Installation, Operation and Test Manual

Part No. 09845-93005
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Printing History

This manual is for use with any System 45B or 45C Desktop Computer. It is a revised version of the Owner's/System Exerciser Manual for the HP 9845B/C, part number 09845-92005.

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 revision 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.

April, 1981...First Edition

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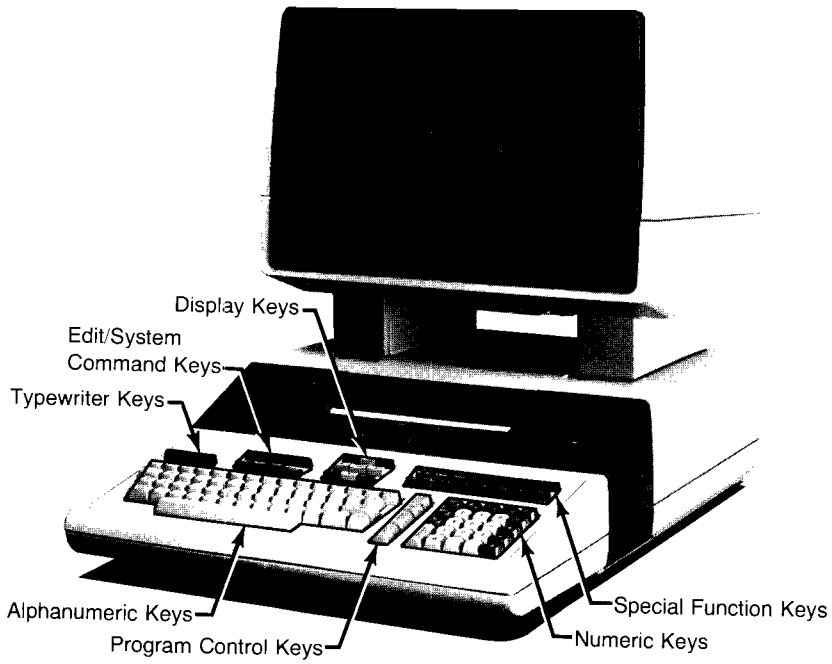
Chapter 1
Operating Basics

Here is a step-by-step guide to the basic operation of your System 45 (if you have already set up and tested your computer as described in the following chapters). Simple arithmetic operations, and storing, loading, running, and listing a program are covered in this chapter. By following the steps below, learning to use your desktop computer can be easy.

CAUTION

OPERATING YOUR COMPUTER BEFORE IT IS PROPERLY SET UP COULD DAMAGE IT, SO IF YOUR COMPUTER IS NOT ALREADY INSTALLED AND READY TO USE, READ THE PROCEDURES IN THE FOLLOWING CHAPTERS FIRST.

Your System 45



Basic Keyboard Operations

Executing Computations

To do simple arithmetic, use the **numeric** section of the keyboard.

First, try converting some Fahrenheit temperatures to Celsius temperatures. The formula to use is (F-32)*(5/9). Type the following to convert 54°F:

```
(54-32)*(5/9)
```

Press EXECUTE

In general, spaces are not important, so you get the same answer if you type:

```
( 54 - 32 ) * ( 5 / 9 )
```

By pressing the RESULT key, the answer to the previous calculation can be used as part of another calculation. Use it to convert the 12.22°C answer back to its Fahrenheit value. Type this calculation, pressing the RESULT key for the RES function:

```
(RES*9/5)+32
```

Press EXECUTE

Simultaneous Computations

Two or more computations can be entered and solved at the same time by separating each with either a semicolon (for close spacing of the results) or a comma (for 20-character fields). EXECUTE these calculations which convert 212°F to Celsius degrees and 100°C to Fahrenheit degrees:

```
(212-32)*(5/9),(100*9/5)+32
```

Using Variables at the Keyboard

Variables can be assigned values using an equals sign to create an assignment statement. For example, to assign 45 to F_lowtemp and 80 to F_hightemp, enter:

```
F_lowtemp=45
```
Press EXECUTE

```
F_hightemp=80
```
Press EXECUTE

Now that some variables have assigned values, they can be used in place of numbers in math calculations. Type the following:

```
F_averagetemp=(F_hightemp+F_lowtemp)/2
```
Press EXECUTE

Assignment statements and calculations such as these can be put together in a logical sequence to form a program. Here is an example:

```
10   PRINTER IS 16
20   Ftemp=155
30   Ctemp=(Ftemp-32)*(5/9)
40   PRINT Ftemp;"DEGREES FAHRENHEIT = ";Ctemp;"DEGREES CELSIUS."
50   END
```

Type this program exactly as it is shown, using the **alphanumeric keys**. Press the STORE key (not the STORE **special function key**) after entering line 10, then you can continue with line 20. Press STORE after you finish typing each line. Press STOP after you have STOREd line 50 and are certain that you have entered the program correctly.

