Operating
The HP 250

HP 250

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Manual Part No. 45260-90002 E1281

Printing History

New editions of this manual will incorporate all material
updated since the previous edition. Update packages may be
issued between editions and contain replacement and additional
pages to be merged into the manual by the user. Each updated
page will be indicated by a revised date at the bottom of the
page. A vertical bar in the margin indicates the changes on each
page. Note that pages which are rearranged due to changes on a
previous page are not considered revised.

The manual printing date and part number indicate its current
edition. The printing date changes when a new edition is
printed. (Minor corrections and updates which are incorporated
at reprint do not cause the date to change.) The manual part
number changes when extensive technical changes are incorporated.

<div align="center">

November 1981 ... FIRST EDITION

January 1982...revised pages for ii through
vii, 2-1, 2-3, 2-6, 5-1, 5-5,
5-13, 6-2, C-1, C-2

</div>

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System Overview

Welcome to the HP 250 Office Computer System. The HP 250 is an easy-to-operate business computer that allows you to enter, process, and access information, and output reports in the form of hard-copy print or on a display screen.

The HP 250 Office Computer can be used in a variety of environments, from small single-user configurations to larger systems capable of processing several tasks. From any starting configuration, the system can be expanded to meet growing business needs.

To allow for this flexibility, the HP 250 has been designed as a series of components. Each system consists of four major components: the central processing unit, the workstation, the mass storage device(s), and the printer(s). The central processing unit is the "brain" of your system. You talk to it via the keyboard of your workstation, which resembles an office typewriter. The display, a television-like screen, is useful for viewing input data and for filling forms. The mass storage devices are used for storing and accessing information and programs. The actual storage medium may be a disc or a tape cartridge. The printer is used to produce hard-copy reports which contain the information required in the day-to-day operation of your business.
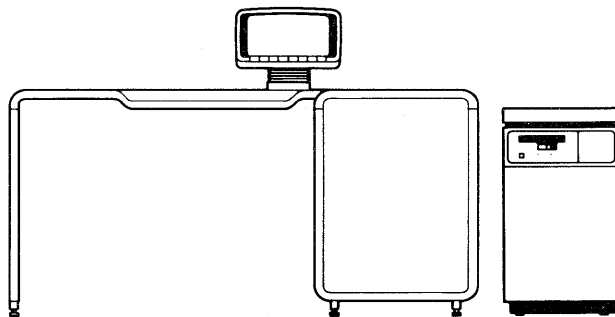
HP 250/35   **HP 250/30**
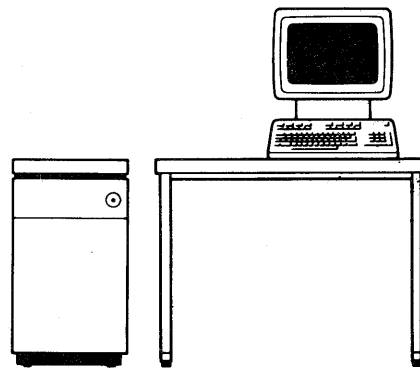
It is important that you are able to recognize all of the compo-
nents of your system and understand their functions. This guide
describes all possible components and configurations of the HP
250. Do not be alarmed if you see a picture of a component in
this book which you cannot identify as part of your system.

The following are drawings of all the possible components of your
system. Learn the names of those components which make up your
particular configuration. Then, if you need information about a
specific component, turn to either the Table of Contents or the
Index of this manual.
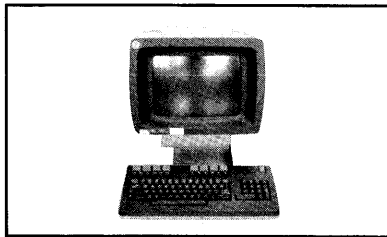
HP 2622D Personal Workstation
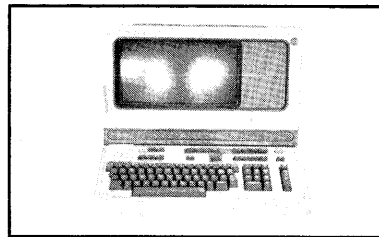
HP 2649D Remote Workstation
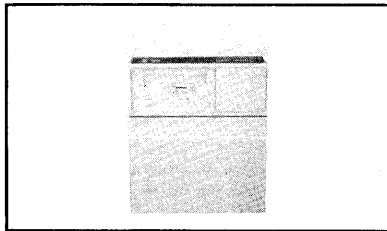
HP 7908P Integrated Storage Product
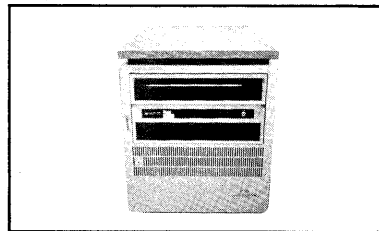
HP 7906 Disc Drive
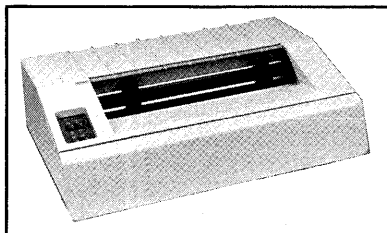
HP 2631A Line Printer
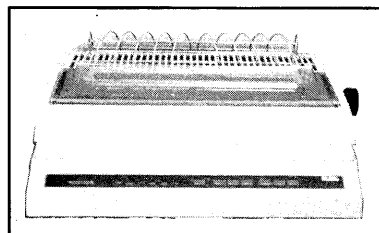
HP 2601 Line Printer
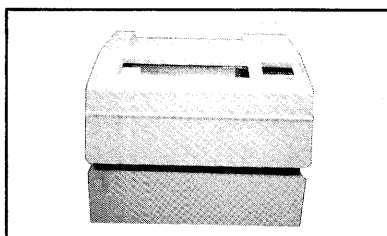
HP 2608 Line Printer
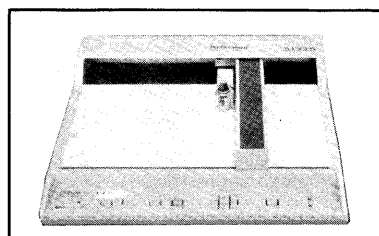
HP Plotter

This manual is organized to be read sequentially. Chapters 2
through 4 contain the background information necessary to turn
the system on, understand your workstation keyboard and its fea-
tures, and interact with the computer.

Chapters 5, 6, and 7 get you acquainted with the different types
of storage devices, storage media, printers, and graphics devices
that may be part of your HP 250; it is important that you recog-
nize the relationships between the components of the system.

Once you understand the different components of your HP 250 sys-
tem, proceed to Chapter 8. There you will find several HP 250
BASIC Commands that will be useful in the day-to-day operation of
your system.

Chapter 9 and 10 describe typical maintenance procedures and what
to do if you encounter a problem with the system.

The appendices provide reference material that you may find occa-
sionally helpful (such as error messages). Words printed in bold
type throughout the manual appear in the Glossary (Appendix A).

As stated before, you may find that some of the material in this
manual is not applicable to your particular configuration or your
daily task. We do recommend, however, that you hold onto this
information for future reference. You may someday add a printer,
workstation, or mass storage device to your system. Additional-
ly, your daily responsibilities may not require some of the mate-
rial presented here, but you should take the time to read it any-
way; that way you will know where to find the answer to a ques-
tion that may come up.

Even though various HP 250 configurations look physically differ-
ent, you will have no problem operating your system once you rec-
ognize and understand the different components.

Finally, you should remember that this guide is not a programming
manual. The information presented here is what you need to oper-
ate your HP 250 system. If you need programming information, you
should consult the appropriate manual, which is included in the
HP 250 Programming Manual Kit.

CHAPTER 2

System Start-up

After a Hewlett-Packard Customer Engineer has installed your HP 250 system, it is ready to operate.

Starting up (or loading) your system can be compared to starting an automobile. Your car must have fuel in it before you can successfully start it by turning the ignition key. In the same way, your HP 250 must have a version of the system software available. This system software may be stored on a fixed disc or on a removable medium such as a tape cartridge or flexible disc. It is the "fuel" required to start your system.

Once you have successfully started your system up, turn it off only when you are sure that no other **task** will be affected. For example, you may have completed your work and are now ready to leave the office for the day. If you shut any part of the system down (including a disc drive), you can affect work being done by another person.

Loading From an Integrated Storage Unit

An Integrated Storage Unit consists of two different storage devices - a cartridge tape drive and a disc (HP 7908, 7911, or 7912). When your system first arrives, you can start it from a tape cartridge only. Once you have successfully started the system using a tape, you can then run the ROUTIL Utility Program to copy all files on a tape over to the disc; doing this allows you to start your system from either a tape cartridge or the disc. See the HP 250 System Utilities Manual (45260-90061) for information on the ROUTIL Utility Program.

Loading from the Cartridge Tape Drive

The following is the procedure for loading your HP 250 system from the cartridge tape drive.

1. Turn the Integrated Storage Unit power switch to the ON position.

2. Insert the tape cartridge labeled SYSTEM into the drive,
    label side up.
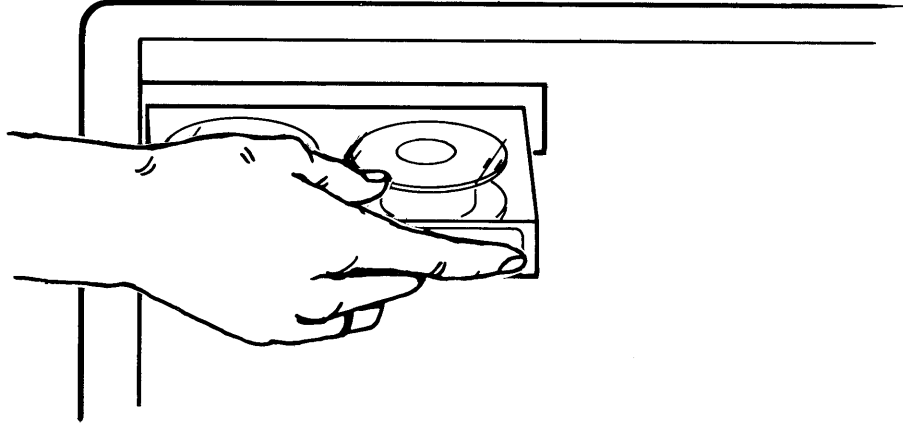
3. Insert the key into the processing unit and turn it clockwise
    to position 1 (see drawing below). The drive door is locked
    automatically during loading. If the BUSY light (indicating
    that the drive is in use) never comes on, it may mean that
    the tape cartridge was inserted improperly. Push the lever,
    remove the tape, re-insert it and then turn the key again.
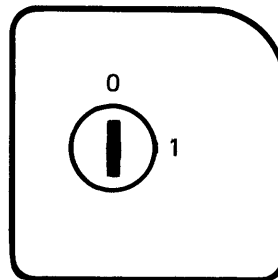
4. A system self-test is performed automatically when the power
    is turned on. As the test is performed, a listing of system
    components is shown on the display of the principal
    workstation (see glossary in back). If any component fails,
    the system is not operable. If this occurs, consult the
    chapter titled "In Case of Difficulty".

5. If no problem occurs, a message in the form:

                      SYSTEM LOADING

    followed by:

                      LOADING DROMS

    is shown. The message remains on the screen for about 30
    seconds. When the loading process is complete, a blinking
    underscore, known as the cursor, is displayed.

If the message:

                 The "SYSTEM" file was not found

appears on the screen while loading the tape either you did not
insert the cartridge properly or the tape you used did not have
the system software on it. You should turn the key to the off
position (0), ensure that the tape cartridge in the drive is lab-
eled SYSTEM, and then repeat the loading procedure.

When the system has been properly loaded, you may remove the tape
cartridge labeled SYSTEM from the drive. Press the UNLOAD key on
the drive. The BUSY light will flash. When the tape cartridge
is ready to be removed, a buzzer sounds. Pull the lever gently
to the right and remove the cartridge from the drive.

If the result of the self-test is an error message or the system
failed to power on, consult the section titled "In Case of
Difficulty".

Loading from the HP 7908, 7911, or 7912 Disc

After the operating system has been copied to an HP 7908, 7911,
or 7912 disc, you can start your HP 250 directly from the disc.

1. Turn the power switch of the Integrated Storage Product to
    the ON (1) position. Ensure that no storage medium labeled
    SYSTEM is in any other drive.

2. Insert the key of the HP 250 into the lock and turn it clock-
    wise to position 1.

3. A system self-test is automatically performed when you turn
    the power on. As the test is performed, a list of system
    components is displayed. If any component fails, the system
    is not operable; consult the chapter "In Case of Difficulty"
    if this occurs.

If no problem occurs, a message in the form:

SYSTEM LOADING

followed by:

LOADING DROMS

is shown. The message remains on the screen for about ten seconds. A blinking underscore, known as the cursor, appears on the display to indicate completion of the loading process.

Loading from a Flexible Disc Drive

The following is the procedure for loading your HP 250 system from the flexible disc drive.

1. Open the drive door by pressing the small bar on the drive. Insert the disc labeled SYSTEM into the drive until the disc clicks into place. Pull the drive door down so that it latches.

2. Insert the key and turn it clockwise to position 1. The drive door is locked automatically during loading. If the light indicating that the drive is in use never comes on, it may mean that the disc was inserted improperly. Open the drive door and remove the disc; retry the procedure.

3. A system self-test is automatically performed when the power
    is turned on. As the test is performed, a listing of system
    components is shown on the display of the principal work-
    station. If any component fails, the system is not operable.
    If this occurs, consult the section titled "In Case of
    Difficulty" in this manual.

    If no problem occurs, a message in the form of:

                          SYSTEM LOADING

    followed by:

                          LOADING DROMS

    is shown. The message remains on the screen for about 30
    seconds. The cursor, a blinking underscore, appears on the
    display to indicate completion of the loading process.

    If the message:

            The "SYSTEM" file was not found.

    appears on the screen during loading, the operating system
    disc was not inserted into a drive or was inserted improp-
    erly. You should turn the key to the off position, insert
    the disc, and restart the loading procedure.

When the operating system is loaded, you may remove the flexible
disc marked SYSTEM from the drive. You can now load another disc
that may contain data or programs. See the section on "System
Commands" that appears later in this manual.

If the result of the self-test is an error message or the system
failed to power on, consult the section titled "In Case of
Difficulty".

Loading from a HP 7906 Disc Drive

Follow this procedure to load the HP 250 Operating System from a HP 7906 removable cartridge.

1. If you have not already done so, open the drive door and mount the removable disc cartridge containing the system software into the HP 7906 drive.

2. Flip the HP 7906 STOP/RUN switch to the STOP position and then back to the RUN position.

3. Wait for the "DRIVE READY" indicator to light on the front panel of the HP 7906.

4. Insert the key into the lock located on your HP 250 system. Turn the key clockwise to positiom 1 to power on the HP 250. After the initial self-test is performed, the screen is cleared for approximately 20 seconds. When the loading process is completed, the cursor, a blinking underscore, is displayed.

If the message "System File Not Found." is displayed, you must repeat the system loading procedure from the beginning.

Using a 5 Mb. Disc Drive

Your 5 Mb. Disc drive is used to store files that you create. You cannot keep a copy of the operating system on this disc; load the system from your flexible disc drive.

The 5 Mb. Disc is powered on when you power on the HP 250. Therefore, when you load the operating system by following the instructions "Loading a Flexible Disc Drive" (in this chapter), you will also power-on your 5 Mb. Disc drive.

Workstations

The **Central Processing Unit** (CPU) of the computer controls all other components of the system. It holds the operating system of the HP250, which is software associated with the computer and its processing capabilities. It also has at least 32K bytes of memory available to you for programs and data; user memory, capable of processing six tasks simultaneously, may be expanded to 384K bytes by additional memory options. The activity within the CPU is invisible to you.

CPU
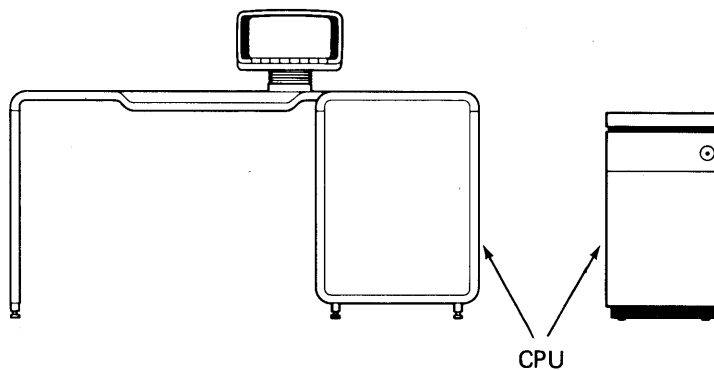
Your workstation, a combination of a keyboard and video display, is your path to the CPU. This chapter is divided into three sections, each of which describes one of the three possible HP 250 workstations. Based on the drawings below, turn to the appropriate section to learn about your workstation.

HP 2622D
Personal Workstation
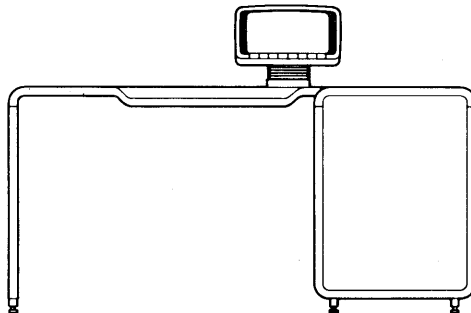
HP 250/35
Integrated Workstation

HP 2649D
Remote Workstation

The HP 2622D Personal Workstation

Display

The display is used to view program listings, information entered
from the keyboard, and program output. The display memory can
store more characters than shown on the screen at one time. The
screen holds one page which consists of 24 lines of up to 80
characters each. If the display has been filled, the top line
rolls off the screen. As you type a line, the display will roll
up to make room for a new line. When viewing display lines, you
may access lines preceding or following those currently on the
screen by pressing the display editing keys [↑]   and [↓]   .
The illustration shows the scrolling process.

When your HP 250 is ready for operation, the cursor is visible on
the screen.

The capabilities of the display are numerous. For example,
characters may appear on the screen as half-bright, underlined,
blinking, or inverse video (or any combination). These features
can be accessed either from the keyboard or programmatically.
Accessing these display enhancement features is described later
in this section.

Thermal Printer (Optional)

As an option, the HP 2622D workstation can have an integral thermal printer to produce a hard copy of information. Generally speaking, it has two printing capabilities:

1) Display of screen contents - the printer can print the entire contents of what you see at any given time on the display. To learn how to do this, consult the section under "Printing a Screen Image on the Thermal Printer" in this chapter.

2) Display of all interactions with the system - the printer can record any or all interaction with the system such as file catalogs, transactions, and even program results. To learn how to do this, read the section titled "Output Commands" in Chapter 8.

For general information on the thermal printer (such as how to load paper), turn to Chapter 6.

Keyboard

The keyboard resembles a typewriter keyboard and is used to communicate with the computer. The keyboard consists of a typewriter block, a data entry pad, display editing keys, an execute key, a halt key, 3 remote keys, and 8 function keys. All of these keys are described in this section.

Typewriter Block

The typewriter block is used to input data or program lines. The
alphabetic keys normally enter lower case characters. Use the
shift key with the alphabetic keys to enter upper case
characters. When you depress the CAPS-LOCK key, only
alphabetical keys are shifted to upper case.

Typewriter Block

Several special control keys are located on the left and right
sides of the keyboard block.

The SHIFT key enters upper case characters.

The CAPS-LOCK key locks only alphabetic keys to upper
case characters. In order to access the shifted key
characters on non-alphabetic keys, you must press the
SHIFT key. For example, if you want to enter the $ sign
while the CAPS-LOCK key is depressed, you must press
.

The BACKSPACE key is used to move the display cursor
toward the left margin.

The CARRIAGE RETURN key moves the cursor to the beginning
of the next line. When SHIFT is pressed, the cursor
is moved to the beginning of the present line of input.

The ENTER key enters data into memory. It also executes
the current command.

The SET TAB key allows you to set tabs and also clear
them. You move the cursor to the desired position on the
line and then press this key to set the tab. In order to
delete any tab that you have set, move the cursor to the
tab position, and press SHIFT .

The TAB key moves the cursor to the first character position of the next input field or tabbed position. If you press SHIFT [⏎] , the cursor will be moved to the first character of the previous input field or to the previous tabbed position.

The CONTROL key is used to access special characters and commands as shown throughout this chapter.

The CYCLE key is used to access all 24 user-defined softkeys. This key is discussed in the section on softkeys, which appears later in this chapter.

Data Entry Pad

Use this block of keys, located on the far right side of the keyboard to input numeric data rapidly.
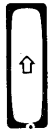
Another ENTER key is conveniently placed on the side of the data entry pad.

Above the ENTER key of the data entry pad is the MINUS key. The MINUS key usually enters a negative sign when pressed. For example, if you perform this series of keystrokes: [−][5][⇧]   then you have entered

-5. The MINUS key can also be configured to serve as an additional TAB key; see "Setting the HP 2622D Configuration".

Data Entry Pad

Display Editing Keys

These keys are used for modifying input and positioning the cursor at specific locations on the screen. Each of the keys is rapidly repeated by holding it down.

The CLEAR key clears the current line or field. If you press CONTROL CLEAR, only the characters from the present cursor position to the end of the current line are cleared from the display. If SHIFT CLEAR is pressed, all input fields are cleared from the cursor's present position to the end of the display storage area (which includes all lines below that are not currently displayed). If you press CONTROL SHIFT CLEAR, the entire display storage area is cleared (including all lines not currently displayed on the screen).

The DELETE key is used to delete the current character position of the cursor. If you press SHIFT DELETE, the entire current line is deleted from the display. Note that the current line can take up more than one row of the display screen.

The INSERT key allows you to insert characters to the left of the cursor. Press this key to enter the insert mode. You can now type in the characters you wish to insert. To exit from the insert mode, either press the INSERT key again or move the cursor from its current line (pressing the ENTER or EXECUTE key also exits you from insert mode since the cursor is automatically moved from the current line). You can tell if you are in insert mode by looking at the Status Display which is described on page 3-13. If you press SHIFT INSERT, a blank line is inserted preceding the current line; the cursor then appears at the first position of the new line.

These keys move the position to the left or right. If you hold them down, the cursor will move rapidly. The cursor wraps around to the next line if a margin is encountered. For example:

↑

↓

These keys move the cursor up or down one line from the current position on the display. Pressing SHIFT [↑] and SHIFT [↓] moves the cursor to the previous and next display page respectively. The sketch on page 3-2 describes this movement up or down, called **scrolling**.

↖

The HOME key moves the cursor to the upper left of the display. When SHIFT HOME is pressed, the cursor is moved to the first character of the display storage area, which may be on a previous display page.

Execute Key

◻

This key executes the current line or expression in the display. For example, if you typed in the following sequence:

8+22-7*11

then the value of the line is computed and output on the display.

Halt Key

◻

This key halts a program at the end of a current operation. Unless overridden by the program, pressing the HALT key stops the program, and the next program line to be executed is displayed. Pressing the HALT key is not a normal way to stop a program, and may require reloading the program to resume operation.

You should note that if you are sending output to an HP 2601 printer, it may continue to print for a period of time even though you pressed the HALT key.

Press SHIFT HALT to stop the current program from executing and all Input/Output operations.

Press CONTROL HALT to abort all operations and clear the user work area.

IMPORTANT
You should use the HALT key with discretion. Data may be lost by halting a program.

Remote Keys

The remote keys, labeled RESUME, [MODEM] , and TEST, are located in the upper left hand corner of the keyboard.

[RESUME] The RESUME key allows you to request a total update of display information in the event of a data communication or other error that would cause the workstation to display incorrect data. When you press this key, the display storage area is erased and the remote workstation display is rewritten under the control of the HP 250 system.

```
                         NOTE
    Pressing RESUME while data is being
    sent to a remote printer results in
    a loss of the data.
```

[TEST] The TEST key initiates several diagnostic tests to verify the workstation's operation. The self-test is performed on a local basis; in other words, the test is performed even if the remote workstation is not connected to the HP 250. These diagnostic tests are described later in this section under the heading "Testing the HP 2622D"

[MODEM] The MODEM key is a local key that is significant when you are linked to the HP 250 system via a modem. It can be set as either active or inactive in the terminal configuration (see "Setting the HP 2622D Configuration"). When configured as active, pressing this key disconnects the modem; pressing it again connects the modem. You can see the status of this key by accessing the Status Display, as described on page 3-12.

Softkeys

There are eight softkeys located on the top portion of the keyboard.

You will most likely use these keys in conjunction with an application software program, a utility program (such as initializing media), or as typing aids; these are known as user-defined softkeys.

The HP 250 system also has its own defined softkeys which can be used to set the terminal configuration, display status information, display all softkey labels, and access alternate character sets (line drawing, display mode, and display enhancements).

User-Defined Keys

Each of the 8 keys can be defined 3 ways. In other words, it is possible to have 24 user-defined softkeys at any one time. These softkeys are appropriately numbered 1 through 24. The corresponding softkey labels appear on the screen when the keys are defined. Pressing a key activates a predefined program or routine that is stored in the computer's memory.

If you are running a program which has 24 softkeys defined, only 8 of the keys are available at any given time. In other words, you will see the definitions of either softkeys 1-8, 9-16, or 17-24 at any one time. To activate the next set of softkeys and display the corresponding labels, press the CYCLE key located on the lower left hand side of the typewriter block.

Below is an example of softkey labels on the display screen.
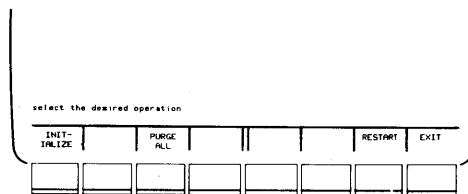
To learn more about using softkeys as typing aids, you should look at the appendix titled "Using Softkeys as Typing Aids".

System Defined Keys

You can access several special functions defined by the system by pressing softkeys simultaneously with either the SHIFT or CONTROL keys. These are known as the Control Function Key Set and the Shift Function Key Set.

Shift Function Keys

The shift function key set contains system-defined keys which you can use to configure your workstation, display the screen contents to the optional thermal printer, show a status display, and display all softkey labels.

