last in the series.

b. Connect one end of an HP 13013A-003 multi-unit cable to the right side of the T-connector (part no. 07905-60040) on the terminator bracket on each remaining disc drive cabinet. Ensure that the last drive in the series is the one whose T-connector is fitted with the Terminator PCA (part no. 07905-60039), while the others have T-connectors fitted with cable-to-cable adapters (part no. 07905-80010).

c. Connect the free end of each HP 13013A-003 multi-unit cable to the left side (as viewed from the rear) of the T-connector on the preceding drive. (For instance, connect the cable from the second drive to the T-connector on the first drive, and so forth.)

d. Connect the free end of one HP 13213A-002 data cable with the cable clamp to the data connector (A7P4) on the rear of each disc drive and secure it with a screw. (See figure 3-1, detail B.)

NOTE

The 18-foot HP 13013A-002 Multi-Unit Cable must be used to connect the first HP 29425A Disc Cabinet to the HP 29000-Series Cabinet. The 8-foot HP 13013A-003 Multi-Unit Cables must be used to interconnect the remaining HP 29425A Disc Cabinets. This permits a total combined cable length of less than 74 feet.

3-10. HP 19701A Multiple Drives (Added to Installed Systems). For HP 19701A disc drives added to systems already installed in the field:

a. Turn the power to the mainframe OFF.

b. For each disc drive in the subsystem, set the RUN/STOP switch to STOP and the POWER switch to OFF.

c. Remove the top cover and front panel from the HP 13037A disc controller in the HP 29404B Cabinet. Then remove the data cable retainer from the device controller PCA. Pass the PCA-end of each new HP 13213A-002 data cable added to the system through the opening at the rear of the controller. Connect each of these cables to the device controller PCA (part no. 13037-60002) at any free connectors J4 through J11, positioning them in the channel provided and laying them to the right of the side fan. (The correspondence between particular connectors and cables makes no difference.) (See figure 3-2.) Replace the data cable retainer and the controller's top cover and front panel.

d. Remove the Terminator PCA (part no. 07905-60039) from the T-connector (part no. 07905-60040) on the mounting bracket in the last disc drive in the present series. Replace this PCA with a cable-to-cable adapter (part no. 07905-80010). Save the PCA for future use.

e. Continue with the installation exactly as shown in steps b through d in paragraph 3-9, above. (Ensure that the last disc drive installed is the one whose T-connector is fitted with a Terminator PCA.)

3-11. POWER CABLES. Set the circuit-breaker switch on the power panel at the rear of each HP 29425A Cabinet to OFF. Then, plug the ac power cable from each disc drive into an appropriate power source. Do NOT turn on ac power at this time.

NOTE

HP 29425A Disc Cabinets to be installed as part of a system using 60-Hz power are shipped with an ac power cable attached. However, cabinets to be installed as part of a system using 50-Hz power are shipped without an ac power cable. For these systems, this cable and its connector must be fabricated at the time of site preparation by the customer. The cable must have a neutral and ground line and be capable of supplying 15 amperes at 230 Vac. This ac power cable is connected to the circuit breaker on the HP 29425A Cabinet Power Panel Assembly. The power panel assembly diagrams are contained in the HP 29425A Cabinet Installation and Service Manual (part no. 29425-90007).

For further information, see HP 2000 Series Computer System Site Preparation Manual (part no. 19700-90005), and HP Model 7905A Disc Drive Service and Installation Manual (part no. 07905-90007).

INTERFACE CABLE
13037-60015

TO HP 7905A
DISC DRIVE(S)

MICROPROCESSOR
PCA

ERROR CORRECT
PCA

DEVICE
CONTROLLER PCA
13037-60002

HP 13037A
DISC CONTROLLER

DRVJ3
(DRIVE)

HP 13013A
MULTI-UNIT CABLE

JUMPER CABLE
13037-60022

HP 13213A
DATA CABLE

IFJ1
(INTERFACE)

INTERFACE PCA
13037-60003
(COMPONENT SIDE)

HP 21MX-E COMPUTER
(REAR VIEW)
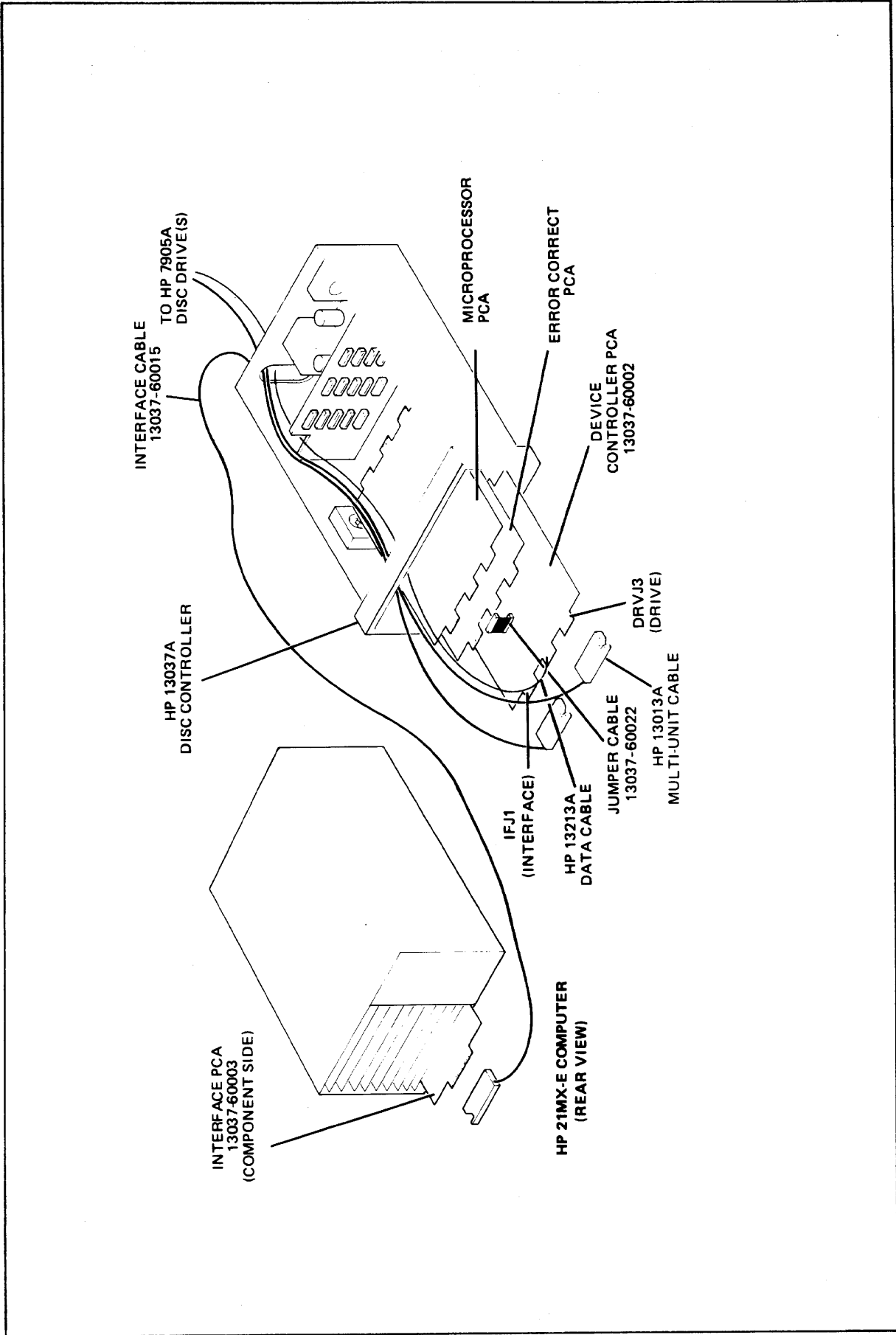
Figure 3-2. HP 13037A Disc Drive Controller Connection

3-12. HP 12920B ASYNCHRONOUS TERMINAL CONTROLLER

One HP 12920B Asynchronous Terminal Controller (ATC) with HP 30062A Multiplexor Connector Panel is furnished with the system, and a second can be provided as an option. Up to 16 CRT or hard-copy EIA-compatible user terminals can be connected to each connector panel. Local terminals are connected directly to the panel; remote terminals are connected through modems to the panel in accordance with the Electronic Industries Association (EIA) Specification RS 232C.

NOTE

Connection of terminals other than the system console (which is NOT connected via the ATC) is the responsibility of the customer. You should direct his attention to the manuals listed below.

For information on how to connect terminals (hard-wired or through modems), data sets, data stations, and terminal interfaces, see HP 2000 User Terminal Installation Guide (part no. 30062-90002). For a discussion of software considerations for remote job entry (RJE), see HP 2000 Series Computer System BASIC Reference Manual (part no. 22687-90001), TSP/2000-HASP User's Manual (part no. 20240-90002), and HP 2000 Series Computer System Operator's Manual (part no. 22687-90005).

3-13. OTHER PERIPHERAL EQUIPMENT

Installation of all optional (non-standard) devices is discussed in the manuals covering these devices, furnished with the system. A complete list of all such devices and their manuals is provided in the Installation Record of the System Support Log (part no. 02000-90088). The model and subsystem numbers for these devices are also shown in table 3-1.

Table 3-1. Supported Equipment

MODEL NUMBER	EQUIPMENT	SUBSYSTEM USE
HP 2607A	Line Printer	HP 12987A
HP 2613A	Line Printer	HP 12975A
HP 2617A	Line Printer	HP 13053A
HP 2618A	Line Printer	HP 12983A
HP 2640A	CRT Terminal	-
HP 2644A	Mini DataStation	-
HP 2748B	Punched Tape Reader	HP 12925A
HP 2749B	Teleprinter	-
HP 2762A	Terminal Printer	-
HP 2762B	Terminal Printer	-
HP 2767A	Line Printer	HP 12984A
HP 2892A	Card Reader	HP 12985A
HP 2894A	Card Reader Punch	HP 12989A
HP 2895B	Tape Punch	HP 12926A
HP 7261A	Optical Mark Reader	HP 12986A
HP 7905A	Disc Drive	HP 19701A
HP 7970B	Magnetic Tape Unit	HP 12970A
HP 7970E	Magnetic Tape Unit	HP 12972A
HP 29402B	Cabinet	-
HP 29404B	Cabinet	-
HP 3070A	Link Terminal	HP 92900A

Before the customer operates any device in his new system, you must turn on the main power, verify the power-supply voltage tolerances for the system and input/output processors, turn on all connected peripheral devices, and check their operation. These procedures are described below; those for individual devices can also be used when installing new devices into an existing system.

| CAUTION |

Before proceeding, be sure that you have measured all voltages and checked all circuits as described in paragraph 2-14 of this manual, and found them satisfactory.

4-1. TURNING ON MAIN-FRAME AND PROCESSOR POWER.

To prepare the new system for operation, you must turn on the power to the main-frame, check the power-supply accuracy of the HP 2109A System Processor (SP) and the HP 2113A Input/Output Processor (IOP), and set various switches on these processors. Proceed as follows:

a. Turn on the main-frame power by setting the circuit breaker on the rear of the power control module (PCM) ON.

b. Energize the digital voltmeter that you will use to check the processor power-supply voltages, and allow it to warm-up to its rated accuracy.

c. Verify the power-supply voltage tolerances for the SP and IOP. For the SP, perform steps 1, 2, 4, 5, 6, 7, 10, and 12 through 17. For the IOP, perform steps 1 through 6, 8, 9, and 11 through 17.

SP IOP 1. Loosen the quarter-turn fasteners on the front
[ ] [ ]   (operator) panel of the processor, and lower the panel to the access position. (The SP panel has two fasteners and the IOP panel has four.) Then remove the PCA cage cover.

| WARNING |

Hazardous voltages are exposed when the front power supply shield is removed in the next step, below.

SP IOP 2. Remove the three screws and lockwashers securing the
[ ] [ ]   front power supply shield to the processor main-
             frame.

     IOP 3. For the IOP, remove the single screw and lockwasher
     [ ]   attaching the shield to the battery PCA guide.

SP IOP 4. Disconnect the key-operated switch assembly cable
[ ] [ ]   from the lower power supply PCA connector and remove
             the front power supply shield. Then reconnect the
             key-operated switch assembly cable.

SP IOP 5. Set the ~LINE switch on the rear panel of the proc-
[ ] [ ]   essor to the ON position.

SP IOP 6. Rotate the key-operated switch on the operator panel
[ ] [ ]   to the R (reset) position, and then to the OPERATE
             position.

SP   7. For the SP, connect the positive lead of the volt-
[ ]   meter to Location J8-5 (+5 volt test point) and con-
            nect the common lead to Location J8-2 (common test
            point). (See figure 4-1.) Adjust the +5 volt ADJ
            potentiometer, if required, to obtain a voltmeter
            indication of +5.00 ± 0.25 volts.

     IOP 8. For the IOP, connect the positive lead of the volt-
     [ ]   meter to Location J6-5 (+5 volt test point) and con-
             nect the common lead to Location J6-2 (common test
             point). (See figure 4-2.) Adjust the +5 volt ADJ
             potentiometer, if required, to obtain a voltmeter
             indication of +5.00 ± 0.25 volts.

     IOP 9. For the IOP, connect the positive lead of the volt-
     [ ]   meter to Location J6-6 (+5 VM test point). Adjust
             the +5 VM potentiometer to obtain a voltmeter indi-
             cation of +5.00 ± 0.25 volts.

SP   10. For the SP, check the tolerances of the remaining
[ ]   power supplies, using the test points and tolerances
            listed in table 4-1.

     IOP 11. For the IOP, check the tolerances of the remaining
     [ ]   power supplies, using the test points and tolerances
             listed in table 4-2.

                            NOTE

        If one or more power supplies are out of tolerance,
        notify the Product Support Group at HP's General
        Systems Division.