Note

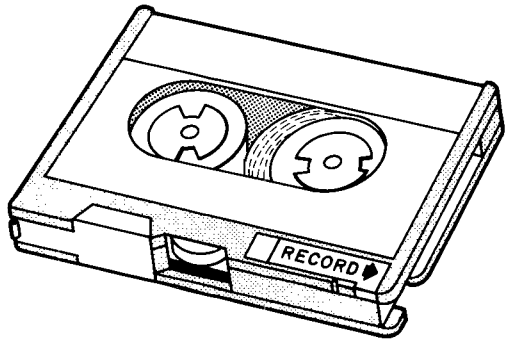
If you make a typing error in a line, use the ← and → **display keys** to move the cursor until it is under the character you wish to change. Then type the correct character in its place. Use the ↑ and ↓ **display keys** to move to another line that you wish to change.

Run the program by pressing the RUN key.

Getting Started With Mass Storage

Now you should store this program on a tape cartridge so that you can run it again at a later date.

To record on a tape cartridge, the record tab must be in the rightmost position, in the direction of the arrow (as shown):



The left tape drive is referred to as :T14 and the right-hand one is :T15. Insert a tape cartridge into the right-hand tape drive, type `CAT":T15"` and press EXECUTE. You should see a listing of the files that are stored on that tape cartridge.

If the display shows error 85, then the tape has not been used yet. Before you can use a tape cartridge for storing programs or data, it must be initialized. Type `INITIALIZE":T15"` and press EXECUTE. The initialization procedure takes approximately three minutes to complete.

After the tape has been initialized and is unprotected (tab slid to the right), you can store the program (above) on it. Type the following:

`STORE "TEMP:T15"` Press EXECUTE

Now you can edit "TEMP" so that the message is printed on the computer's thermal printer instead of on the CRT. (If your machine does not have the printer option, you should not edit your program.) First, press the EDIT **special function key**, type the number 10, and press EXECUTE.

Using the ← display key, move the cursor over until it is under the "1" in 16. Change that 16 to a zero by pressing the "0" key and the space bar. Store this new line by pressing the STORE key.

Your program should now look like this:

```
10   PRINTER IS 0
20   Ftemp=155
30   Ctemp=(Ftemp-32)*(5/9)
40   PRINT Ftemp;"DEGREES FAHRENHEIT = ";Ctemp;"DEGREES CELSIUS."
50   END
```

You can change the temperature to be converted by changing the value in line 20 and pressing STORE.

Your "new" program can also be stored on the tape cartridge. Press the STOP key and then type the following:

`STORE "TEMP2:T15"` Press EXECUTE

Run the "TEMP2" program by pressing RUN. A message similar to this one should be printed on the thermal printer:

```
155 DEGREES FAHRENHEIT =  68.3333333334 DEGREES CELSIUS.
```

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www.hpmuseum.net

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If you would like to see the first program "TEMP" again, you can load it back into the machine's memory from the tape cartridge by typing:

```
LOAD "TEMP:T15"  Press EXECUTE
```

The program can be listed:

- on the CRT by typing `LIST#16` and pressing EXECUTE
- on the thermal printer by typing `LIST#0` and pressing EXECUTE

To see what is stored on your tape cartridge, type the following:

```
CAT":T15"  Press EXECUTE
```

The first column of the catalog report shows the names of the programs stored on your tape cartridge. The names TEMP and TEMP2 should be shown.

Automatic Start for Programs

You can take advantage of the computer's automatic start capability by naming a program "AUTOST".

If a tape cartridge with a file named "AUTOST" is present in the right-hand tape drive and the AUTOST key is latched when you turn the machine on, the computer automatically loads and runs the "AUTOST" program.

Summary

This chapter has introduced you to some basic operations and has given you an overview of the System 45. For more details about the keyboard and programming, refer to your BASIC Programming Manual.