Setting 2622D Configuration

You configure the 2622D workstation by pressing:

SHIFT and f1

and then selecting the options by using softkeys. The following screen appears:

```
              WORKSTATION CONFIGURATION


         Baud Rate  ░░░░░░       Frame Rate  ░░░░░░


         Minus Key  ░░░░░░       Modem Key   ░░░░░░


                  Chars/Line  ░░░░░







 ┌──────┬──────┬────────┬────────┬┬──────┬──────┬──────┬──────┐
 │ SAVE │ NEXT │PREVIOUS│DEFAULT ││      │      │      │      │
 │CONFIG│CHOICE│ CHOICE │VALUES  ││      │      │      │      │
```

To change the option for any setting, use the TAB key to position
the cursor within the field you wish to change, and then use the
softkeys labeled NEXT CHOICE and PREVIOUS CHOICE to select the
proper values. The DEFAULT VALUES softkey sets the options to
system-defined values. When you have all values exactly as you
want them, press the SAVE CONFIG softkey to record your new
configuration and exit.

Printing a Screen Image to Thermal Printer

If your workstation has a thermal printer, you can print the
contents of the display screen on the thermal printer
by pressing:

<div align="center">

SHIFT and F4

</div>

Remember that you can specify the character width to be printed
when setting the configuration of the workstation.

A sample screen image is shown below.

```
CAT ":0"
NAME    PRO    TYPE    REC/FILE    BYTES/REC    ADDRESS
:02,7,0
SYSTEM   *     SYST      600         256         1260
EUROPE         DROM        4         256         1860
PACK           DRCM        7         256         1864
IMAGE          DROM       72         256         1871
SORT           DRCM       29         256         1943
REPORT         DROM       30         256         1972
FORMS          DRCM        6         256         2002
EUR71          DROM        3         256         2008
RIO            DROM       19         256         2011
TIO            DROM       23         256         2030
TRACE          CRCM        9         256         2053
P2608          DROM        7         256         2062
TRIG           DROM        7         256         2069
MATRIX         DROM       22         256         2076
SPOOL          DROM       11         256         2098
CS250          DRCM       55         256         2109
MEDIA          DROM       42         256         2164
IMAGE2         DRCM       14         256         2206
TASK           DRCM        8         256         2220
COPY           DROM        4         256         2228
IMAGEU         DRCM       15         256         2232
```

The Status Display

By pressing SHIFT f5, you can display the following information:

1. Softkey Set Status
2. Modem Status
3. Insert Character Status

The last two lines of the screen are reserved for the status display. Regardless of the setting of the status display, you have 24 lines of the screen available when softkey labels are off; when softkey labels are on, you have 21 lines available.

To remove the status display from the screen, press SHIFT f5 again.

Softkey Set Status

You can see which user-defined softkey status is active at any given time. The sets are defined as Set 1 (Keys 1-8), Set 2 (9-16), and Set 3 (17-24). When you press the CYCLE key, this value automatically changes to reflect the new set of active keys.

Modem Status

The modem status is only meaningful when your workstation is connected via a modem. The status is defined as either "MODEM ON" or "MODEM OFF" depending on your use of the MODEM key (the MODEM key is defined in the section on Remote Keys).

Insert Character Status

You can tell whether or not you are in insert mode by looking at the information displayed in the lower right hand corner of the Stat us Display. When you press the INSERT key, the information on the display changes from OFF to ON or vice versa.

Displaying All Softkey Labels

To display all user-defined and system-defined softkeys at one time press:

SHIFT and f8

The display appears as shown below.

CONTROL FUNCTION KEYS

ALTERNATE CHAR SET			DISPLAY FUNCTIONS	INVERSE VIDEO	BLINKING	UNDERLINE	HALF BRIGHT

SHIFT FUNCTION KEYS

TERMINAL CONFIG			PRINT DISPLAY	STATUS DISPLAY			LABELS DISPLAY

SOFTKEY SET 3   INSERT CHARACTER OFF

To turn off the softkey display mode, press SHIFT f8 again.

Control Function Keys

You can access several alternate character sets by pressing
the CONTROL key in conjunction with a softkey. These character
sets include a line drawing set, a display character control set,
and display enhancement sets (half-bright, blinking, inverse
video, and underlining).

CONTROL FUNCTION KEYS

ALTERNATE CHAR SET			DISPLAY FUNCTIONS		INVERSE VIDEO	BLINKING	UNDERLINE	HALF BRIGHT

Characters from these alternate sets may be intermixed in display
operations, included in string variables, and, in general,
handled like the standard Roman alphanumeric character set.
These alternate characters, however, may not be recognized by
most external devices (including printers).

Each alternate character set is accessed by a unique CONTROL-key
sequence with the softkeys.

Line Drawing Character Set

You access the line drawing set by pressing the following key
sequence.

                         CONTROL and f1

To exit the line drawing character mode, press the following:

                    SHIFT and CONTROL and f1

Display Character Set

You access the display control character set by pressing the following key sequence:

CONTROL and f4

To exit the display control character set, you press the following sequence of keys:

SHIFT and CONTROL and f4

One typical use of these display control characters involves the definition of softkeys as typing aids. For a more detailed discussion, see the section in this book titled "Using Softkeys as Typing Aids".

Display Enhancement Set

As mentioned before, there are 4 modes of display enhancement: inverse video, half-bright, underlined, and blinking characters. Any combination of enhancements can be set. These alternate characters are not recognized by most external output devices, such as printers.

The display enhancements are accessed by pressing the CONTROL key and the appropriate softkey, as shown in the next figure.

CONTROL FUNCTION KEYS

ALTERNATE CHAR SET			DISPLAY FUNCTIONS	INVERSE VIDEO	BLINKING	UNDERLINE	HALF BRIGHT

To turn off any of the display enhancements, press the SHIFT key, the CONTROL key, and the appropriate softkey simultaneously.

The HP 250/35 Integral Workstation

Display

The display is used to view program listings, information entered
from the keyboard, and program output. The display memory can
store more characters than shown on the screen at one time. The
screen holds one page which consists of 24 lines of up to 80
characters each. If the display has been filled, the top line
rolls off the screen. As you type a line, the display will roll
up to make room for a new line. When viewing display lines, you
may access lines preceding or following those currently on the
screen by pressing the display editing keys [↑] and [↓] .
The illustration shows the scrolling process.
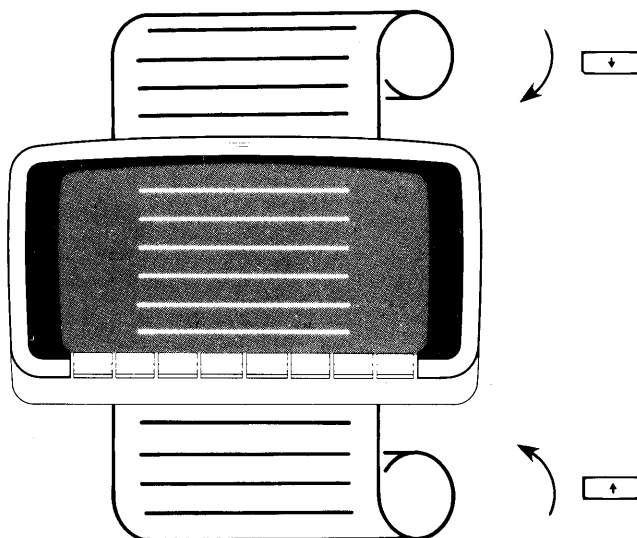
When your HP 250 is ready for operation, a blinking underscore,
known as the cursor, is visible on the screen.

The capabilities of the display are numerous. For example,
characters may appear on the screen as half-bright, underlined,
blinking, or inverse video (or any combination). These features
can be accessed either from the keyboard or programmatically.
Accessing these display enhancement features is described later
in this chapter.

3-16

Keyboard

The keyboard resembles a typewriter keyboard and is used to
communicate with the computer. The keyboard consists of a
typewriter block, a data entry pad, display editing keys, an
execute key, a halt key, and special function keys (known as
softkeys). All of these keys are described in this section.

Typewriter Block

The typewriter block is used to input data or program lines. The
alphabetic keys normally enter lower case characters. Use the
SHIFT key with the alphabetic keys to enter upper case
characters. When you depress the caps-lock key, only
alphabetical keys are shifted to upper case.

Typewriter Block

Several special control keys are located on the left and right sides of the keyboard block.

The SHIFT key enters upper case characters.

The CAPS-LOCK key locks only alphabetic keys to upper case characters. In order to access the shifted key characters on non-alphabetic keys, you must press the SHIFT key. For example, if you want to enter the $ sign while the CAPS-LOCK key is depressed, you must press .

The BACKSPACE key is used to move the display cursor toward the left margin.

The CARRIAGE RETURN key moves the cursor to the beginning of the next line. When SHIFT is pressed, the cursor is moved to the beginning of the present line of input.

The ENTER key enters data into memory. It also executes the current command.

The SET TAB key allows you to set tabs and also clear them. You move the cursor to the desired position on the line and then press this key to set the tab. In order to delete any tab that you have set, move the cursor to the tab position, and press SHIFT

The TAB key moves the cursor to the first character position of the next input field or tabbed position. If you press SHIFT , the cursor will be moved to the first character of the previous input field or to the previous tabbed position.

The CONTROL key is used to access special characters and commands as shown throughout this chapter.

When pressed simultaneously with another key, the REPEAT key causes that key to be repeated.

Data Entry Pad

You use this block of keys, located on the far right side of the keyboard to input numeric data rapidly.

⟨⇧⟩   Another ENTER key is conveniently placed on the side of the data entry pad.

⟨−⟩   Above the ENTER key of the data entry pad is the MINUS key. The MINUS key usually enters a negative sign when pressed. For example, if you perform this series of keystrokes: ⟨−⟩⟨5⟩⟨⇧⟩   then you have entered −5.

Data Entry Pad

Display Editing Keys

These keys are used for modifying input and positioning the cursor at specific locations on the screen. Each of the keys is rapidly repeated by holding it down.

⟨CLEAR⟩   The CLEAR key clears the current line or field. If you press CONTROL CLEAR, only the characters from the present cursor position to the end of the current line are cleared from the display. If SHIFT CLEAR is pressed, all input fields are cleared from the cursor's present position to the end of the display storage area (which includes all lines below that are not currently displayed). If you press CONTROL SHIFT CLEAR, the entire display storage area is cleared (including all lines not currently displayed on the screen).

[DELETE] The DELETE key is used to delete the current character
position of the cursor. If you press SHIFT DELETE, the
entire current line is deleted from the display.

[INSERT] The INSERT key allows you to insert alphanumeric
characters to the left of the cursor. Press this key to
enter the insert mode. The cursor appears within an
inverse video box. You can now type in the characters
you wish to insert. To exit from the insert mode, either
press the INSERT key again or move the cursor from its
current line; the cursor reverts to its normal
appearance. If you press SHIFT INSERT, a blank line is
inserted preceding the current line; the cursor appears
at the first position of the new line.

[←] These keys move the position to the left or right. If
[→] you hold one down, the cursor moves rapidly in that
direction. The cursor wraps around to the next line if a
margin is encountered. For example:

Cursor Positioned at Left Margin   Pressing ⬅ Moves Cursor to Previous Line

[↑] These keys move the cursor up or down one line from the
[↓] current position on the display. Pressing SHIFT ⬆ and
SHIFT ⬇ moves the cursor to the previous and next
display page respectively. The sketch on page 3-16
describes this movement up or down, which is called
scrolling.

[↖] The HOME key moves the cursor to the upper left of the
display. When SHIFT ⬋ is pressed, the cursor is moved
to the first character of the display storage area, which
may be on a previous display page.

Execute Key

[✿]   This key executes the current line or expression in the
display. For example, if you typed in the following
sequence:

$$8+22-7*11 \quad \boxed{✿}$$

then the value of the line is computed and output on the
display.

Halt Key

[HALT]   This key halts a program at the end of a current
operation. Unless overridden by the program, pressing
the HALT key stops the program, and the next program line
to be executed is displayed. Pressing the HALT key is
not a normal way to stop a program, and may require
reloading the program to resume operation.

You should note that if you are sending output to an HP
2601 printer, it may continue to print for a period of
time even though you pressed the HALT key.

Press SHIFT HALT to stop the current program from
executing and all Input/Output operations.

Press CONTROL HALT to abort all operations and clear the
user work area.

<div align="center">

IMPORTANT
_____
You should use the HALT key with
discretion. Data may be lost
by halting a program.
_____

</div>

Softkeys

The softkeys consist of 8 keys each on the keyboard and the display.

You will most likely use these keys in conjunction with an application software program, a utility program (such as initializing media), or as typing aids; these are known as user-defined softkeys. Pressing each key runs a pre-defined program or routine stored in the computer memory.

User Defined Softkeys

The softkeys located on the display are numbered from 1 through 8. The softkeys on the keyboard contain the sets 9-16 and 17-24. Softkeys 9-16 are accessed by pressing the appropriate key on the keyboard; softkeys 17-24 are accessed by pressing the SHIFT key and the appropriate key on the keyboard.

When softkeys 1-8 are defined, their definitions appear on the display. This reduces the amount of lines the screen can hold from 24 to 21. The definitions for softkeys 9-24 are not shown on the display.

Below is an example of softkey labels on the display screen.

```
                            select the desired operation
                    INIT-         PURGE                    RESTART  EXIT
                    IALIZE        ALL
```

To learn more about using softkeys as typing aids, you should look at the appendix titled "Using Softkeys as Typing Aids".

Control Function Keys

You can access several alternate character sets by pressing
the CONTROL key in conjunction with a softkey. These character
sets include a line drawing set, a display character control set,
and display enhancement sets (half-bright, blinking, inverse
video, and underlining).

Characters from these alternate sets may be intermixed in display
operations, included in string variables, and, in general,
handled like the standard Roman alphanumeric character set.
These alternate characters, however, may not be recognized by
most external devices (including printers).

Each alternate character set is accessed by a unique CONTROL-key
sequence with the softkeys.

Line Drawing Character Set

You access the line drawing set by pressing the following key
sequence.

                    CONTROL and Softkey #9

To exit the line drawing character mode, press the following:

               SHIFT and CONTROL and Softkey #9

Display Character Set

You access the display control character set by pressing the following key sequence:

CONTROL and Softkey #12

To exit the display control character set, you press the following sequence of keys:

SHIFT and CONTROL and Softkey #12

One typical use of these display control characters involves defining softkeys as typing aids. For a more detailed discussion, see the section in this book titled "Using Softkeys as Typing Aids".

Display Enhancement Set

As mentioned before, there are 4 modes of display enhancement: inverse video, half-bright, underlined, and blinking characters. Any combination of enhancements can be set. These alternate characters are not recognized by most external output devices, such as printers.

The display enhancements are accessed by pressing the CONTROL key and the appropriate softkey, as shown in the figure below.

To turn off any of the display enhancements, press the SHIFT key, the CONTROL key, and the appropriate softkey simultaneously.

The HP 2649D Workstation

Display

The display is used to view program listings, information entered from the keyboard, and program output. The display memory can store more characters than shown on the screen at one time. The screen holds one page which consists of 24 lines of up to 80 characters each. If the display has been filled, the top line rolls off the screen. As you type a line, the display will roll up to make room for a new line. When viewing display lines, you may access lines preceding or following those currently on the screen by pressing the display editing keys ⊂↑⊃ and ⊂↓⊃ . The illustration shows the scrolling process.

When your HP 250 is ready for operation, the cursor is visible on the screen.

The capabilities of the display are numerous. For example, characters may appear on the screen as half-bright, underlined, blinking, or inverse video (or any combination). These features can be accessed either from the keyboard or programmatically. Accessing these display enhancement features is described later in this chapter.

Keyboard

The keyboard resembles a typewriter keyboard and is used to
communicate with the computer. The keyboard consists of a
typewriter block, a data entry pad, display editing keys, an
execute key, a halt key, and special function keys (known as
softkeys). All of these keys are described in this section.

Typewriter Block

The typewriter block is used to input data or program lines. The
alphabetic keys normally enter lower case characters. Use the
shift key with the alphabetic keys to enter upper case
characters. When you depress the caps-lock key, only
alphabetical keys are shifted to upper case.

Typewriter Block

Several special control keys are located on the left and right sides of the keyboard block.

The SHIFT key enters upper case characters.

The CAPS-LOCK key locks only alphabetic keys to upper case characters. In order to access the shifted key characters on non-alphabetic keys, you must press the SHIFT key. For example, if you want to enter the $ sign while the CAPS-LOCK key is depressed, you must press SHIFT $4 .

The BACKSPACE key is used to move the display cursor toward the left margin.

The CARRIAGE RETURN key moves the cursor to the beginning of the next line. When SHIFT is pressed, the cursor is moved to the beginning of the present line of input.

The ENTER key enters data into memory. It also executes the current command.

The SET TAB key allows you to set tabs and also clear them. You move the cursor to the desired position on the line and then press this key to set the tab. In order to delete any tab that you have set, move the cursor to the tab position, and press SHIFT .

The TAB key moves the cursor to the first character position of the next input field or tabbed position. If you press SHIFT , the cursor will be moved to the first character of the previous input field or to the previous tabbed position.
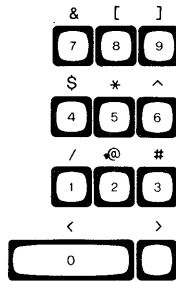
The CONTROL key is used to access special characters and commands as shown throughout this chapter.

When pressed simultaneously with another key, the REPEAT key causes that key to be repeated. This key does not apply to the remote keys (TEST, MODEM,)

Data Entry Pad

You use this block of keys, located on the far right side of the keyboard to input numeric data rapidly.

Another ENTER key is conveniently placed on the side of the data entry pad.

Above the ENTER key of the data entry pad is the MINUS key. The MINUS key usually enters a negative sign when pressed. For example, if you perform this series of keystrokes: ⊟ 5 ⬆ then you have entered -5.

Data Entry Pad

Display Editing Keys

These keys are used for modifying input and positioning the cursor at specific locations on the screen. Each of the keys is rapidly repeated by holding it down.

The CLEAR key clears the current line or field. If you press CONTROL CLEAR, only the characters from the present cursor position to the end of the current line are cleared from the display. If SHIFT CLEAR is pressed, all input fields are cleared from the cursor's present position to the end of the display storage area (which includes all lines below that are not currently displayed). If you press CONTROL SHIFT CLEAR, the entire display storage area is cleared (including all lines not currently displayed on the screen).
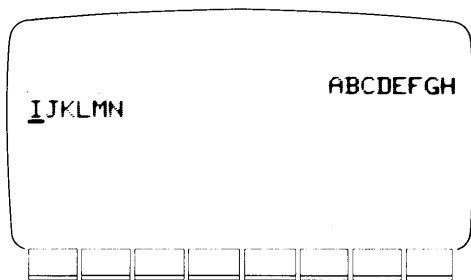
The DELETE key is used to delete the current character position of the cursor. If you press SHIFT DELETE, the entire current line is deleted from the display.
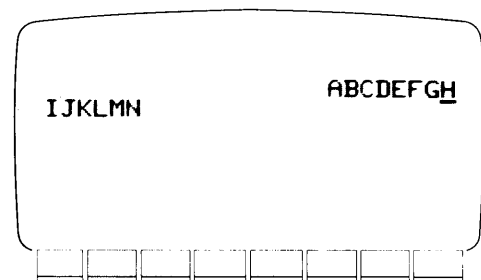
The INSERT key allows you to insert alphanumeric characters to the left of the cursor. Press this key to enter the insert mode. The cursor appears within an inverse video box. You can now type in the characters you wish to insert. To exit from the insert mode, either press the INSERT key again or move the cursor from its current line; the cursor reverts to its normal appearance. If you press SHIFT INSERT, a blank line is inserted preceding the current line; the cursor appears at the first position of the new line.

These keys move the position to the left or right. If you hold one down, the cursor moves rapidly in that direction. The cursor wraps around to the next line if a margin is encountered. For example:

Cursor Positioned at Left Margin   Pressing ⊂▭ Moves Cursor to Previous Line

These keys move the cursor up or down one line from the current position on the display. Pressing SHIFT ⊂↑⊃ and SHIFT ⊂↓⊃ moves the cursor to the previous and next display page respectively. The sketch on page 3-25 describes this movement up or down, which is called scrolling.

The HOME key moves the cursor to the upper left of the display. When SHIFT ⊂↖⊃ is pressed, the cursor is moved to the first character of the display storage area, which may be on a previous display page.

Execute Key

This key executes the current line or expression in the display. For example, if you typed in the following sequence:

8+22-7*11

then the value of the line is computed and output on the display.

Halt Key

HALT

This key halts a program at the end of a current operation. Unless overridden by the program, pressing the HALT key stops the program, and the next program line to be executed is displayed. Pressing the HALT key is not a normal way to stop a program, and may require reloading the program to resume operation.

You should note that if you are sending output to an HP 2601 printer, it may continue to print for a period of time even though you pressed the HALT key.

Press SHIFT HALT to stop the current program from executing and all Input/Output operations.

Press CONTROL HALT to abort all operations and clear the user work area.

IMPORTANT
You should use the HALT key with discretion. Data may be lost by halting a program.

Remote Keys

The three keys labeled RESUME, TEST, and MODEM are located in the
upper left hand portion of the 2649D.

The RESUME key allows you to request a total update of
display information in the event of a data communications
or other error that would cause the workstation to
display incorrect data. When this key is pressed, the
display storage area is erased and pointers of the remote
workstation are reset. Then the data is rewritten to the
display storage area from the CPU.

NOTE

Pressing the RESUME key while data
is being sent to the remote print-
er results in a loss of data.

The TEST key initiates several diagnostic tests to verify
the remote workstation's operation. The self test is
performed on a local basis, even if the remote
workstation is not connected to the HP250. The tests are
described later in this chapter under the heading
"Testing the HP 2649D Workstation".

The MODEM key initiates a modem disconnect. The hardware
to support this function is optional. The transmit light
located directly above the MODEM key indicates the
physical connection to the HP250. If the light is not
on, either the main workstation is not powered on or
there is a failure in the data comm channel. The
transmit light is only operative when the Extended Data
Comm option (HP 13260B) is present.

Softkeys

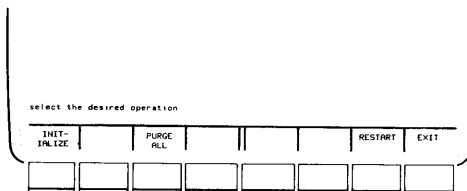The softkeys consist of 8 keys located on the keyboard. You will most likely use these keys in conjunction with an application software program, a utility program (such as initializing media), or as typing aids; these are known as user-defined softkeys.

User Defined Softkeys

Each of the 8 softkeys can have up to 3 definitions (thus, it is possible to have 24 softkeys defined at any one time). To use the first set of definitions, softkeys 1-8, the mode light located beneath the keys must be on; to turn the mode light on and off, press ⎍ . When the mode light is off, softkeys 9-16 and 17-24 are defined. Softkeys 9-16 are accessed by pressing the associated key; softkeys 17-24 are accessed by pressing the SHIFT key and the associated key.

When softkeys 1-8 are defined, their definitions appear on the display. This reduces the amount of lines the screen can hold from 24 to 21. The definitions for softkeys 9-24 are never shown on the display.
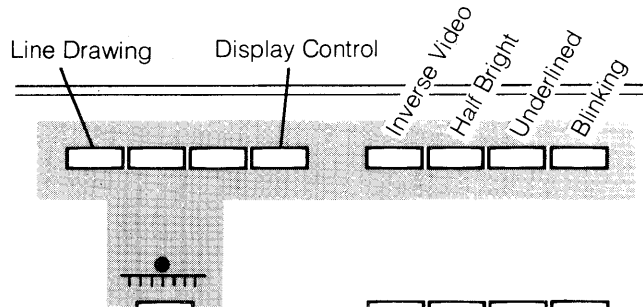
Below is an example of softkey labels on the display screen.

ᶜAUTO	ᶜREN ᶜ	ᶜFETCH	ᶜGET	ᶜSAVE	ᶜLISTᶜ	ᶜCATᶜ	ᶜSYSTEM PRINTER]

(SFK1)   (SFK8)
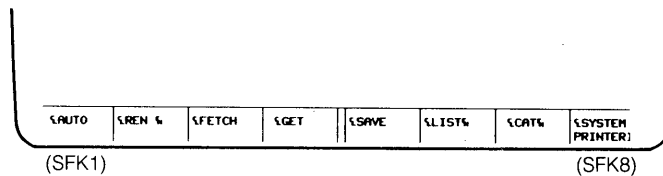
To learn more about using softkeys as typing aids, you should look at the chapter titled "Using Softkeys as Typing Aids".

Control Function Keys

You can access several alternate character sets by pressing
the CONTROL key in conjunction with a softkey. These character
sets include a line drawing set, a display character control set,
and display enhancement sets (half-bright, blinking, inverse
video, and underlining).

Characters from these alternate sets may be intermixed in display
operations, included in string variables, and, in general,
handled like the standard Roman alphanumeric character set.
These alternate characters, however, may not be recognized by
most external devices (including printers).

Each alternate character set is accessed by a unique CONTROL-key
sequence with the softkeys.

Line Drawing Character Set

You access the line drawing set by pressing the following key
sequence.

<div align="center">CONTROL and Softkey #1</div>

To exit the line drawing character mode, press the following:

<div align="center">SHIFT and CONTROL and Softkey #1</div>

Display Character Set

You access the display control character set by pressing the
following key sequence:

CONTROL and Softkey #4

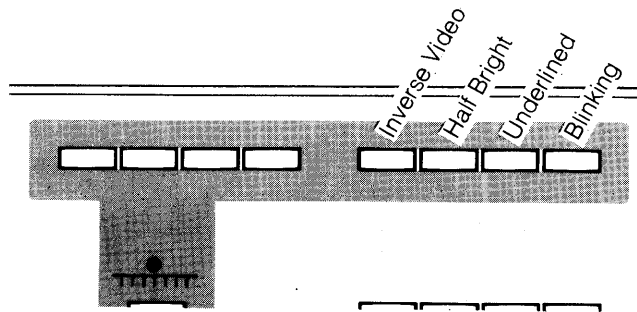To exit the display control character set, press the
following sequence of keys:

SHIFT and CONTROL and Softkey #4

One typical use of these display control characters involves the
definition of softkeys as typing aids. For a more detailed
discussion, see the section in this book titled "Using Softkeys
as Typing Aids".