BATTERY OUTPUT PCA
(PART OF POWER FAIL
RECOVERY SYSTEM)

LOWER POWER SUPPLY
PCA A3A1

+5V ADJ   J8-10   J8-1
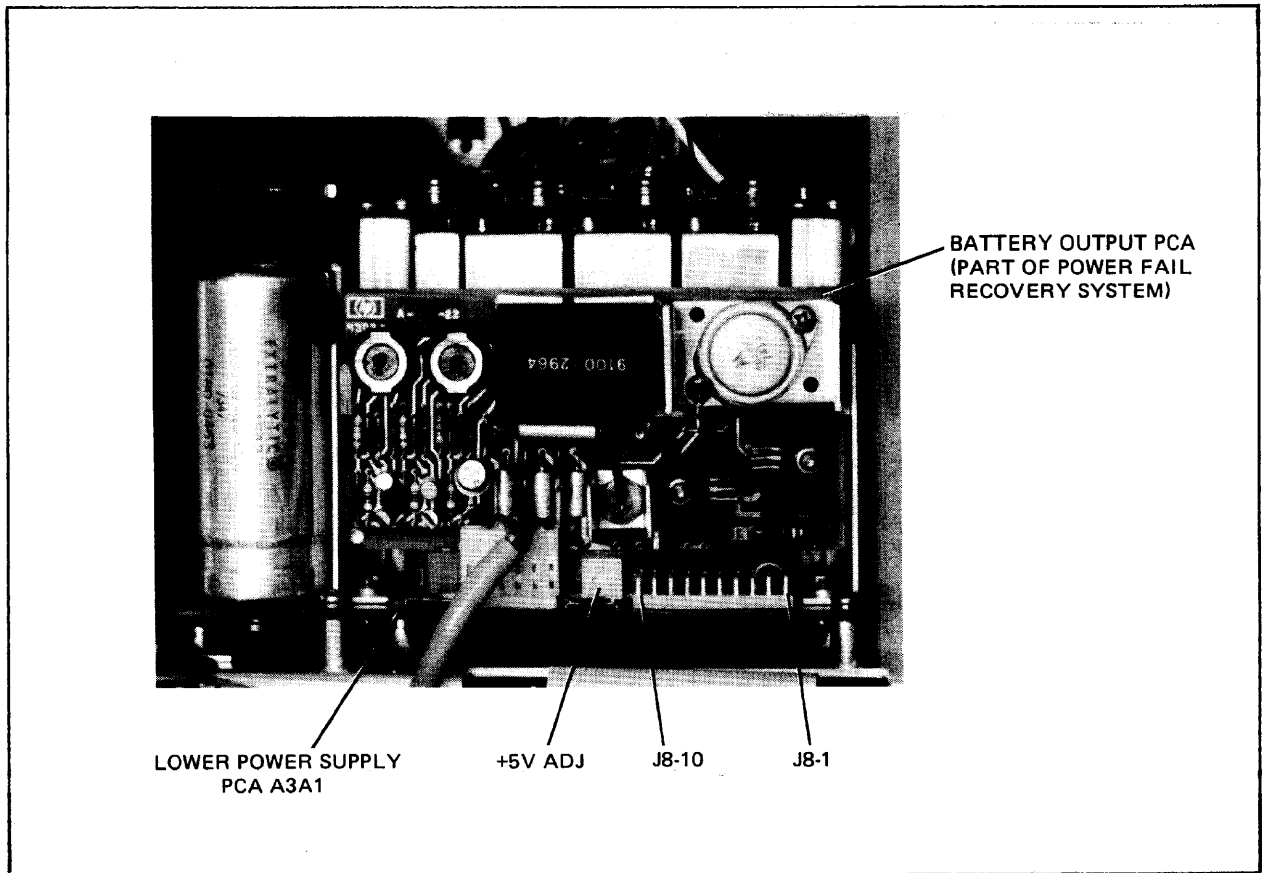
Figure 4-1. HP 2109A Processor Power Supply Field
Adjustment and Test Points

Table 4-1. HP 2109A Processor Power Supply
Voltage Tolerances

SUPPLY	TEST POINT*	TOLERANCE
-12V	J8-1	±0.6V
Common	J8-2	-
+12V	J8-3	±0.6V
-2.3V	J8-4	±0.2V
+5V	J8-5	±0.25V
+5V(M)	J8-6	±0.25V
V+(BAT)	J8-7	-
PUUP	J8-8	-
+12VM	J8-9	±0.6V
-12VM	J8-10	±0.6V
*J8 is mounted on lower power supply PCA.		

+5VM ADJ   +5V ADJ   J6-10   J6-1
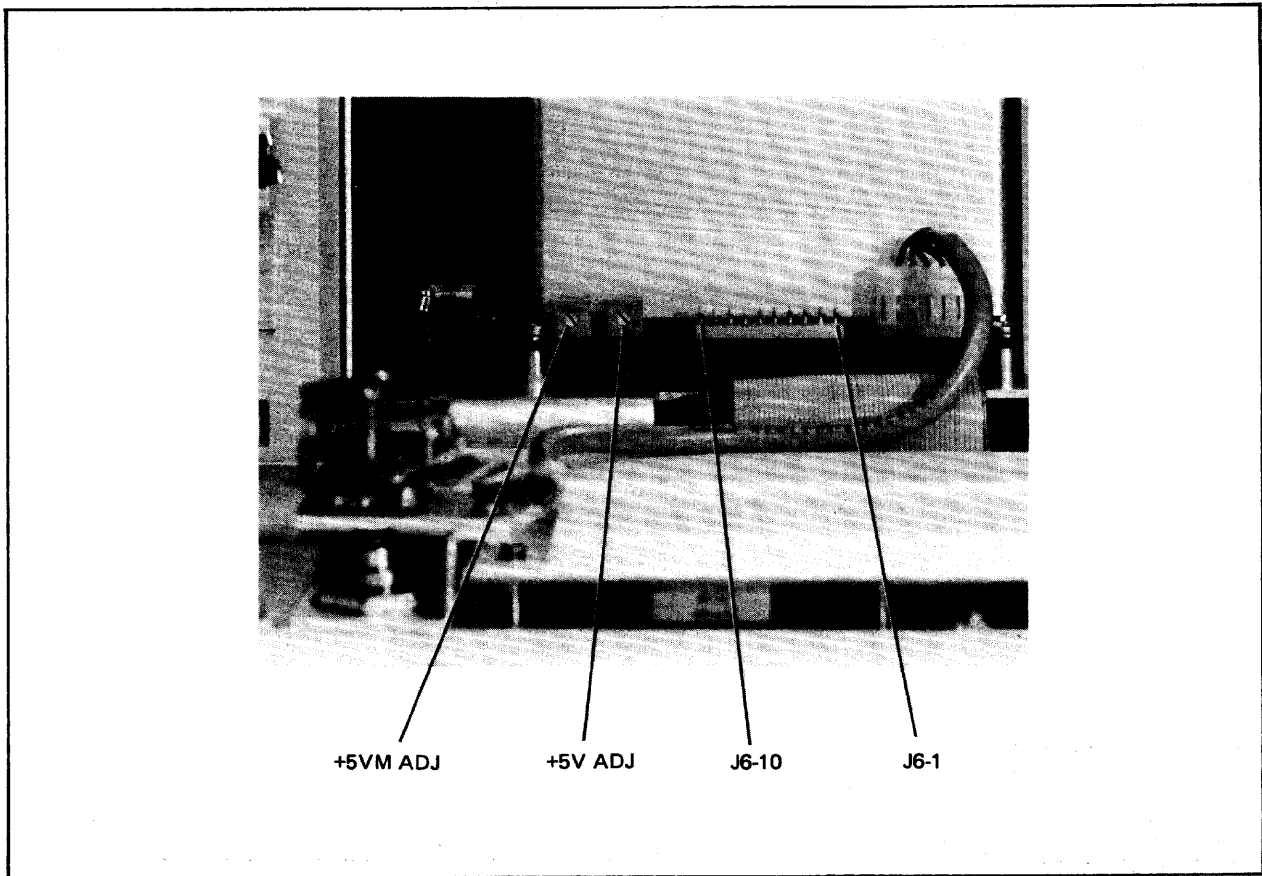
Figure 4-2. HP 2113A Processor Power Supply Field
Adjustment and Test Points

Table 4-2. HP 2113A Processor Power Supply
Voltage Tolerances

SUPPLY	TEST POINT*	TOLERANCE
PUUP	J6-1	-
Common	J6-2	-
+28V**	J6-3	±2.8V
-2.3V	J6-4	±0.2V
+5V	J6-5	±0.25V
+5VM	J6-6	±0.25V
+12VI/0	J6-7	±0.6V
-12VI/0	J6-8	±0.6V
+12VM	J6-9	±0.6V
-12VM	J6-10	±0.6V

* J6 is mounted on lower power supply
  PCA.
**+28V is present if jumper is installed
  on upper power supply PCA.

```
SP   IOP   12.  Set the key-operated switch on the operator panel to
[ ]  [ ]        the STANDBY position.

SP   IOP   13.  Set the ~LINE switch on the rear panel to the OFF
[ ]  [ ]        position.

SP   IOP   14.  Disconnect the voltmeter and key-operated switch
[ ]  [ ]        assembly cable.

SP   IOP   15.  Replace the front power supply shield and re-connect
[ ]  [ ]        the key-operated switch assembly cable.

SP   IOP   16.  Replace the memory PCA cage cover.
[ ]  [ ]

SP   IOP   17.  Replace the operator panel assembly and tighten the
[ ]  [ ]        quarter-turn screws.
```

d.   Set the following switches on the HP 2109A System Processor
     and the HP 2113A Input/Output Processor as follows:

   1.   Set the ARS/$\overline{ARS}$ switch on the rear of the HP 2109A System
        Processor (SP) to the ARS position.

   2.   Set the S1 switch on the rear of the SP to the HALT posi-
        tion.

   3.   Set the ON/OFF switch on the rear of the SP to the ON
        position.

   4.   Set the BATTERY ON/OFF switch at the rear of the SP to
        the ON position.

   5.   Repeat steps 1 through 4 above for the HP 2113A Input/
        Output Processor (IOP).

   6.   Turn the key-operated switch on the front of the SP to
        the OPERATE position.

   7.   Repeat step 6, above, for the IOP.

e.   Replace the rear doors on each bay of the HP 29000-Series
     Cabinets.

4-2.   TURNING ON PERIPHERAL POWER

To turn on the standard peripheral devices furnished with the
system, load the devices with any input/output media required
(printing paper and ribbons, magnetic tape reels, cartridge
discs, and so forth), and proceed as follows:

4-3. HP 2762A CONSOLE/PRINTER

To turn on the HP 2762A Console/Printer, follow these steps:

a. Set the AUTO LINEFEED switch on the keyboard panel to the OFF (leftmost) position.

b. Set the ALL CAPS switch to the ON (rightmost) position.

c. Press the ONLINE push-button switch so that the light on this switch and the adjacent READY light both turn ON.

d. Set the CHANNEL TYPE switch to the FULL position (for full-duplex operation).

e. Lift the keyboard panel and set the RATE switch under this panel to the 30 CPS position.

4-4. HP 12970A (HP 7970B) OR HP 12972A (HP 7970E) MAGNETIC TAPE UNIT SUBSYSTEM

To turn on the HP 7970B or HP 7970E magnetic tape unit:

a. Set the AC POWER toggle switch behind the front door of the tape unit to the ON position.

b. Press the appropriate unit number pushbutton on the front panel.

4-5. HP 7905A CARTRIDGE DISC DRIVE

To turn on the HP 7905A Cartridge Disc Drives, perform the following operations for each disc drive:

a. Set the ac power circuit breaker at the rear of the HP 29425A Cabinet to the ON position.

b. Set the RUN/HALT switch on the front panel of the disc drive to the RUN position.

c. Verify that all fans in the HP 29425A Cabinet are operating.

4-6. OTHER PERIPHERAL DEVICES

To turn on optional peripheral devices (not provided as standard items), see the manuals covering these devices, which are furnished with the system.

After you have turned on the system and peripheral power, you are ready to verify that the system operates according to factory specifications. To do this, you must:

● Load the operating system software.

● Load and run the system verification test programs, which verify the operation of various BASIC language constructs, system performance under heavy load, peripheral devices, and certain disc-related functions. (If you encounter difficulty in any of these tests, you may also need to load and run pertinent hardware diagnostic programs.)

5-1.   LOADING THE OPERATING SYSTEM SOFTWARE

Before you can run the system, you must load the HP 2000 Operating System (HP 22687A) (including HP 2000 BASIC and a program for converting HP 2000 F files for use on the new system). At this time, you may also load the FCOPY/2000 and EDITOR/2000 subsystems, and any application programs optionally ordered by the customer.

To load the above programs, follow the directions in HP 2000 Series Computer System Operator's Manual (part no. 22687-90005). In general, these directions require you to:

a. Generate the initial operating system in main memory and on disc. This step consists of loading and running the Master Program supplied on the master magnetic tape to configure the input/output processor (IOP) and system processor (SP), and to load all operating system and BASIC software. At this time, you may also save a copy of the configured IOP on magnetic tape for back-up. (See Section IV and Appendix A of the Operator's Manual.)

b. Create user identification codes under which the supplied programs can be stored. Generally, FCOPY/2000 and EDITOR/ 2000 reside under id-code A000. Optional application programs can be assigned other id-codes. (The id-codes and loading procedures for the verification test programs are noted in paragraph 5-2, below.) To create the id-codes, use the NEWID command (Section III of Operator's Manual).

c. Copy the entire system to disc, using the SLEEP command (Section III of Operator's Manual).

d. Selectively load the FCOPY, BASIC, and application programs from the tapes supplied, via the LOAD command (Section III of Operator's Manual).

5-2. LOADING VERIFICATION TESTS

The verification test programs and the files used by them are supplied on an individual reel of magnetic tape. (For 800 bits-per-inch (bpi) tapes, the part number is HP 22687-10005. For 1600 bpi tapes, the part number is HP 22687-11005.) These programs and files must be loaded under the account identified by the id-code Z100. To create this account and load the software, proceed as follows:

a. Create an account with the id-code Z100 and other required parameters by entering the NEWID command as follows:

NEWID-Z100,,65536.65535.PR,RP,PP,MT,CR,LP,LT,JI,JT,JM,JL,MWA

(For the meaning of these parameters, see the Operator's Guide, Section III. Omit the parameters for any non-sharable devices or job function designators that do not exist on the system.)

NOTE

In this and other examples throughout this section, your input is underlined; system output, however, is not underlined.

The id-code Z100 should be used only for the verification test software. Therefore, if this id-code already exists and is being used for another purpose, you must clear it from the system (with the KILLID command) and then re-create it (with the NEWID command).

b. Copy the present system to disc with the SLEEP command.

c. Load the test software by responding as follows during the SLEEP/operator dialogue:

```
SLEEP
SYSTEM DUMP OR RELOAD?RELOAD
LOAD OR DUMP COMMANDS?LOAD
ENTER NAME LIST, ONE PER LINE.  TERMINATE WITH 'END'
Z100
END
```

d. Restart the system and log-on under the id-code Z100.

5-3. RUNNING VERIFICATION TESTS

Now, you are ready to run the verification tests that demonstrate to the customer that his new system is operating satisfactorily. These tests can be run from any user terminal on the system.

a. Enter the following EXECUTE command to run the test program (named VERITE):

     EXECUTE-VERITE
     VERITE ◄─────────(program name, displayed by system.)

b. The test program issues the following prompt:

     WHICH TEST?

     You may select the test to be run by responding to the prompt as directed below.

                            NOTE

          As you run VERITE, you may abbreviate any response
          to a prompt as long as the abbreviation distin-
          guishes between all possible responses that start
          with the same characters. Thus, you could not use
          DI to distinguish DIRECTORY from DISC -- but you
          could use DIR for this purpose.

c. Normal verification test termination occurs in different ways, depending on the test:

    ● The BASIC test (discussed in paragraph 5-4), upon conclu-
      sion, returns control to VERITE which then terminates. To
      select further testing, you must re-run VERITE.

    ● The Load Test (discussed in paragraph 5-5) loops indefin-
      itely until you press the BREAK key on your terminal.
      When this is done, the test program terminates. The sys-
      tem then displays STOP and waits for a new command. To
      request further testing, you must re-run VERITE.

    ● The Device Tests (discussed in paragraphs 5-6 through
      5-18), each return control to VERITE, which prompts you to
      request:

         -- Testing of another device,
         -- Another type of verification test, or
         -- Termination of VERITE.

    ● The Utility Tests (discussed in paragraphs 5-19 through
      5-23) return control to VERITE, which prompts you to re-
      quest:

         -- Another utility test
         -- Termination of VERITE.

d. At your option, you can terminate VERITE at any time by pressing the BREAK key. When VERITE terminates, the system displays STOP and waits for a new command.

e. If error messages are reported during any test, first try to correct the error yourself. If the error occurs during a device or utility test, you may run the appropriate hardware diagnostic test to help determine the cause of the error. If you cannot correct the error, call your Product Specialist for assistance. Charge any corrective action by HP to the customer's 90-day warranty.