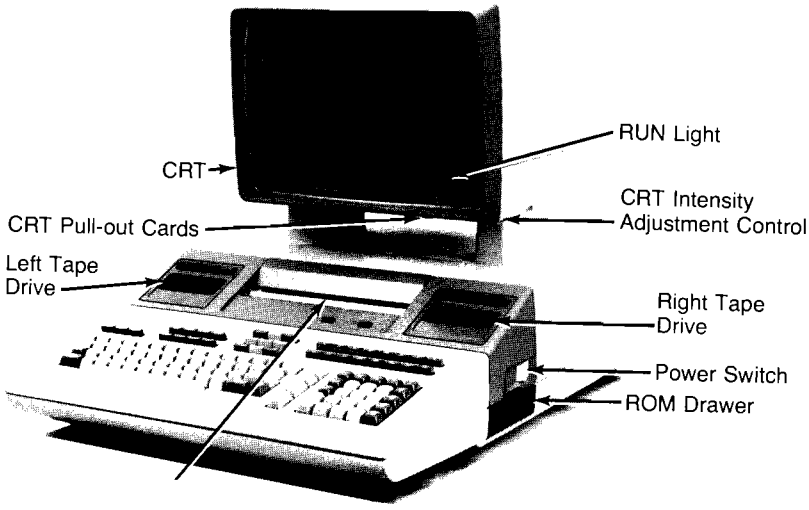
Chapter 2
Setting Up Your System 45

Introduction

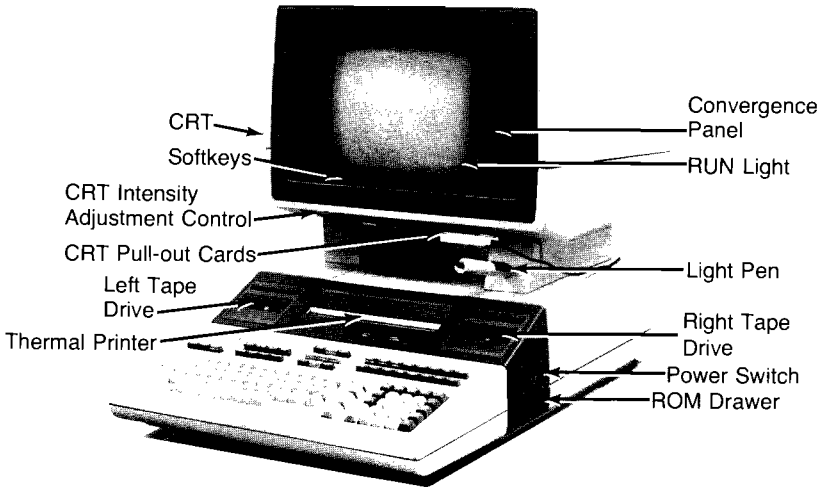
The following chapters cover installation, maintenance, and system testing for the HP 9845B and HP 9845C Desktop Computers. Where similar, the computers are referred to as the "System 45" or the "9845". Any differences between computers or models are noted when necessary. The following table shows the configurations for the model numbers which are referred to.

	Monochromatic CRT (98750A)	Monochromatic CRT With Enhanced Graphics (98780A)	Color CRT (98770A)
Standard Processor	9845B Model 100	—	9845C Model 100
Enhanced Processor	—	9845B Model 200	9845C Model 200

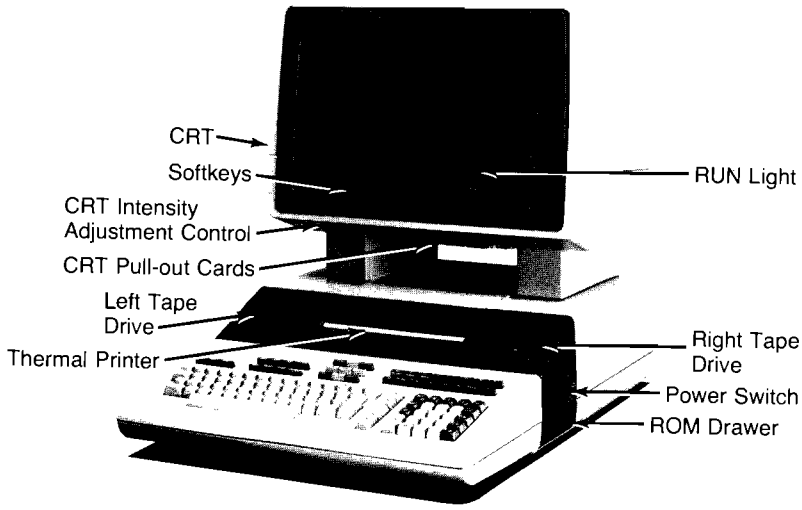
There are other models which are based on the model numbers in the previous table. The 9845B Model 150, for instance, is a 9845B Model 100 with a thermal printer, two tape drives, graphics, and 187 K-bytes of read/write memory. For simplicity, this manual refers to Models 100 and 200 only. If you have a 9845B Model 150, just remember that your computer is referred to as the 9845B Model 100 in this manual.



9845B Model 100



9845C



9845B Model 200

Read/Write Memory

The memory options[1] available for the System 45 are shown in the following tables:

Read/Write Memory	9845B Model 100 or 200	9845B Model 150, 190, 250, or 290
56 266 bytes	standard	—
187 146 bytes	Opt. 204	standard
318 026 bytes	Opt. 205	Opt. 215
448 906 bytes	Opt. 206	Opt. 216

Read/Write Memory	9845C Model 100 or 200	9845C Model 150, 190, 250, or 290
56 060 bytes	standard	—
186 940 bytes	Opt. 204	standard
317 820 bytes	Opt. 205	Opt. 215
448 700 bytes	Opt. 206	Opt. 216

Unpacking Your Computer

Inspecting the 9845

Your System 45 was thoroughly inspected before it was shipped to you. All equipment should be in good operating order. Carefully check the 9845, ROMs, peripheral equipment, and other items for any physical damage sustained in transit. Notify HP and file a claim with the carrier if there is any damage.

Please check to insure that you have received all of the items which you ordered and that any options specified on your order have been included with your machine. Refer to the following table and check that all accessories are present. If any items are missing, please contact your local HP Sales and Service Office. Addresses are supplied at the back of this manual.

1 These figures are obtained by executing `SCRATCH A`, then `LIST`. The special function key definitions use 160 bytes (138 bytes if you don't have the left tape drive), and this memory can be made available by typing `SCRATCH KEY` and pressing the EXECUTE key.