Display Enhancement Set

As mentioned before, there are 4 modes of display enhancement:
inverse video, half-bright, underlined, and blinking characters.
Any combination of enhancements can be set. These alternate
characters are not recognized by most external output devices,
such as printers.

The display enhancements are accessed by pressing the CONTROL key
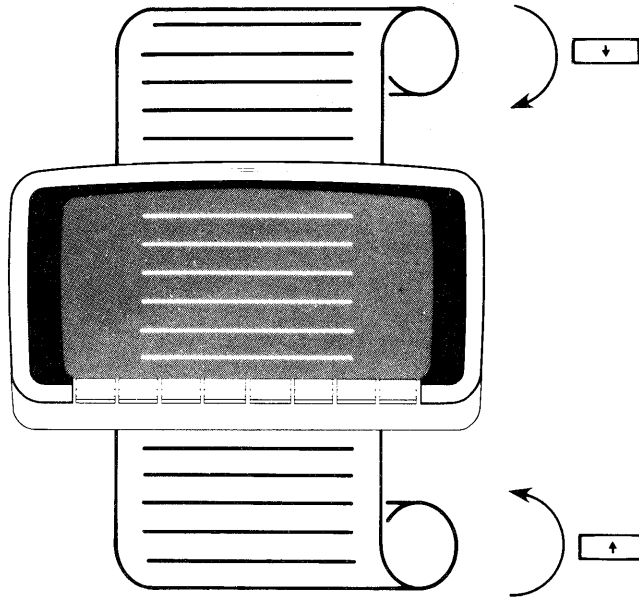and the appropriate softkey, as shown in the figure below.

To turn off any of the display enhancements, press the SHIFT key,
the CONTROL key, and the appropriate softkey simultaneously.

Testing the 2649D Workstation

By pressing the TEST key on the upper left corner of the keyboard, you initiate a general workstation self-test. The test works on a local basis only and does not require a data communications link to the HP 250. This self test is performed in the following sequence:

1. The display is cleared and any output to the remote printer is stopped.

2. The keyboard lights are turned on.

3. Each installed ROM (Read Only Memory) is tested and checked for proper placement.

4. A pattern test is performed on the display memory. The pattern is shown in the next diagram.

5. The HP-IB interface is tested if the firmware ROM is present on the workstation.

6. The bell is beeped.

7. All character sets (including foreign character sets if included in the hardware are displayed on the screen. This is shown in the next diagram.

8. An enhancement pattern is displayed.

9. Status information is displayed.
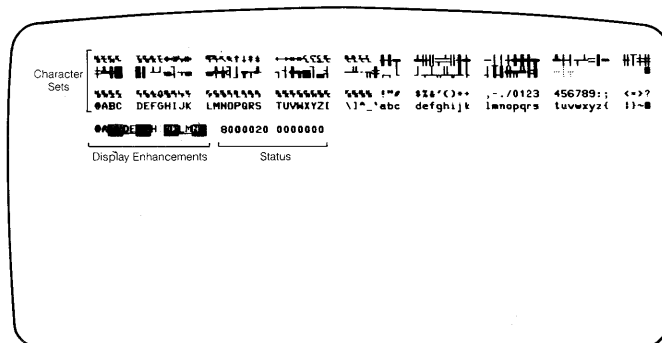
If an error occurs during step 3,4, or 5, the test is stopped and the appropriate error message is displayed. Press RESUME to remove the error message. If no errors occur during the test, the test pattern remains on the screen until you press RESUME or CNTL HALT.

If nothing happens when you press the TEST key, check that the workstation is plugged into an electrical outlet and the power switch is turned on.

Extended Tests

By pressing CTRL TEST, you initiate a set of extended tests. These tests check the keyboard matrix, lights, and switches. When CTRL TEST is pressed, the following message is displayed on the screen:

ENTER EXTENDED TEST NO. (1-4)

You can press either the space bar or RESUME to exit, or you can type the number of the desired test.

Test	Function
1	Repeat test indefinitely
2	Keyboard matrix test
3	Data comm switch test
4	Keyboard LEDs test

Once one of the extended tests is entered, the space bar must be pressed to exit the function and return to the selection menu.

Test 1

REPEAT TEST - This function repeats both the general self-test and the data comm self-test until either an error is detected or you interrupt by pressing RESUME or the space bar. If the switch which inhibits the data comm test is open, the data comm portion of the test is never executed.

To exit the test, press the space bar.

Test 2

KEYBOARD MATRIX TEST - When this test is entered, Key Matrix is
displayed in the upper left hand corner of the screen. A 40
column by 6 row display represents the position of the keys.
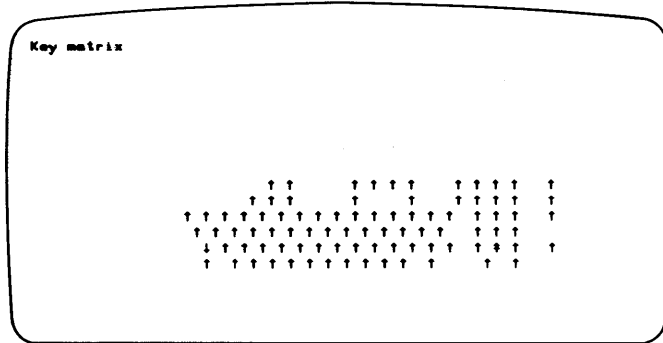
For every key on the keyboard (except RESUME) a vertical arrow is
displayed in a corresponding position on the screen. If a key is
pressed, the corresponding arrow on the display is changed from
an upward pointing arrow to a downward pointing arrow. When the
key is released, its arrow is changed to an upward pointing
double-headed arrow. Pressing the key again changes the arrow to
a downward pointing double-headed arrow. The progression is
shown in the following figure

Key up   Pressed   Released   Pressed   Released

If the processor detects an input for a key that is not supposed
to be on the keyboard, a DEL character is displayed in the lower
right corner of this display. The visual feedback provided by
this test allows you to quickly identify malfunctioning keys or
groups of keys.

To exit the test, press the space bar once.

Test 3

DATA COMMUNICATION SWITCH TEST — The data comm switches (baud rate, parity, and duplex) are tested in extended test number 3. When in this test state, "Data communication switches" is displayed above a graphic display of the actual switch settings. This display is continuously updated as the switches are changed. The following figures shows how the display would look for full duplex, 9600 baud, and odd parity.
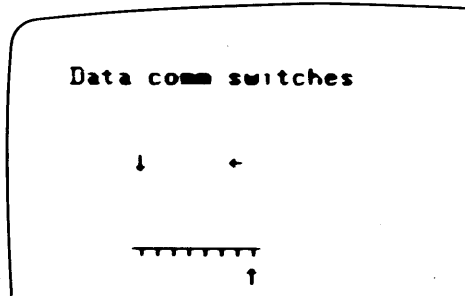
If the duplex switch is left on HALF or the baud rate switch is left on EXT, when the space bar is pressed, the message "IMPROPER SETTINGS" is displayed until they both are corrected. (This is done since the workstation will not work with the HP 250 for these settings.)

Test 4

KEYBOARD LEDs TEST — When the keyboard light test is entered, Keyboard LEDs is displayed and all of the LEDs are turned off. The user may then toggle each LED by pressing the key below it. The space bar must be pressed to exit this test.

CHAPTER 4
Keyboard Operations

Solving Arithmetic Problems

The data entry pad can be used to solve arithmetic problems. The range of numbers that your HP 250 can handle – or the smallest through the largest numbers that the machine can print – is approximately -10×10^{99} through $+10 \times 10^{99}$.

While the system is computing, the cursor is not shown on the display. You cannot enter any information from the keyboard during this time.

Numerical results can appear in 3 forms: integer, decimal, and scientific notation. Example computations illustrate the 3 output forms:

Integer Result

```
    8+22
     30

     _
```


Decimal Result

```
    4.7+5.7
     10.4

     _
```


Scientific Notation Result

```
   1.93E55*10
    1.93000000000E+56

     _
```

The most frequently used operators are + (addition), — (subtraction), / (division), * (multiplication), and ^ (or **) (exponentiation).

For example, in order to compute the sum of 8 and 22, press the following key sequence: (8) (SHIFT) (+/↑) (2) (2) (↵)

```
8+22
 30
—
```

More complicated problems can be solved as well. When you press this series of keys, it is equivalent to the problem 9*8+(7-2)+10 being solved: (9) (SHIFT */2) (8) (SHIFT +/↑) (SHIFT (/9) (7) (—) (2) (SHIFT)/0) (SHIFT +/↑) (1) (0) (↵)

```
9*8+(7-2)+10
 87
—
```

You cannot multiply numbers without using the operator *. The expression AB, which indicates "A times B" in algebra, is not interpreted as multiplication by the computer. You must enter A*B.

The computer performs operations in a preset order called a mathematical hierarchy. For keyboard operations, you need to remember that exponentiation has higher priority than multiplication and division. Multiplication and division have higher priorities than addition and subtraction. Below is an abbreviated list of the mathematical hierarchy, with parentheses having the highest priority.

Symbol	Description
( )	parentheses
^ (or **)	exponentiation
* , /	multiplication, division
+ , —	addition, subtraction

Here are several examples:

1) To solve the problem 3+(2*5), press: [3][SHIFT +/1][SHIFT (/9][2][SHIFT */2][5][SHIFT)/0][⊡]

```
3+(2*5)
 13
_
```

This is the equivalent of 3+2*5, even though no parentheses are present. If two operators have equal priority in an expression (such as * and /), then the operations are performed from left to right. Multiplication has priority over addition, however, so the expression 2*5 is performed first. When parentheses are included, the computer evaluates the quantities in parentheses first.

2) To solve (10-5)*(8/4), press:

[SHIFT (/9][1][0][−][5][SHIFT)/0][SHIFT */2][SHIFT (/9][8][SHIFT //3][4][SHIFT)/0][⊡]

```
(10-5)*(8/4)
 10
_
```

If no parentheses were used in the key series above:

[1][0][−][5][SHIFT */2][8][SHIFT //3][4][⊡]
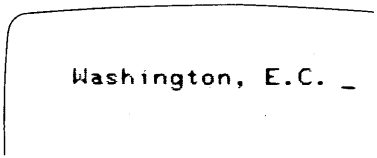
then the expression would be evaluated in this way. First 5 would be multiplied by 8 giving 40. Second, this value 40 would be divided by 4 giving 10. And third, the value 10 would be subtracted from 10 giving 0.

```
10-5*8/4
   ‿‿
    1
  ‿‿‿‿
     2
 ‾‾‾‾‾‾‾
    3
```

So it is obvious that the use of parentheses (or their omission) can affect results. When in doubt, put parentheses in an expression, since all extra sets of parentheses are ignored.
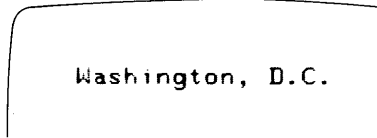
Correcting Typographical Errors

If you enter an incorrect command, the HP 250 responds with an
error message. The most frequent errors are typographical in
nature. In order to correct a typographical error, use the
display editing keys described in the "Keyboard" section of this
manual. If, for example, you had typed this input:

```
Washington, E.C. _
```
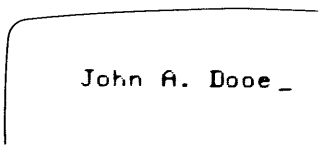
and had wanted to type:

```
Washington, D.C.
```
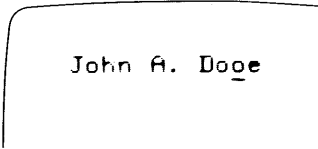
press the ⬚ or ⬅ key until the cursor moves left to a
position under the character E. Type the capital letter D and
press the ENTER key to enter the correct data. You do not have
to advance the cursor to the end of the line in order to enter
the corrected version.

If you had typed this:
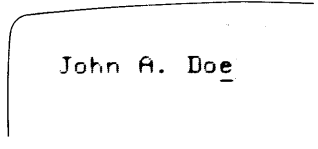
```
John A. Dooe_
```

press the ⬚ key until the cursor is under either letter o:

```
┌─────────────────────
│
│    John A. Doｏe
│
│
```

press the DELETE key:

```
┌─────────────────────
│
│    John A. Doe
│
│
```

When the line is correct, press the ENTER key.
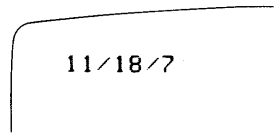
Understanding Error Messages

Typographical errors made when entering a command are detected by
the computer after you press the ENTER key. These errors result
in a message being displayed on the screen. The error message
appears on the screen directly below the line with the error
immediately after the line is entered.

If the date is in the form:
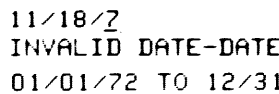
$$MM/DD/YY$$

But you enter this line:

```
┌─────────────────────
│
│    11/18/7
│
│
```

An error message similar to this is shown below the line:

```
┌─────────────────────
│
│    11/18/7
│    INVALID DATE-DATE RANGE IS
│    01/01/72 TO 12/31/99
│
```

The cursor indicates the specific character in error. In this case, a two-digit number must be entered for the year.

When you have entered the appropriate number, the cursor indicates the next line is ready for entry.

You may at some time misspell a command. The RUN command, for example, must be spelled exactly as shown:

<div align="center">RUN</div>

and followed by pressing the ENTER key in order for the current program in memory to be executed. If you had typed:

```
  RUIN
```

the computer would interpret RUIN as an illegal part of an expression:

```
  RUIN
  IMPROPER EXPRESSION
```

This is an example of a syntax error, which is an error in the structure of a statement or command. Syntax errors result most often from misspelling or misplaced punctuation.

Programming or software errors usually appear like this:

ERROR 31 IN LINE 90

This particular error message (Error 31) indicates that division
by zero is being attempted in line 90 of the program you are
running.

Error codes and their explanations are listed in the back of this
manual. Procedures to follow if you encounter difficulties are
described in Chapter 10.

Storage Devices and Media

This chapter contains information on several HP storage devices
and the associated media that you can use with your HP 250
system. They include:

- HP Integrated Storage Product (7908P, 7911P, 7912P)
- HP Built-in Flexible Disc Drive
- HP 7906 Disc Drive
- HP Built-in 5 Mb. Disc Drive

If you need information other that what is presented here, you
should consult the operator guide which was sent with your
storage device.
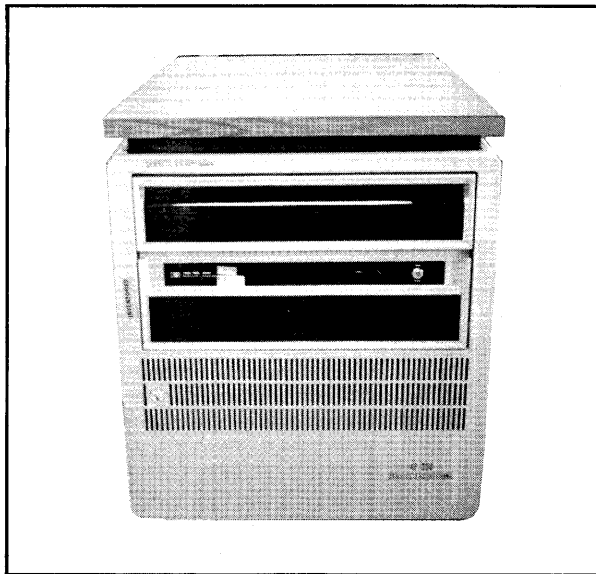
HP 7906 Disc Drive
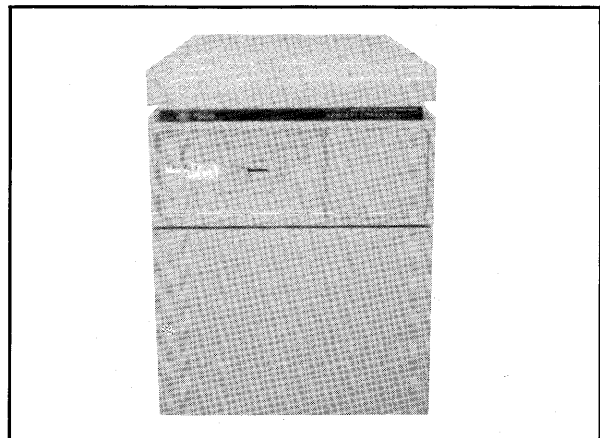
HP Integrated Storage Product

HP Built-in Flexible Disc Drive

HP Integrated Storage Product

An HP Integrated Storage product, as seen in the drawing below, consists of a disc drive, and a high-speed cartridge tape drive; the disc can be either an HP 7908, 7911, or 7912. A single "brain" (known as the controller) manages the operations of each disc and tape drive combination.
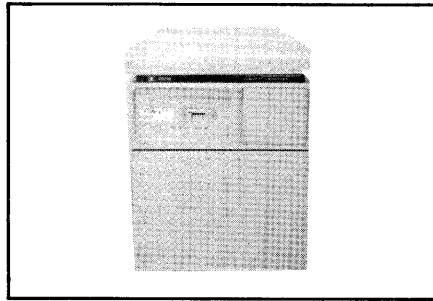
HP 7908, 7911, and 7912 Disc Drives

The only information you need to know regarding the HP 7908, 7911, and 7912 disc drives is power-on procedure. Once the drive is operating properly, you won't need to deal with it further. You never have to touch, insert, or remove the disc.

To turn any of the three discs on, push the switch located on the rear of the cabinet (see the drawing below) to the ON (1) position. To power off a drive, push the same switch to the OFF (0) position.
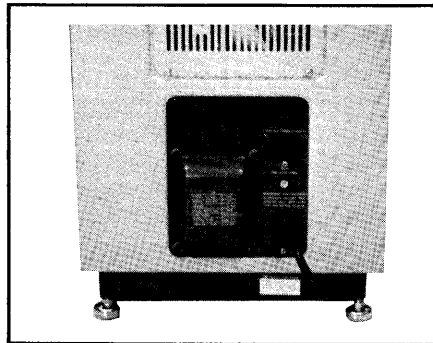
NOTE

You should never power off any Integrated Storage Product unless you are sure that no other tasks require it for processing.

Cartridge Tape Drive

The cartridge tape drive has been designed to serve as a backup device for the disc within the Integrated Storage Unit. It uses tape cartridges as the media on which information is recorded.

Tape Cartridges

Cartridge tapes come in two sizes. The short cartridge is 150 ft. long. The long cartridge is 600 ft. long and holds about four times more information than the short cartridge. You can differentiate one from the other by the length printed on the tape cartridge label.

PROTECT PEG — SAFE — HIGH DENSITY DATA CARTRIDGE 150 ft.

047032-02
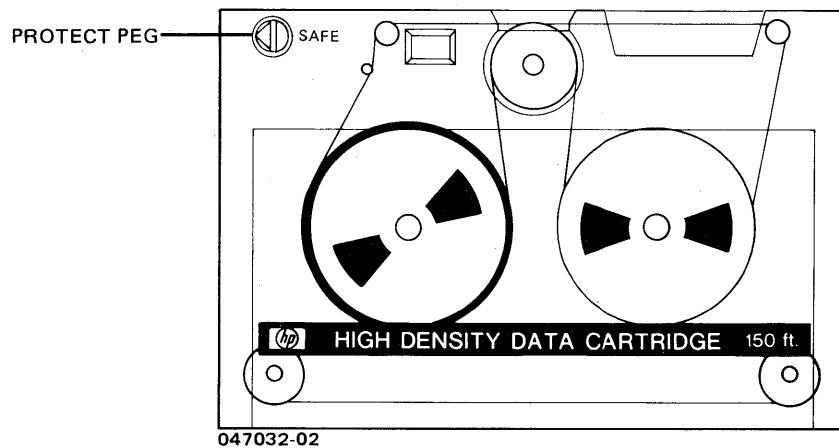
The peg in the upper left hand corner of the tape cartridge is used to keep information from being altered. Turn the peg to the SAFE position to protect the tape from any kind of writing or updating operation.

Handling Tape Cartridges

Follow these guidelines to ensure that your tape cartridges remain error-free for as long as possible.

● Do not touch the surface of the exposed tape.

● Do not attempt to clean the tape or tape guides within the cartridge.

● When not in use, remove all tape cartridges from the drive and store them in the protective plastic case.

● Do not store tape cartridges in excessively warm, dry, or humid areas, direct sunlight, or areas where magnetic fields are present (motors, transformers etc.)

NOTE

Although all HP 250 commands can work with the cartridge tape drive, use the drive only as a backup device. Any use other than copying files in a sequential manner will probably result in poor drive performance
---

Inserting a Tape Cartridge

If necessary, remove the tape cartridge already in the drive and store it in its case.

Slide the tape cartridge label-side up into the drive until you hear it click into its proper position (see drawing below).
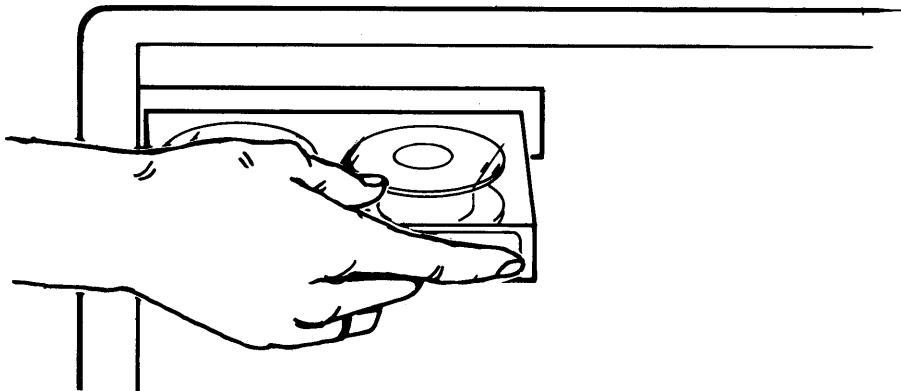
To keep the tape from becoming slack, the tape cartridge is always stored at the end-of-tape position. As a result, it must be rewound to the beginning-of-tape position to be available for use. This rewinding process may take anywhere from 30 seconds to two minutes depending on the length of the tape.

Using the Tape Drive

Once you have inserted the tape cartridge, and waited for it to be properly loaded, it is ready for use.

Remember that you will most likely be using the tape drive in conjunction with a backup or some other sequential operation. As a result, one error you might see is ERROR 54. This means that a duplicate file name exists. This can happen if you use the same tape cartridge continually to back up the same disc.

When the tape is being accessed, the eject lever is locked and the cartridge cannot be removed. The BUSY light comes on during any tape operation, including the loading and unloading process. The PROTECT light goes on when you insert a protected cartridge (SAFE peg in position).

You should note that most commands involving the tape drive will not execute unless its corresponding disc is ready (and functioning properly).

Removing a Tape Cartridge

To remove a tape cartridge from the drive, push the UNLOAD button on the front panel of the drive.

Part of the unloading process involves the drive automatically winding the tape to the end-of-tape position. This process, like the loading process, may take anywhere from 30 seconds to two minutes depending on the length of the tape.

When the UNLOAD button is pressed, the responsibility for the operation is assigned to the task which has been configured as TASKID 1 (your principal operator knows who this is). As a result, a program run under TASKID 1 may pause or the cursor may disappear from the workstation for up to two minutes while the tape is unloaded.

The BUSY light goes off and the drive buzzes to indicate that the winding process is complete. You may now remove the tape cartridge by sliding the eject lever to the right.

```
                           NOTE
         Do not use excessive force on
         the tape eject lever.  It will
         not operate when power is off
         or when the BUSY light is lit.
```

If a tape is removed from a drive under abnormal circumstances,
such as the HP 250 experiencing a temporary power failure, you
will get an error if you insert any tape other than the one you
removed. You must re-insert the correct tape and complete the
standard unloading process described earlier. If you cannot loc-
ate the correct tape cartridge, you must run a special utility
program, which is described in the System Utilities Manual.

```
                         WARNING
        The disc drive does not contain operator-
        serviceable parts.  To prevent electrical
        shock, refer all installation and mainten-
        ance activities to service-trained
        personnel.
```

Flexible Disc Drive

Your HP 250 may be equipped with a flexible disc drive, located
in the unit which houses the central processing unit. The drive
is an assembly which rotates a disc, and then transfers
information from the disc to memory (known as a read operation)
or from memory to disc (a write operation).

The storage medium associated with this type of drive is the
flexible disc (also known as a floppy disc, floppy, or diskette).
It is a magnetic medium used to store data and programs; in
addition, it is extremely for backup purposes and software
data exchange.

Handling Flexible Discs

Follow these guidelines to ensure that your flexible discs remain
error free for as long as possible.

- Always return discs to their storage envelopes after removing
  them from the drive.

- Since fingerprints on the disc can cause loss of data, handle
  the disc only by its label area.

- Never touch the surface of the disc showing through the
  protective sealed jacket.

- Never write on the protective jacket with a lead pencil or
  ballpoint pen. Use a soft felt-tip pen and write on the label
  only. Don't erase titles; instead apply a new label.

- Although the disc is flexible, don't bend or fold it since
  this, too, can cause damage to the disc.

- Never subject discs to temperature or humidity extremes.

- Contamination from dust, ashes, smoke, etc. can damage discs.
  Always close disc drive doors when not in use. Also close the
  roll-up door to cover all drives when not being used.

- Avoid placing discs in strong magnetic fields that may exist
  around transformers or magnets, since this can cause loss
  of data.

- Never remove discs from their sealed protective jackets.

- The inside surface of the sealed jacket is coated with a material that cleans the disc as it rotates. Any other method of cleaning may scratch the disc and cause loss of data.

- Use only HP approved discs - others may impair data integrity or damage the disc drive.

Inserting a Flexible Disc

Press the bar on the drive door to open the door. If necessary, remove the disc already in the drive and store it in its envelope.