5-4. BASIC TEST

The BASIC test verifies satisfactory operation of the HP 2000 BASIC software by executing various BASIC language statements and programmatically checking the outcome against expected results. Whenever possible, all statement types in various forms are tested.

NOTE

You should perform the BASIC test before any other verification tests, to validate operation of internal portions of the system.

You should use a high-speed CRT terminal, if available, to execute this test, since interaction with a slower terminal may require as much as 20 minutes before testing is complete. (This interaction is necessary to test the input/output functions of BASIC.)

To execute the BASIC test:

a. Respond to the WHICH TEST? prompt by entering BASIC. (See figure 5-1, Item 1).

b. The test routine displays TS0000 (Item 2), and then begins testing. During the test, many lines of extraneous output used to verify various terminal operations are displayed on your terminal (Item 3). You should ignore this output and direct your attention instead to any messages output to the system console. If any message appears other than the standard message nn TEST OF SYSTEM COMMAND (where nn is the port number of the terminal), this message identifies an error in the operation of the BASIC software. If no messages other than the standard message appear, no errors occurred.

c. When the test routine completes one full cycle, it prints the number of passes completed, which is always 1 (Item 4), the current hour (Item 5) and minute (Item 6), and the message DONE (Item 7) on your terminal. The routine then returns control to VERITE, which terminates.

```
   WHICH TEST ?BASIC ←①
   TS0000 ←②
┌  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX·····XXXXX
│  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX·····XXXXX
│  TS0001
│  TS0002                        ↑
③ ⎨                              │
│             ·    (Many lines of extraneous data
│             ·              from test)
│             ·
│                                ↓
│  TS0039           ④
└  END OF PASS 1         HOUR = 10    MINUTE = 27

      DONE ←⑦                      ⑤            ⑥
```
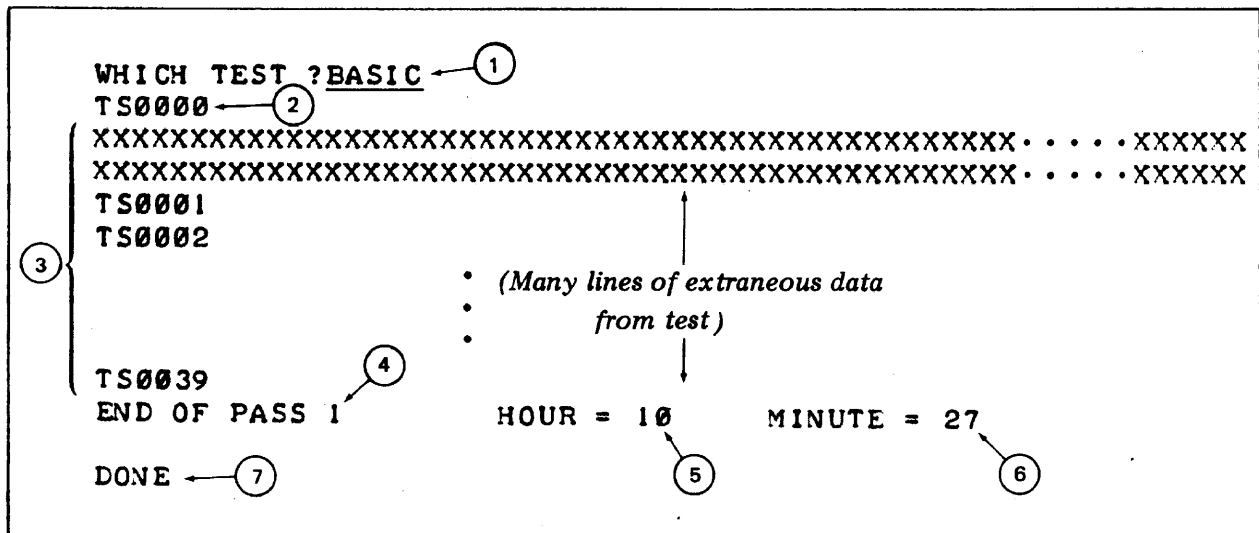
Figure 5-1. BASIC Verification Test Input/Output

Any errors detected are always reported on the system console,
regardless of which terminal you use to execute the test. Many
different specific error messages are possible, but all contain
either the term "BYPASSED" or "FAILED", as illustrated by the
examples below.

Terminal   *Test routine*   *Result of function*   *Cause or location*
port no.   *identity*   *test*   *of error*
   \   /   /   /
   06   TS0000--BYPASSED--FILE COULD NOT BE CREATED

Terminal   *Test routine*   *Result of function* *Cause or location*
port no.   *identity*   *test*   *of error*
   \ | /   /
   06 TS0000--FAILED--LINE 77
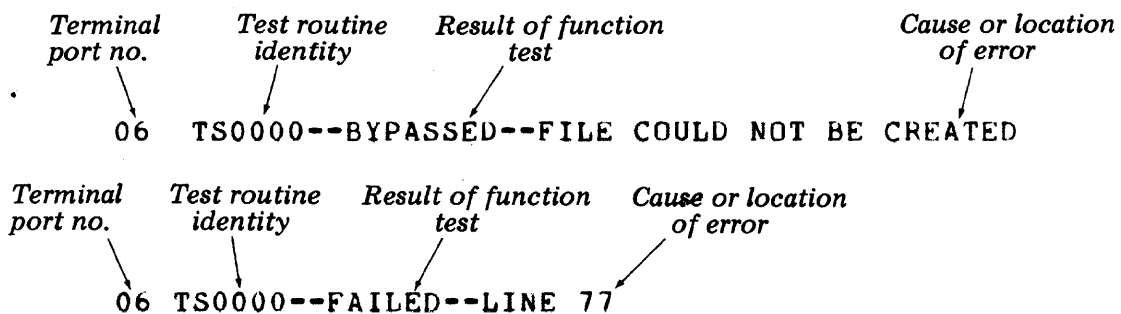
Messages indicating BYPASSED generally denote some function that
could not be performed. The malfunction of this operation is not
necessarily fatal to system operation and may be possible for you
to correct. Messages indicating FAILED, however, refer to severe
problems that probably require help from the Product Support
Group. When either type of message occurs, proceed as follows:

a. If this is a BYPASSED error, delete all temporary files
    created under your log-on id-code on all terminal ports by
    the various verification tests. Do this by running the PURGE
    utility test (discussed in Paragraph 5-22) and responding to
    the PURGE FILES FOR WHICH PORT? prompt by replying ALL. In
    addition, attempt to correct any error whose solution seems
    obvious to you.

b. Re-run VERITE and request the BASIC test again.

c. If the test program still reports errors, call the Product
    Support Group at HP's General Systems Division.

5-5.   LOAD TEST

The Load test uses the same programs and files as the BASIC test, but is run on more than one terminal simultaneously to evaluate system operation under a severe load. Unlike the BASIC test, however, LOAD loops through its cycle infinitely. As it completes each pass, the routine displays the number of that pass, the current hour, and time on the terminal. The routine also repeats this message on the console for each terminal completing each pass.

If possible, you should run the Load test on about eight terminals simultaneously. This places a very strenuous load on the system, and may expose various operating system or hardware anomalies. You should allow each terminal to complete at least one pass of the Load test.

To execute the Load test:

a.   Respond to the WHICH TEST? prompt by entering LOAD   (figure 5-2, Item 1).

b.   The test routine displays TS0000 (Item 2) and then begins testing, performing the same functions as the BASIC test (paragraph 5-4). As in the BASIC test, extraneous output is displayed on the terminal (Item 3); this should be ignored.

c.   When the test completes one pass, it prints the number of the pass and the current hour and minute (Items 4, 5, and 6) and then begins another pass (Item 7). The test routine continues in this fashion indefinitely.

d.   To terminate testing, press the BREAK key.   In response, VERITE terminates, and the system prints STOP (Item 8) and waits for a new command.

e.   Check the console for any messages other than the standard message nn TEST OF SYSTEM COMMAND. If any error messages appear, take the actions noted in paragraph 5-3(e). Such actions include deleting all temporary files created by the verification tests, by using the PURGE utility test.

```
②  WHICH TEST ?LOAD◄─────①
 ↳TS0000
 ┌ XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX·····XXXXXX
 │ XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX·····XXXXXX
 │ TS0001
③│ TS0002
 │                              •
 │                              •
 │                              •
 └ TS0039           ④          •              ⑤              ⑥
⑦  END OF PASS 1              HOUR = 10       MINUTE = 50
 ↳TS0000
    XXXXXXXXXXXXXXXXXXXXXXXX
⑧─►STOP
```
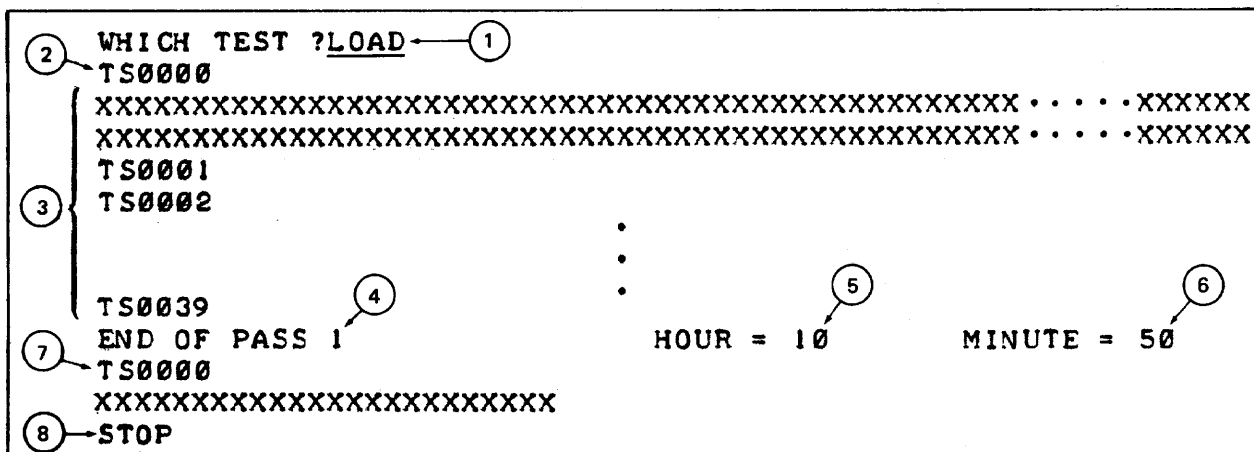
Figure 5-2.   Load Verification Test Input/Output

5-6. DEVICE TESTS

The device test routines verify proper operation of all HP-supported non-sharable devices and HP 2000-to-HP 2000 data communications functions configured into the system. To run one of these routines, proceed as follows:

NOTE

It is good practice to allow load testing on two or more terminals to continue while running the device tests. This allows you to evaluate device operation under normal operating conditions.

a. Respond to the WHICH TEST? prompt by entering DEVICE (figure 5-3, Item 1).

b. The system next displays the following prompt:

DEVICE TO BE TESTED?

Respond to this prompt by entering a three-character code selected from table 5-1, determining the device to be evaluated. In these codes, the character $\underline{n}$, a digit between 0 and 9, denotes the specific unit number of the device. In the example in figure 5-3 (Item 2), the line printer identified by unit number zero is selected.

c. The system now displays the following prompt:

RECORD LENGTH (CR FOR DEFAULT)?

This prompt allows you to override the default record size of the device to be tested, as that size was configured into the system. The new size you specify applies to the device during the test.

Ordinarily, you would only wish to change the record size when testing a line printer on which forms smaller than the default size are mounted. Specify the new size by entering the width of the forms in words (2 characters/word); any value between one and the default size is permissible. If you wish to maintain the default size for this test, enter a carriage return (Item 3).

d. The system transfers control to the test selected in Step b, above. When the test is completed, VERITE again displays the DEVICE TO BE TESTED? prompt.

e. Select another device by entering its selection code, or request termination of device testing by entering a carriage return. If you request termination, VERITE again displays the WHICH TEST? prompt.

f. Select another verification test, or terminate VERITE (by entering a carriage return.)

g. If error messages are reported during any device test, take the actions described in paragraph 5-3(e).

```
    WHICH TEST ?DEVICE ──────①


    DEVICE TO BE TESTED?LP0 ────②
    RECORD LENGTH (CR FOR DEFAULT)? return ────③
                       •
                       •
                       •
```
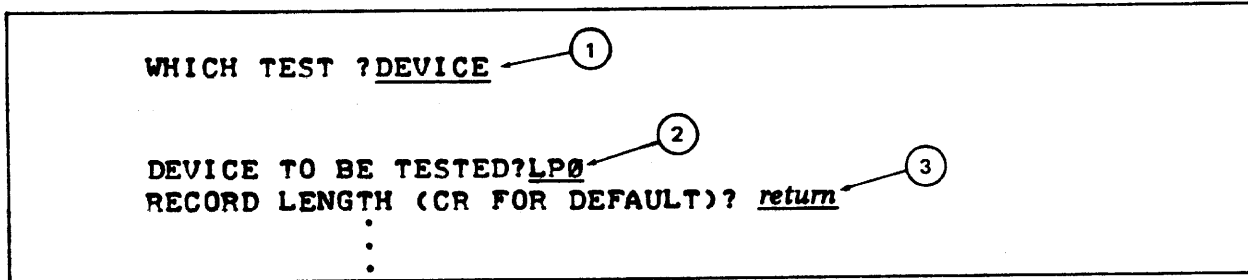
Figure 5-3. Device Verification Test Selection Dialogue

Table 5-1. Device Verification Selection Codes

DEVICE TO BE TESTED		CODE ENTERED	REFERENCE PARAGRAPH NO.
Line printer		LPn	5-7
Magnetic tape unit		MTn	5-8
Card reader		CRn	5-9
Paper tape punch		PPn	5-10
Paper tape reader		PRn	5-11
Card reader/punch		RPn	5-12
Link terminal		LTn	5-13
Job transmitter function	HP 2000-to-HP 2000	JTn	5-15
Job lister function	data communications	JLn	5-16
Job inquiry function	functions	JIn	5-17
Job message function	(paragraph 5-14).	JMn	5-18

5-7. LINE PRINTER TEST. The line printer test is conducted as described below:

NOTE

Prior to selecting this test, ready the line printer by loading it with paper and setting it on-line.

a. The test begins by prompting you for the sub-type of the printer to be tested, as follows:

SUBTYPE?

b. Respond to this prompt by entering a digit corresponding to the appropriate printer (figure 5-4, Item 1), selected from table 5-2.