Accessories Supplied

The following items are packaged with each 9845:

Item	Part Number	9845B Model 100	9845B Model 200	9845C Model 100	9845C Model 200
BASIC Programming Manual	09845-93000	1	1	1	1
Installation, Operation and Test Manual	09845-93005	1	1	1	1
Quick Reference	09845-93015	1	1	1	1
Color Graphics Manual	09845-92051			1	1
Monochromatic Graphics	09845-93050		1		
BASIC Language Interfacing Concepts	09835-90600	1	1	1	1
Manual Binder	9282-0898	2	2	2	2
System Exerciser Cartridge #1	09845-92041	1	1	1	1
System Exerciser Cartridge #2	09845-92042	1	1	1	1
9845B Introductory Training Package:	09845-10120	1	1		
9845B Introductory Training Cartridge	09845-10124	1	1		
System 45 Workbook	09845-93090	1	1		
9845C Introductory Training Package:	09845-10220			1	1
9845B Introductory Training Package	09845-10120			1	1
Graphics Training Cartridge	09845-10225			1	1
System 45 Graphics Workbook	09845-93091			1	1
9845C Advanced Color Graphics Pack:	09845-10230			1	1
Color Utilities Tape	09845-10234			1	1
Color Examples Tape	09845-10235			1	1
Advanced Color Graphics Manual	09845-93055			1	1
Utility Library Software Pack	09845-10200	1	1	1	1
Special Function Key Overlays	7120-6164	5	5	5	5
Blank Tape Cartridges	next table	2	2	2	2
Dust Cover	9222-0592	1			
Dust Cover	9222-0728		1	1	1
Magnetic Head Cleaner	8500-1251	1	1	1	1
Spare fuses:					
4 Amp (SB)	2110-0365	1		1	
8 Amp (NB)	2110-0342	1		1	
6 Amp (NB)	2110-0056		1	1	2
10 Amp (NB)	2110-0051		1	1	2
Brochure	5953-4525	1	1	1	1
9845C Demo Cartridge	11141-10224			1	1
9845C Data Cartridge	11141-10225			1	1
9845C Demo Manual	09845-15241			1	1

The previous items are available in Accessories Kits:

9845B Model 100	09845-80020
9845B Model 200	09845-80220
9845C Model 100	09845-80025
9845C Model 200	09845-80225

Single items may be ordered through your HP Sales and Service Office.

Peripheral devices, ROMs, and interface cards are packaged separately from your 9845. Each of these has its own manual or operating note and may also have extra items packaged with it.

The following items are also available, and can be ordered from your HP Sales and Service Office.

Item	Part Number
Blank Tape Cartridges (package of five)	98200-67000
Blue-print Continuous Thermal Paper:	
Standard	92161M
Metric	92161A
High-contrast Blue-print Continuous Thermal Paper:	
Standard	92161N
Metric	92161B
High-contrast Black-print Continuous Thermal Paper:	
Standard	92161P
Metric	92161C
Black-print Perforated Thermal Paper:	
Standard	92161Q
Metric	92161D
High-contrast Black-print Perforated Thermal Paper:	
Standard	92161R
Metric	92161E
Carrying Case (hard)[1]:	
Computer	09845-64405
CRT (for 9845B Model 100 only)	09845-64406
Carrying Case (soft):	
Computer	09845-64403
CRT (for 9845B Model 100 only)	09845-64404
CRT (for 9845B Model 200 or 9845C)	09845-66408
Carrying Cases (hard and soft):	
Computer	09845-64401
CRT (for 9845B Model 100 only)	09845-64402

Note

Thermal paper is packaged in a box containing six rolls.

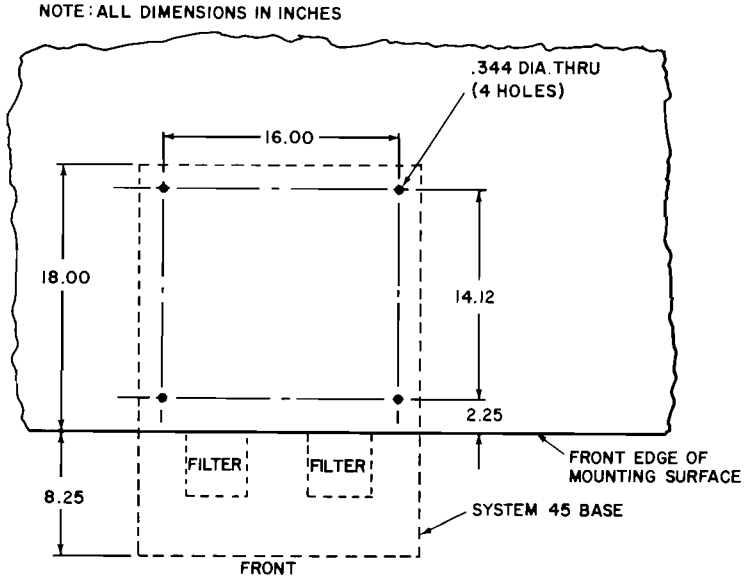
1 Hard carrying cases are designed to be used over the soft carrying cases.

Table Mounting

The System 45 mainframe can be attached to a table top by replacing each foot with an internally threaded device and bolting up through the table top. Bolting the mainframe to a desk which has a lockable drawer secures the computer from theft. Care must be taken in laying out the bolt holes so that the front edge of the computer overhangs the edge of the table top. This ensures that the air filters can still be removed and cleaned.