Slide the new disc into the drive until you hear it click into its proper position. Insert the disc with the label up as shown:

Close disc drive door until it latches. Now that the disc is in place, you are ready to either load data from it or to initialize if blank. In some instances, another program may automatically access the disc.

Removing a Flexible Disc

Press the bar below the drive door to unlock the door. You can open the door only when the in use light is not on.

Slide the disc out and place it in its storage envelope. Be sure to close the disc drive door before resuming program operation. This will help keep the area free from dust and dirt.

NOTE
For a more in-depth description, read the booklet titled "Protecting, Preserving, and Replacing Your HP 250 Flexible Disc Media" (45251-90303).

The HP 7906 Disc Drive

The HP 7906 Disc Drive is a high-performance, random-access, mass-storage device. It has a fixed disc and provisions for accepting a removable disc cartridge.

Removable Disc Cartridges

Each HP 12940A Formatted Disc Cartridge is individually tested and certified to meet Hewlett-Packard's requirements for error-rate performance, mechanical balance, and surface flatness. Because of the unique interdependence of the disc drive and the disc cartridge, Hewlett-Packard's published specifications, disc drive performance, and reliability can only be assured when using the HP 12940A Disc Cartridge. For the above reasons, if the HP 7906 Disc Drive is operated using a disc cartridge other than the HP 12940A Disc Cartridge and damage occurs as a result, Hewlett-Packard will <u>not</u> be responsible for the repair or the resulting damage under warranty or under the service contract.

Storing Disc Cartridges

Special considerations must be taken for storage of disc cartridges. It is highly desirable for you to store disc cartridges in environmental surroundings that are nearly identical with those of the operating area. Storing disc cartridges in the same area where the disc drive is located avoids waiting for disc drive and disc cartridge temperature equalization.

Disc cartridges should always be stored in a clean, dust-free area and should not be stacked more than two high when lying flat. It is advisable to provide storage cabinets with shelves adjusted to the appropriate height. Disc cartridges should not come in contact with any magnetic material and should not be stored directly on top of the disc drive.

Using the HP 7906

You should observe the following precautions when operating the disc drive:

- Do not place magnetic media on top of the disc drive.

- Observe all warning and caution labels affixed to the disc drive.

- In normal operation the heads "fly" over the disc surfaces on a thin cushion of air. Dust or other contaminants between the head and the disc can cause the head to contact the disc and possibly damage the disc and/or head. Operate the disc drive in a clean area to minimize the chance of this malfunction occurring.

- If head and disc contact should occur as described above, do not attempt to retrieve data by placing the potentially damaged disc cartridge in another drive. Also, do not place another disc cartridge in this drive until the drive and disc cartridge have been checked by service-trained personnel.

WARNING

The disc drive does not contain operator-serviceable parts. To prevent electrical shock, refer all installation and maintenance activities to service-trained personnel.

The following paragraphs provide the basic operating procedures for the disc drive. Included is a procedure for startup, changing a disc cartridge, shutdown, and responding to disc drive faults.

Starting Up the HP 7906

To operate the HP7906, proceed as follows:

1) Set the RUN/STOP switch to the STOP position.

2) Push in on the bottom edge of the control panel access door
    to open it.

3) Set the POWER/OFF switch to POWER position and observe that
    the Unit Select Identification and DOOR UNLOCKED indicators
    light (Note that some HP 7906 models have the power switch
    on the rear panel).

4) Close the control panel access door.

5) Open the cartridge access door by pulling out and down on its
    recessed upper edge.

CAUTION
If head and disc contact should occur, as described earlier, do not attempt to retrieve data by placing a potentially damaged disc cartridge in another drive. Also, do not place another disc cartridge in this drive until the drive and disc cartridge have been checked by service-trained personnel.

6) Carefully insert an HP 12940A Formatted Disc Cartridge,
    access-door end first, until it is seated fully.

7) Close the cartridge access door.

8) Set the RUN/STOP switch to RUN. The DOOR UNLOCKED indicator
    will go out and after the startup sequence is complete (one
    minute or less), the DRIVE READY indicator will light. The
    DRIVE FAULT indicator will only light if a malfunction
    occurs.

Changing a Disc Cartridge

To change a disc cartridge, perform the following sequence:

1) If the disc drive is operating, set the RUN/STOP switch to STOP. The DRIVE READY indicator will go out immediately.

2) Allow the spindle to halt (30 seconds or less). The DOOR UNLOCKED indicator will light indicating that the cartridge access door may be opened.

3) Open the cartridge access door by pulling out and down on its recessed upper edge.

4) Firmly grasp the disc cartridge and slowly pull it straight out.

5) Carefully insert the new disc cartridge, access-door end first, until it is seated fully. Use only an HP 12940A Formatted Disc Cartridge.

6) Close the cartridge access door.

7) Set the RUN/STOP switch to RUN to resume operation.

Shutdown Procedure

To shut down the disc drive, proceed as follows:

1) Set the RUN/STOP switch to STOP. The DRIVE READY indicator will go out immediately.

2) Allow the spindle to halt (30 seconds or less). The DOOR UNLOCKED indicator will light indicating that the cartridge access door may be opened and the cartridge removed, if desired.

3) Push in on the bottom edge of the control panel access door to open it.

4) Set the POWER/OFF switch to the OFF position. The Unit Select Identification and DOOR UNLOCKED indicators will go out.

5 Mb. Disc Drive

Your HP 250 may include a built-in 5 megabyte disc and drive,
located in the unit which houses the central processing unit.
The drive is an assembly which rotates the disc, and then
transfers information from the disc to memory (a read operation),
or from memory to disc (a write operation). Information can be
stored on the random-access surface of the fixed disc, allowing
you to maintain data, even when the HP 250 is turned off.

A 5 Mb. Disc drive is powered on with the same key that powers on
the HP 250. When the cursor appears on the screen, both the
HP 250 and the 5 Mb. drive are ready for use.

CHAPTER 6

Printers

This chapter contains information on the three HP printers that could be connected to your HP 250 system. They include:

- HP 2631 Dot Matrix Printer
- HP 2608 Dot Matrix Printer
- HP 2601 Letter Quality Printer
- HP 2622D Thermal Printer

If you need information other than what is presented here, you should consult the operator guide which was sent with your printer.

HP 2631 Dot Matrix Printers

The HP 2631 Dot Matrix printer forms characters by printing a pattern of inked dots. The maximum speed of the HP 2631 printer is 180 characters per second. This printer uses fanfolded/pin-fed paper.
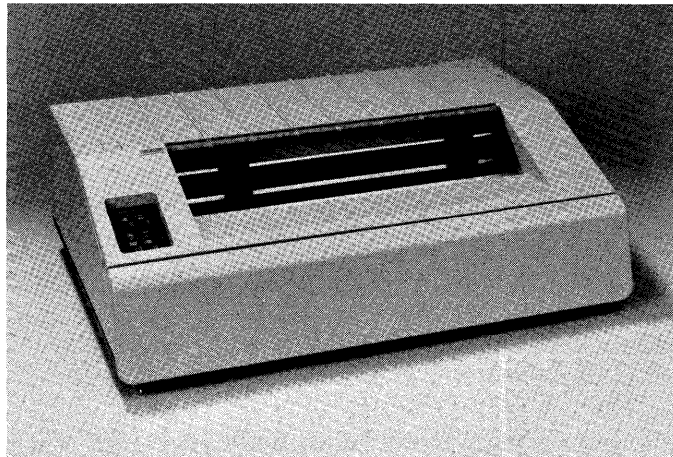
Loading Paper

Follow this procedure for loading paper into the dot matrix printer:

NOTE
If the printer runs out of paper while printing, it stops and beeps. Reload paper and press ON/OFF LINE button to continue printing with no loss of data

1) Take the printer offline by pressing the ON/OFF LINE button. Open the access cover, then open each tractor hold-down.
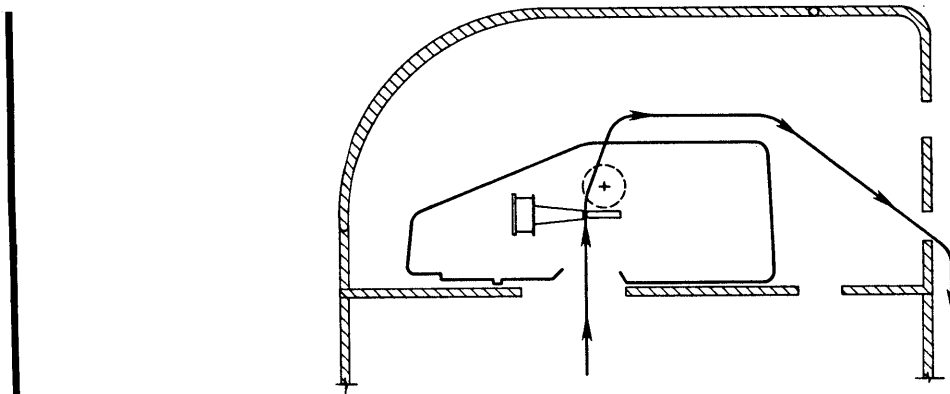
2) If your printer is on a stand, load forms through the bottom slot of the printer. If the printer is on a table, load paper through the back. Position the box of paper on the shelf or floor directly under the slot in the bottom of the printer.

3) Push the paper through the paper slot in the printer until it appears above the print mechanism. Engage the pin holes on the paper with the pin feeds on the paper tractor. Either tractor can be adjusted for width by lifting up on the tractor clamp and sliding the tractor to the desired position. Close the paper hold-down on each tractor.

CAUTION

Do not close the access cover with the paper hold-downs open since the tractor or the viewing window can be damaged.

---

4) Close the access cover. Be certain that the leading edge of the paper protrudes through the paper exit without binding.

5) Press the FORM FEED switch to advance paper to the next Top of Form position.

NOTE

Pressing the RESET button sets the printer to Top of Form at its current position (without advancing the paper). Since other printer conditions can be affected by RESET, refer to your HP 2631 operator manual for details.

---

6) Use the paper advance knob to move paper to the Top of Form. For fine adjustment, pull the paper advance knob out while turning. Put the printer back on line by pressing the ON/OFF LINE button.

Replacing Ribbon Cartridges

In order to remove the ribbon cartridge and replace it with a new one, follow the procedure below.

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

If the printer has been in operation for more than five minutes, the print head will be hot. Before installing or changing the ribbon, turn the printer off and allow it to stand with the access cover open for at least 15 minutes.

Removal

1) Take the printer offline by pressing the ON/OFF LINE button.

2) Remove the old ribbon cartridge by raising the right hand end up, then lift and discard it.

3) Clean and vacuum all paper, dust, and residue from the area under the ribbon cartridge.

Installation

1) Be sure the printer is switched offline.

2) Install the ribbon cartridge by sliding the groove in the left end of the cartridge over the tongue on the left mounting bracket.

3) Thread the ribbon around the left ribbon guide and in front of the print head. Drop the right side of the cartridge onto the drive shaft. Use the knob on the top right of the ribbon assembly to tighten and align the ribbon.

Cleaning the Print Head

The print head should be removed and cleaned at least once every two months. If you notice a deterioration of print quality, you may need to do more frequent cleaning. Follow the procedure in your HP 2631 Operator's Manual.

HP 2608A Printer

The HP 2608 Dot Matrix Printer forms characters by printing a pattern of inked dots. The maximum speed of the HP 2608 is 400 lines per minute.

Operator Safety

Close the access cover when the printer is in a ready-to-operate condition and when it is operating. Keep hands, long hair, necklaces and articles of clothing such as long sleeves out of the printer when ready-to-operate or operating conditions exist.

Loading and Adjusting Paper

The HP 2608A will accommodate continuous fan-fold edge-perforated paper. It will accommodate forms thickness variations up to a total pack thickness of 0.61 mm (0.025 inches). Forms thicker than 0.61 mm should be tested to verify that they will print successfully. Recommended paper weights are: 15 to 20 pounds single part and 11 pounds multi-part forms. Forms and card stock should be tried for satisfactory feeding, registration, and print quality. Multi-part forms must be held together without the use of metal or plastic fasteners.
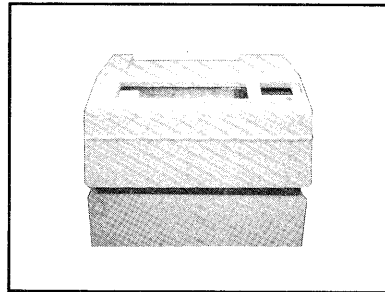
Paper is loaded through the bottom of the HP 2608A. To load
it, perform the following sequence of steps:

1) Position the paper supply inside the printer stand against
   left side alignment bracket.

2) Pull the platen release lever toward you to open the platen.

3) Open the access cover; then open both tractors. If a
   different form or horizontal position is required, unclamp
   both tractors so they may be adjusted to a different width.
   The tractors should be positioned so that paper may be pushed
   up into the printer without hitting the open tractor doors.

<div align="center">

NOTE

</div>

An interlock prevents printing when the platen is open. A fault indication is displayed on the control panel by the PLATEN/RIBBON Fault Indicator during paper loading and adjustment.

4) Push the paper up into the printer from below until it
   appears above the print mechanism; then pull the paper up
   until the holes can be matched to the tractor lugs. Make
   certain the paper is not skewed to either side. Close the
   tractors. Push the platen release lever to close the platen.
   If the forms thickness has been changed, use the Platen
   Adjust Knob to adjust the gap for maximum print quality.

5) Clamp the tractors in place on the tractor guide shaft if
   previously released.

6) When the printer runs out of paper, it stops at Top Of Form.
   It is only necessary to use the FORM FEED switch to advance
   the printer to the Top Of Form position if paper out did not
   occur.

NOTE

Pressing the RESET switch will clear all
pre-established or programmatically con-
trolled conditions of the printer to
power-on status. Therefore, it is rec-
commended that the RESET switch not be
used to define Top of Form.

7)   One of two methods may be used to move the paper to the
     desired Top Of Form position as explained in the following
     paragraphs:

     Use the LINE FEED switch to advance the paper one line at a
     time and align the horizontal paper perforation with the
     desired form length on the scale (8-inch through 12-inch)
     which is located on the top of the printer. For example, if
     you want to print on an 11-inch form, advance the form until
     the desired first print position is aligned with the 11-inch
     mark on the scale. Use of the LINE FEED switch does not
     change logical Top of Form when paper out has occurred.

                              or

     For more exact adjustment of the paper, use the plastic Top
     Of Form adjustment scale which is supplied with the printer.
     This scale provides precise adjustment for forms from one to
     12 inches in length.

     Open the left paper tractor. Align the desired form length
     (form length is indicated on the left edge of the scale) with
     the horizontal paper perforation and match the holes in the
     adjustment scale to the tractor lugs. Close the paper
     tractor.

     Use the LINE FEED switch or the UP/DOWN forms adjust switches
     to align the desired measurement increment (located on the
     right edge of the scale) with the v-notch on the left paper
     tractor. For example, if you want the first line of print to
     be one inch from the perforation on an 11-inch form, align
     the one inch measurement on the right side of the scale with
     the v-notch on the left paper tractor.

Use the UP and DOWN Forms Adjust switches to make the final fine adjustment for locating the first line of print. The UP switch advances paper one dot row at a time. If the switch is held down, paper will continue to advance. The DOWN switch retracts paper; however, if the platen is not open, you must tension the paper below the printer (or release the platen) to allow it to move in the reverse direction. Use of these Forms Adjust switches never changes logical Top Of Form. Final forms adjustment must be made by moving the paper upward with the platen closed to ensure proper tensioning of the paper.

8) A horizontal scale located on the top of the core bar provides column locations for each of the 132 print columns. Horizontal adjustments may be made by unclamping both tractors and moving both tractors and paper to the desired position.

9) Close the access cover. Be certain that the leading edge of the paper protrudes through the paper exit without binding.

10) Logical Top Of Form is defined as the present paper position when the printer is put on-line after a paper-out condition has occurred.

11) To remove paper, tear below the machine (inside the stand) and operate the FORM FEED switch until all paper is clear of the machine.

CAUTION

Do not pull paper down through the printer; perforations may catch and damage the ribbon shield or paper out switches.

Replacing Ribbon Cartridges

Tools are not required to install or remove the ribbon cartridge.

NOTE

An interlock prevents printing when either ribbon cartridge is removed or the platen is open. A fault indication will be displayed on the control panel by the PLATEN/RIBBON indicator during ribbon removal and installation.

Removal

1) Pull the platen release lever toward you to open the platen.

2) Lift the back side of the ribbon cartridge until you have removed it from the drive shaft and the mounting slot in the metal base.

3) Discard the used ribbon cartridge.

4) Close the platen and clean any paper, dust or residue from the area under the ribbon cartridge.

Installation

1) Pull the platen release lever toward you to open the platen.

2) Slide the ribbon into place between the print mechanism and the metal ribbon shield, as shown in the sketch.

3) Fit the mounting lug on the lower left underside of the ribbon cartridge into the mounting slot on the metal base. Note the small knob on the top surface of the cartridge for moving the ribbon manually. Use this knob to take up any slack in the exposed portion of the ribbon and to make sure the ribbon is tight and straight.

4) Make certain the cartridge is secured on both the left and right ends, and that the ribbon is completely positioned in front of the print mechanism.

5) Close the platen.

HP 2601 Letter Quality Printer

The HP 2601 printer is a daisywheel printer that produces
typewriter-quality output. It uses either plastic or metalized
print wheels, which are available in several languages.

Loading Paper or Forms

Inserting paper or forms into the HP 2601 is accomplished in much
the same manner as in a standard typewriter. Paper is inserted
down behind the metal paper out bail and platen while the platen
is turned manually to bring the paper around and up in front of
the platen. The front paper bail aids in guiding the paper back
over the platen to the rear when pulled forward. The paper
release lever at the right-hand side of the printer may be pulled
forward to release roller pressure after paper insertion so the
paper can be properly aligned in the printer. After positioning
the paper, return both the front paper bail and paper release
lever to their operating positions.

Paper Thickness/Print Intensity Adjustment

The 2-position multicopy lever located at the front of the
carriage assembly adjusts for paper thickness and print
intensity. Setting the lever to its upper position moves the
carriage close to the platen, and actuates a switch for the
proper setting of light and medium weight paper and form sets of
up to two carbon copies. For heavier or form sets of up to five
copies, the Multicopy lever is set to its lower position. This
rocks the carriage away from the platen slightly, and deactivates
the switch, enabling increased print intensity.

To avoid the possibility of ribbon damage, the Multicopy lever
should always be set to its upper position when printing on
single sheets of paper using carbon ribbons.

Installing a Print Wheel

```
                            CAUTION
          Ensure that the power to the HP 2601
          is turned off before installing a
          print wheel.
```

1) Grasp the print hammer guide and pull it toward you to tilt
   the print wheel mechanism away from the platen and card
   guide.

2) Rotate the print wheel motor hub to bring the hub's alignment
   tab to the upper part of its arc of travel.

3) Grasp the print wheel (metal or plastic) by its rubber hub
   and place it on the print wheel motor hub. Align the wheel's
   alignment slot with the hub's alignment tab, and push the
   wheel firmly to fully seat it onto the motor hub.

4) Tilt the print wheel mechanism back rearward into its
   operating position.

5) Ensure that the print wheel select rotary switch on the
   inside control panel matches the type of print wheel
   selected.

Removal of the print wheel is simple. Tilt the print wheel
mechanism toward you, grasp the print wheel by its rubber hub and
pull it free of the print wheel hub.


```
                            NOTE
          Print wheels are rugged and dependable,
          but they can be damaged.  Use care when
          handling them to avoid bending the pe-
          tals.  Always store them in their plas-
          tic containers when they are not in-
          stalled in the printer.  When instal-
          ling a metal print wheel to be used
          with a cloth ribbon, make sure the
          print wheel is clean.
```

Replacing a Ribbon Cartridge

CAUTION

Ensure that power to the HP 2601 is
turned OFF (initial start only).

1) Open the plastic envelope and remove the ribbon cartridge.
   Note the small knob on the top surface of the cartridge for
   moving the ribbon manually. Use this knob to take up any
   slack in the exposed portion of the ribbon and to make sure
   the ribbon is tight and straight.

2) Hold the cartridge in one hand with the exposed ribbon toward
   the platen as shown. Lower the cartridge down over the print
   hammer guide. Engage the ribbon behind the two ribbon guide
   posts and push the cartridge "ears" against the card guide.
   Check that the exposed ribbon is straight, and located
   between the card guide and print wheel. Push the cartridge
   down firmly until both latches have snapped into position
   locking the cartridge on the carriage ribbon platform. Rock
   the cartridge back and forth on the platform to ensure that
   the ribbon is free to move up and down. Turn the manual
   ribbon advance knob to ensure that the ribbon is tight,
   straight and ready to operate.

   You remove the ribbon cartridge by pressing down on both
   latches simultaneously. Raise the cartridge slightly,
   grasping it gently, and lift it out of the printer.

3) When a ribbon cartridge is nearly empty, a yellow
   cross-hatched pattern will appear on the visible back side of
   the ribbon.

   The HP 2601 will stop printing, sound its alarm and light the
   RIBBON/PAPER lamp if printing is attempted with the ribbon in
   the warning (yellow) zone.

NOTE

When installing a cloth ribbon to be used
with a print wheel make sure the print
wheel is clean. See the section with
cleaning instructions.

Cleaning Print Wheels

Print Wheels used with carbon ribbons seldom need cleaning.
Plastic Print Wheels used with cloth ribbons require an occa-
sional cleaning. A Metal Print Wheel requires periodic cleaning
when used with a cloth ribbon. Consult the operating manual sent
with the printer for procedures on cleaning the print wheel.

Changing Ribbons During Operation

As mentioned earlier, the HP 2601 will stop printing, light the
RIBBON/PAPER light, and sound the alarm upon reaching the end of
a carbon ribbon. Should this happen while receiving data from
the system, you should open the access cover, replace the ribbon
cartridge as described, close the access cover, and then touch
the Control Panel RESET switch to resume printing.

<div align="center">

NOTE

You should ensure the ribbon is ten-sioned and in the position (up or down) last commanded by the host prior to resuming system operation.

</div>

Cleaning the Print Hammer

Consult the operating manual sent with the printer for procedures
on cleaning the print hammer.

HP 2622D Thermal Printer

The optional thermal printer uses specially manufactured paper.
It is recommended that you always use HP Thermal Paper in your
printer. Use of non-HP paper can shorten the life of the print
head and also affect print quality. Additionally, if you have an
HP Warranty Service Contract, you must use HP Thermal Paper to
maintain a valid contract.

Loading Thermal Printer Paper

To load a roll of thermal paper, perform the following steps:

1) Lift the top cover of the printer mechanism. An illustration
    of the correct paper position and flow is embossed on the
    underside of the cover.

2) Press the latch toward the front of the unit to release the
    latching frame. Lift the hinged latching frame to its
    forward position.

3) Remove any paper remaining in the printer.

4) The center paper core is held in place by a metal rod
    inserted through the center of the core. Grasp the core and
    lift forward and upward along the guide slots to remove the
    core and rod.
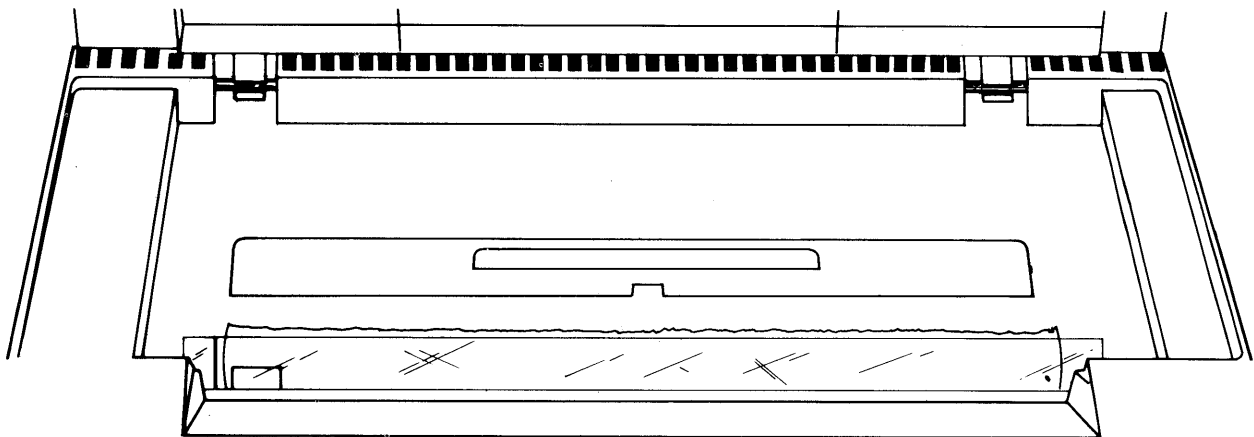
5) Remove the old core from the rod and insert the rod through the core of a new roll of paper.

6) HP Thermal Paper is coated with print material on only one side; it must be inserted correctly into the printer to produce a print image. The paper must feed toward the front of the unit from the underside of the paper roll.

7) Place the ends of the metal rod into the guide slots and press downward and then toward the back of the unit until the rod snaps into place.

8) Feed the leading edge of the paper through the latching frame and the clear plastic guide window.

CAUTION
The print head is relatively fragile and susceptible to damage; be careful not to strike it while loading paper.

9) Lower the latching frame without locking it into place.

10) Align the sides of the paper with the guide lines embossed on each side of the guide window.

11) Each new roll of HP thermal paper has a glue spot near the leading edge of the roll that holds the paper roll intact during shipment. You must not allow the print head to come in contact with this glue spot. Feed approximately 12 inches of paper through the latching frame so that the glue spot is beyond the print head and guide window.

12) Press the latch down until it clicks into place. If the latch is not locked, a printer error will be printed at the bottom of the screen whenever you attempt a print operation.

13) Tear off the excess paper using the guide window as the cutting edge.

14) Close the top cover securely and then press the ENTER key.

NOTE
If subsequent printer operations produce no image on the paper, you probably installed it with the wrong side facing the print head.