5-8

c. The test routine now validates operation of the printer by directing output to it. Specifically, the test routine prints a heading on the printer form, verifies all carriage control spacing and line-skipping options such as single, double, and triple-spacing, top-of-page and bottom-of-page skipping, and page ejection. The first two pages of the extensive output generated by this test on the line printer appear in figure 5-5; the specific carriage-control options verified are denoted on the first page of this listing.

d. If the test routine detects errors, they are reported on your terminal and on the system console. For instance:

    LP0 - DEVICE NOT READY
    CORRECT AND PRESS 'RETURN' AT USER TERMINAL

    Take the corrective action that such messages request, if possible, and the test resumes.

e. When the test is complete, it prints pass-completion and routine-termination messages (Item 2), and returns control to VERITE, which prompts you for the name of another device to be tested (Item 3).

f. To fully verify proper printer operation, examine the printer output; this contains a full description of each item that should appear on the output, which you can visually check.

```
WHICH TEST?DEVICE


DEVICE TO BE TESTED?LP0
RECORD LENGTH (CR FOR DEFAULT)? return

SUBTYPE?0 ←───(1)

 LP PASS 1 COMPLETED          }
LINE PRINTER TESTING COMPLETED } (2)

DEVICE TO BE TESTED? ←──(3)
```

Figure 5-4.   Line Printer Test Input/Output

Table 5-2.   Line Printer Sub-Type Selection Codes

SUBTYPE	LINE PRINTER
0	HP 2607A, HP 2610A, HP 2614A
1	HP 2613A, HP 2617A, HP 2618A
2	HP 2767A
3	HP 2778A

```
LP0-CTL(01).1 ..    *** I M P O R T A N T    I N F O R M A T I O N ***




LP0-CTL(08).1 ..THE FORMAT OF EACH OUTPUT LINE IS: XXX-CTL(YY).LL..ZZZ...
LP0-CTL(03).1 ..  WHERE   XXX     =  DESTINATION DEVICE DESIGNATOR
LP0-CTL(03).1 ..          YY      =  CTL FUNCTION USED PRIOR TO PRINTING LINE
LP0-CTL(03).1 ..          LL      =  NUMBER OF TIMES THIS LINE IS PRINTED
LP0-CTL(03).1 ..          ZZZ...  =  ACTUAL DATA OR TEXT




LP0-CTL(06).1 ..  THE FOLLOWING CTL FUNCTIONS ARE VERIFIED:

LP0-CTL(15).1 ..      FUNCTION    ACTION

LP0-CTL(15).1 ..         01       PRINT AND ADVANCE PAPER TO TOP OF PAGE
LP0-CTL(03).1 ..         02       PRINT AND ADVANCE PAPER TO BOTTOM OF PAGE
LP0-CTL(03).1 ..         03       PRINT AND ADVANCE PAPER TO NEXT LINE
LP0-CTL(03).1 ..         04       PRINT AND ADVANCE PAPER TO NEXT DOUBLE LINE
LP0-CTL(03).1 ..         05       PRINT AND ADVANCE PAPER TO NEXT TRIPLE LINE
LP0-CTL(03).1 ..         06       PRINT AND ADVANCE PAPER TO NEXT HALF PAGE
LP0-CTL(03).1 ..         07       PRINT AND ADVANCE PAPER TO NEXT QUARTER PAGE
LP0-CTL(03).1 ..         08       PRINT AND ADVANCE PAPER TO NEXT SIXTH PAGE
LP0-CTL(03).1 ..         14       PRINT AND ADVANCE PAPER ONE LINE
LP0-CTL(03).1 ..         15       PRINT AND ADVANCE PAPER TWO LINES
LP0-CTL(03).1 ..         16       PRINT AND ADVANCE PAPER THREE LINES
```

Figure 5-5. Line Printer Test Printer Output

```
LPO-CTL(01).1 ..THE FOLLOWING LINE PRINTERS MAY BE TESTED:

LPO-CTL(15).1 ..      LINE PRINTER        SUBTYPE

LPO-CTL(15).1 ..        HP 2607A            0
LPO-CTL(03).1 ..        HP 2610A            0
LPO-CTL(03).1 ..        HP 2613A            1
LPO-CTL(03).1 ..        HP 2614A            0
LPO-CTL(03).1 ..        HP 2617A            1
LPO-CTL(03).1 ..        HP 2618A            1
LPO-CTL(03).1 ..        HP 2767A            2
LPO-CTL(03).1 ..        HP 2778A            3




LPO-CTL(06).1 ..THE NEXT TWO LINES CONTAIN THE PRINTABLE ASCII CHARACTER SET.

LPO-CTL(15).1 .. !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ
LPO-CTL(03).1 ..[\]^_@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^




LPO-CTL(07).1 ..THE NEXT THREE LINES SHOW THE NUMBER OF  PRINTABLE COLUMNS.

LPO-CTL(15).1 ..000000000000000000000000000000000000000000000000000000000000000000
LPO-CTL(03).1 ..1112222222222233333333334444444444555555555566666666667777777777778
LPO-CTL(03).1 ..7890123456789012345678901234567890123456789012345678901234567890
```

Figure 5-5.   Line Printer Test Printer Output (Continued)

5-8. MAGNETIC TAPE UNIT TEST. The magnetic tape unit test is conducted as follows:

a. The test begins by displaying the following messages:

        MOUNT A MAG TAPE WITHOUT A WRITE RING
        TYPE <CR> WHEN READY

b. Respond to the first message (figure 5-6, Item 1) by selecting a small (200- to 600-foot) reel of tape and mounting it without the write-enable ring.

c. Respond to the second message by entering a carriage-return (Item 2).

d. The test routine now verifies that the write operations are invalid without the write-ring installed on the tape reel. Then, the routine prints:

        RE-MOUNT TAPE WITH A WRITE RING
        TYPE <CR> WHEN READY

e. Respond to the first message in Step d (Item 3) by dis-mounting the tape reel, inserting a write-enable ring, and re-mounting the reel.

f. Respond to the last message by entering a carriage return (Item 4).

g. The test routine now performs various writing, spacing, and reading tests; all possible character combinations are written to the tape, read back, and verified. Finally, the test routine validates proper detection of the end of the tape by spacing to the end of the tape and halting movement of the reel.

                            NOTE

        This test performs many operations and may require up to 10 minutes to complete.

h. If the test detects errors, it reports them to your terminal and the console with messages such as:

        07 MTTEST FAILED, LINE # 3130 TYPE 304.

i. You can tell that the test is complete when the motion of the tape reel stops. No terminating message appears on the terminal, but the DEVICE TO BE TESTED? prompt is returned (Item 5).

```
DEVICE TO BE TESTED?MT0
RECORD LENGTH (CR FOR DEFAULT)? return


MOUNT A MAG TAPE WITHOUT A WRITE RING          (1)
TYPE <CR> WHEN READY return          (2)

RE-MOUNT TAPE WITH A WRITE RING          (3)
TYPE <CR> WHEN READY return          (4)

DEVICE TO BE TESTED?          (5)
```
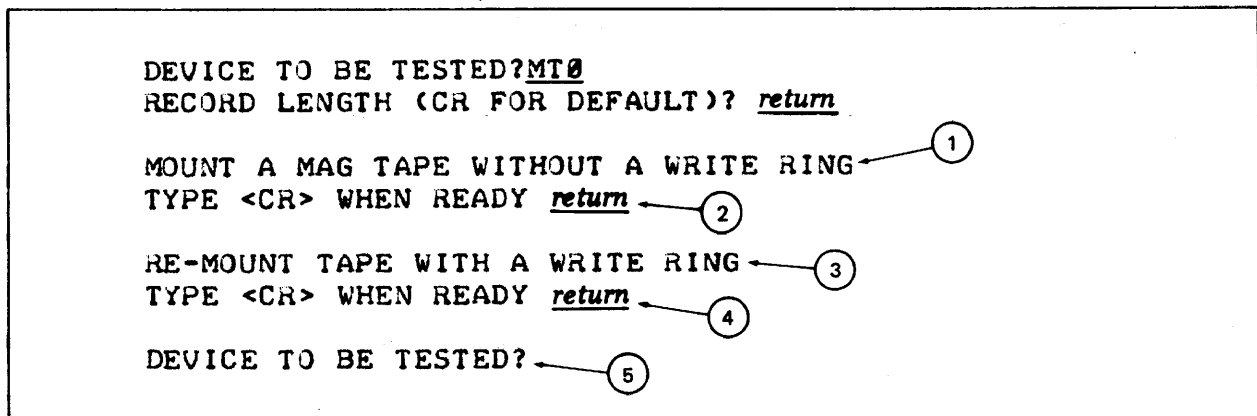
Figure 5-6.   Magnetic Tape Unit Test Input/Output

5-9.   CARD READER TEST. The card reader test is performed as shown below:

a. The test begins by prompting you for the subtype of the card reader to be tested:

    SUBTYPE?

b. Respond to this prompt by entering 0 if testing an HP 2892 Card Reader (figure 5-7, Item 1) or 1 if testing an HP 7261 Card Reader.

c. If you have not already done so, the test routine prompts you to load a test deck into the card reader, make the reader ready for on-line input, and enter a carriage return:

    CRn - DEVICE NOT READY (LOAD CARDS)
    CORRECT AND PRESS 'RETURN' AT USER TERMINAL

d. Respond to the first prompt above (Item 2) by loading a test deck and readying the card reader. Any card deck, regardless of its contents, will suffice. A convenient one to use is the test deck supplied for the hardware diagnostic test.

e. Respond to the second prompt above by entering a carriage-return (Item 3).

f. The test routine reads the test deck (up to a maximum of 200 cards), stores the card images in a disc file, and displays:

    CRn - TO VERIFY, LOAD CARD AGAIN
    CORRECT AND PRESS 'RETURN' AT USER TERMINAL

g. Respond to the first of these prompts (Item 4) by loading the same test deck into the card reader again and readying the reader.

h. Respond to the second prompt by entering a carriage return (Item 5).

i. The test routine reads the cards again, verifying them against the card images in the disc file.

j. If the test detects no errors, it prints the following message on your terminal (Item 6).

   CR<u>n</u> READ <u>x</u> AND VERIFIED <u>y</u> CARDS WITH <u>z</u> DATA RECORDS

   In this message, <u>n</u> is the unit number of the card reader, <u>x</u> is the number of cards read, <u>y</u> is the number of cards successfully verified, and <u>z</u> is the number of errors detected (which should be zero in this case).

k. If the test routine detects errors, it reports them to your terminal and the system console in a message similar in format to the above message.

l. When the test routine terminates, VERITE returns the DEVICE TO BE TESTED? prompt (Item 7).

```
DEVICE TO BE TESTED?CR0
RECORD LENGTH (CR FOR DEFAULT)? return
SUBTYPE?0          1
CR0 - DEVICE NOT READY(LOAD CARDS)        2
                                                     3
CORRECT AND PRESS 'RETURN' AT USER TERMINAL return
CR0 - TO VERIFY, LOAD CARD AGAIN   4
CORRECT AND PRESS 'RETURN' AT USER TERMINAL return   5
CR0 READ 105 AND VERIFIED 105 CARDS WITH 0 DATA ERRORS   6

DEVICE TO BE TESTED?        7
```
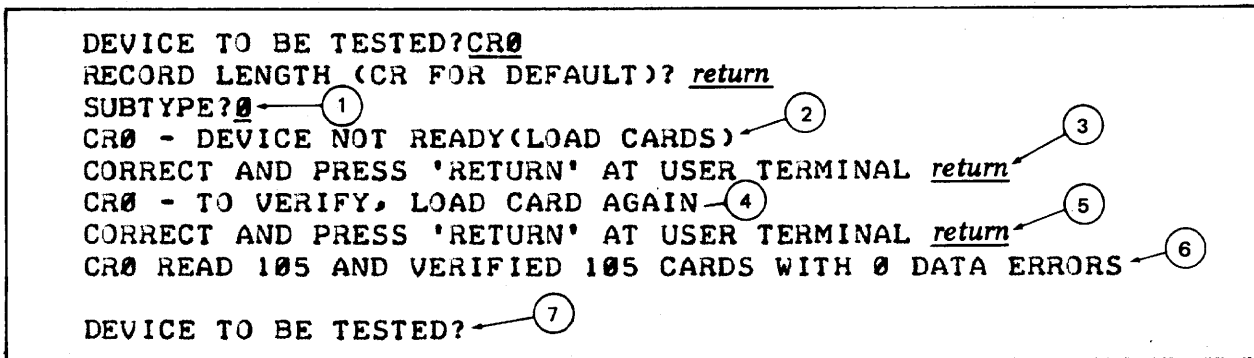
Figure 5-7. Card Reader Test Input/Output

5-10. PAPER-TAPE PUNCH TEST. The paper tape punch test is conducted in this manner:

a. The test routine begins by printing a message identifying itself (figure 5-8, Item 1), and then prompting you to ready the tape punch and enter a carriage-return.

   ***** PAPER TAPE PUNCH TEST *****
   READY PAPER TAPE PUNCH PPn AND PRESS RETURN

b. Mount the paper tape in the punch, ready the punch, and enter a carriage return (Item 2).

c. The test routine produces four paper tapes, each using one of four possible control (CTL) codes. On each tape, the data is punched in the same format, which consists of these items (in the order listed below). The format for each tape appears in figure 5-9.

   ● One of the following characters -- E (for CTL 30), O (for CTL 31), N (for CTL 32), and T (for CTL 33).

- A pattern made up of two triangles.

- All characters possible to punch (including all 128 char-
  acters in the ASCII set), in order of ascending octal
  value.

NOTE

For the paper-tape punch, the CTL selected deter-
mines the punching option as follows:

CTL	RESULT
30	Punch data with even parity and with X-OFF, RETURN, and LINE FEED as record separator.
31	Punch data with odd parity and with X-OFF, RETURN, and LINE FEED as record separator.
32	Punch data with no parity and with X-OFF, RETURN, and LINE FEED as record separator.
33	Punch data with no parity and no record separators.