Your computer can be secured to the top of a table or desk in the following manner:

- Drill four holes in the top surface of your table to accommodate 5/16-24 NF-2A screws according to the following diagram.
- Replace the four rubber feet attached to the bottom of the computer with the four hexagonal spacers supplied with the Table Mounting Accessory (P/N 09845-61201), using the 6-19X.438 Pan Head, Pozidrive, Plastite screws, also supplied.
- Attach the computer to the table top, using four 5/16-24 NF-2A machine screws that are 3/8 inch longer than the thickness of the table top. The hexagonal spacers should be held with a wrench while these screws are tightened to prevent stripping the smaller screws out of the plastic base.
- The keyboard should extend 8.25 inches in front of the table top, as shown, to make the air filters accessible for periodic cleaning or replacement.

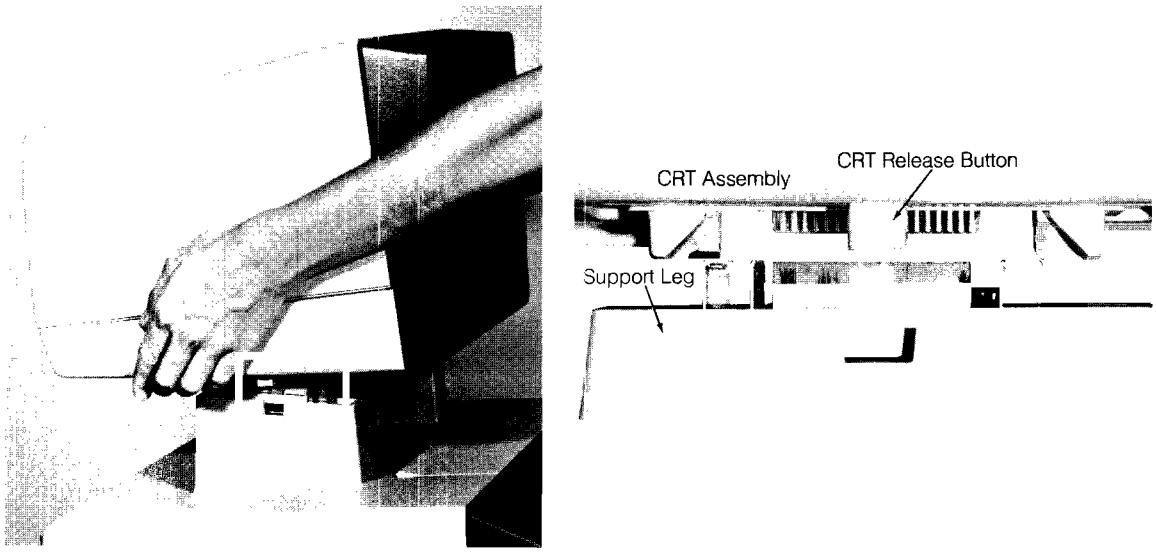


Installing the CRT

The System 45 comes equipped with a CRT (Cathode Ray Tube) display. The eight keys directly below the CRT screen on the 9845B Model 200 and the 9845C are called softkeys. The "CRT pull-out cards" (under the CRT) serve as a handy reference for operating your computer.

Installing the 9845B Model 100 CRT

Align the guides on the CRT assembly with the mainframe support legs, as shown here. Notice that the buttons on the bottom of the CRT assembly align with the notches in the support legs.



After careful alignment, allow the CRT to rest on the support legs.

To remove the CRT, press the CRT release buttons and pull up.

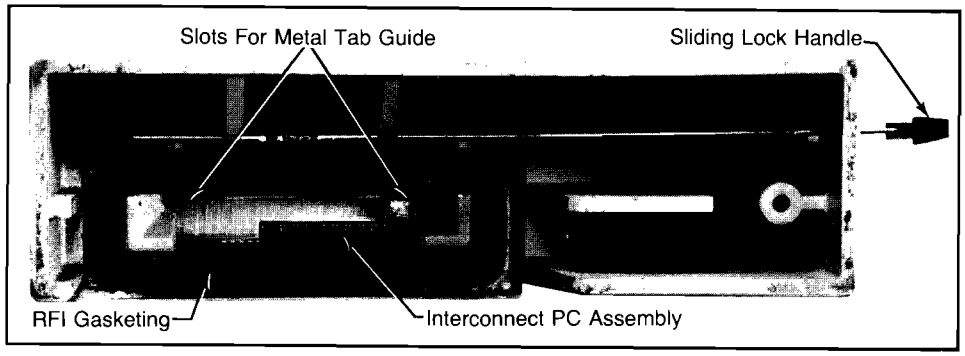
Installing the 9845B Model 200 CRT or the 9845C CRT

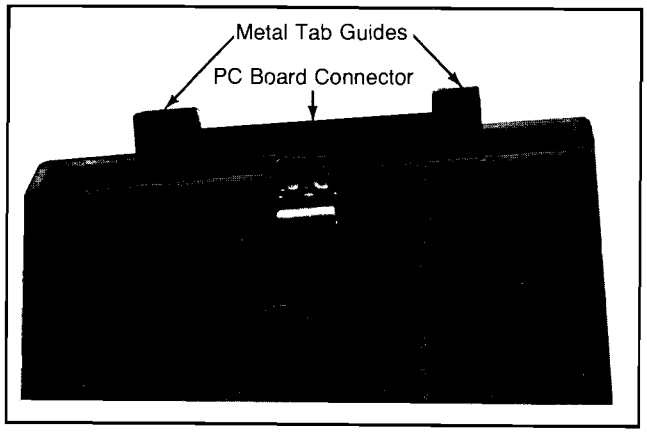
WARNING

THE 9845C COLOR DISPLAY (CRT) WEIGHS 29.5 KILOGRAMS (65 LBS.). TO AVOID PERSONAL INJURY OR DAMAGE TO THE EQUIPMENT, IT IS RECOMMENDED THAT THE COLOR DISPLAY ALWAYS BE LIFTED BY TWO PEOPLE.