Graphics Devices

Graphics Plotters

A Graphics Plotter allows you to draw pictures on your computer
system, like these:

```
                            XYZ COMPANY
                              ORDERS
              TOTAL            DOMESTIC          INTERNATIONAL
           _____         .........         _ _ _ _ _ _

        DOLLARS IN MILLIONS
  3500 |
       |
  3000 |
       |
  2500 |
       |
  2000 |
       |
  1500 |
       |
  1000 |
       |
   500 |
       |
     0 |___|_____|_____|_____|_____|_____|_____|_____|_____|___
       1971  1972  1973  1974  1975  1976  1977  1978  1979  1980
                              FISCAL YEAR

         PLOTTED ON HP 7220C GRAPHICS PLOTTER USING PROGRAM GPLE01
```
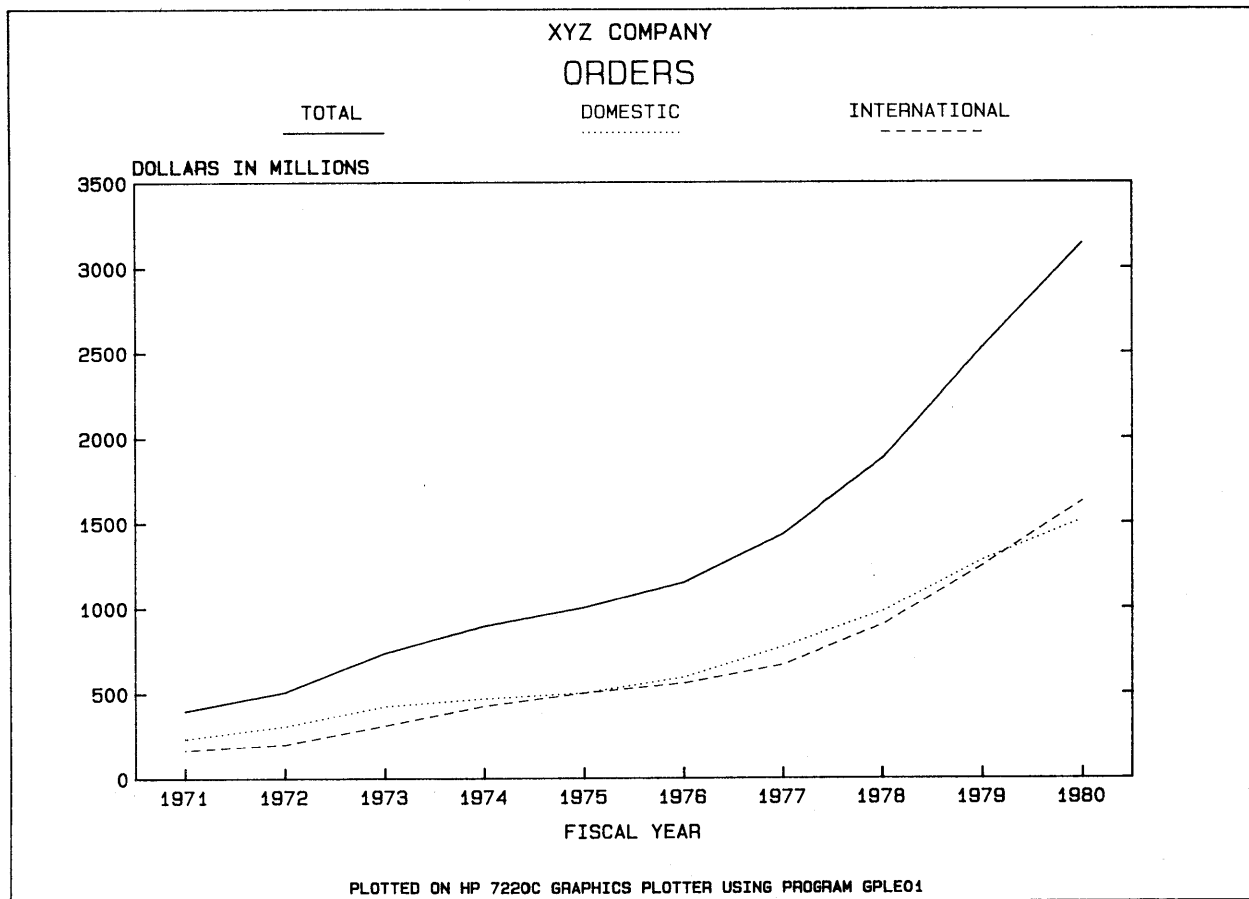
In order to draw these pictures, you need your application
program, and your graphics plotter must be connected to your
computer system.

Your plotter is likely to be a single pen plotter like this   .
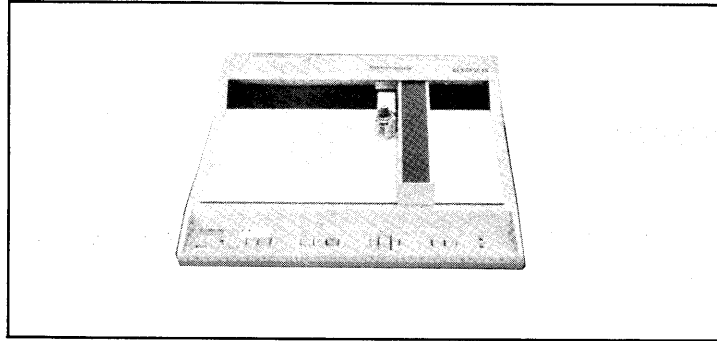
or an eight pen plotter, like this. .
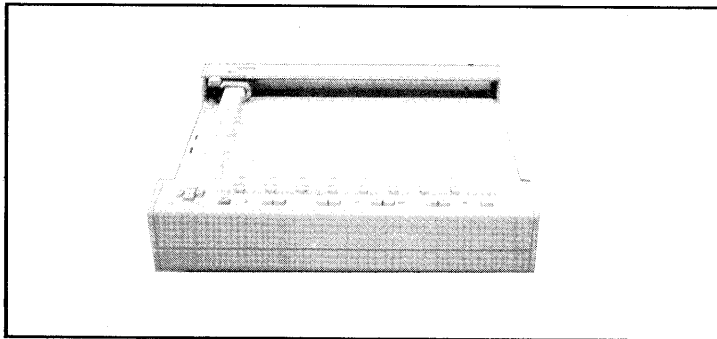
or an eight pen plotter with automatic chart advance, like this...
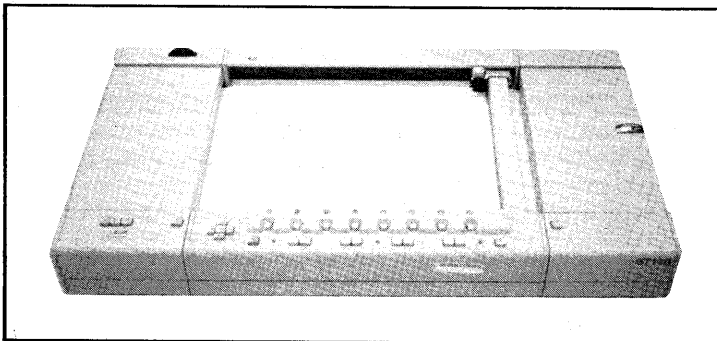
These plotters differ mainly in the maximum paper size, number of pens, type of paper, and automatic paper advance capability.

In this chapter, you will learn how to operate an HP Graphics
Plotter.

The instructions from this chapter are a simplified version of
those available from the Operating and Programming Manuals
supplied with HP Graphics Plotters. More details and pictures
may be found in the manual supplied with your plotter.

To proceed further, you should have one of the following plotters
connected to your system:

>   Single Pen Plotter
>
>   HP 7225A/7225B Graphics Plotter with either
>   option 17603A RS-232-C Personality Module
>   or
>   option 17604A RS-232-C Personality Module
>
>   Four Pen Plotter
>
>   HP 7220A/7221A/7221B Graphics Plotter
>
>   HP 7220S/7221S Graphics Plotter
>   with automatic paper advance
>
>   Eight Pen Plotter
>
>   HP 7220C/7221C Graphics Plotter
>
>   HP 7220T/7221T Graphics Plotter
>   with automatic paper advance

Turning on AC Power

If the device has never been connected to your power line, be
sure it is properly configured for your type of AC Power BEFORE
plugging it in. See the plotter Operating and Programming Manual
for details.

1. Locate the Power Switch

>   Single Pen Plotters - Located on the right hand side near
>   the base of the plotter.
>
>   Four and Eight Pen Plotters - Located under the right front
>   edge near the base.

2. Turn on the Power

Push the switch until it stays in the depressed position. To later turn off the power, just push again to release from the depressed position.

Noticeable things should happen; the sequence depends on the particular plotter.

Single Pen Plotters

1. The LINE lamp goes on steadily.
2. The OUT OF LIMIT light momentarily flashes on.
3. The pen holder moves to the lower right corner.
4. Any paper that was on the plotter will now be held down by electrostatic force.

Four and Eight Pen Plotters

1. The pen holder moves to the lower right corner.
2. The ON LINE light turns on steadily.
3. The OUT OF LIMIT light turns on steadily.
4. Any paper that was on the plotter will now be held down by electrostatic force.

Now you are ready to add or change pens and/or paper.

Loading Pens and Paper

Pens and paper may be loaded before starting your application program and changed while running the program.

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

For safety reasons, the plotter should be disabled from receiving any data from the computer whenever pens or paper are changed.

Disabling the Plotter

To disable the plotter:

SINGLE PEN PLOTTERS - Carefully push the CHART LOAD pushbutton
so that the RESET button is not pushed. The CHART LOAD lamp
will go on and the plotter will be disabled from receiving any
data from the computer. First change the pens and then the
paper, turning off the CHART LOAD lamp as the last operation.
If you choose to smooth down the paper after turning off the
CHART LOAD lamp, do it at your own risk after making sure that
no system user is sending data to your plotter. If your
application program is running, it will supply some safe-
guards.

FOUR and EIGHT PEN PLOTTERS - Push the STBY (STANDBY) switch
to cause the standby lamp to go on steadily. You should do
this only when plotting has stopped because any data in the
plotter will be purged by this operation. With the STANDBY
lamp on, you may change pens and paper safely in any order.
When ready to resume plotting, push the ON LINE button twice
to cause the lamp to blink steadily and check that the CHART
LOAD lamp is off.

Changing Pens

HP offers a variety of pens including are narrow tip (0.3 mm) and
wide tip (0.6 mm or 0.7 mm) pens for paper and overhead
transparency film in a variety of colors.

The most commonly used pens are the narrow line (0.3 mm) paper
pens in black, red, green, and blue colors; you should ensure
that a supply of these pens are kept in stock.

The procedure for loading and changing pens differs for the
single pen and multiple pen plotters. In both cases the plotter
should be disabled as explained above before performing the
operation.

Single Pen Plotters:

1. Disable the plotter by turning on the CHART LOAD lamp.

2. Pull out the old pen with one hand while holding the metal
   carrier ring with the other hand.

3. Press the new pen into the holder while still holding the carrier ring with the other hand. See the illustration below.

4. Re-enable the plotter by turning off the CHART LOAD lamp. You should put a cap on the pen after the plotting session is terminated.

Four and Eight Pen Plotters:

1. Disable the plotter by turning on the STANDBY lamp.

2. Push the PEN SELECT pushbutton for the stall to be loaded. The old pen will be placed in the pen holder.

3. Remove the old pen from the pen holder.

4. Load the new pen into the pen holder, as shown in the figure below.

5. Push the ENTER and appropriate PEN SELECT (1-8) push-buttons in sequence. The pen will be loaded into the selected stall.

6. Repeat the operation for any other pens to be changed.

7. It is recommended that stalls 1 through 4 be loaded with narrow line paper pens, black, red, green, and blue, respectively.

8. Set the ON LINE lamp to the blinking state when ready to continue plotting. The STANDBY lamp should turn off automatically.

9. After finishing plotting, be sure that all pens are in the stalls. If one remains in the pen holder, it may dry out. To return it to the holder, push ENTER and the appropriate PEN SELECT (1-8) pushbutton.

Changing Sheet Paper

All of the HP Graphics Plotters are capable of plotting on smooth surface sheets of paper, smooth so that the ink does not bleed. HP supplies a broad range of such paper, and others may be used.

Common paper sizes that are used include:

    ISO A4 - 210 mm x 297 mm
    ISO A3 - 297 mm x 420 mm

    English A - 8.5 in. x 11 in.
    English B - 11 in. x 17 in.

Most plotting is done with ISO A4 or English A sizes. The following procedures are given for these smaller size sheets. Similar procedures are used for large size sheets on 7220 and 7221 plotters.

    Single Pen Plotters:

    1. Push the CHART LOAD pushbutton to turn on the CHART LOAD
       lamp. This both disables the plotter from the computer
       and turns off the electrostatic paper hold.

    2. Remove old sheet of paper.

    3. Place a new sheet down on the surface. If the sheet has
       binder holes along a long edge, PLACE THE HOLES TOWARDS THE
       BACK OF THE PLOTTER, away from the front panel controls.

    4. Smooth out the paper with the back of your hand.

    5. Push the CHART LOAD lamp to turn off the lamp.

<div align="center">NOTE</div>

The plotter RESET button is adjacent to the CHART LOAD button. If this is accidentally touched while running the application program, valuable data may be lost. In addition, care must be used if you smooth out the paper with the CHART LOAD lamp off. The single pen HP Graphic Plotters do not have any other convenient way to be disabled from the computer. Usually, your application program will provide safeguards. If so, paper should be changed only after starting the application program.

Four and Eight Pen Plotters:

1. Disable the plotter by turning on the STANDBY lamp.

2. Push the CHART LOAD pushbutton to turn on the CHART LOAD
   lamp. The OUT OF LIMIT light should also go on steadily,
   and the pen holder is moved to the upper right corner of
   the platen.

3. Remove old paper.

4. Place sheet of paper on the platen so that the lower edge
   is under the lips of the nylon paper stop. Then move the
   paper to the left so that the paper is snug against the
   left paper stop. (The left paper stop may be depressed.
   If so, raise the lower one by pushing with a pencil on the
   upper one.) See the figure below. For smaller sheets of
   paper (e.g., ISO A4), place the long edge of the paper
   against the left edge of the plotter.

5. Press the CHART HOLD pushbutton and smooth out any ripples
   using the back of your hand with left-to-right motion. The
   CHART LOAD lamp should go off.

6. When ready to resume plotting, push the ON LINE pushbutton
   twice. The ON LINE lamp should blink, and the STANDBY
   lamp should turn off.

Changing Roll Paper

The S and T plotter models have automatic chart advance
capability. You may use these plotters either with a roll of
paper or in the single sheet mode used with the other plotters.
See the Operating and Programming Manual supplied with your
plotter for detailed instructions on changing a roll of paper.

Loading Overhead Transparency Materials

The HP 17055A Overhead Transparency Kit may be used with HP Graphics Plotters to produce colorful, professional appearing transparencies for presentation.

The kit comes with 200 sheets of special overhead transparency film and a supply of pens in 7 colors and two line widths. Additional pens and film may be ordered separately.

Special procedures must be used in handling the pens and film, as described in the following sections.

Transparency Film Pens

The transparency film pens have a special fast drying ink for transparency film. The transparency film pens come in two line widths, which may be identified by markings on the top of the pen body. In addition, the pens come in many compatible colors.

Because of the fast drying tendency of the inks in the pens, the pens should be capped when not in use.

A pen should be checked after a period of storage by gently drawing a warm-up line on a scrap piece of film before placing the pen in the holder. Do not use pressure or the pen tip may be damaged.

A dry pen can sometimes be restored by dipping the tip in the special solvent supplied with the HP 17055A Overhead Transparency Kit. It may take several minutes before the dry seal dissolves. Try writing a line on a scrap piece of film. Repeat as needed.

For multi-pen plotters, you may wish to remove leftover ink from the boots in the pen stalls using a cotton swab and solvent. This will prevent the transfer of other inks to the plots.

The solvent may also be used to clean the transparency film ink from the hands, plotter surface, or transparencies.

It is recommended that paper pens be left in the plotter after finishing your application if the plotter is being used for both paper and transparency film applications.

Transparency Film

The transparency film surface must be completely free of
fingerprints and dust for the ink to adhere properly. Always
handle with the tissue covering the writing surface.

Leave the tissue on the film while placing it on the plotter.
Engage the electrostatic chart hold by turning off the CHART LOAD
lamp. Then smooth down the film with the back of your hand
rubbing across the tissue. Finally, carefully remove the tissue.

The ink dries on the transparency film in about 10 minutes at
20-30 degrees C (68-86 degress F). It will dry faster at
temperatures up to 55 degrees C (131 degrees F), slower at lower
temperatures to 10 degrees C (50 degrees F). Until dry, nothing
should be placed on the transparency material. You may carefully
remove it from the plotter while still wet, holding it by the
edges and placing it in a safe place.

Always store the dry transparencies in a cool, dry place with
tissue between sheets of film or enclosed in a plastic cover.

Limitation of Some Early HP 7225A Models

An application program can instruct the plotter to slow down the
maximum plotting speed for transparency film applications. This
allows better ink transfer from the pen to the transparency film.

Some early models of the HP 7225A Graphics Plotter do not have
programmable pen velocity control. For those models, the pen
will travel faster than desired for long lines, and you must be
especially careful to use clean transparency film and fresh pens
as often as possible.

Routine Maintenance

Maintenance of the plotter is limited to a periodic cleaning of the external surfaces, electrostatic paper hold-down surface, and air filter.

WARNING
Disconnect the plotter from the power source prior to performing any maintenance. When cleaning, apply water using a lint-free tissue. DO NOT allow water to run onto the electrical components and circuits or through openings in the enclosure as it may create a shock hazard. Scratches or punctures in the electrostatic paper hold-down surface may expose high voltage conductors. Plotters damaged in this manner should not be operated.

Electrostatic Paper Hold-Down Surface Cleaning

Dust and other contaminants will lower the paper holding capability. Although pen ink will not affect hold-down performance, it may be desirable to remove ink stains as well.

Cleaning moderate contamination can be accomplished as follows:

1. Prepare a mixture of 50% isopropyl alcohol and 50% water by volume.

2. Apply the alcohol/water mixture to the surface using a lint-free tissue. Immediately wipe any moisture from the surface. Never let any liquid stand on the surface as it may become permanently damaged.

If the surface cannot be easily cleaned with the alcohol/water mixture, cleaning can be accomplished as follows:

1. Select a clean, lint-free cloth that will not scratch the surface.

2. Remove transparency ink with solvent (HP 5060-6828) and dry thoroughly before continuing the cleaning process.

3. Dampen the cloth with warm water or alcohol and apply a light amount of powdered cleanser.

4. Wipe the surface until it is clean, then rinse the cloth and wipe any remaining cleanser from the surface. Immediately wipe any moisture from the surface. Alcohol and water may be used to remove the remaining cleanser from the surface.

Air Filter Cleaning

The air filter (located on the left side for single pen plotters and on the rear panel for multi-pen plotters) should be cleaned approximately every three months or when dirt becomes visible on the filter surface, whichever happens first. Remove the filter and either hold it under running water, or wash it in warm soapy water, followed by a rinse in clean water. Dry the filter thoroughly before replacing it.

In Case of Trouble

If the plotter does not seem to be operating correctly, perform the following sequence of steps:

1. Check to see the plotter is plugged in, powered on, and cabled properly.

2. Have your principal operator run the CONFIG program to ensure that your HP 250 is configured to use the plotter.

3. Run the plotter test program described in the chapter titled "In Case of Difficulty".

System Commands

You use system commands to execute programs, clear memory, store or retrieve files, delete files, copy files, and output information.

All mass storage operations deal with files, which are the basic component of a storage medium.

When you turn your HP 250 system on, the device used to load the operating system is automatically specified as the default mass storage device, unless another device is specified in the CONFIG program. This is the device to which all file operations are directed if no other device is specified.

REMINDER

Although all commands can be used with a cartridge tape drive, it is not intended to be used as a disc. Any use other than copying files in a sequential fashion will probably lead to poor performance and early drive failure.

Accessing Files on Storage Devices

Wherever a file name is used in a system command, a unit specifier or a volume name can be included. The unit specifier is the physical location of the file (a cartridge tape, hard disc, flexible disc) while the volume name is a name that you assign to a storage medium with the PRINT LABEL command.

The following is analogous to accessing files on your HP 250 system. Suppose you asked a friend to come to your home. Once this friend arrives at your street, there are several ways he can locate your home. One way could be that the friend is aware that your name is painted on your mailbox; he can look at every mailbox until he finds the right name. Another way could be that you told the friend your street address; with this piece of information, your friend can locate your home easily.

Accessing mass storage devices is very similar to this. You can access a file on any particular storage device by knowing either the label of the storage medium (the volume name) or by knowing the physical address of the storage device (the unit specifier).

Assigning Names to Storage Media (PRINT LABEL)

You assign names to storage media with the PRINT LABEL command. For example, if you wanted to have the label SAMPLE on the volume in the default mass storage device, you would enter:

PRINT LABEL "SAMPLE"

The label you give to a volume cannot exceed 8 alphanumeric characters, the first of which cannot be a number.

If you do not know the label on the default mass storage device, but wish to find out, enter the following command:

READ LABEL A$

Physical Addresses

Each storage device is assigned an address by which you can access the files located on the medium that is currently located in the drive.

For example if you want to print the label SAMPLE on a tape cartridge (which is not the default mass storage device), you enter the following command:

PRINT LABEL "SAMPLE" ON ":K"

The ":K" specifies the physical address (the unit specifier) of the tape.

If you wanted to determine the label on a tape currently in the tape drive (and the tape drive is not currently the default device), you enter the following command:

READ LABEL A$ ON ":K"

A list of all physical unit specifiers appear in Appendix C.

Once you understand this concept of accessing discs and files through either physical addresses or volume names, you will have no trouble using the commands presented in this chapter.

Changing the Default Mass Storage Device (MSI)

As described earlier, the device that is used to load the operating system is automatically specified as the default mass storage device. You can change the default device by executing the MASS STORAGE IS (or MSI) command.

For example, if you want to declare the tape drive as the default mass storage device, enter the following command:

                         MSI ":K"

If you want to declare the volume whose label is SAMPLE as the mass storage device, enter the following:

                         MSI",SAMPLE"

Executing Programs (RUN)

To load and run a program that is not currently in memory, you use the RUN command. For example, if TAX is the name of a program to be loaded, the command:

                         RUN "TAX"

causes TAX to be loaded into memory from the default mass storage device and then run.

If any program already exists in memory, then the command

                             RUN

causes that program to be run.

Erasing the Contents of Memory (SCRATCH)

All or part of your user work area can be erased by using the
SCRATCH command .

SCRATCH	Erases programs and variables
SCRATCHA	Erases the entire user area (same as CONTROL HALT)
SCRATCHP	Erases programs, variables, and binary routines.
SCRATCH KEY#	Erases softkey typing-aid definitions.

File Operations

You can store data and programs on various mass storage media for
later use. All devices are operated with the same statements and
functions that are described here.

Storing Programs (STORE)

The STORE command stores a program file on a mass storage device
for later retrieval. The command:

STORE "TAX"

causes a program named TAX to be stored on the default mass
storage device. A file created by the STORE command is labeled
as being file type PROG in a CATalog listing.

If you want to store a program file on a device other than the
mass storage device, you have to specify the location of the
volume that you wish to store it on. For example, to store a
program on a 7908 hard disc, enter the following command:

STORE "TAX:Q"

To store a program in memory into the same file name as before,
use the RE-STORE Command. For example, if you want to store TAX
to the default mass storage device and it is already there, you
get an error (ERROR 54) when you execute STORE "TAX". In order
to do this, you must execute RE-STORE "TAX".

Transferring Program Files into Memory (LOAD)

The LOAD command transfers a program file created by a STORE
command from a mass storage device into the computer's memory.
The command:

                        LOAD "TAX"

transfers the file TAX from the mass storage device into memory
for your use. Note that if the file has been specially marked as
run-only (see the CATALOG command section), it will begin to
execute after being LOADed.

Storing Data Files (SAVE)

The SAVE command creates a DATA file and stores a program
currently in memory on a storage device for later retrieval. The
command:

                        SAVE "TAX"

saves the program TAX as a DATA file on the default mass storage
device. You retrieve a data file stored by the SAVE command with
the GET command.

Transferring Data Files into Memory (GET)

To transfer a data file created by the SAVE command from a mass
storage device into the computer memory, use the GET command.
For example, execute:

                        GET "TAX"

to transfer the data file TAX from the default device into
memory.

Copying a File (COPY)

The COPY command duplicates a file, either on the same medium or on another medium.

Copying to the Same Mass Storage Devices

If you wanted to copy a file named TAX to the same mass storage device, you would execute the following command:

COPY "TAX" TO "INCTAX"

Note that you must name the destination file with a different name than the file you wish to copy. If you tried to copy the file TAX to another file TAX on the same mass storage device, you would get an error message (ERROR 54) which tells you that a duplicate file already exists.

Copying to a Different Mass Storage Device

If you need to copy a file onto a second mass storage device, the COPY statement can be used with a slight modification from the first example.

COPY "TAX:Q" TO "TAX:K"

This above command transfers a file named tax from the tape cartridge to the 7908 fixed disc. Since the files are on different media, they can have the same name.

Here is another example that uses labels, rather than unit specifiers, to designate media:

COPY "TAX,VOL1" TO "TAX,VOL2"

VOL1 and VOL2 are the names of two different media, that have been given via the PRINT LABEL command.