A 12-inch leader and trailer are automatically punched.

d. If the test routine encounters punching errors, it reports
them to the console.

e. When the test routine terminates, it prints the following
message (Item 3):

PAPER TAPE PUNCH TEST COMPLETED

f. The test routine passes control to VERITE, which returns the
DEVICE TO BE TESTED? prompt (Item 4).

```
DEVICE TO BE TESTED?PPØ
RECORD LENGTH (CR FOR DEFAULT)? return

***** PAPER TAPE PUNCH TEST *****     (1)

READY PAPER TAPE PUNCH PPØ AND PRESS RETURN return     (2)

PAPER TAPE PUNCH TEST COMPLETED     (3)


DEVICE TO BE TESTED?     (4)
```

Figure 5-8.   Paper Tape Punch Test Input/Output

CTL 30 TAPE

**CTL 31 TAPE**

CTL 32 TAPE

CTL 33 TAPE
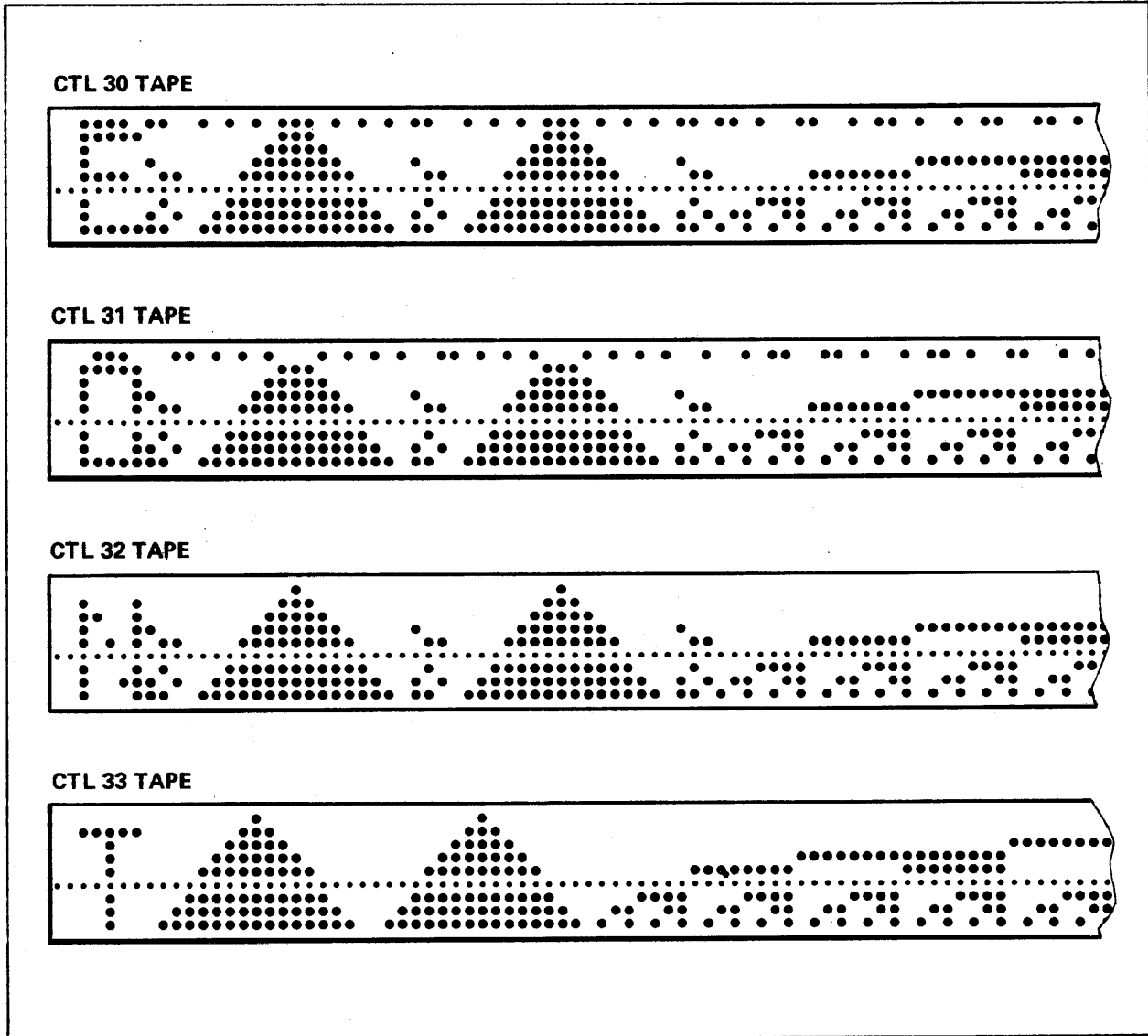
Figure 5-9.   Paper Tape Punch Test Tape Formats

5-11. PAPER-TAPE READER TESTS. The paper tape reader test rou-
tine allows you to select any of three tests as shown below. For
these tests, you use any of the tapes produced in the paper-tape
punch test (paragraph 5-10) as input. These tapes should contain
at least 12 inches of trailer. When mounting a tape, be sure to
position it so that the punch's reading heads are located within
six inches of the beginning of the data on the tape.

a. The test routine begins by prompting you to choose a test
    (figure 5-10, Item 1).

b. To select the tape read test, enter R (Item 2).

    1. The test prompts you to mount the tape, ready the tape
        reader, and enter a carriage-return (Item 3):

            INSERT TAPE, READY READER, AND PRESS RETURN

    2. The test reads the tape, copying its contents into a disc
        file.   The test begins reading at the first character of
        data on the tape, and continues until it has read ten con-
        secutive null characters.

    3. When reading is complete, the test prompts you to again
        mount the tape, ready the reader, and enter a carriage-
        return (Item 4):

            RESET TAPE IN READER, READY AND PRESS RETURN

    4. The test reads the tape again, copying its contents into a
        second disc file. The test then compares the contents of
        the first and second disc files and, if it detects errors,
        reports them to the terminal and the console. If no
        errors are detected, the test prints the following message
        on the console (Item 5):

            TAPES COMPARED

    5. The test routine now returns the prompt for another paper
        tape reader test (Item 6).

c. To select the tape parity test, enter P (Item 7).

    1. The test prompts you to mount the tape, ready the tape
        reader, and enter a carriage-return (Item 8):

            INSERT TAPE, READY READER, AND PRESS RETURN

    2. The test reads the tape and reports its parity to your
        terminal (Item 9). The test begins reading at the first
        character of data on the tape, and continues until it has
        read ten consecutive null characters. Any errors detected
        are reported to the terminal and console.

    3. The test routine now prompts you for another paper-tape
        reader test (Item 10).

d. To select the control (CTL) test, enter C (Item 11).

1. The test prompts you to specify the CTL option under which the tape is to be read (Item 12):

    INPUT CTL 30/EVEN, 31/ODD, 32/NO, OR 33/TRANS?

2. Select one of the following CTL options:

    CTL   RESULT

    30   Read data with even parity and with RETURN as record separator

    31   Read data with odd parity and with RETURN as record separator

    32   Read data with parity ignored and with RETURN as record separator

    33   Read data with parity ignored and no record separators

3. The test prompts you to mount the tape, ready the reader, and press return (Item 13):

    INSERT TAPE, READY READER, AND PRESS RETURN

4. The test reads the tape under the CTL you specified, and copies the records read to your terminal (Item 14). For a CTL of 30, 31, or 32, the test begins reading with the first character of data and continues until it has read an end-of-file indicator. For a CTL of 33, the test begins reading with the first character of data and continues until it reads ten consecutive null characters.

5. If the test encounters any errors, it reports them to your terminal and the console in messages such as:

    READ/WRITE ERROR DETECTED

6. The test routine now prompts you for another paper tape reader test (Item 15).

e. To terminate the paper-tape reader test routine, enter E (Item 16).

f. Control returns to VERITE, which returns the DEVICE TO BE TESTED? prompt (Item 17).

```
DEVICE TO BE TESTED?PRØ
RECORD LENGTH (CR FOR DEFAULT)? return

RUN WHICH TEST?
     R - READ
     P - TEST PARITY        ⟩  ①
     C - CTL
     E - EXIT                              ③
?R ②
INSERT TAPE, READY READER AND PRESS RETURN return
RESET TAPE IN READER, READY AND PRESS RETURN return  ④


TAPES COMPARED  ⑤


RUN WHICH TEST?
     R - READ
     P - TEST PARITY        ⟩  ⑥
     C - CTL
     E - EXIT
?P ⑦
INSERT TAPE, READY READER AND PRESS RETURN return  ⑧
TAPE HAS ODD PARITY ⑨

RUN WHICH TEST?
     R - READ
     P - TEST PARITY        ⟩  ⑩
     C - CTL
     E - EXIT                              ⑫
?C ⑪
INPUT CTL  30/EVEN, 31/ODD, 32/NO OR 33/TRANS?30
INSERT TAPE, READY READER AND PRESS RETURN return  ⑬


RECORD 1
 73      73      73      65


RECORD 2
 1       3       7       15      31      63      63      31      15      7       3       1


RECORD 3
 1       3       7       15      31      63      63      31      15      7       3       1


RECORD 4
 1       2       3       4       5       6       9       11      12


RECORD 5
 65      66      67      68      69      70      71      72      73      74      75      76
 77      78      79      80      81      82      83      84      85      86      87      88
 89      90      91      92      93      94      95      96      97      98      99      100
 101     102     103     104     105     106     107     108     109     110     111     112
 113     114     115     116     117     118     119     120     121     122     123     124
 125     126


RECORD 6
 1       2       3       4       5       6       9       11      12
```

Figure 5-10. Paper Tape Reader Test Input/Output

```
RECORD 7
    65    66    67    68    69    70    71    72    73    74    75    76  ⟩
    77    78    79    80    81    82    83    84    85    86    87    88  ⟩ ⑭
    89    90    91    92    93    94    95    96    97    98    99   100  ⟩
   101   102   103   104   105   106   107   108   109   110   111   112 ⟩
   113   114   115   116   117   118   119   120   121   122   123   124 ⟩
   125   126
```

```
RUN WHICH TEST?                  ⟩
      R - READ                   ⟩
      P - TEST PARITY            ⟩ ⑮
      C - CTL                    ⟩
      E - EXIT                   ⟩
 ?E ⑯


 DEVICE TO BE TESTED?  ⑰
```

Figure 5-10. Paper Tape Reader Test Input/Output (Continued)

5-12. **CARD READER/PUNCH TEST.** The card reader/punch test is performed as shown below:

a. The test program begins by printing a definition (figure 5-11, Item 1) of the message "CLEAR DEVICE," which is output several times throughout the test.

                         NOTE

    Specifically, the "CLEAR DEVICE" message, whenever
    it appears, directs you to:

    1. Flip the ONLINE/OFFLINE toggle switch on the
        card reader/punch from the ONLINE to the OFF-
        LINE position, and then back to the ONLINE
        position.

    2. Next, press the STOP button twice.

    3. Finally, press the START button.

The "CLEAR DEVICE" definition is followed immediately by the prompt shown below, and the program waits for your response:

    PRESS RETURN WHEN READY

b. When you are ready to continue, respond to this prompt by entering a carriage-return (Item 2), directing the test program to proceed.

c.   The program now directs you to place about 100 blank cards in
     the front hopper (Hopper No. 2) of the card reader/punch, and
     clear the device (Item 3). Then, enter a carriage-return to
     proceed with the test (Item 4).

                              NOTE

         In this test, always perform any card-loading oper-
         ations before clearing the device and entering the
         carriage-return to continue.

d.   The test program reads 21 cards to check the stacker/hopper
     control, placing 10 blank cards in the right stacker, 10
     other blank cards in the left stacker, and one blank card in
     the visible wait station. The program then prints a message
     stating the locations of these cards, directs you to clear
     the device, and replace all cards in the front hopper (Item
     5). After you have done this, enter a carriage return to
     continue (Item 6).

e.   The test program reads 11 cards, placing 10 in the right
     stacker and printing a message to this effect (Item 7), and
     placing one in the visible wait station.   The program also
     prompts you to pull the arm on this stacker outward as far
     as possible to prepare for checking the stacker-overflow mode
     (in step f, below).   After you have done this, enter a
     carriage-return to continue (Item 8).

f.   The test program now reads 10 cards in stacker-overflow mode,
     which causes ten to be placed in the left stacker with one
     in the visible wait station. The program then displays a
     message to this effect (Item 9). The message also directs
     you to clear the device, collect all cards, and place them in
     the front hopper. When you have done this, enter a carriage
     return to continue (Item 10).

g.   The test program punches and prints all 64 punchable ASCII
     characters in ten of these cards, placing the cards in the
     right stacker and printing a message to this effect (Item
     11).   This message also directs you to clear the device, col-
     lect these punched cards, and replace them in the rear hopper
     (Hopper No. 1). Then, enter a carriage-return to continue
     (Item 12).

h.   The test program reads the ten punched cards, and then dis-
     plays a message to clear the device and discard those punched
     cards (Item 13). When you have done this, enter a carriage
     return to continue (Item 14).

i.   The program now punches all possible column binary positions
     in 52 more cards and prints a message asking you to collect
     these cards and place them in the rear hopper (Item 15).
     Then, enter a carriage-return (Item 16).

                              5-21

j. The program reads back all these punched cards, verifying
    their content. If an error is detected, the program returns
    control to VERITE which prompts you to select another device
    test. Otherwise, the program directs you to clear the device
    and discard all punched cards (Item 17). When you have done
    this, enter a carriage return to continue (Item 18).

k. The program punches all 64 punchable characters from the
    ASCII character set on 10 more cards, directs you to clear
    the device, and then replace these cards in the rear hopper
    after checking that no printing appears on the cards (Item
    19). Enter a carriage-return to continue (Item 20).

l. The program reads the cards and checks their contents as in
    Step j.   It then directs you to again clear the device and
    place these same cards in the rear hopper (Item 21).   Then,
    enter a carriage return (Item 22).

m. The program now prints all 64 punchable characters from the
    ASCII Character Set on these cards and prints a message
    stating this (Item 23). It also directs you to save these
    cards and clear the device. Enter a carriage return to con-
    tinue (Item 24).

n. The program next verifies the "print-and-punch different
    data" option by using this option to print and punch the same
    data on 10 cards that duplicate those produced in steps k
    through m. The program also prints a message denoting this
    (Item 25). This message also requests you to clear the
    device, and informs you that the test is complete. (You
    should now visually check the printing on the cards produced
    in this step with that on the cards produced in step m.) The
    program terminates, and VERITE returns the DEVICE TO BE
    TESTED? prompt (Item 26).

```
DEVICE TO BE TESTED? RP0
RECORD LENGTH (CR FOR DEFAULT)? return
IN THE FOLLOWING INSTRUCTIONS, 'CLEAR DEVICE' MEANS:       ⎫
FLIP THE ONLINE/OFFLINE TOGGLE SWITCH FROM ONLINE TO OFFLINE ⎬ ①
AND BACK TO ONLINE.  ADDITIONALLY, PRESS STOP TWICE, THEN   ⎪
PRESS START.                                                ⎭
PRESS RETURN WHEN READY return ②


PLACE APPROXIMATELY 100 BLANK CARDS IN THE FRONT HOPPER   ⎫
CLEAR DEVICE.                                             ⎬ ③
PRESS RETURN WHEN READY return ④                         ⎭
```

Figure 5-11. Card Reader/Punch Test Input/Output

THERE SHOULD BE 10 BLANK CARDS IN THE RIGHT HAND STACKER
AND 10 BLANK CARDS IN THE LEFT HAND STACKER WITH ONE CARD IN   } (5)
THE VISIBLE WAIT STATION.   CLEAR DEVICE, REPLACE ALL CARDS IN
THE FRONT HOPPER.
PRESS RETURN WHEN READY _return_ (6)

THERE SHOULD BE 10 CARDS IN THE RIGHT HAND STACKER.   PULL   } (7)
RIGHT HAND STACKER ARM OUT AS FAR AS IT WILL GO.
PRESS RETURN WHEN READY _return_ (8)

THERE SHOULD BE 10 CARDS IN THE RIGHT HAND STACKER AND 10   } (9)
CARDS IN THE LEFT HAND STACKER WITH ONE CARD IN THE VISIBLE
WAIT STATION.   CLEAR DEVICE, REPLACE ALL CARDS IN THE FRONT HOPPER. }
PRESS RETURN WHEN READY _return_ (10)

THERE SHOULD BE 10 CARDS IN THE RIGHT HAND STACKER WITH
ALL 64 PUNCHABLE ASCII CHARACTERS PUNCHED AND PRINTED.   CLEAR } (11)
DEVICE AND PLACE 10 PUNCHED CARDS IN REAR HOPPER.
PRESS RETURN WHEN READY _return_ (12)

CLEAR DEVICE.   } (13)
DISCARD PUNCHED CARDS.
PRESS RETURN WHEN READY _return_ (14)

CLEAR DEVICE; REPLACE ALL PUNCHED CARDS IN REAR HOPPER (15)
PRESS RETURN WHEN READY _return_ (16)

CLEAR DEVICE; DISCARD ALL PUNCHED CARDS. (17)
PRESS RETURN WHEN READY _return_ (18)

CLEAR DEVICE. PLACE PUNCHED CARDS INTO REAR HOPPER.   } (19)
VISUALLY CHECK THAT THERE IS NO PRINTING ON THE CARDS.
PRESS RETURN WHEN READY _return_ (20)

CLEAR DEVICE. PLACE PUNCHED CARDS INTO REAR HOPPER. (21)
PRESS RETURN WHEN READY _return_ (22)

CARDS IN RIGHT HAND STACKER SHOULD NOW HAVE ASCII 64   } (23)
CHARACTER SET PRINTED.   CLEAR DEVICE.   SAVE PUNCHED/PRINTED CARDS.
PRESS RETURN WHEN READY _return_ (24)

LAST 10 CARDS PUNCHED AND PRINTED SHOULD DUPLICATE THOSE PRINTED } (25)
IN PREVIOUS STEP.   CLEAR DEVICE.
READER/PUNCH/INTERPRETER TEST COMPLETE.