Inspect the interconnect PC assemblies in both legs of the display, making certain that they are straight. Also check the metal tab guides on the support legs of the mainframe. They should be straight or bent slightly toward the PC board connector.

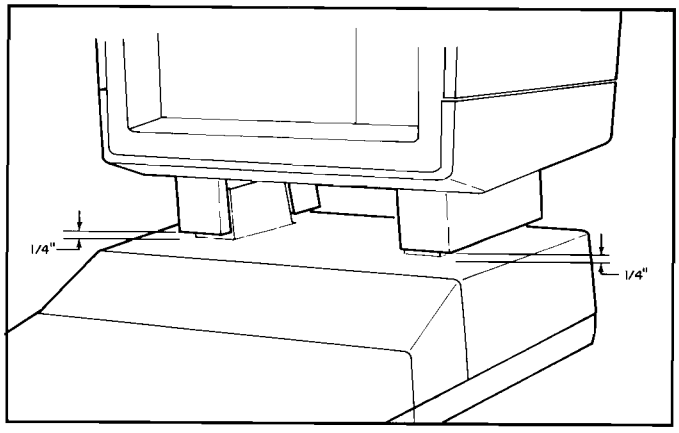
The sliding lock handles[1] – on each leg of the display – should be pulled out (in the open position).





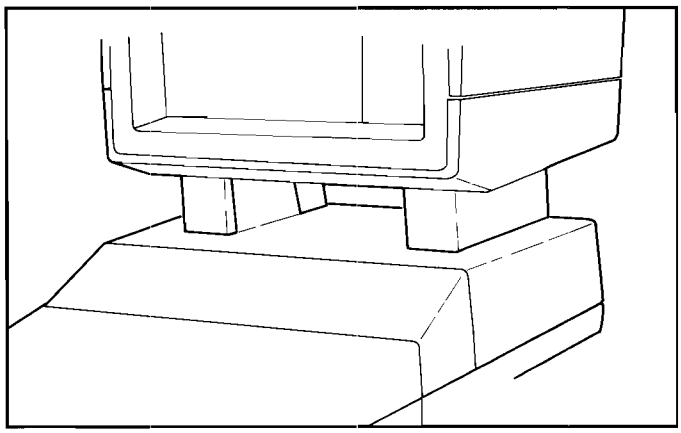
Working on one leg at a time, tilt the display slightly to the right and guide the right leg into place. Pull the display to the left toward the other leg, and position the left leg into place.

The back of both display legs should now be resting on the top cover of the mainframe. (If not, check both sliding lock handles – they should be pulled out.) There should be a gap (about 1/4 inch) between the mainframe top cover and the front of the display legs. If the display does not appear to be sitting properly on the mainframe, repeat the previous step.



1 Ignore the references to the sliding lock handles if your 9845C is not equipped with the sliding lock mechanism.

With the display sitting level, push down firmly on the top front of the display. This compresses the RFI gasketing and ensures proper contact with the mainframe.



Now push the sliding lock handles in, to secure the CRT to the mainframe.

To remove the CRT, pull the sliding lock handles out and lift the CRT straight up. (Remember that two people are needed to lift the color display.)

CRT Intensity

Once your System 45 has been set up and is operating, CRT brightness is controlled by a small dial underneath the CRT. It is located on the right-hand side of the 9845B Model 100 and on the left-hand side of the 9845B Model 200 and the 9845C.

Note

Hewlett-Packard products which use Cathode Ray Tubes are designed to limit X-radiation levels to values of 0.5 mR/hour[1] or below at 5 cm distance. This level has been established by the United States Bureau of Radiological Health and conforms to similar international requirements. All measurements are made using equipment that is VDE certified, and are conducted with the equipment operating under normal conditions as well as worst case maladjustment.