Cataloging Files (CATALOG)

The CATALOG command creates a listing (catalog) of the files
stored on a mass storage device. This listing indicates whether
or not those files are accessible, and provides information
relating to that file. For example, if you need a CATALOG
listing of the default mass storage device, execute the following
command:

                              CAT

The first column of the table designates the file name. Any
notation appearing in the PRO column indicates that the
associated file is protected; this means that a file cannot be
edited. Although files can be protected, restricted access can
be allowed in the case of 2 protect codes, * and RO. If either
of these codes is found in the PRO column, the associated file
can be accessed by LOAD, GET, or RUN. However, unlike a file
coded * , a file designated as RO is erased after being run, and
cannot be displayed or listed. The TYPE label refers to one of
the several file types. The most frequent types of files are
PROG and DATA, which indicate program and data files
respectively.

```
CAT ":F"
NAME    PRO    TYPE    REC/FILE    BYTES/REC    ADDRESS
UTILITY:F2,6,0
  ACCEPT   *     BPRG        4         256          60
  BIT      *     BPRG        2         256          64
  CATBIN   *     BPRG        3         256          66
  DATE     *     BPRG        3         256          69
  DBPASS   *     BPRG        4         256          72
  DBSTOR   *     BPRG       18         256          76
  DBUTIL   *     BPRG       15         256          94
  DUP      *     BPRG        5         256         109
  R-ONLY   *     BPRG        1         256         114
  REVCHK   *     BPRG        1         256         115
  TAPBIN   *     BPRG        1         256         116
  XCOPY    *     BPRG        4         256         117
  BACKUP  RO     PROG       59         256         121
  BKSUB1  RO     PROG      203         256         180
  BKSUB2  RO     PROG      168         256         383
  BCKF1    *     FORM        6         256         551
  BCKF2    *     FORM        6         256         557
  BCKF3    *     FORM        5         256         563
  BCKF4    *     FORM        3         256         568
  BCKF5    *     FORM        4         256         571
  BCKF6    *     FORM        4         256         575
```

Example of CAT Listing

To obtain a catalog from a medium other than the mass storage device, you can use either the unit specifier or volume label. For example, if you wanted to see a catalog of the tape cartridge located in the tape drive, you would execute the following command:

CAT ":K"

You will then see a table listing of all files present on the tape cartridge.

If you wanted to obtain a catalog of a volume labeled HP250 (it could be any physical device), enter the following command:

CAT ",HP250"

Selective Catalogs

Suppose rather than obtaining a catalog of all files located on a specific mass storage device, you wanted just a listing of all files beginning with the letters HP or a listing of all type DATA files on a mass storage device. You can do this by adding some information to the CAT command.

For example, to obtain a listing of all files beginning with the letters HP that reside on the default mass storage device, you would enter the following command:

CAT "HP"

To obtain a listing of all files that are type DATA on a flexible disc, enter the following command:

CAT ":F",DATA

Finally, suppose you want to obtain a catalog listing of all programs beginning with the letters HP that are type PROG and reside on the 7908 fixed disc; enter the following command:

CAT "HP:Q",PROG

In all cases, the catalog is listed on the current system printer. This is usually the display. To obtain a hard-copy listing of a catalog, look at the section in this chapter on output commands.

Deleting Files from a Mass Storage Device (PURGE)

The PURGE command deletes a file from a mass storage device. You should use PURGE with caution; if you delete data by mistake, and have no back-up copy, that data is lost.

Assume that TAX is a file stored on a tape cartridge and is outdated or no longer required. You purge the file by executing the following command.

    PURGE "TAX:K"

As soon as the PURGE has been performed, the cursor reappears on the display. If you try to purge a file that is not present on the particular storage device, you get an error message (ERROR 56).

If you would like to verify that the file TAX has been purged from the mass storage device, you can use a CAT command after you have executed the PURGE command.

Output Commands

Information output from your HP 250 takes three forms: PRINT outputs, SYSTEM outputs, and PRINT ALL outputs. All outputs are automaticallly output on the display screen after the system is powered on or reset. The display is called the default output device. Alternatively, you may specify other devices to output each type of information by using the appropriate statements described here.

There are several commands you can use to output information. They are the PRINTER IS, the SYSTEM PRINTER IS, and the PRINT ALL IS commands. The table below gives you a general summary of these commands.

Output Type	Operations Affected	Controlled By
PRINT	PRINT, PRINT USING	PRINTER IS
SYSTEM	LIST, CAT, TRACE, Single-Step	
	Output	SYSTEM PRINTER IS
PRINT ALL	All displayed information	PRINT ALL IS

Peripheral Addresses

Each peripheral device connected to your HP 250 responds to a unique address. The address is a number between 0 and 20. Switches on each device are used to set each address. The following table is a list of the numbers that you will use to direct output to printers.

0 through 5	System Printers
8	Display
10 through 20	Remote printers connected to workstation

Outputting Listings and Catalogs (SYSTEM PRINTER IS)

The SYSTEM PRINTER IS statement assigns the device used for all SYSTEM outputs; these include the CAT and LIST commands.

To specify the system printer as the output device, enter the following command:

SYSTEM PRINTER IS 0

Suppose you want to print a catalog listing of a volume on a printer, rather than displaying it on the screen. You would execute the above command, followed by the appropriate CAT command. When you no longer wanted to direct information to the line printer, enter the following command:

SYSTEM PRINTER IS 8

After executing this statement, all information is displayed to the screen only.

Printing all Displayed Information (PRINT ALL IS)

To obtain a permanent copy of all of your interactions with the system, you use the PRINT ALL IS command to specify a device other than the display. For example, suppose you want to use the system printer to record all of your interactions. Enter the following command:

PRINT ALL IS 0

If you no longer wish to record all of your interactions with the system, enter the following command:

PRINT ALL IS 0

If your workstation has an optional thermal printer, you can record all of your interactions with the system by entering:

PRINT ALL IS 10

Setting a Printer to Top of Form

The PRINTER IS command assigns the output device for all PRINT and PRINT USING operations, which are normally issued within a program. Each successive PRINTER IS statement cancels the previous one. Therefore, if you specify a device with this statement, it is overridden if a program you run sets the printer to another device. For most intents and purposes you will not issue this command.

There is one place where this command might prove to be useful. If you wish to set a printer to the top of the form, you use the PRINTER IS statement followed by a PRINT PAGE statement.

For example, if you wanted to set a printer at address 0 to the top of form without walking to the printer, you would enter the following sequence:

PRINTER IS 0
PRINT PAGE

If you wanted to send the thermal printer to the top of form, enter the following command:

PRINTER IS 10

followed by:

PRINT PAGE

If you look carefully at the thermal printer paper, you will notice a small tick mark. This tick mark is the bottom of form. It is printed so that you can distinguish between pages easily.

CHAPTER 9
Maintenance

Maintenance of your HP 250 and associated peripherals (disc drives, printers, plotters, consoles) is limited to periodic cleaning of the external surfaces. Cleaning intervals are determined by the type of operation, local air contamination, and climatic conditions.

<div align="center">

WARNING

Disconnect devices from the power source prior to performing any maintenance. While cleaning, apply water using a lint-free cloth or sponge. Do not allow water to run into electrical components or circuits, or through openings in any enclosure as it may create a shock hazard.

</div>

General Cleaning

1) Get rid of any accumulated dust by vacuuming the surrounding area.

2) Clean outer surfaces only. Use only mild soap and water on a damp sponge or cloth. Do not use an abrasive cleanser; using one can result in scratches on the surface you are cleaning. Wipe all surfaces dry after cleaning; be sure that moisture does not get into the keyboard of your workstation or any other part of the system.

More detailed instructions for system peripherals are presented in separate reference manuals.

<div align="center">

REMINDER

When you have finished, remember to reconnect all devices as before.

</div>

CHAPTER 10
In Case of Difficulty

In the event that your system becomes inoperable, you should take action to pinpoint the problem. By checking the system yourself, you may be able to avoid calling for service. In any case, you can minimize the time needed to get your system back into operation.

When you get an error, you should do things the SLOW way:

  Stop what you are doing

  Look up error message or procedure described in this manual

  Observe what is on the screen

  Write down this very important information.

Generally, any difficulty you encounter falls into 1 of 2 categories.

  • Start-up errors
  • Processing Errors

One classic symptom of a start-up error is that the cursor does not appear on the screen. (Although this is not always true).

Processing errors can be caused as a result of hardware failures, software errors, or operator errors. They may result in a loss of the cursor and program control. They also may result in an inability to access certain data, print reports or plot charts.

Start-Up Errors

Self-Test Failure

The HP 250 automatically tests itself each time you turn it on.
The test checks the system for hardware failure. Results of the
test are displayed on the principal workstation.

If any component of the self-test fails, you should turn your
HP 250 off and then back on again.

If any component of the self-test fails on successive reloads,
make a note of the message on the screen.

If the problem occurs intermittently (i.e., not on successive
reloads), keep a record of the occurrence and the circumstances
leading up to the error.

Once all the tests have passed, loading the operating system is
started.

System Loading

If the message:

>   "The 'SYSTEM' file was not found"

appears on the principal workstation after repeated attempts to
reload, or a different error occurs, reload using a back-up copy
of the operating system.

If this procedure is unsuccessful, you should record the
resulting error message and contact HP for service.

If the message:

>   "The system is waiting for the disc to warm up"

appears on the principal workstation, you should wait a few
moments and retry the start-up procedure. If this message
appears repeatedly or a different error occurs, record the
resulting error message and contact HP for service.

Loader Errors

If you encounter a loader error, consult the proper section in
the Appendix with error messages.

For example, if the following message:

                    LOADER ERROR B

appears on the principal worksation, you will find that this
resulted from a disc read error (by looking in the appendix with
error messages). Loader errors A through C may indicate that the
medium holding the Operating System is worn or damaged. Try
loading the system with the backup copy of the Operating System
disc. If any loader error persists after repeated tries, record
the error message and call HP for service.

Configuration Messages

Configuration messages indicate an inconsistency in
hardware/operating system configuration. Although your HP 250
system can operate with these inconsistencies, they should be
corrected as soon as possible.

For example, if the message:

               MEMORY FAILURE — BLOCK 10

appears, either the Operating System was told (via the CONFIG
Utility Program) to expect more memory than available or a memory
block has failed. Consult your principal operator to remedy this
problem. Other configuration messages are described in Appendix
E.

Remote Workstation Failure

In the event that your remote workstation is unoperable (either
the cursor does not appear or there is no response to the
keyboard), you should take appropriate action to pinpoint the
problem. By checking the workstation yourself, you may be able
to avoid calling for service.

There are three basic steps you can perform:

1. Ensure that the workstation is plugged in, powered on, and cabled properly.

2. Use the TEST key to determine if your workstation is functioning. The TEST key is described in Chapter 3. If an error message appears as a result, record the error message.

3. Have your principal operator run the CONFIG utility program to determine if the operating system is configured to use the remote workstation.

Processing Errors

As described before, processing errors are caused as a result of hardware failures, software errors, or operator errors.

Hardware Failures

Hardware errors can also occur during processing. They are noted by error messages as listed in Appendix E.

If you get a hardware error, note all conditions preceding the error: try to recall the key sequence you pressed, any error message, and also all environmental conditions.

Software Errors

Software or programming errors are caused by an error in a program being run on your HP 250 system. Given the identical set of operating conditions, a software error will occur repeatedly. It occurs when the program is loaded and run.

If a software error occurs, note all conditions preceding the error: record the key sequence you pressed, any error message (and line number if indicated), the number of the form or report presently being used, incorrect program output. If the keyboard is unresponsive due to the error, press the HALT key to stop the program. If that is not effective, press SHIFT HALT. If the keyboard continues to be unresponsive, press CNTL HALT.

Operator Errors

Operator errors are caused by attempting incorrect procedures, inappropriate commands, or commands with incorrect form. If you encounter an operator error, it is probably a result of a typographical error.

System Errors

Some special system malfunctions are denoted with the words:

SYSTEM ERROR

If a system error occurs while a program is executing on the HP 250, you see a screen similar to the one shown at the bottom of this page.

When this occurs, perform the following sequence of steps:

1) Record the entire contents of the screen on a piece of paper. In addition, you should write down what you were doing when the system error occurred; the program you were running and programs other users were running can provide important background information. You should also record anything else you may have observed which you feel may be important. A sample of this is displayed below.

```
                                              SYSTEM ERROR  021010
                                                            021007
                                                            113432
                                                            102563
                                                            045342
                                                            121342
        This is an example of a System Error Display          123215
        on the Principal Workstation.                         154342
                                                            021121
                                                            023333
                                                            002121
                                                            010224

                                                            121123
                                                            176542
                                                            023412
                                                            012432
                                                            054632
                                                            021111
                                                            012115
                                                            044332
                                                            012222
                                                            044310
                                                            021111
```
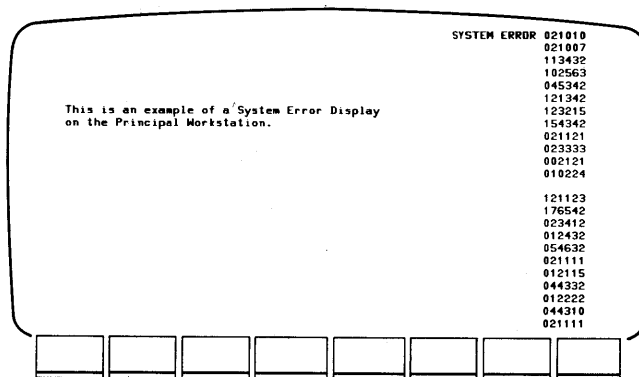
2) To produce a printed report of the system error on the system printer at address 0, press the ENTER key located next to the data entry pad. To produce a report on the system printer at address 15, press the EXECUTE key.

   Keep this report with the copy of the screen contents from Step 1 for future reference. Together, they provide information that is extremely valuable in diagnosing problems that may exist.

   ──────────── NOTE ────────────
   If you press the ENTER key and get no
   response, do not be alarmed. There
   are several conditions that may cause
    this. Proceed to Step 3.
   ──────────────────────────────

3) Start the system up again (see Chapter 2 for details).

4) Notify your customer engineer about the system error.

If the System Error problem persists, repeat the previous series of steps.

System Tests

The computer automatically performs a series of internal tests immediately after power is switched on. You can perform additional tests to verify system operation by running the TEST program, which is included with the system software. Tests are available for checking the keyboard, display, printer, and mass storage media.

Except for the keyboard test, all tests described here can be run from any workstation.

To run the TEST program, enter the following command:

RUN "TEST"

Then select the test from the initial test menu:

```
                          SYSTEM TESTS
HP250.3.93.B

  DISPLAY TEST      - Provides utilities for CRT re-adjustment and testing.

  PRINTER TEST      - Allows system printers to be tested.

  MEDIA TEST        - Allows HP format media to be tested, and provides a
                      limited class of error recovery facilities.

  IBM MEDIA TEST    - Allows IBM format media to be tested.

  PLOTTER TEST      - Checks plotter configuration and exercises GPL.

  MISC. TESTS       - Provides tests for various other parts of the 250 hardware.


  Please select a function.


  DISPLAY  PRINTER   MEDIA   IBM MEDIA  PLOTTER    MISC.              EXIT
   TEST     TEST     TEST     TEST       TEST      TESTS             PROGRAM
```

The MISC.TESTS softkey accesses the keyboard test described later.

Display Tests

Press the DISPLAY TEST softkey to list the available display
tests:

```
                          SYSTEM TESTS
                          DISPLAY TEST

  DISPLAY CHECK - Tests basic CRT functions such as video enhancements and
                  character generation ROMs.

  DISPLAY RAM   - Puts various bit patterns in the display RAM.  A visual
                  inspection must be made that the patterns are correct.

  FOCUS & ALIGN - Displays a pattern on the CRT to aid in alignment.

  CYCLE MODE    - Toggles the cycle mode.  If the cycle mode is ON, the
                  DISPLAY CHECK or the DISPLAY RAM test will repeat forever.

                                                      CYCLE MODE: OFF

  Please select a function.

  ┌─────────┬─────────┬─────────┬──────┬──────┬──────┬──────┬──────┐
  │ DISPLAY │ DISPLAY │ FOCUS   │      │      │      │ CYCLE│ EXIT │
  │ CHECK   │ RAM     │ & ALIGN │      │      │      │ MODE │      │
  └─────────┴─────────┴─────────┴──────┴──────┴──────┴──────┴──────┘
```

The DISPLAY RAM and FOCUS & ALIGN tests are intended for service
use only.

Pressing the DISPLAY CHECK softkey first shows a series of
inverse-video fields, allowing you to check the screen for blank
areas or stray dots. Then the entire character set is displayed.

```
                          SYSTEM TESTS
                          DISPLAY CHECK
  US ASCII CHARACTER SET
  ...

  LINE DRAWING SET

  SYSTEM CONTROL CHARACTERS

  OPTIONAL EUROPEAN CHARACTER SET

  OPTIONAL KATAKANA CHARACTER SET

  VIDEO ENHANCEMENTS

  ┌──────┬──────┬──────┬──────┬──────┬──────┬──────┬──────┐
  │      │      │      │      │      │      │      │ EXIT │
  └──────┴──────┴──────┴──────┴──────┴──────┴──────┴──────┘
```
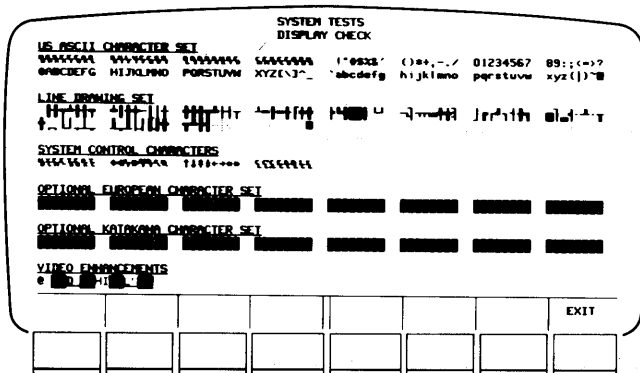
The optional European and Katakana character sets are not
displayed unless they are configured to be loaded with the
operating system.

After examining the final display, press EXIT to return to the
DISPLAY TEST menu. Press EXIT again to return to the SYSTEM
TESTS menu.

Printer Test

Press the PRINTER TEST softkey to select and test each printer in
your system.

```
                        SYSTEM TESTS
                        PRINTER TEST


   PRINTER TEST   - Tests the currently selected printer.  Various options
                    are available when testing each kind of printer.

   SELECT PRINTER - Allows the printer to be tested to be specified.

   CYCLE MODE     - Toggles the cycle mode.  If the cycle mode is ON, the
                    PRINTER TEST will repeat forever.




                                        Printer is currently CRT.
                                              CYCLE MODE: OFF

   Please select a function.


   PRINTER                    SELECT          CYCLE   EXIT
   TEST                       PRINTER         MODE
```

The printer currently selected is displayed on the right.   To
select another printer, press SELECT PRINTER.   Now the device
addresses of the printer(s) currently on-line are displayed.
Specify the device address of the printer to be tested by
pressing the appropriate softkey.   The next menu offers a choice
of tests:

```
                        SYSTEM TESTS
                        PRINTER TEST


   PROCEED        - Runs standard printer test.

   RIPPLE PRINT   - Runs a ripple print test.  This test runs until the EXIT
                    key is pressed.




                                        Printer is currently 0.
                                              CYCLE MODE: OFF

   Please select a function.


   PROCEED                    RIPPLE                  EXIT
                             PRINT
```

After selecting the test, compare the final printout with the
original test printout kept with the system.   If characters are
missing or misformed, contact HP for service.   Note that light
character printout could be caused by either a worn or defective
ribbon, or a dirty print head.   Refer to the printer section of
this manual or the printer's operating manual for details on
changing ribbon or cleaning the print head.

Press EXIT to return to the SYSTEM TESTS menu.

Media Test

Press the MEDIA TEST softkey to select and test each mass storage
medium in the system:

```
                              SYSTEM TESTS
                               MEDIA TEST

      VERIFY       - Verifies a media using tight margin read.  Will optionally
                     attempt to recover certain classes of errors.

      CHECK AVT    - Rebuilds the availability table from the directory.  Will
                     report any overlapping files which occur.

      RECORD 0     - Will attempt to recover a media which is giving error 85's
      RECOVERY       because of a trashed sector 0.

      SELECT       - Allows the device to be tested to be specified.
      DEVICE

                                        Currently selected device is :F2,6,0.
      _____
      Please select a function.



      _____
      | VERIFY  | CHECK | RECORD 0 |       | SELECT |       |       | EXIT  |
      |         | AVT   | RECOVERY |       | DEVICE |       |       |       |
```

The VERIFY softkey runs a test which reads each file on the
media.   The CHECK AVT and RECORD 0 RECOVERY softkeys provide
error recovery routines, as described later.

Pressing SELECT DEVICE lists the mass storage devices currently
in the system. The next menu, for example, lists the flex disc,
7906 fixed disc, and the 7906 removable disc as ready.

```
                              SYSTEM TESTS
                              SELECT DEVICE


               LABEL        DEVICE          COMMENT

                         FLEX DISC :F2,6,0
               SYSTEM    7906 CART :C2,7,0
               BACKUP    7906 FIXD :D2,7,0




                                     Currently selected device is :C2,7,0.
      _____
      Please select a device.


      _____
      | FLEX DISC | 7906 CART | 7906 FIXD |     |     |     |     | EXIT |
      | :F2,6,0   | :C2,7,0   | :D2,7,0   |     |     |     |     |      |
```

Press the appropriate softkey to select the device and return to
the MEDIA TEST menu.

Press VERIFY to start the media verification routine. Now select
whether the routine should automatically log any disc errors
encountered and continue (press W/O RECOVERY) or halt when
encountering a disc error (press WITH RECOVERY). The flex disc
test takes a minimum of 2 minutes; longer if errors are
encountered. A display message indicates the test progress:

```
Verify 15% complete.                    Currently selected device is :F2,6,0.

Total errors logged: 0.


                                                                EXIT
```
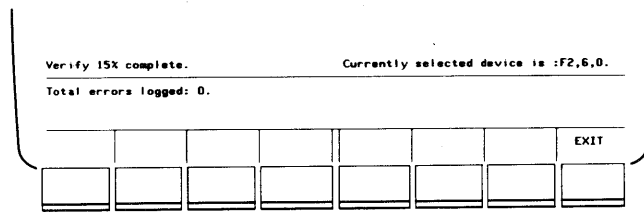
When W/O RECOVERY is selected, the final display indicates the
number of errors logged and where each error occurred. For
example:

```
                        SYSTEM TESTS
                        VERIFY MEDIA

ERRORS DETECTED:

    1:64:06 (POSS.)     1:66:04 (POSS.)     1:66:27 (POSS.)     1:67:11 (POSS.)
    1:67:18 (POSS.)     1:68:10 (POSS.)




Verify 100% complete.                   Currently selected device is :F2,6,1.

6 errors detected on media.


                                                                EXIT
```
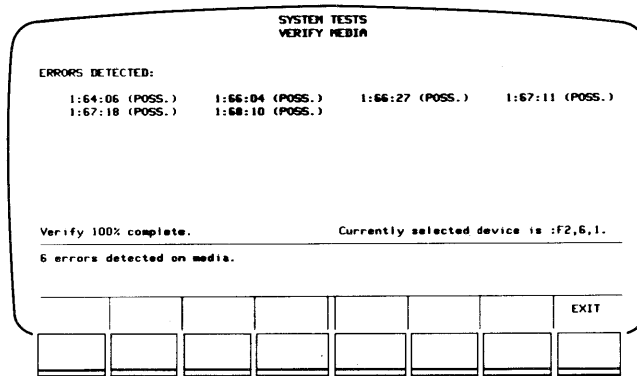
Each entry in the error list indicates the head, track, sector
and error type. "POSS." indicates a read-data error which is
possibly recoverable by running VERIFY and selecting WITH
RECOVERY.

```
        head      sector
          ↓         ↓
        1:67:11  (POSS.)
          ↑         ↑
        track    error type
```
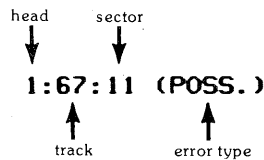
An * appears in place of the sector number when successive
sectors of a track cause errors. When testing a flex disc, head
0 is the bottom side and head 1 is the top side.

When WITH RECOVERY is selected, the test stops to display the
location and type of each error. You may choose to attempt to
recover (re-write) the file (press YES) or simply log the error
and continue (press NO). If the recovery fails, note the file
name so you can attempt to manually read the file later.

- For type PROG files, manually recover by LOADing and SAVEing
  the file. Then press CTRL HALT to erase any unexpected code.
  Now GET the program and RE-STORE it on another media.

- For type DATA files, attempt to GET or manually read the
  data.

- For type DSET or ROOT files, attempt to do a serial unload
  (DBUNLD) and recreate the file as described in the System
  Utilities Manual.

All other file types are not recoverable except via the VERIFY
routine.

IMPORTANT
The detection of any errors on a media indicates that either the media is worn or defective or the drive requires service. After running VERIFY with recovery, the media should be backed up onto a known good media. Consult your principal operator for details.

If Error in Main Directory appears when running WITH RECOVERY,
press EXIT and then press CHECK AVT to rebuild the availability
table. If the AVT fails, press RECORD 0 RECOVERY and copy the
spare directory to the main. Then run CHECK AVT again. Once the
main directory and availability table appear OK, run VERIFY
again.

IBM Media Test

Press the IBM MEDIA TEST softkey to select and test IBM 1/4 megabyte flexible discs.

```
                        SYSTEM TESTS
                        MEDIA TEST

    VERIFY      - Verifies an IBM 1/4 mbyte media using tight margin read.

    SELECT      - Allows the device to be tested to be specified.
    DEVICE




                                    Currently selected device is none.
    _____
    Please select a function.

    _____
    | VERIFY  |       |       | SELECT  |       |       |       | EXIT  |
    |         |       |       | DEVICE  |       |       |       |       |
```

The VERIFY softkey runs a test which reads each file on the media.

Pressing SELECT DEVICE lists the mass storage devices currently in the system and indicates the storage media that are eligible for testing.

```
                        SYSTEM TESTS
                        SELECT DEVICE

        LABEL       DEVICE          COMMENT

        UTILITY     FLEX DISC:F2,6,0    unavailable (not IBM 1/4 mbyte format)
        IBMDEM      FLEX DISC:F2,6,1



                                    Currently selected device is none.
    _____
    Please select a device.

    _____
    |         | IBMDEM |       |       |       |       |       | EXIT  |
    |         | :F2,6,1|       |       |       |       |       |       |
```

Press the appropriate softkey to select the device and return to the IBM MEDIA TEST menu.

Press VERIFY to start the verification routine. Displayed messages indicate test progress, total errors logged, and where each error occurred.