DEVICE TO BE TESTED? (26)

Figure 5-11. Card Reader/Punch Test Input/Output (Continued)

5-23

5-13.   LINK TERMINAL TESTS. The link terminal tests consist of four function tests:

● START evaluates the terminal's operation during its initialization and exit procedures.

● PRINT tests its output operations.

● READ checks its input operations.

● CTL verifies its control operations.

a.   The test routine begins by prompting you to select a function test (figure 5-12, Item 1). You may request the tests in any order desired.

b.   To select the START test, enter S (Item 2).

1.   The test identifies itself by printing the following message (Item 3) on your log-on terminal and the console:

    START AND EXIT TEST

2.   The test now prints a message (Item 4) on your log-on terminal that describes the actions to occur next on the link terminal:

    DEVICE TO BE ALLOCATED : DISPLAY AND LIGHTS SHOULD GO OFF

    The link terminal is now allocated for use, and the test routine turns off all indicator lights and clears the terminal display. (Check the keyboard and display to ensure that this has occurred.)

3.   The test next prints this message (Item 5):

    EVERY SECOND LIGHT SHOULD GO ON AND DISPLAY BE FILLED WITH 0'S

    Now, the test turns on every other (alternating) indicator light on the link terminal keyboard, and fills the display with zeros.

4.   The test now prints this message (Item 6):

    DEVICE TO BE DEALLOCATED : LIGHTS AND DISPLAY SHOULD GO OFF

    The test deallocates the link terminal: all indicator lights turn off and the display clears.

5. The test prints another message (Item 7):

> DEVICE TO BE ALLOCATED AGAIN BUT WITH DEVICE OFF-LINE
> (OR POWERED OFF)
> TURN POWER OFF AT DEVICE AND TYPE CR (RETURN) TO
> CONTINUE TEST

Turn off the link terminal's power switch and enter a carriage-return at your log-on terminal. The test attempts to allocate the link terminal, but this attempt should fail and the following message (Item 8) should appear on the log-on terminal:

> SYSTEM MESSAGE SHOULD BE PRINTED READING **LTXX -
> DEVICE NOT READY**
> TEST SHOULD RESUME AND END AS DEVICE BECOMES READY

Then, on both the log-on terminal and the console, the test prints the actual DEVICE NOT READY message that specifically shows the unit number of the link terminal (Item 9). For example:

> LT0 -DEVICE NOT READY

6. Turn on the link terminal's power switch, restoring the terminal to on-line status. The START test terminates, and you are again prompted to select another function test (Item 10).

c. To select the PRINT test, enter <u>P</u> (Item 11).

1. The test identifies itself by printing this message (Item 12):

> **PRINT TEST**
> START OF OUTPUT FUNCTION TEST

2. The test next prints the following message (Item 13):

> THE FOLLOWING MESSAGE SHOULD BE PRINTED 5 TIMES:
> 123456.78E-90
> DISPLAY SHOULD BLINK AFTER LAST CHARACTER OF EACH
> LINE

The test then displays the characters <u>123456.78E-90</u> five times in succession, and causes the display to blink each time it is completed.

3. The test now prints this message (Item 14):

> THE STRING 9876 SHOULD BE PRINTED TO THE LEFT
> OF THE DISPLAY
> NO BLINKING SHOULD OCCUR THIS TIME

The test now clears the display and prints the characters 9876 at the left side of the display. No blinking occurs.

4. The test next prints this message (Item 15):

   543210 SHOULD BE APPENDED TO THE PRESENT CONTENTS
   OF DISPLAY
   AND DISPLAY SHOULD BLINK AT THE END OF OUTPUT

   The test displays the characters 543210 appended at the right of the last characters displayed, causing this output to blink. The display now reads:

   9876543210

5. The test next prints the following message (Item 16):

   DISPLAY WILL GET ERASED BEFORE EXITING FROM THIS TEST

   Now the display is cleared. The PRINT test terminates and you are again prompted to select another function test (Item 17).

d. To choose the READ test, enter R (Item 18).

   1. The test identifies itself by printing this message (Item 19):

      READ TEST
      START OF INPUT FUNCTION TEST

   2. Next, the test prints a message (Item 20) requesting you to enter a line of random data via the link terminal every time that the link terminal's ready light turns on. (You will be requested to enter a total of five such lines.) Terminate each line by pressing the ENTER key on the link terminal. All numeric characters entered should appear on the link terminal's display, which blinks when you press ENTER. Furthermore, for each line entered, various data (Item 21) appears on the log-on terminal: the number of characters you enter (Item 21A), their ASCII representation (Item 21B), and their ASCII codes (in decimal) which appear in parentheses (Item 21C).

   3. Next, the test prompts you to do the following (Item 22):

      a) Input a portion of a line of data on the link terminal.

      b) Turn off the system power by setting either processor to STAND-BY mode.

      c) Return the system to OPERATE mode.

d) Complete your input line and press the ENTER key on the link terminal. This simulates a system power failure and verifies the recovery procedures.

The following message (Item 23) now appears on the log-on terminal:

LTxx -DEVICE ERROR (LINE HAS TO BE RETYPED)

4. When the link terminal's READY light turns on, re-enter the data you input in step 3, above. This data and its ASCII representation and code then appears on the log-on terminal. (Item 24).

5. Now, the test prompts you (Item 25) to:

a) Begin a line of data on the link terminal.

b) Turn off the link terminal's power switch.

c) Turn on the link terminal's power switch again. (The terminal's display has been cleared and the ready light has been turned off. The keyboard emits a buzzing signal that indicates the terminal is not ready to accept input.)

6. Now, press the RESTART (gold) key on the link terminal; the READY light should come back on, and you should now be able to re-enter the full line originally entered in Step 5, a) above. The test echoes this line on the log-on terminal (Step 26).

7. Next, the test activates the terminal's error-trapping mechanism and requests further input (Item 27). Until you enter this input, which can be any random data, the test prints the message **NO DATA PRESENT. . .(Item 28) everys two seconds on the log-on terminal. When you enter the requested data, the test echoes it on the on terminal (Item 29), and prints the following message (Item 30):

DISPLAY WILL BE ERASED AT END OF THIS TEST

The PRINT test clears the display and terminates, and you are once more prompted to select another function test (Item 31).

e. To choose the CTL test, enter C (Itrem 32). This test itself consists of a group of three tests:

● LIGHTS tests the indicator light controls.

● SPECIAL KEYS evaluates the operation of special function keys.

● DISPLAY ECHO CONTROL verifies the operation of the echo facility.

The test routine immediately prompts you to select one of these tests:

1. To choose the LIGHTS test, enter 71 (Item 33).

2. The LIGHTS test identifies itself by printing the following message (Item 34):

        LIGHTS TEST
     START OF C-71 FUNCTION TEST (INDICATOR LIGHTS CONTROL)

3. The test now prints a description of the next test steps (Item 35), and then switches on all lights on the link terminal keyboard. After five seconds, every second light (beginning with Light No. 1) turns off.

4. The test prints a description of the next set of steps (Item 36). Input random data via the link terminal, turn off the terminal's power switch, and then press the ENTER key. (This simulates a local power failure.)

5. Now, turn the terminal's power switch back on and press the RESTART (gold) key. The indicator lights should return to the state they were in when power was terminated.

6. Re-enter the line originally input in Step 4, above, and press ENTER. This line is echoed on the log-on terminal (Item 37).

7. Now the LIGHTS test prints the following message (Item 38):

     FIRST ROW OF LIGHTS SWITCHED ON, OTHER LIGHTS OFF
     ALL INDICATOR LIGHTS WILL BE TURNED OFF

8. Now you are once more prompted to select another function test (Item 39).

f. To choose the CTL test again, enter C (Item 40).

1. To select the SPECIAL KEYS test, enter 72 (Item 41).

2. The SPECIAL KEYS test identifies itself by printing the following message (Item 42).

        SPECIAL KEYS TEST
     START OF C-72 FUNCTION TEST (SPECIAL FUNCTION
     KEYS CONTROL)

3. The test places all special function keys in terminating mode, and prompts you to enter 10 successive lines of data (Item 43). Terminate the first line with the ENTER key, the second with the SFK-2 key, the third with the SFK-3 key, and so forth. The last character of each of the last nine lines should be the code that corresponds to the SFK key used to terminate that line: for

instance. 16 for the line terminated by SFK-2, 17 for the line terminated by SFK-3, and so forth. The last nine lines are each validated when the corresponding SFK key is pressed. The lines entered are echoed on the log-on terminal, as in the READ test (Item 44).

4. Now, the test returns the special function keys to normal mode and requests you to enter a line composed entirely of special functions keys terminated by the ENTER key (Item 45). This line is validated when you press ENTER, and the SFK codes should appear in parentheses on the log-on terminal (Item 46).

5. The test now prints the following message (Item 47):

   DISPLAY IS CLEARED AT END OF TEST

6. The test clears the display and you are again prompted to select another function test (Item 48).

a. To choose the CTL test again, enter C (Item 49).

   1. To select the DISPLAY test, enter 73 or 74 (Item 50). (Either entry invokes the same test.)

   2. The DISPLAY test identifies itself by printing the following message (Item 51).

              DISPLAY TEST
        START OF C-73, C-74 FUNCTIONS (DISPLAY ECHO CONTROL)

   3. The test turns the echo facility off and transmits the data 123456.78 E-90 to the link terminal; because the echo facility is disabled, this data does not appear on the link terminal display. A message describing this step appears on the log-on terminal. (Item 52).

   4. The test now requests you to enter a line of random data (Item 53), which also is not echoed in the link terminal display. This information does, however, appear on the log-on terminal (Item 54).

   5. The test turns the echo facility on again. Again the test transmits data to the link terminal and then waits for you to also input random data, as in steps 3 and 4, above. This time, however, the data is echoed in both cases. A message describing this step appears on the log-on terminal (Step 55). The data you enter also appears on the log-on terminal (Item 56).

   6. The test now prints the following message (Item 57):

      DISPLAY WILL BE CLEARED AT END OF TEST

   7. The test clears the display and you are again prompted for another test function (Item 58).

h. To terminate testing, enter a carriage return (Item 59).
The program terminates, and VERITE returns the DEVICE TO
BE TESTED? prompt (Item 60).

```
DEVICE TO BE TESTED?LTO
RECORD LENGTH (CR FOR DEFAULT)? return

RUN WHICH TEST ?     ⎫
      S - START      ⎪
      P - PRINT      ⎬ ①
      R - READ       ⎪
      C - CTL        ⎭
?S ②

                          **START AND EXIT TEST** ③

DEVICE TO BE ALLOCATED : DISPLAY AND LIGHTS SHOULD GO OFF ④
EVERY SECOND LIGHT SHOULD GO ON AND DISPLAY BE FILLED WITH 0'S ⑤


DEVICE TO BE DEALLOCATED : LIGHTS AND DISPLAY SHOULD GO OFF ⑥


DEVICE TO BE ALLOCATED AGAIN BUT WITH DEVICE OFF-LINE (OR POWERED OFF)⎫ ⑦
TURN POWER OFF AT DEVICE AND TYPE CR (RETURN) TO CONTINUE TEST       ⎭

SYSTEM MESSAGE SHOULD BE PRINTED READING **LTXX - DEVICE NOT READY** ⎫ ⑧
TEST SHOULD RESUME AND END AS DEVICE BECOMES READY                   ⎭


LTO -DEVICE NOT READY ⑨



RUN WHICH TEST ?     ⎫
      S - START      ⎪
      P - PRINT      ⎬ ⑩
      R - READ       ⎪
      C - CTL        ⎭
?P ⑪

                          **PRINT TEST** ⎫ ⑫
                                         ⎬
START OF OUTPUT FUNCTION TEST            ⎭

THE FOLLOWING MESSAGE SHOULD BE PRINTED 5 TIMES : 123456.78E-90 ⎫ ⑬
DISPLAY SHOULD BLINK AFTER LAST CHARACTER OF EACH LINE          ⎭


THE STRING 9876 SHOULD BE PRINTED TO THE LEFT OF THE DISPLAY ⎫ ⑭
NO BLINKING SHOULD OCCUR THIS TIME                           ⎭


543210 SHOULD BE APPENDED TO THE PRESENT CONTENTS OF DISPLAY ⎫ ⑮
AND DISPLAY SHOULD BLINK AT THE END OF OUTPUT                ⎭


DISPLAY WILL GET ERASED BEFORE EXITING FROM THIS TEST ⑯
```

Figure 5-12. Link Terminal Test Input/output

```
RUN WHICH TEST ?
      S - START
      P - PRINT        ⎫
      R - READ         ⎬ ⑰
      C - CTL          ⎭
?R ⑱


                    **READ TEST**    ⎫
                                     ⎬ ⑲
START OF INPUT FUNCTION TEST         ⎭


EVERY TIME THE READY LIGHT GOES ON YOU ARE REQUESTED TO ENTER  ⎫
A LINE TERMINATED WITH THE ENTER KEY.                          ⎪
ALL THE NUMERIC CHARACTERS SHOULD GET PRINTED ON THE DISPLAY   ⎪
AND THE DISPLAY SHOULD BLINK WHEN THE ENTER KEY IS PRESSED.    ⎬ ⑳
THE NUMBER OF CHARACTERS ENTERED, THE ASCII REPRESENTATION     ⎪
OF THE LINE AND THE ASCII CODES (DECIMAL VALUES) ARE REPORTED. ⎪
NOW YOU WILL BE ASKED TO ENTER 5 SUCCESSIVE LINES :            ⎭

    10 �21A CHARACTER LINE ENTERED 1234567890 �21B    ⎫
    ( 49 50 51 52 53 54 55 56 57 48 ) �21C           ⎪
                                                     ⎪
                                                     ⎪
    12     CHARACTER LINE ENTERED -1-0-2-3-4-9       ⎪
    ( 45 49 45 48 45 50 45 51 45 52 45 57 )          ⎪
                                                     ⎪
                                                     ⎬ ㉑
    8      CHARACTER LINE ENTERED 9587.215           ⎪
    ( 57 53 56 55 46 50 49 53 )                      ⎪
                                                     ⎪
                                                     ⎪
    16     CHARACTER LINE ENTERED ...............,.  ⎪
    ( 46 46 46 46 46 46 46 46 46 46 46 46 46 46 46 46 ) ⎪
                                                     ⎪
                                                     ⎪
    0      CHARACTER LINE ENTERED                    ⎪
    ( )                                              ⎭

INPUT ONE LINE AND MAKE THE SYSTEM POWER FAIL BEFORE    ⎫
PRESSING THE ENTER KEY (DO NOT TURN OFF THE DEVICE YET).⎪
WHEN THE SYSTEM COMES BACK UP THE **LTXX DEVICE ERROR** ⎬ ㉒
MESSAGE SHOULD BE PRINTED AT THE TERMINAL AND THE OPERATION ⎪
SHOULD AUTOMATICALLY RESTART. WHEN THE READY LIGHT COMES ON ⎪
ENTER YOUR LINE AGAIN.                                  ⎭

***LTO-DEVICE ERROR**   (LINE HAS TO BE RETYPED) ㉓


    12    CHARACTER LINE ENTERED 123456789.06  ⎫
    ( 49 50 51 52 53 54 55 56 57 46 48 54 )    ⎬ ㉔

INPUT ONE LINE AND POWER OFF THE DEVICE UNDER TEST BEFORE    ⎫
PRESSING THE ENTER KEY. TURN POWER ON : DISPLAY SHOULD BE CLEAR ⎪
AND THE READY LIGHT OFF. THEN PRESS THE RESTART KEY :        ⎬ ㉕
 - THE READY LIGHT SHOULD COME BACK ON AND YOU MAY RE-ENTER  ⎪
THE FULL LINE.                                               ⎭


    10    CHARACTER LINE ENTERED -1248.0549  ⎫
    ( 45 49 50 52 56 46 48 53 52 57 )        ⎬ ㉖
```