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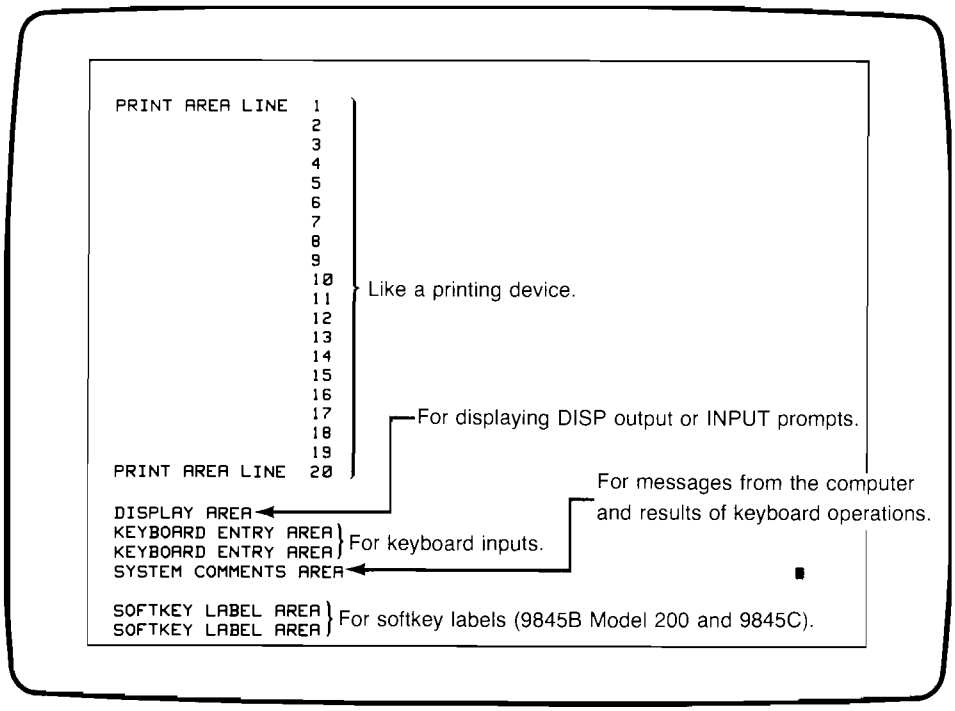
1 mR/hour: Milli-Roentgen per hour

Functional Areas of the CRT



Installing the Light Pen

The light pen is available for use with the 9845B Model 200 and the 9845C. It provides for direct graphical input and visual feedback, and may be used in either alphanumeric or graphics mode. The light pen enables you to point to or position an object on the screen (thus identifying it to the system), draw figures on the display, and input data or commands.

The light pen attaches to the 9845B Model 200 or to the 9845C via a 15-pin connector equipped with a safety clip to prevent accidental detachment. The connector is located on the rear panel of the CRT, in the lower left corner.

Turn power off to the computer and hold the connector cord from the light pen so that the seven pins of the connector are on top. Position the safety clip so that the left screw is centered directly beneath the hole in the clip. Plug in the connector and push the clip to the left until it snaps into place.

A light pen holder which fits around either front mainframe support leg (right or left) provides convenient storage for the light pen when it is not in use. To install it, first pull out the sliding lock handle[1] for the appropriate leg, lift the front of the CRT slightly, and slide the pen holder into place. Then push down on the front of the display to ensure proper contact, and push the sliding lock handle in to secure the CRT to the mainframe.

1 Ignore the references to the sliding lock handles if your 9845C is not equipped with the sliding lock mechanism.

CAUTION

DO NOT CONNECT OR DISCONNECT THE LIGHT PEN WHILE POWER IS ON. THIS COULD CAUSE DAMAGE TO THE CRT OR TO THE LIGHT PEN.

ROMs

Plug-in ROMs (Read Only Memories) provide additional language capabilities to perform specific tasks, such as using mass storage devices, printers, or plotters. The ROMs available for use with the System 45 are shown in the following table.

ROM Name	ROM Number	Amount of Read/ Write Memory Used
Graphics (9845B Model 100 only)	HP 98411B or Opt. 311	90 bytes
Enhanced Graphics (9845B Model 200 and 9845C)	(standard)	264 bytes
I/O	HP 98412A or Opt. 312	640 bytes
Mass Storage	HP 98413B or Opt. 313	None
Advanced Programming	HP 98414A or Opt. 314	None
Structured Programming	HP 98415A	None
Basic Datacomm	HP 98417A	380 bytes
Bisync Datacomm	HP 98418A	40 bytes
Assembly Execution	HP 98438A or Opt. 438	See the Assembly Execution ROM Manual
Assembly Execution and Development	HP 98439A or Opt. 439	See the Assembly Development ROM Manual
Data Base Management System	HP 98430A or Model 190, Opt. 330, 331, or 332	120 bytes

The ROM Drawers

The System 45 has two ROM drawers which contain the ROMs. They are located on each side of the machine at the base of the dark stripe.

The ROMs that belong in the left-hand drawer have green labels, and those that belong in the right-hand drawer have black labels. Since it is important that each ROM be inserted in the proper drawer, the drawers are designed to prevent you from inserting a ROM in the wrong drawer.

The labels on the drawers and the ROMs have symbols on them: a circle, square, or triangle. Use these symbols as a guide for matching ROMs to the appropriate slots:

- ○ ROMs can go in ○ or □ slots.
- □ ROMs must go in □ slots.
- Δ ROMs must go in Δ slots.