Keyboard Test

Press the MISC. TEST softkey on the SYSTEM TEST menu to access
the keyboard test. The other miscellaneous tests are intended
for service use only.

```
                           SYSTEM TESTS
                         MISCELLANEOUS TESTS


    ROM TEST        - Verifies that the checksum in the loader and parse table
                      ROMs are correct.

    7 SEGMENT LED   - Tests the 7 segment LED display on the processor board.

    THUMB SW. TEST  - Tests the switch positions of the thumb wheel on the
                      processor board.

    KEYBOARD TEST   - Tests keyboard of main console.

    CYCLE MODE      - Toggles the cycle mode.  If cycle mode is ON, the ROM TEST
                      will repeat forever.
                                                        CYCLE MODE: OFF
    Please select a function.


   ROM TEST |7 SEGMENT| THUMB  |KEYBOARD|        |        | CYCLE  | EXIT
            | LED TEST|SW. TEST| TEST   |        |        | MODE   |
```

Press KEYBOARD TEST to display representation of the main console
keyboard.

```
                           SYSTEM TESTS
                          KEYBOARD TEST


          ↑↑↑↑  ↑↑↑↑  ↑  ↑↑↑ ↑↑↑↑↑ ↑
         ↑↑↑↑↑↑↑↑↑↑↑↑↑↑↑↑↑    ↑↑↑ ↑
          ↑↑↑↑↑↑↑↑↑↑↑↑↑↑↑↑↑    ↑↑↑ ↑
           ↑↑↑↑↑↑↑↑↑↑↑↑↑↑↑↑    ↑↑↑ ↑
            ↑↑↑↑↑↑↑↑↑↑↑↑↑       ↑ ↑
    Control:
    Shift lock:
    Shift:
    Key press indicator:
                                              CYCLE MODE: OFF

    Press all keys.  Press the space bar when complete.

      ↑    |  ↑   |  ↑   |  ↑   |  ↑   |  ↑   |  ↑   |  ↑
```
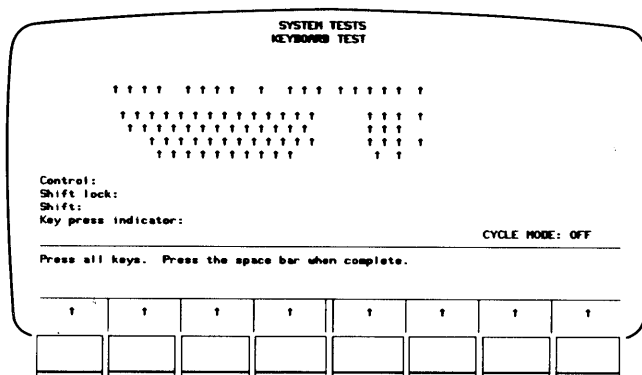
As each key is pressed, its corresponding up arrow is replaced by
an *. Arrows appear on the left to indicate whether CTRL, ◯
or ◯   is pressed with another key. The "key press indicator"
changes position as each key is pressed. Be sure to also test
the display softkeys.

If the key press indicator does not change position each time a
key is pressed, that key is defective. Call HP for service.

Press the space bar to return to MISCELLANEOUS TESTS menu.

Plotter Test

Press the PLOTTER TEST softkey to select and verify any plotters
connected to your HP 250 system. The initial menu describing the
test appears:

```
RUN "GPLCFT"
                    HP 250 PLOTTER/SYSTEM CONFIDENCE TEST
                                Introduction

Objectives of this test:
        1.  Verify that a graphics plotter is properly connected
            and configured to your HP 250 Computer System.
        2.  Verify that required plotter functions are working.

You should:
        1.  Turn on your plotter and load clean paper.
        2.  Follow the rest of the instructions in this program.
        3.  Examine the plot and compare with the picture in
            the manual OPERATING THE HP 250.
            Please be sure that no picture detail is missing.
        4.  If the picture is incorrect, see OPERATING THE HP 250
            for further instructions.

Press CONTINUE when your plotter is ready.


 _____                                            _____
 CONTINUE |      |      |      ||      |      |      | EXIT
          |      |      |      ||      |      |      | PROGRAM
```

Press the CONTINUE softkey. The screen appears as follows:

```
                        HP 250 PLOTTER/SYSTEM CONFIDENCE TEST
                                   Plotter Selection


           Model Number      Device Address

             7221S                11
             7221T                12
             7225A/3V             13
             7225B/4V             14




    Please select your device by pressing the appropriate softkey.


 ┌─────────┬─────────┬─────────┬─────────┬─────────┬─────────┬─────────┬─────────┐
 │  7221S  │  7221T  │7225A/3V │7225B/4V │         │         │  EDIT   │  EXIT   │
 │    11   │    12   │    13   │    14   │         │         │  GPL%CF │ PROGRAM │
```

You may now either test any of the devices previously configured
or edit the plotter configuration file (GPL%CF). If you are
getting started and need to add a plotter, or wish to change or
delete an already configured plotter, press the EDIT GPL%CF
softkey.

Adding, Changing, or Deleting Plotters

When you press the EDIT GPL%CF softkey, the following menu
appears:

```
                        HP 250 PLOTTER/SYSTEM CONFIDENCE TEST
                                Plotter Selection


            Model Number      Device Address


               7221S               11
               7221T               12
               7225A/3V            13
               7225B/4V            14




        Please select the edit option.


         ┌─────────┬        ┌─────────┬        ┌─────────┬        ┌        ┌─────────┐
         │  ADD    │        │ CHANGE  │        │ DELETE  │        │        │  EXIT   │
         │ PLOTTER │        │ PLOTTER │        │ PLOTTER │        │        │  EDIT   │
         └─────────┘        └─────────┘        └─────────┘        └        └─────────┘
```

ADD PLOTTER	Adds a plotter to the configuration file. When you first start up, you must specify the plotter type and address here. After pressing the ADD PLOTTER softkey, you will be presented with several menus which allow you to specify the model number, model type, and device address; if you are unsure of the model type, look at the plotter.
CHANGE PLOTTER	Changes an existing plotter configuration. After pressing this key, you will be presented with several menus which allow you to change the model number, model type, and device address of any plotter.
DELETE PLOTTER	Allows you to delete any plotter which you have previously configured.

Running the Confidence Test

When you select a plotter to be tested, the first screen to
appear is the following:

```
     ┌──────────────────────────────────────────────────┐
     │         HP 250 PLOTTER/SYSTEM CONFIDENCE TEST     │
     │              Plotter Address Selection            │
     │       Plotter: HP 7221S Graphics Plotter.         │
     │                                                   │
     │                                                   │
     │                                                   │
     │                                                   │
     │                                                   │
     │    Please select plotter address.                 │
     │                                                   │
     │  ┌───┬───┬───┬───┬┬───┬───┬───┬───┐               │
     │  │11 │   │   │   ││ 8 │   │   │EXIT│              │
     │  └───┴───┴───┴───┴┴───┴───┴───┴───┘               │
     └──────────────────────────────────────────────────┘
        ┌──┐┌──┐┌──┐┌──┐┌──┐┌──┐┌──┐┌──┐
        └──┘└──┘└──┘└──┘└──┘└──┘└──┘└──┘
```

Press the leftmost softkey to draw the confidence plot on the
plotter. If you press the softkey with the value "8", all data
will be sent to the display.

After selecting the output device, you may choose to do either a
SIMPLE or COMPLETE confidence test. Sample plots showing the
difference between the two appear at the end of this chapter.

When you press the COMPLETE softkey, two menus are presented,
which allow you to enter an optional date and run number.

If you have specified an output device other than the CRT (8),
and have either pressed the SIMPLE softkey or completed the date
and run number information for the COMPLETE test, you now specify
the type of paper on which the confidence plot will be drawn.

After selecting the type of plotter paper, you will be presented
with several different paper sizes. If you are not sure of the
type of paper to use, see Chapter 7 of this manual.

When you have provided all of the plotter paper information, the
following menu appears:

```
                    HP 250 PLOTTER/SYSTEM CONFIDENCE TEST

              Plotter: HP 7221S Graphics Plotter.
       Plotter address: 8

                 Test: SIMPLE

                Paper: ISO A4 size plot (210 mm x 297 mm) on metric roll paper.




     When ready to start plotting, please push START PLOTTING.

     ┌─────────┬───────┬───────┬───────┬─────┬──────┬─────┬──────────┐
     │ START   │       │       │       │     │      │     │ EXIT     │
     │ PLOTTING│       │       │       │     │      │     │          │
```

Press the START PLOTTING softkey to begin the test. At any time
during the test, you may press the ABORT PLOT softkey.

When the test is complete, the following menu appears:

```
                    HP 250 PLOTTER/SYSTEM CONFIDENCE TEST

              Plotter: HP 7221S Graphics Plotter.
       Plotter address: 8

              Test: SIMPLE

              Paper: Metric ISO A4 sheet (210 mm x 297 mm).


   Plotter status: Plot completed.

   Please select a function.

   _____
   | RESTART |    |    |   ||   |    |    |  | EXIT      |
   |         |    |    |   ||   |    |    |  | PROGRAM   |
```
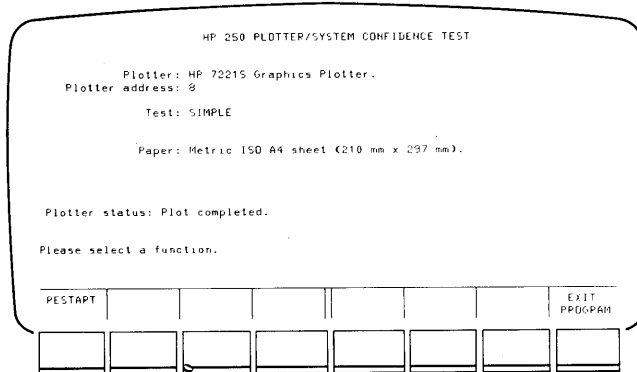
You may now restart the plotter test, exit the plotter test, or
return to the TEST utility main menu.

Look at the plot drawn for the confidence test. Compare it to
the samples shown on the following pages. If the result of the
test is a partial plot or no plot at all, there may be something
wrong in the system connection or the device. Consult your
principal operator to ensure that everything is connected
properly.

                          NOTE
          The number of pens and several other
          parameters in the upper right hand
          corner of the picture are dependent
          on the model of the plotter.

SIMPLE Test Result

```
                                    TEST
                                    COMPLETED
```

COMPLETE Test Result

```
GPLCFT - GRAPHICS DEVICE/SYSTEM CONFIDENCE TEST
                                                    11/23/81
      Slowest velocity test.                        Run# 1
                                                     7220C
                                            Device address=17
   NINE LINESTYLES      EIGHT PENS         Buffer size=928 bytes

   0 _____
   1 _____      1 _____
   2 ....................  2 _____
   3 - - - - - - - -       3 _____
   4 — — — — —             4 _____
   5 —  - —  - —           5 _____
   6 -------------         6 _____
   7 - - - - - -           7 _____
   8 —  —  —  —            8 _____
   9 —  - —  - —

                                              TEST
                                            COMPLETED

                  TEXT ROTATION-2


  ! "#$%&'()*+,-./                            £
  0123456789:;<=>?         ¯  •¨çÑñ ¡¿¤£¥§
  @ABCDEFGHIJKLMNO         âêôûáéóúàèòùãёõũ
  PQRSTUVWXYZ[\]^_         ÅîØÆåíøæ ÄìÖÜÉïβ
  `abcdefghijklmno
  pqrstuvwxyz{|}~
                                            Revision HP250.3.94
```

TEXT ROTATION-3

TEXT ROTATION-1

alphanumeric characters - letters, numbers, and punctuation
marks.

applications software modules - computer programs to solve busi-
ness related problems such as inventory, accounts receivable,
order entry, etc.

backing up - duplicating or copying files on a medium after sig-
nificant modification.

BASIC - an acronym for Beginner's All-purpose Symbolic Instruc-
tion Code; a popular, easy-to-learn programming language used on
the HP 250 computer system.

binary program - an extension of the operating system, invoked by
the user, that provides BASIC language enhancements.

bit - an abbreviation for binary digit, which is a unit of infor-
mation equal to either 0 or 1.

byte - a sequence of eight bits operated on as a unit, which is
the smallest accessible amount of information in the computer.

command - an operation which can be executed only from the compu-
ter keyboard; it cannot be used in a program.

console - the part of a computer used for communication between
the operator and the computer. See workstation.

CPU - (Central Processing Unit), the part of the computer that
controls all computer components and operates on data.

CRT - (Cathode Ray Tube), a synonym for the display or screen.

cursor - the flashing underscore which appears on the display
that points out the current character position.

data base - a collection of related data sets (files).

data integrity - the validity of data or information.

data set - a data base file that contains data entries (records).

defective tracks - a track on a storage medium where reading and writing of data is not possible, usually because of a scratch, dirt, or lack of magnetic oxide on the surface of the disc. If any defective tracks exist, they are identified during the media initialization process (the INIT utility program).

disc - a storage medium for the HP 250.

display - a television-like screen used for outputting data, messages, and other information to the operator.

display editing keys - a set of keys used to position the cursor at specific locations on the display to modify data

directory - a "table of contents" showing the name, type, and number of files recorded on a disc.

disc drive - the device used to transfer data between disc media and computer memory.

disc drive code - the number of the disc drive unit.

diagnostic - a test that the system performs on itself.

DROM - (Discrete Relocatable Optional Module), a system software module which can be configured to be loaded into system memory at power-on.

exponentiation - raising a number to a power. For example:
$$2**3 = 2*2*2 = 8$$

editing - correcting errors, whether typographical or non-typographical, and modifying program lines and data.

error message - an English phrase or number describing an error that has occurred during execution. An error number refers to a detailed description of the problem (see the appendix titled Error Messages).

expression - one or more variables, numbers, functions, etc., grouped together with operators (+,-,*,/, etc.), and mathematically or logically evaluated to a single value.

file - a file is one or more logical records written on a storage medium. It consists of contiguous sectors which hold information such as programs or user-defined data.

flexible disc - one of the storage media for the HP 250. Data is written on a thin magnetic oxide film coated on plastic. The disc is enclosed in a sealed plastic jacket for protection.

floppy disc - another name for a flexible disc.

form feed - The ability of the printer to automatically advance to the next form or page of paper for printing.

field - a "window" or section of the display line where input or output is allowed.

function - a BASIC language operation which returns a number or value, and can be executed either from the keyboard or programmatically.

hardware - the physical equipment of your computation system.

hardware error - an error associated with a mechanical failure of a component of your system.

mathematical hierarchy - a list of priorities or procedures regarding relational operators, functions, and punctuation.

initialization - a process that writes addresses on a storage medium, tests the writing and reading patterns from the disc, and sets up the directory to keep track of files.

keyboard - a set of keys used to input information and program lines. It typically consists of a typewriter block, data entry pad, halt and execute keys, special function keys, and display editing keys.

mass storage device - a device used to store program and data.

medium - the material on which data is recorded (e.g. tape cartridge, flexible disc, etc.).

null string - a string variable containing no characters; it is often designated as "".

numerical range - the range of limits on the value of numbers output by the HP 250.

numerical value - the value of an expression represented as a decimal, an integer, or in scientific notation.

operand - the expression that is being operated upon by a function, or a relational or arithmetic operator. For example:

$$2 + 8$$

operator error - an error caused by attempting an improper key sequence, command, or procedure.

operating system - the software associated with the computer and its processing capabilities.

output - to yield the results of processed data; often refers to the results itself.

parameters - variables in a command or statement whose values are defined by the user.

password - a unique code, usually a number or a name. used to access an applications software module or data base information.

peripherals - devices used for input/output operations which are compatible for use with the HP 250. Examples are the cartridge tape drive and the printer.

precision - the number of digits allowed per data element. Real (full) precision allows 12 digits, short precision allows 6 digits, and integer precision allows numbers from -32767 through 32767.

principal workstation - the integral workstation on the HP 250/35 or the workstation connected to Port 1 of the HP 250/30. It is the workstation where loading and System Error information is displayed.

program - a sequence of instructions or statements that a computer interprets and executes.

record - a block of 256 bytes of data written on the disc.

scientific notation - a form of writing a number as a decimal times a power of 10. Example: 1.0E6 = 1,000,000

scrolling - refers to the movement of the display up and down. Scrolling occurs when you enter a new line at the bottom of the display or when you use the xxxx and xxxx keys at the top or bottom of the screen.

softkeys - special function keys that are defined to perform a series of keystrokes or branch to a program line.

software - programs which are loaded into your system from a storage medium.

software error - a logical or syntactical error encountered in a program that is being executed.

special function keys (SFK) - user definable keys on the HP 250. Each key can be dynamically defined as a typing or programming aid. Also known as softkeys.

spooling - temporary storage of data or programs on mass storage files, allowing the system to continue processing while an output device is used.

statement - a numbered line stored in computer memory. A collection of statements is known as a program.

storage device - a mechanism that holds a medium for recording information for later retrieval.

string variable - a variable which represents a series of alphanumeric characters.

syntax - the formal required structure of a program statement.

system software - the operating system and language enhancements which are loaded into a reserved, protected segment of memory. System software is not erased by loading and running programs.

task - the actual or potential activity of HP 250 program execution.

variable name - a name representing a location in memory where data such as numbers, alphanumeric strings, and numeric arrays are stored. The value of this data can be modified.

volume - the physical medium on which data and programs are stored.

word - two bytes of information.

workstation - the part of a computer used for communication between the operator and the computer. See console.
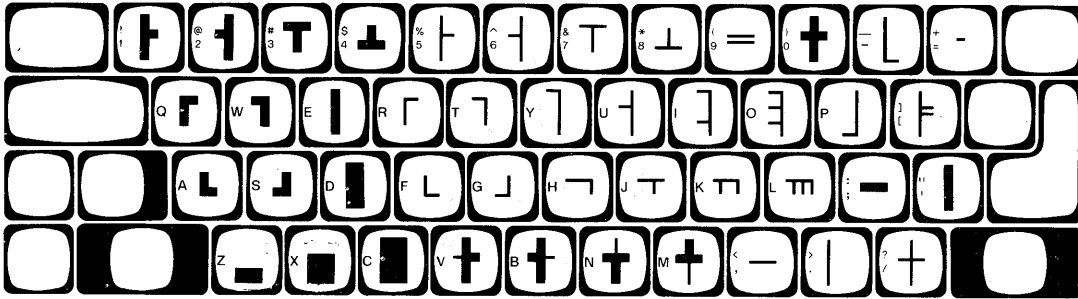
Keyboards

Unshifted Line-Drawing Keyboard
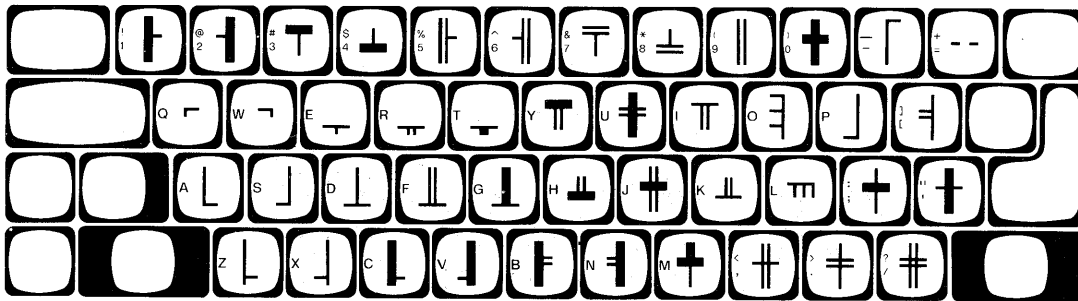
Shifted Line-Drawing Keyboard

NOTE

Refer to Appendix C, The Config Program, for instructions on defining the primary and secondary keyboard loaded at power-up.

HP 250 DENMARK
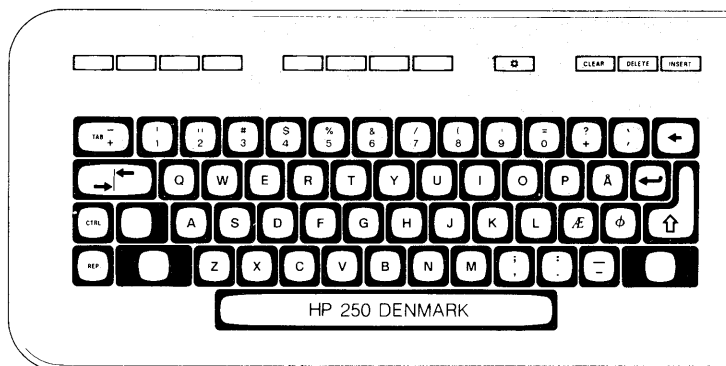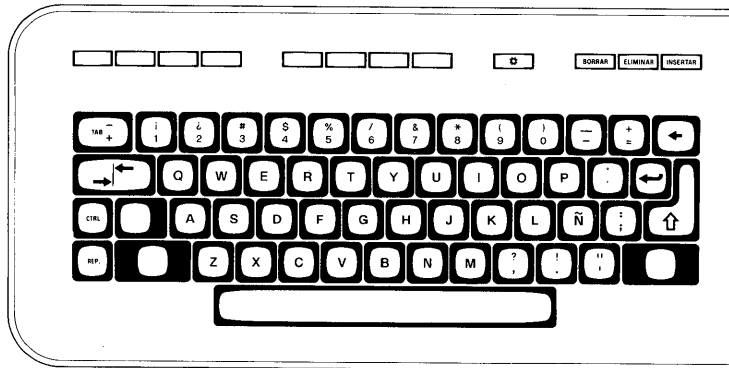
Spanish Language Keyboard
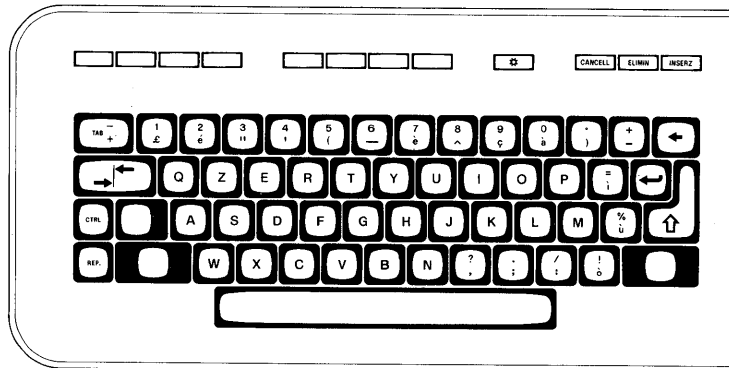
Italian Language Keyboard
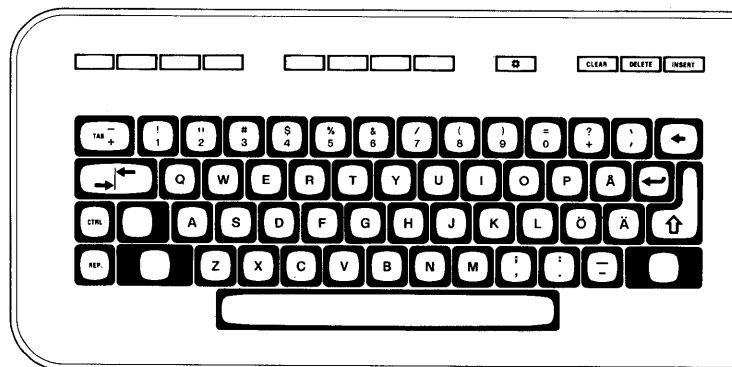
Swedish Language Keyboard
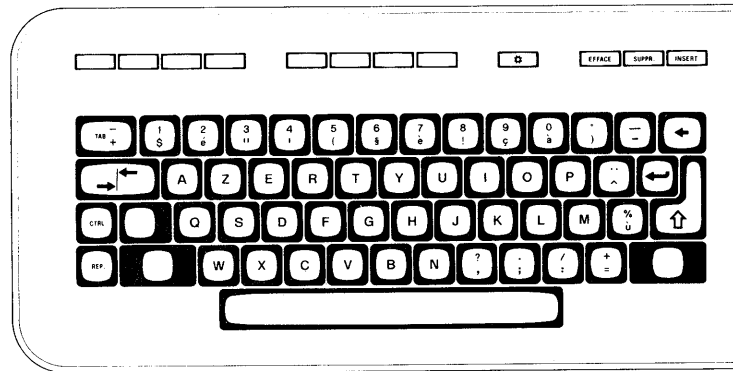
French Language Keyboard
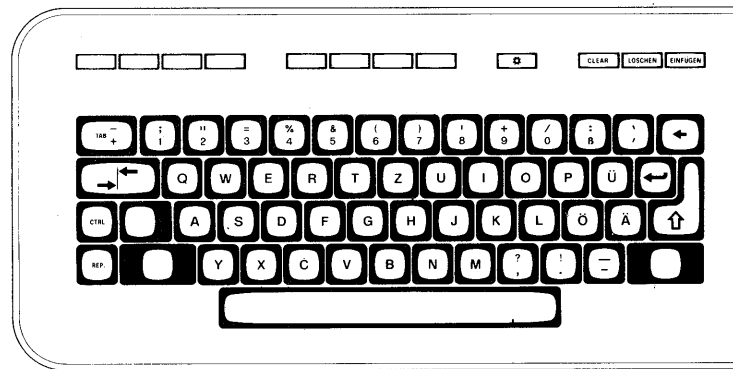
German Language Keyboard
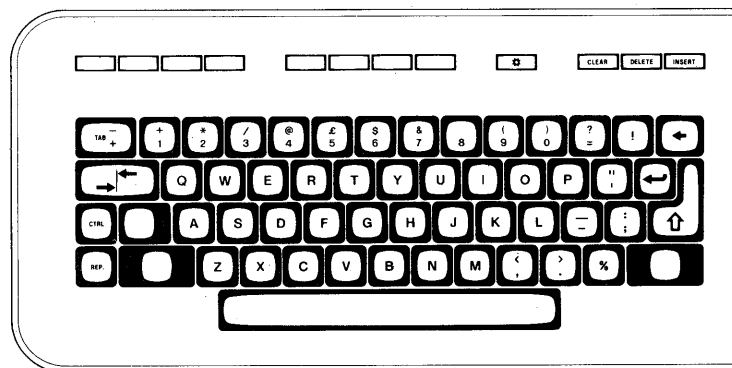
United Kingdom Language Keyboard

APPENDIX C
Volume Specifiers

This appendix describes the physical unit specifiers which are used to tell your HP 250 the device you wish to access.