Figure 5-12. Link Terminal Test Input/output (Continued)

ERROR TRAPPING HAS BEEN ACTIVATED AND AN INPUT WILL BE ⎫
REQUESTED. AS LONG AS THE LINE IS NOT ENTERED ERROR 300 ⎬ (27)
SHOULD BE TRAPPED AND **NO DATA PRESENT** MESSAGE WILL ⎪
BE PRINTED AT THE TERMINAL EVERY 2 SECONDS.
(ERROR= 300   ) **NO DATA PRESENT ON LTO-DEVICE ⎫
(ERROR= 300   ) **NO DATA PRESENT ON LTO-DEVICE ⎬ (28)
(ERROR= 300   ) **NO DATA PRESENT ON LTO-DEVICE ⎪
(ERROR= 300   ) **NO DATA PRESENT ON LTO-DEVICE ⎭

 10   CHARACTER LINE ENTERED -9756.0265 ⎫ (29)
(45 57 55 53 54 46 48 50 54 53)

DISPLAY WILL BE ERASED AT END OF THIS TEST (30)

RUN WHICH TEST ?   ⎫
        S - START   ⎪
        P - PRINT   ⎬ (31)
        R - READ   ⎪
        C - CTL   ⎭
?C (32)

WHICH CONTROL FUNCTION : 71,72,73,74 ?71 (33)

                        LIGHTS TEST   ⎫
                                                   ⎬ (34)
START OF C-71 FUNCTION TEST (INDICATOR LIGHTS CONTROL) ⎭

ALL LIGHTS SHOULD BE SWITCHED ON FOR 5 SECONDS   ⎫ (35)
EVERY SECOND LIGHT STARTING WITH LIGHT #1 WILL GO OFF ⎭

TEST OF DEVICE RESTART FROM LOCAL POWER FAIL WITH LIGHTS ON ⎫
TURN POWER OFF AT DEVICE BEFORE PRESSING THE ENTER KEY IN THE ⎪
NEXT INPUT OPERATION. TURN POWER BACK ON AND PRESS THE RESTART ⎬ (36)
KEY : THE LIGHTS SHOULD GET RESTORED TO THEIR STATE BEFORE THE ⎪
POWER WAS TURNED OFF. RE-ENTER YOUR LINE TERMINATED BY ENTER ⎭

 10   CHARACTER LINE ENTERED 123145.118 ⎫ (37)
(49 50 51 49 52 53 46 49 49 56)

FIRST ROW OF LIGHTS SWITCHED ON, OTHER LIGHTS OFF ⎫ (38)
ALL INDICATOR LIGHTS WILL BE TURNED OFF   ⎭

RUN WHICH TEST ?   ⎫
        S - START   ⎪
        P - PRINT   ⎬ (39)
        R - READ   ⎪
        C - CTL   ⎭
?C (40)

WHICH CONTROL FUNCTION : 71,72,73,74 ?72 (41)

                     SPECIAL KEYS TEST   ⎫
                                                           ⎬ (42)
START OF C-72 FUNCTION TEST (SPECIAL FUNCTION KEYS CONTROL) ⎭

Figure 5-12. Link Terminal Test Input/Output (Continued)

```
ALL SPECIAL FUNCTION KEYS WILL BE ASSIGNED TERMINATING MODE
YOU ARE ASKED TO ENTER 10 LINES : 1-ST TERMINATED BY ENTER
                                   2-ND TERMINATED BY SFK-2
                                   3-RD TERMINATED BY SFK-3      ⟩  ㊸
                                   ETC......
THE LAST CHARACTER OF EACH OF THE LAST 9 LINES SHOULD BE THE
CORRESPONDING SPECIAL FUNCTION KEY CODE (16,17,.....24)
THE LAST 9 LINES SHOULD GET VALIDATED WHEN THE SFK IS PRESSED


  6      CHARACTER LINE ENTERED 123456
( 49 50 51 52 53 54 )


  4      CHARACTER LINE ENTERED 222
( 50 50 50 16 )


  4      CHARACTER LINE ENTERED 333
( 51 51 51 17 )


  4      CHARACTER LINE ENTERED 444
( 52 52 52 18 )


  4      CHARACTER LINE ENTERED 555
( 53 53 53 19 )                                          ㊹


  4      CHARACTER LINE ENTERED 666
( 54 54 54 20 )


  4      CHARACTER LINE ENTERED 777
( 55 55 55 21 )


  4      CHARACTER LINE ENTERED 888
( 56 56 56 22 )


  4      CHARACTER LINE ENTERED 999
( 57 57 57 23 )


  4      CHARACTER LINE ENTERED 000
( 48 48 48 24 )

KEYS ARE BACK TO NORMAL MODE
INPUT A LINE COMPOSED OF ALL SPECIAL FUNCTION KEYS AND
TERMINATED BY ENTER
THE LINE SHOULD NOT GET ACCEPTED UNTIL THE ENTER KEY IS       ㊺
PRESSED. THE CODES OF THE SFK'S CODES SHOULD APPEAR IN
THE LINE PRINTED ON THE TERMINAL

  9      CHARACTER LINE ENTERED
( 16 17 18 19 20 21 22 23 24 )           ㊻

DISPLAY IS CLEARED AT END OF TEST    ㊼
```

Figure 5-12. Link Terminal Test Input/Output (Continued)

```
RUN WHICH TEST ?
     S - START
     P - PRINT        ⎫  48
     R - READ         ⎬
     C - CTL          ⎭
?C  49

WHICH CONTROL FUNCTION : 71,72,73_74 ?73  50

                           **DISPLAY TEST**        ⎫
                                                   ⎬  51
START OF C-73,C-74 FUNCTIONS (DISPLAY ECHO CONTROL) ⎭

DISPLAY WILL BE FIRST ECHOED OFF. A MESSAGE WILL BE  ⎫
SENT TO THE DEVICE 123456.78 E-90 BUT SHOULD NOT BE  ⎬  52
PRINTED ON THE DISPLAY                               ⎭


YOU SHOULD NOW INPUT ONE LINE BUT THE CHARACTERS  ⎫  53
SHOULD NOT GET ECHOED ON THE DISPLAY              ⎭

   11    CHARACTER LINE ENTERED 123456789.0  ⎫  54
( 49 50 51 52 53 54 55 56 57 46 48 )          ⎭

DISPLAY IS PUT BACK TO ECHO ON MODE. AN OUTPUT THEN  ⎫
AN INPUT OPERATIONS WILL BE ATTEMPTED. THIS TIME THE ⎬  55
DATA SHOULD GET PRINTED ON THE DEVICE'S DISPLAY      ⎭


   11    CHARACTER LINE ENTERED 9876543210.  ⎫  56
( 57 56 55 54 53 52 51 50 49 48 46 )          ⎭

DISPLAY WILL BE CLEARED AT END OF TEST  57




RUN WHICH TEST ?          ⎫
     S - START            ⎪
     P - PRINT            ⎬  58
     R - READ             ⎪
     C - CTL              ⎭
? return  59

DEVICE TO BE TESTED?  60
```

Figure 5-12. Link Terminal Test Input/Output (Continued)

5-14. HP 2000-TO-HP 2000 DATA COMMUNICATIONS FUNCTION TESTS. If HP 2000-to-HP 2000 Data Communications functions are configured into the system, the following functions can be validated through verification test routines:

- Job transmitter
- Job lister
- Job inquiry
- Job message

NOTE

No verification test is available for the job punch facility.

5-15. Job Transmitter Test. The job transmitter test evaluates the transmission of data between one HP 2000 Computer System and another such system. This test is executed on the sending (transmitting) system.

NOTE

To operate the job transmitter test successfully, you must simultaneously run the job lister function test (described in paragraph 5-15, below) on the receiving system.

a. The job transmitter test begins by displaying a message explaining that you can transmit the data discretely (one time only) or repetitively (figure 5-13. Item 1), followed by a prompt for the option you select (Item 2).

b. To select a single transmission, respond NO. To select repetitive transmission, enter YES. In either case, the data transmitted is a group consisting of all bit combinations possible mixed with all record-lengths possible. If you select repetitive transmission, terminate the test by pressing the BREAK key on the terminal. Any errors detected are reported on the receiving terminal and console.

c. When transmission is completed, the test routine displays the following prompt (Item 3):

TEST COMPLETED SUCCESSFULLY. REPEAT?

d. To repeat the test and return to the LOOPING TEST? prompt, enter YES.

To terminate the test, enter NO. In this case, VERITE again displays the DEVICE TO BE TESTED? prompt (Item 4).

```
DEVICE TO BE TESTED?JTØ
RECORD LENGTH (CR FOR DEFAULT)? return


YOU HAVE TWO OPTIONS IN RUNNING THIS TEST.  YOU MAY EITHER  ⎞
SELECT A ONE SHOT TEST OR CONTINUOUS LOOPING.  IF YOU SELECT ⎬ ①
CONTINUOUS LOOPING, PRESS BREAK TO TERMINATE                ⎠

LOOPING TEST?NO ②
TEST COMPLETED SUCCESSFULLY. REPEAT?NO ③

DEVICE TO BE TESTED?④
```

Figure 5-13.   Job Transmitter Function Test Input/output

5-16. Job Lister Test. The job lister test is the receiving
system's counterpart to the job transmitter test (paragraph
5-14).

NOTE

> To operate the job lister test, you must simulta-
> neously run the job transmitter test on the sending
> system.

a. The job lister test begins by displaying the following mes-
    sage, which it repeats every six seconds until data is
    actually received from the transmitting system (figure 5-14,
    Item 1).

    RECEIVED LINE- nnnn-
    NO INPUT RECEIVED FOR 6 SECONDS. INDICATES POSSIBLF ERROR

    (In this message, nnnn is a count of the lines received, ini-
    tially zero.)

b. When data is received, it is examined for proper format and
    content.   The data itself is not displayed. If no error is
    found, testing continues indefinitely and the count of lines
    received (nnnn) in the status message is incremented. But if
    any error is found, the test program displays:

    INVALID LINE RECEIVED. TEST ABORTED!
        or
    INVALID CTL CODE RECEIVED. TEST ABORTED!

    Then, the test program terminates and VERITE displays the
    DEVICE TO BE TESTED? prompt.

c. One pass, during which data is received from the transmitting
    system, is sufficient for the job lister test. To terminate
    the test, press the BREAK key. VERITE responds by displaying
    the DEVICE TO BE TESTED? prompt (Item 2).

```
DEVICE TO BE TESTED?JL1
RECORD LENGTH (CR FOR DEFAULT)? return

RECEIVED LINE-    0-
NO INPUT RECEIVED FOR 6 SECONDS.   INDICATES POSSIBLE ERROR ⎫①
RECEIVED LINE-    0-                                         ⎬
NO INPUT RECEIVED FOR 6 SECONDS.   INDICATES POSSIBLE ERROR ⎭
                •
                •
                •
                •
                •


DEVICE TO BE TESTED? ②
```

Figure 5-14.   Job Lister Function Test Input/output

5-17. Job Inquiry Test. This test validates the job inquiry
function. It is conducted as follows:

a.   The job inquiry test begins by printing an explanation of the
     operations it performs (figure 5-15, Item 1).

b.   The test next issues the following prompt (Item 2):

         AUTOMATIC SENDING?

c.   To automatically transmit a pre-determined sequence of mes-
     sages to the receiving system, enter YES (or Y); in response,
     the system will transmit these messages and skip to Step e
     below.   The messages contain all printable characters,
     written in records of varying length.

     To prepare to supply your own test message, enter NO (or N).
     The system then prompts you for this message (Item 3).

d.   Enter your test message (Item 4).

e.   The system prompts you to specify if you wish to again enter
     your own message (Item 5):

         AGAIN?

f.   To transmit the message again, enter YES; the test routine
     returns to Step d, allowing you to enter your next test mes-
     sage.

     To continue the test routine, enter NO.

5-37

g. The system next prompts you to specify whether you wish any
    further testing (Item 6):

        TEST AGAIN?

    To continue further testing and return to Step b, enter YES.

    To terminate testing, enter NO; the system displays the
    DEVICE TO BE TESTED prompt (Item 7).

h. The message is sent to the console of the receiving system.
    In addition, if the job message test (described in paragraph
    5-18, below) is being run on the receiving system, the mes-
    sage also appears on the device on which that test is being
    run. To verify the message reception, check the output on
    either the console or terminal.

```
DEVICE TO BE TESTED?JI0
RECORD LENGTH (CR FOR DEFAULT)? return


THIS PROGRAM TESTS THE JOB INQUIRY DEVICE BY SENDING EITHER  ⎫
A USER SUPPLIED MESSAGE TO ANOTHER SYSTEM OR BY SENDING A    ⎪
PRE-DETERMINED SEQUENCE OF MESSAGES TO ANOTHER SYSTEM.       ⎬ ①
YOU MUST USE THE DEVICE TESTING PROGRAM JM TEST TO VERIFY    ⎪
PROPER RECEIPT OF MESSAGES OR VERIFY THE MESSAGES AS TYPED   ⎪
ON THE SYSTEM CONSOLE.                                       ⎭

AUTOMATIC SENDING?N ②

ENTER YOUR MESSAGE: ③
HELLO TO THE OTHER HP 2000 SYSTEM ④
AGAIN?NO ⑤

TEST AGAIN?YES ⑥

AUTOMATIC SENDING?YES


TEST AGAIN?NO

DEVICE TO BE TESTED?⑦
```

Figure 5-15. Job Inquiry Function Test Input/output

5-18. **Job Message Test.** This test allows a user terminal on the system to receive input from the job inquiry test -- it is the receiving system's counterpart to the job inquiry test.

a. The job message test begins by printing an explanation of the function it performs (figure 5-16, Item 1).

b. The test then displays a warning message (Item 2), which it repeats every 20 seconds until a transmitted message is actually received. At that point, it displays the message received (Item 3). The test then resumes the warning message (Item 4) until another transmitted message is received.

c. To terminate the test, press the BREAK key on the terminal. The system responds by displaying the DEVICE TO BE TESTED? prompt (Item 5).

```
DEVICE TO BE TESTED? JM0
RECORD LENGTH (CR FOR DEFAULT)? return

THIS PROGRAM TESTS THE JOB MESSAGE DEVICE. ALL IT DOES
IS TO READ FROM THE JM DEVICE AND PRINT THE MESSAGE RECEIVED
AND ITS LENGTH.  IF NO MESSAGE IS RECEIVED IN 20 SECONDS IT      ① 
PRINTS A WARNING MESSAGE TO THAT EFFECT.  PRESS BREAK TO TERMINATE
THE TEST
NO RECEPTION FOR 20 SECONDS.  INDICATES POSSIBLE ERROR.      ②
NO RECEPTION FOR 20 SECONDS.  INDICATES POSSIBLE ERROR.
                    .
                    .
                    .
HELLO TO THE OTHER HP 2000 SYSTEM ③
NO RECEPTION FOR 20 SECONDS.  INDICATES POSSIBLE ERROR. ④
                    .
                    .
                    .
DEVICE TO BE TESTED? ⑤
```

Figure 5-16. Job Message Test Input/Output

5-19. **UTILITY TESTS**

The utility tests verify input/output operations on the HP 7905A disc drive. To prepare to run these tests:

a. Respond to the WHICH TEST? prompt by entering UTILITY (figure 5-17, Item 1).

b. The system next displays a list of the utility tests you can select (Item 2), followed by this prompt (Item 3):

WHICH UTILITY ?

c. Select one of the following utility tests listed and enter its name in response to the above prompt:

SPACE
DIRECTORY
DISC
PURGE

The system transfers control to this test.

d. When the test is complete, the system prompts you for the name of another utility test, by repeating the WHICH UTILITY? prompt. (To terminate utility testing, enter a carriage return in response to this prompt.)

NOTE

The utility tests should be performed only after nonsharable device operation has been verified through the device tests (paragraph 5-6).

If any utility tests detect an error, first try to correct the error, perhaps running a disc diagnostic test for assistance. If you cannot correct the error, call the Product Support Group at HP's General Systems Division. Charge any corrective action to the customer's 90-day warranty.

```
WHICH TEST ?UTILITY  ①

ENTER 'SPACE' TO FILL ALL DISC SPACE.
ENTER 'DIRECTORY' TO FILL DIRECTORY.          ②
ENTER 'DISC' TO FILL DIRECTORY AND DISC SPACE.
ENTER 'PURGE' TO PURGE TEMPORARY FILES.

WHICH UTILITY ? ③
         •
         •
         •
```

Figure 5-17. Utility Verification Test Selection Dialogue

5-20. SPACE TEST. The SPACE utility test routine verifies disc input/output by performing read and write operations on all free disc space available to the Z100 id-code or in the system (whichever amount is smaller).

NOTE

Because this test may require up to 20 minutes or more for completion, you may choose to bypass it during installation operations.

a. The test begins by continuously creating BASIC formatted files until all space available for them (under your id-code or in the system) is exhausted. Because this operation requires several minutes for completion, the test routine prints a status message (figure 5-18, Item 1) every three minutes.   When this operation is complete, the test routine prints one of the following messages (Item 2):

    ALL ACCOUNT DISC SPACE FILLED
         or
    ALL SYSTEM DISC SPACE FILLED

b. Next, the test routine writes a character string to each record in each file, reads the record, and checks the record against the string transmitted. Again, because this operation is time-consuming, the test routine prints a status message (Item 3) every three minutes.   Any errors found are reported on the system console and your terminal. If no errors are found, the file is purged.   If an error is detected, the file is saved so that you can determine its disc address later by using the system command DIRECTORY. This allows the blocks in error to be locked (using the MLOCK command) or checked against a disc diagnostic.

c. When all files created in step a have been checked as noted in step b, the system prompts you for the name of the next utility test (Item 4).

```
WHICH UTILITY ?SPACE

RECORDS  CLAIMED = 0      OF MAXIMUM 64727.   MIN = 41  HOUR = 10  ⎫
RECORDS  CLAIMED = 0      OF MAXIMUM 64727.   MIN = 44  HOUR = 10  ⎪
RECORDS  CLAIMED = 0      OF MAXIMUM 64727.   MIN = 47  HOUR = 10  ⎬ ①
RECORDS  CLAIMED = 0      OF MAXIMUM 64727.   MIN = 50  HOUR = 10  ⎪
RECORDS  CLAIMED = 0      OF MAXIMUM 64727.   MIN = 53  HOUR = 10  ⎭
ALL ACCOUNT DISC SPACE FILLED. ⟵──②
RECORDS TESTED  = 804    OF REQUIRED 32767   MIN = 56  HOUR = 10  ⎫
RECORDS TESTED  = 3137   OF REQUIRED 32767   MIN = 59  HOUR = 10  ⎪
RECORDS TESTED  = 5469   OF REQUIRED 32767   MIN = 2   HOUR = 11  ⎬ ③
RECORDS TESTED  = 7802   OF REQUIRED 32767   MIN = 5   HOUR = 11  ⎪
RECORDS TESTED  = 10000  OF REQUIRED 32767   MIN = 7   HOUR = 11  ⎭

WHICH UTILITY ? ④
```

Figure 5-18. SPACE Utility Test Input/output

5-21. DIRECTORY TEST. The DIRECTORY utility test routine veri-fies the operation of seldom-used system code by filling the entire system file directory with data.

NOTE

Because this test may require up to 45 minutes or more for completion, you may choose to bypass it during installation operations.

a. The test routine begins by purging any entries already in the system directory, and then filling the directory until either the directory is full or 9999 entries are created for it. As this operation continues, the routine prints the number of entries purged and the number filled in increments of 25 entries (figure 5-19, Items 1 and 2).

b. The test routine next purges all entries created in Step a, above, again displaying the total number deleted in increments of 25 entries (Item 3).

c. When the last entry is purged, the system prompts you for the name of the next utility test (Item 4).

```
WHICH UTILITY ?DIRECTORY
PURGE
  25 ←—①
CREATE
  25    50     75    100   125    150    175   200    225    250    275    300 ⎞
  325   350    375   400   425    450    475   500    525    550    575    600 ⎟
  625   650    675   700   725    750    775   800    825    850    875    900 ⎟
  925   950    975   1000      1025      1050      1075      1100      1125    ⎟
  1150       1175    1200      1225      1250      1275      1300      1325    ⎟
  1350       1375    1400      1425      1450      1475      1500      1525    ⎟
  1550       1575    1600      1625      1650      1675      1700      1725    ⎟
                            •                                                  ⎟
                            •                                                  ⎬ ②
                            •                                                  ⎟
                            •                                                  ⎟
  9350       9375    9400      9425      9450      9475      9500      9525    ⎟
  9550       9575    9600      9625      9650      9675      9700      9725    ⎟
  9750       9775    9800      9825      9850      9875      9900      9925    ⎟
  9950       9975    FINISHED CREATING 9999 ENTRIES                           ⎠

PURGE
  25    50     75    100   125    150    175   200    225    250    275    300 ⎞
  325   350    375   400   425    450    475   500    525    550    575    600 ⎟
  625   650    675   700   725    750    775   800    825    850    875    900 ⎟
  925   950    975   1000      1025      1050      1075      1100      1125    ⎟
  1150       1175    1200      1225      1250      1275      1300      1325    ⎟
  1350       1375    1400      1425      1450      1475      1500      1525    ⎟
  1550       1575    1600      1625      1650      1675      1700      1725    ⎟
  1750       1775    1800      1825      1850      1875      1900      1925    ⎟
  1950       1975    2000      2025      2050      2075      2100      2125    ⎬ ③
                            •                                                  ⎟
                            •                                                  ⎟
                            •                                                  ⎟
  9150       9175    9200      9225      9250      9275      9300      9325    ⎟
  9350       9375    9400      9425      9450      9475      9500      9525    ⎟
  9550       9575    9600      9625      9650      9675      9700      9725    ⎟
  9750       9775    9800      9825      9850      9875      9900      9925    ⎟
  9950       9975                                                             ⎠

WHICH UTILITY ? ④
```

Figure 5-19. DIRECTORY Utility Test Input/output

5-22. DISC TEST. The DISC utility test routine performs both the SPACE and DIRECTORY utility tests. This routine allows you to request both tests with a single command, DISC, entered in response to the WHICH UTILITY? prompt. The printed output is the same as that shown for SPACE and DIRECTORY.

NOTE

You might wish to request the DISC routine when you plan to be gone from the installation site for an hour or more. This would allow SPACE to run to completion and DIRECTORY to be nearly completed during your absence.

5-23. PURGE TEST. The PURGE utility test routine deletes all temporary files created under your log-on id-code by the various verification tests. You should always conduct this test after each successful operation of the disc utility tests; if any files are found to purge after these tests, this indicates that one or more of these tests malfunctioned.

NOTE

Do NOT execute the PURGE utility test routine while any other verification test is being conducted, because this will cause the other test to malfunction.

a. The PURGE test begins by prompting you for the port for which the files are to be deleted:

PURGE FILES FOR WHICH PORT?

Respond by entering THIS to purge the files created on your log-on terminal, a particular port number to purge all files created on the corresponding terminal, or ALL to purge all files created on all terminals (figure 5-20, Item 1).

b. The test routine now purges the files, and reports at your terminal the number of files actually deleted (Item 2).

c. Finally, the test routine prompts you for another port (Item 3). (To halt further purging, enter a carriage return; the system then prompts you for the name of a new UTILITY test (Item 4).)

```
WHICH UTILITY ?PURGE
PURGE FILES FOR WHICH PORT ? ALL  (1)
NUMBER OF FILES PURGED = 0 (2)


PURGE FILES FOR WHICH PORT ? return  (3)

ENTER 'SPACE' TO FILL ALL DISC SPACE.
ENTER 'DIRECTORY' TO FILL DIRECTORY.
ENTER 'DISC' TO FILL DIRECTORY AND DISC SPACE.
ENTER 'PURGE' TO PURGE TEMPORARY FILES.

WHICH UTILITY ?  (4)
```

Figure 5-20. PURGE Utility Test Input/output

After you have installed the system and verified its operation for the customer, you should formally complete the installation activities by:

- Filling out and transmitting required forms and reports.

- Training the customer's system operator in the activities required for day-to-day system operation.

- Informing the customer how to obtain other support services that will help ensure his continuing success with the system.

6-1. FILLING OUT FORMS AND REPORTS

As soon as verification testing is complete, you should prepare and submit the following paperwork:

a. Customer Acceptance Form. This form verifies that the customer is satisfied with the installation and now accepts responsibility for operating the system (under provisions of the warranty). This form is included in the System Support Log (part no. 02000-90088), and replaces the previously-required Installation Report. Have the customer sign all four copies of this form. Then distribute each copy as directed on the back of the form.

b. Software Maintenance Agreement. This form provides for continued software maintenance by HP and places the customer's name and address in HP's data-base for software updates. It also includes the 90-day warranty statement. The form is obtained from your office. Have the customer sign both copies. Leave one copy with him, and send the original to:

> Manager, Software Support Services
> Hewlett-Packard Company
> Data Systems Division
> 11000 Wolfe Road
> Cupertino, California 95014

c. Computer Systems Communicator Order Form. This form requests for the customer a subscription to the Computer Systems Communicator, if he contracts for it. The Communicator is a monthly magazine published by HP that contains articles about new products, descriptions of updates to existing software,

application hints, new documentation, the latest schedule of training courses, and other important information. The Order Form is available from your office. Send it to:

> Subscription Service Manager
> Hewlett-Packard Company
> Mail Order Department
> P.O. Drawer #20
> Mountain View, California 94043

d. Installation Status Report. This is an informal TWX that you must prepare and transmit as soon as possible to let HP know that the system has been installed. In this TWX, be sure to state the customer's name and address, the servicing office from which you operate, the name of the Customer Engineer who will be responsible for servicing this account (typically yourself), and the configuration installed. Send the TWX to:

> HP 2000 Series Computer Systems
> Product Support Group
> Hewlett-Packard Company
> General Systems Division
> 5303 Stevens Creek Boulevard
> Santa Clara, California 95050

6-2. TRAINING THE SYSTEM OPERATOR

When you turn the new system over to the customer, the person (or persons) who assumes responsibility for monitoring and controlling the day-to-day operation of the system is the customer's System Operator. At this point, you must show this person how to operate the system. Using the HP 2000 Series Computer System Operator's Manual (part no. 22687-90005) as a guide, be sure to explain how to:

- Generate, update, start-up, and shut-down the system (Operator's Manual, Section IV).

- Use all operator commands (Section III).

- Maintain a reliable system back-up (Section VII).

- Monitor and control device allocation (Sections I, III, and VI).

- Operate non-sharable devices (Sections I and II).

- Maintain complete system and user activity records (Section VII).

- Perform error-recovery procedures (Section V).

- Respond to user requests (Section II).

6-3. EXPLAINING SUPPORT SERVICES

Before you leave the installation site, you should tell the customer how to quickly and effectively obtain other HP support services that will help ensure his continued success with the system. These services are discussed below.

6-4. BASIC MONTHLY MAINTENANCE CONTRACT (BMMC)

Make certain that the customer understands the provisions of the Basic Monthly Maintenance Contract (BMMC), and the services it provides. Also, ensure that he understands what it does NOT provide.

6-5. WARRANTY

Go over the major points of HP's 90-day warranty with the customer, stressing the items for which HP will provide full protection against damage or malfunction.

6-6. TRAINING COURSES

Describe the current training course for the HP 2000 Series Computer System which covers areas such as BASIC programming and RJE communication. Point out that the current availability of this course is listed each month in the Communicator.

6-7. SUPPORT PERSONNEL

Explain to the customer the relationship between himself, yourself, and other HP support personnel. Describe the functions of these persons:

● Customer Engineer (CE). As the CE, you should be the first person the customer contacts if a system failure occurs. You can run the diagnostic tests necessary for isolating hardware problems and, in many cases, correct these problems.

● Product Specialist (PS). If you cannot resolve a problem for a customer, you may call in an PS who will use additional diagnostic tests and analyze memory dumps extensively to correct the problem. The PS is knowledgeable in the internal operating philosophies of the HP 2000 Operating System and the data communications facilities, and can analyze both hardware and software problems.

• <u>System Engineer (SE)</u>. If the customer requires either general or specialized training in the externals of the system -- languages, subsystems, and data communication -- he may receive this from the SE. This person is knowledgeable in the areas of products such as BASIC/2000, TSP/2000, FCOPY/2000, EDITOR/2000, and SDE/2000. (In addition to customer training, the SE may also help support certain sales activities.)

6-8. REPORTING PROBLEMS

Whenever a system failure occurs, tell the customer to do the following:

a. Fill out the <u>Cold Dump Report</u> as directed in Section V of <u>HP 2000 Series Computer System Operator's Manual</u> (part no. 22687-90005). <u>Follow all directions carefully.</u> This report describes conditions present when the failure occurred.

b. Create a cold-load dump tape, as directed in Section V of the Operator's Manual. This tape preserves data useful in the off-line analysis of the failure.

c. Try to correct the failure through the use of diagnostic tests, warmstart, salvage dump, or other techniques discussed in the Operator's Manual.

d. If he cannot correct the failure and restart the system, to call you (or another CE) and provide the dump tape, <u>Cold Dump Report</u>, and any other pertinent items such as the console log or the Input/Output Processor Memory Map.

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