In Chapter 8, you saw how several commands associated with files (such as CAT and PURGE) were used. You had to specify either the volume label (the name assigned to a storage medium via the PRINT LABEL command) or the physical unit specifier.

The physical unit specifier consists of several parameters to be specified in this order (optional parameters are enclosed in brackets). The physical unit specifier is always preceded by a colon.

    :device type [select code [,device address [,unit code]]]

The various device types are:

Device	Letter
Flexible Disc Drive	F
7906 Removable Disc	C
7906 Fixed Disc	D
7910 Fixed Disc	L
Cartridge Tape Drive	K
7908 Fixed Disc	Q
7911 Fixed Disc	R
7912 Fixed Disc	S
5 Mb. Disc	G

select code can be an integer from 1 through 15. It is
             not required. The HP 250 system automatically
             sets it to 2. (optional)

device address can be an integer expression from 0 through 7.

Device Address	Disc
0	printer
1	printer
2	optional
3	optional
4	Integrated Storage Unit
5	7906 (C/D)
6	Flexible Disc
7	7910 or 5 Mb. Disc

unit code can be an integer expression from 0 through
           7. For an Integrated Storage Unit (HP 7908,
           7911, or 7912 disc plus cartridge tape drive),
           the disc unit code is always 0 and the tape
           unit code 1. (optional)

Using Softkeys as
Typing Aids

Each softkey can be defined for use as a keyboard typing aid to
reduce a series of up to 160 keystrokes to one touch of a key.
You can store and load typing aid definitions from mass storage
devices as a file, so that the keys do not have to be continually
redefined.

A softkey can be defined in two ways:

1) The ON KEY statement is used to define a softkey within a
    program; pressing a softkey with an active ON KEY definition
    causes an interrupt which can be detected by the program.

2) You can assign a typing aid definition to a softkey directly
    from the keyboard (via the EDIT command).

When a softkey is defined in both ways at the same time (via the
ON KEY statement and via the keyboard), the definition assigned
with the ON KEY statement always has priority. After the ON KEY
definition has been deleted, the typing aid definition can be
accessed.

What follows is a discussion on how you can use softkeys as
typing aids.

Defining Softkeys as Typing Aids

To define or edit a softkey as a typing aid, you perform the
following 3 basic steps:

1)   Execute the following statement:

                    EDIT KEY# key number

     or type the word EDIT and press the softkey you wish to
     define. Doing this places the keyboard in edit mode.

2)   Type in the character sequence that you wish to store in the
     softkey.

3)   Store the typing aid definition in the softkey by pressing
     the softkey. This causes the system to exit the edit mode.
     If you wish to exit the edit mode without storing the
     definition, press the HALT key; in this case, any previous
     typing aid definition is retained. This definition exists as
     long as the system is running. To permanently store a
     softkey definition, see the section headed "Storing Typing
     Aid Definitions".

Erasing Typing Aid Definitions

For a single key: To erase a typing aid definition for a single
                    key , type in SCRATCH and then press the
                    softkey you want to erase.

  For all keys: To erase all typing aid definitions, execute
                    the following command:

                         SCRATCH KEY#

Listing Current Typing Aid Definitions

To list all current typing aid definitions, execute the following
command:
                         LIST KEY#

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Storing Typing Aid Definitions

You might determine, after operating your HP250 for a period of time, that there are several commands which you use repetitively throughout the course of a day. If this is the case, you can define typing aid softkeys to execute the commands and then save your definitions in a special type of HP250 file, known as a KEY file.

To save your softkey definitions, use the STORE KEY command; this saves all softkeys that are currently defined. The STORE KEY command is very similar to the STORE command described in Chapter 6; you specify the volume that you want to store the KEY file on.

For example, to store your softkey definitions onto a 7908 disc in a KEY file named STEVES, execute the following command:

        STORE KEY "STEVES:0"

After doing this, you can execute the CATALOG command to see the file named STEVES.

                            NOTE

If you attempt to STORE a KEY file which
already exists under the same name, you
will get an Error 54. Use the RE-STORE
command to correct this error.

Loading Typing Aid Key Files

Any KEY file created by the STORE command can be loaded into memory by executing the LOAD KEY command. This command is very similar to the LOAD command described in the chapter titled "System Commands".

For example, if you wanted to load the softkey definitions that you just stored onto the 7908 in the example above, execute:

        LOAD KEY "STEVES:0"

Now that you understand all aspects of using softkeys as typing aids, read further to see some examples of how you can use them.

Examples

The following examples are presented to give you ideas on how to use softkeys as typing aids. There is an inexhaustible number of ways in which you can use softkeys as typing aids. What is shown here is, by no means, intended to cover all possible uses of softkeys as typing aids; rather, they are intended to give you specific examples while also encouraging you to think of ways in which you can use these keys to perform repetitive tasks.

Example 1

Suppose that your daily responsibilities require you to type something repeatedly. One such thing might be the date. You might have to type memos that repeatedly use this date. Rather than having to type the date over and over again, you can enter the date into a softkey, and then just press the softkey whenever you need the date. Here is a way to do this.

```
EDIT                              1)  TYPE "EDIT" and PRESS SOFTKEY #1
KEY 1 - UNDEFINED
September 30,1981                  2)  TYPE IN THE DATE AND PRESS
                                      SOFTKEY #1




















September
30,1981
```

Example 2

Suppose someone hands you a disc and says to you, "I want you to purge all of the data files on the mass storage device". If there is a large number of data files, you can save time and effort by defining a softkey as a typing aid to execute the PURGE command for you.

Here is how you would do it.

```
EDIT
KEY 1 - UNDEFINED
⊦PURGE"→→→→→→"⊑⊱
```

1) Type EDIT and press Softkey #1

2) Access the display control character set by pressing CNTL and Softkey #12

3) Type in the sequence as shown
   a) Press INSERT
   b) Type PURGE"
   c) Press the right arrow key six times so that you space over the file name
   d) Type a "
   e) Press CONTROL CLEAR to clear the rest of the line
   f) Press EXECUTE

4) Press Softkey #1 to define the typing-aid key

```
⊦PURGE"→
→→→→→"⊑
```

Error Messages

Operator errors often result from incorrect procedures, inappro-
priate commands, or commands with incorrect parameters. Software
errors are caused by an error in a program being executed. There
may be logical errors or inappropriate commands, or commands with
incorrect parameters. Hardware errors result from hardware fail-
ures, absence, or malfunction. The error message numbers of the
operating system and an appropriate description of each are
listed below.

1. Software (DROM) configuration error: The necessary system
    software is not loaded into memory.

2. Memory overflow: Lack of available memory for the task at
    hand.

3. Line not found or not in current program segment: Specified
    line may have been deleted.

4. Improper RETURN: A RETURN statement is encountered and it
    has no prior GOSUB.

5. Abnormal program termination: Missing a STOP or END
    statement in a program. Or a FNEND statement is
    encountered before the RETURN.

6. Improper FOR-NEXT matching: A NEXT statement is
    encountered without a corresponding FOR. Also improper
    FOR-NEXT nesting.

7. Undefined function or subprogram: Misspelling the function
    or subprogram name. Calling a function or subprogram that
    isn't part of your program.

8. Improper parameter matching: Specifying inconsistent
    parameter lists in a CALL statement or user-defined
    function.

9. Improper number of parameters: Specifying the wrong number
    of parameters in a CALL statement or a user-defined
    function.

10. String value required: Returning wrong type of information
    from a function (when a string was expected, a number was
    sent).

11. Numeric value required: Returning wrong type of information from a function (when a number was expected, a string was sent).

12. Attempt to re-declare a variable or file: Dimensioning or typing the same variable more than once or using the same file number twice.

13. Array dimensions not specified: Attempting to access an array variable which has never been dimensioned or referenced.

14. Incorrect OPTION BASE usage: More than one OPTION BASE statement in a program, or may have a dimension or declarative statement preceding OPTION BASE.

15. Invalid variable bounds: Dimensioning an array in a subprogram where the lower bound is >32767 or <-32767.

16. Dimensions are improper or inconsistent: Using an array variable with the wrong subscripts. Example: If A is a 5x7 array, you can't use A(4). Also, dimensioning an array of more than 32768 elements.

17. Subscript out of range: Using an array element too large dimension-wise to be an element of the desired array.

18. Substring out of range or substring too long: The maximum length of the receiving string is not dimensioned long enough or the subscripts of the string are incompatible with respect to the maximum or current length.

19. Improper value: A parameter is out of range for a particular statement being used.

20. Integer-precision overflow: The number specified as integer is out of the range -32768 thru 32767.*

21. Short-precision overflow: The number specified as short precision is out of the range -9.99999E63 thru +9.99999E63.*

22. Real-precision overflow: The number specified as real precision is out of the range -9.99999999999 thru 9.99999999999E99.*

* These error messages indicate that DEFAULT mode isn't on. If DEFAULT is on, then the error messages will not appear and alternate default values will be assigned to the expressions although the result was out of range. The alternate or default values are either a maximum or minimum of the specified range, or +xxxx, as in error 24 or 26.

23. Intermediate-result overflow: The intermediate result was out of the range -9.99999999999E511 thru 9.99999999999E511.*

24. TAN (N*PI/2), when N is odd: the result is undefined.*

25. Argument of ASN or ACS is >1 in absolute value: Passing an argument to ASN or ACS which is >1 or <-1.

26. 0 to a negative power: Taking the value 0 to a negative power, which is the same as dividing by 0.*

27. Negative number to non-integral power: Taking a negative number to a fractional power. Example: (-16)**.5 would give a complex number.

28. Argument of LOG or LGT is negative: The result would give a complex number.

29. Argument of LOG or LGT is 0: Value is undefined.**

30. Argument of SQR is negative: The square root of a negative expression would give a complex value.

31. Division by 0, or modulo 0: Division by 0 is not allowed.

32. Improper string usage: Reading a numeric value in a READ statement, but a non-numeric string is being accessed in the data statement.   For example:

    10 READ X,Y
    50 DATA "ABC",7

33. Argument of NUM, CHR$, or RPT$ is improper: The NUM parameter may be the null string or if the product of the number of characters to be repeated and the number of it is to be repeated exceeds 32767, the argument of RPT$) is invalid.

34. Reference line is not an IMAGE statement: The PRINT USING or DISP USING statement references a line which is not an IMAGE statement.

35. Improper image: The characters in the string expression of a PRINT USING or DISP USING statement are not acceptable as an image.

** DEFAULT is not on if this error occured. When DEFAULT is on then this expression is assigned a value of -xxxx.

36. Out of data: Reading data using a READ statement when data has run out or does not exist.

37. Edit string too long: Attempting to work with a string longer than 160 characters with EDIT.

38. Syntax error in LENTER or ENTER: An invalid numeric or string expression has been accessed by an ENTER or LENTER statement, or a protected line has been accessed by LENTER.

39. Function subprogram not allowed: A DIM statement in a subprogram contains a user-definable function as a parameter.

40. Improper replace or delete: The last line exceeds 9999 in the REN or LOADSUB command, or a LOADSUB statement was replaced with a statement other than a SUB.

41. First line number > second line number: For example, in a DELETE, SAVE, LIST or SECURE statement, the first line number is larger than the second.

42. Attempt to replace or delete a busy line or subprogram: Attempting to modify a line that currently is required to continue program execution.

43. Matrix not square.

44. Illegal operand in matrix transposition or matrix multiplication.

45. Nested keyboard entry statements: When asked to input a value, another INPUT statement has been executed via a subprogram or ON KEY# routine.

46. (RE-)STORE, (RE-)SAVE (RE-)STORE KEYS, or (RE-)STORE BIN error: Attempting to store information that is not currently in memory.

47. Subprogram COM declaration is not consistent with main program: The initial common statement is not consistent with the variable list of the COM statement in the subprogram.

48. Recursion in single-line function: Single lined function has been defined in terms of itself.

    Example: 90 DEF FNA (X)=FNA(X)*8

49. Line specified in ON declaration not found: Transferring
to a specific line through a statement, such as ON KEY, ON
END, ON ERROR, or ON HALT, and the line does not exist in
the current operating environment.

50. File number out of range: Referencing a file number
outside the range of 1 thru 10.

51. File not currently assigned: Attempting to access a file
that is not currently ASSIGNed.

52. Improper volume label or mass storage unit specifier:
Improper syntax for device specifier or volume label longer
than eight characters.

53. Improper file name: A file name contains invalid
characters, is the null string, or is greater than six
characters.

54. Duplicate file name: Attempting to use the same name for
two files on same medium.

55. Directory overflow: There is not enough room in the direc-
tory to incorporate additional files, or the availability
table is full when purging a file.

56. File name is undefined: The specified file name does not
exist on the specified device.

57. Attempt to use device of unknown type for mass storage:
Haven't loaded the necessary system software (DROM) or
binary program to be used by the system to control a
special device.

58. Improper file type: Attempting to LOAD a file that is not
a program type, or GET a file that is not a data type, or
ASSIGN a nondata file. Must use LINK or GET in order to
load data files as programs.

59. End of file found: Attempting to retrieve or record
information beyond the end of the file in, for example, a
PRINT# or READ# statement.

60. End of record found in random mode: Attempting to retrieve
or record information beyond the end of the record using
direct data access.

61. Defined record size too small: Attempting to store data in
a record which is too small.

62. File is protected, or wrong protect code specified:
    Attempting to modify or purge a protected file with the
    wrong protect code, or attempting to PROTECT a file that is
    already protected.

63. Number of records, bytes/record, or physical sectors too
    large: Cannot exceed 65534.

64. Medium overflow: There is not enough contiguous space on
    the medium to store desired information.

65. Incorrect data type: Attempting to read a string value
    into a numeric or vice versa.

66. Unused

67. Parameter is <=0 (when rounded): The parameter is an
    ASSIGN statement, for example, is less than 1.

68. Invalid line number encountered in mass storage operation:
    The program line access by MERGE, GET, or LINK exceeds 9999
    after executing any renumbering parameter.

69 - 76 Unused

77. Specified label not found: Medium having the specified
    label not found.

78. Possible volume-label conflict: Operation performed,
    however, the drive door was opened between when volume
    label was identified with drive, and this operation.

79. LOAD SUB error: A requested subprogram segment is not
    present or binaries are present in the program file.

80. Mass storage device door open or medium has been removed:
    Data transfer cannot occur if medium is not inserted
    correctly with door closed.

81. Mass storage device failure

82. Mass storage device not present: The device address has
    been specified for a storage medium that is not hooked up
    to the system or not present at all.

83. Mass storage device is write-protected: Attempting to
    store data on a device from which data can only be
    retrieved.

84. Record not found: Addressed (requested) a record not available on that volume.

85. Mass storage medium is not initialized: Blank discs, fixed or flexible, must be initialized before use.

86. Special media: Cannot be accessed via standard mass storage operations.

87. Record address error: The disc medium has been damaged. The medium should be discarded or re-initialized after attempting to recover data.

88. Read data error: May indicate a medium failure due to defective disc or controller.

89. Check read error. Inconsistency between the data written on a medium and the version in memory. Attempt to repeat the operation.

90. Mass storage system error: A mass storage failure – call HP for service.

91. Attempt to access a busy file: I/O operations are nested on duplicate file numbers.

92. Can't get exclusive access to a specified file: Attempting to get exclusive access to a file, for example, thru PURGE, that is currently being accessed by yourself or someone else.

93. Attempt to access an exclusive file: Attempting to access a file when someone else has exclusive access.

94. Specified file cannot currently be locked: A file is already locked by another console.

95. String not intact on file: There is an improper character count encountered during READ# into a string variable.

96. Program is run-only: Cannot be RENAMEd, COPYed, etc.

97. Unexpected Disc Interrupt – data files closed: Normally, the door was opened while files were opened.

98. Unexpected Disc Interrupt – Data lost: The door was opened and some data on at least one file is lost.

99. Unexpected Disc Interrupt – Opening a door on a mass storage device which has been locked via the program (doesn't apply to flexible disc drives.

100. IMAGE specification expects a numeric item: The expression
      to be output in PRINT USING or DISP USING is a string, but
      the corresponding IMAGE specification is numeric.

101. IMAGE specification expects a string item: The expression
      to be output in PRINT USING or DISP USING is numeric, but
      the corresponding IMAGE specification is string.

102. Numeric field specification is larger than internal buffer
      size: An output field larger than the available buffer
      space of the system is specified.

103. Not enough IMAGE specifications: An item in the PRINT
      USING or DISP USING statement has no corresponding IMAGE
      specification.

104 - 119 Unused

120. Output field overflow: A string or a numerical expression
      is too large to fit into an output field.

121. Improper value in CURSOR parameter.

122 - 129 Unused

130. Parameter for REQUEST OR RELEASE out of range: The
      parameter is not an integer from 0 thru 7.

131. Specified device not available: The device is already being
      used by another console.

132. Referenced device missing or wrong type: A device is being
      requested which isn't present, or that the requested device
      is not a printer.

133. Printer is down: Printer is either turned off or no longer
      connected to the system. Turn on or re-connect.

134. Printer is offline: The cover is off the printer or the
      printer is offline and not available for printing.

135 - 139 Unused

140. Spool file record length must be 256 bytes: An existing
      data file has been spooled to, but its record length is
      less than 256 bytes.

141. Incorrect data type found in spool file: Attempting to
      spool using a file that contains non-string data.

142. Door open – spool operation aborted: The disc drive door
     was opened during a spool operation. The current file is
     intact, but the last segment of data may be lost.

143. Expansion of spool file would cause medium overflow: There
     isn't enough contiguous space on the medium being accessed
     to expand the spool file. Spool operation is aborted; file
     is left intact.

144. Spool file size too small: The file being spooled to has
     less than five records.

145 – 149 Unused

150. Type of expression in CASE does not match type of
     expression in SELECT.

151. Parameter out of range on INDENT.

152. Improper matching of structured construct.

153. No structured construct active.

155. Invalid statement specified in COMMAND.

156. More than one level of recursion not allowed in COMMAND.

157 – 159 Unused.

160. Tape Operation Pending: The referenced tape was removed
     from the drive before the proper updating could take place.
     Insert the tape into the drive it was removed from and
     allow it to update properly before removal.

161. Disc Buffer Pending: The buffer required for this
     operation holds data for a tape that was prematurely
     removed. Locate the proper tape, insert it into the drive,
     and let the normal procedure complete before its removal.

162. Buffer Disc Not Ready: The disc holding the buffer for
     this tape is not ready for use.

163. Tape door locked.

164. Writing to tape not allowed until tape is initialized.

165. Self-test failure on Disc.

166 – 199 Unused.

PACK/250 Errors

200. Referenced line not a PACKFMT.

201. Unused.

202. Insufficient dimension length in PACK statement, or insufficient current length in an UNPACK.

203. List item >32K in PACK or UNPACK.

204. Conversion error.

205. UNPACK requires a source string of greater current length.

IMAGE/250 Errors

210. Bad status array.

211. No DBASE IS statement active; improper data base specified or data base is not open.

212. Specified data set not found.

213. Too many variables in list.

214. IN DATA SET already active for data set.

215. Number of elements does not match.

216. Variable type does not match with associated field in set.

217. String length in list insufficient, or length of list array >255 bytes.

218. Variable not in common.

219. Line referenced is not an IN DATA SET LIST statement.

220. Improper or illegal use of maintenance word.

221. Data set not created.

222. Needed volume lost during dismount.

223. Improper backup file.

224. Incomplete backup file.

225. Improper utility version number in root file.

226. Corrupt data base - must recreate it.

227. Corrupt data base - must erase it in its entirety.

228. Data Sets cannot be restored without a root file.

229. No volume name on data base or backup volume.

320. Set or item specifier is out of range or is an invalid set or item name.

321. Relational operator is invalid.

322. The predicate specifier is not a valid form.

SORT/250 Errors

230. Improper nesting of SORT statements, including DATA BASE IS and IN DATA SET.

231. Cannot reactivate workfile.

232. Data base mode improper for sort.

233. Required data set or root file not mounted.

234. Missing or improper set linkage.

235. No WORKFILE IS # statement active.

236. Improper data item or data item not found.

237. Sum of sort field lengths plus overhead exceeds 256 bytes in SORT BY.

238. Improper synthetic linkage.

239. Insufficient space in workfile.

240. Program lost due to disc failure.

241. Improper operation attempted on workfile.

242. Improper READ# or PRINT# on workfile.

243. Workfile contains invalid information.

244. Data Base Corrupt.

REPORT WRITER/250 Errors

250. BEGIN REPORT does not reference a REPORT HEADER statement.

251. Report Writer is already active.

252. An END REPORT DESCRIPTION statement is missing as terminator to the Report Description section.

253. Duplicate Report Writer Description section.

254. Blank lines in PAGE LENGTH statement is greater than page size, or is negative.

255. Expression in a Report Writer statement evaluates to an unacceptable value.

256. A TOTALS ON or GRAND TOTALS ON statement is improperly positioned in the Report Description section.

257. A Report Writer operation was requested while outside the program scope of an active Report Writer, or an END REPORT was not executed for an active Report Writer before subprogram termination.

258. Effective page size is less than three lines.

259. Illegal execution of a Report Description section statement.

260. Insufficient space for printed output within the current page.

261. Left margin specified is less than 1 or greater than current printer width.

262. Control variable in BREAK WHEN statement has a length greater than was initially allocated.

263. A DETAIL LINE statement may not appear within the Report Description section.

264. Level parameter is out of range of from 0 thru 9.

265. (GRAND) TOTALS ON statement is not active for the level requested.

266. Sequence parameter is out of range for (GRAND) TOTALS ON statement at the level requested.

267. WITH number LINES parameter in a header, trailer, or detail line is greater than the effective page size or is negative.

268. OLDCV($) function references a level which does not have a break defined.

269. OLDCV($) function does not match the data type for the control variable in the BREAK WHEN statement at the level requested.

270. PRINTER IS statement may not be executed while Report Writer is active.

271. A Report Writer statement may not be used recursively.

280. Language cannot be changed during SORT BY.

FORMS/250 Errors

290. Not allowed when form is active.

291. Not allowed within form image.

292. Attempt to input after last field of form.

293. Attempt to output after last field of form.

294. Not allowed unless form is active.

TIMER/250 Errors

300. Date not in acceptable format or incorrect.

301. Time not in acceptable format or incorrect.

302. Date or time has already been set. It may be set only once per system boot-up.

303. ON DELAY value incorrect.

T10/250 Errors

310. Port ordinal out of range of from 11 thru 15.

311. Priority value out of range from 1 thru 15.

312. Invalid address in ON...interrupt statement.

314. Ownership error: must do REQUEST before ON INPUT.

315. No input available: cannot do AREAD$ from specified port.

316. Invalid SEND or SEND BREAK statement: specified device is not a computer.

MEDIA/250 Errors

General MEDIA Errors

340. Operation only allowed on IBM media.

341. Improper operation on CHAR file.

342. Operation not allowed on this media.

343. Invalid IBM data set record length.

344. File on IBM media must be type CHAR.

345. Invalid IBM file start address in CREATE command.

IBMDUMP and IBMWREC Errors

370. Record number out of range for IBM media.

371. Device does not contain IBM format media.

372. Invalid display or conversion parameter.

373. Deleted record read.

TASK/250 Errors

The error codes have different meanings for the REQUEST command
and the ATTACH command. The error numbers in the table are
execution errors caused by unsuccessful commands with no optional
result parameter. The result in the table is the returned status
indicating the outcome of the command.

REQUEST# Command

Error Number	Result	Description
none	0	Ownership granted
401	1	Specified TASKID not a task
402	2	Specified TASKID not a secondary task or already owned by another user
403	3	Executing task not the home user of a workstation

ATTACH Command

Error Number	Result	Description
none	0	Attach initiated
401	1	Specified TASKID not a task
402	2	Specified TASKID not owned by executing task
403	3	Executing task not the home user of a workstation or executing task currently not attached to a workstation

Binary Program Errors

800 Source and destination must not be the same device

801 Devices not compatible

802 Destination device is too small

803 Cannot duplicate media

810 Protect code parameter must be 2 characters long.

850 Bad file-type specifier

851 Files not similar

860 Old password does not match

861 Improper number of array elements.

999 Binary program not compatible with current operating system revision.

System Errors

1000. System Files table full; There are too many active files in the system.

1001. Too many accesses to specified file: There are more than 15 concurrent addresses to the same file. Must de-assign some mass memory files.

1002. Request would result in deadlock: You are requesting a resource that, if granted, would deadlock the system.

1003. Cannot get exclusive access to specified device.

1004. Keyword not recognized by this operating system revision.

1005. Memory overflow in common block.

1010. Memory parity error: Hardware failure in memory. May be a temporary condition. If error reoccurs, record the numbers following the error number on the display, and contact HP for assistance.

Some system malfunctions are denoted by an error-like message on the display. These messages will appear as the words "SYSTEM ERROR". In addition, a table of numbers is listed. If a condition of this type occurs, you should record the system error letter and the message and table shown on the display. You must power off the system and then power it up after these errors.

Loader Errors

LOADER ERROR messages indicate that the operating system cannot be loaded successfully:

A   Checksum error.
B   Disc read error.
C   Checkread error.
D   Insufficient memory.
E   Interface error.
F   Disc or system error.

Loader errors A thru C may indicate that the operating system disc or tape is worn or damaged. Try loading the system with the backup (spare) copy of the operating system disc or tape. If any loader error persists after repeated tries, record the error message and call HP for Service.

Configuration Messages

These messages indicate an inconsistency in hardware/operating system configuration. Although the system can operate with inconsistencies, each should be corrected as soon as possible. Contact your software supplier for assistance.

MEMORY FAILURE - BLOCK nn,...
   Either the operating system expected more memory than available or a memory block has failed.

UNEXPECTED MEMORY PRESENT - BLOCK nn,... USER GIVEN EXTRA MEMORY
   More memory is available than expected by the operating system.

ASYNC DATA COMM BOARD ON PA n IS DOWN
   The self-test for the data communications interface has failed. Call HP for service.

HEWLETT
PACKARD