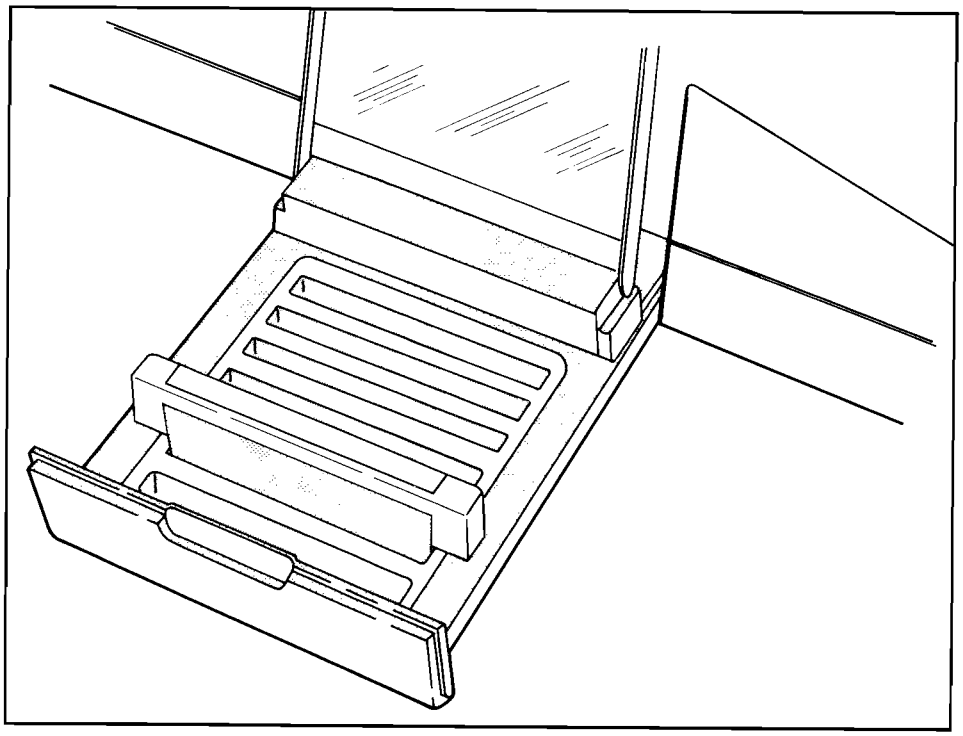
Installing and Removing ROMs

CAUTION

ALWAYS SWITCH OFF THE COMPUTER WHEN INSERTING OR REMOVING ROMS. FAILURE TO DO SO COULD DAMAGE THE EQUIPMENT.

To insert a ROM:

- Turn the power switch off.
- Slide the drawer all the way out and make sure the label color matches that of the ROM you want to insert.
- Open the clear plastic cover by squeezing the sides of the cover to gain access to the connectors.
- Orient the ROM so that the tops of the letters on the label are toward the computer.
- Make sure that the shape (○, □, or Δ) on the ROM corresponds to the shape for the slot.
- Insert the ROM vertically so that it goes all the way to the bottom of the connector. The small raised rib on the top of the drawer should fit into the recess on the bottom of the ROM. If it doesn't, make sure you have made the proper color, shape, and orientation matches.
- When the ROM is inserted, snap the clear cover shut and close the drawer until it is flush with the outside cover of the computer.



To remove a ROM:

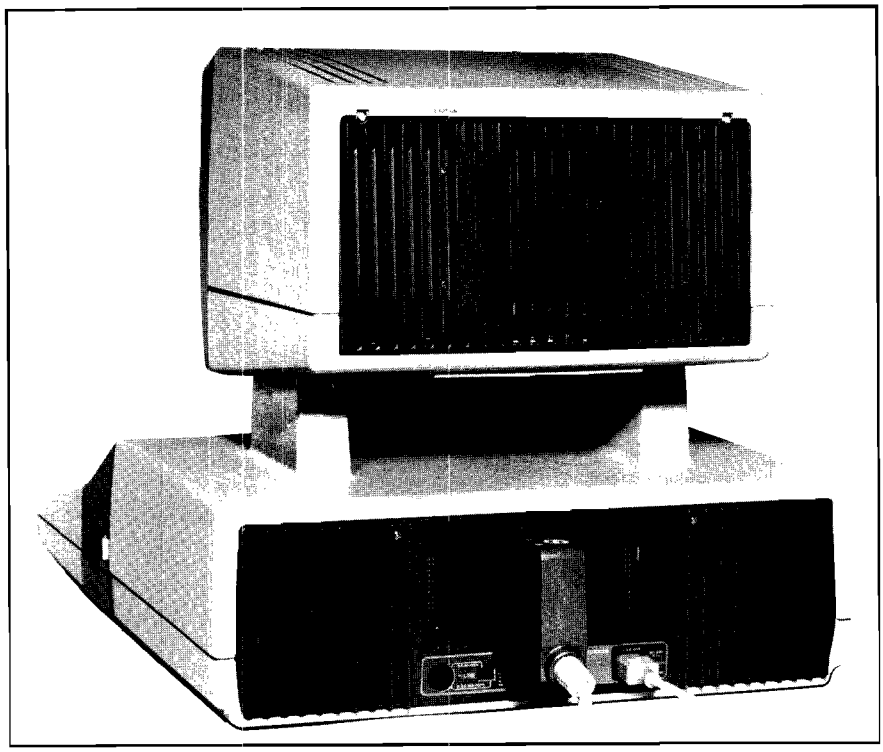
- Turn the power switch off.
- Slide out and open the proper drawer.
- Gently pull the ROM straight up.
- Close the cover and slide the drawer in.

Connecting Interfaces

CAUTION

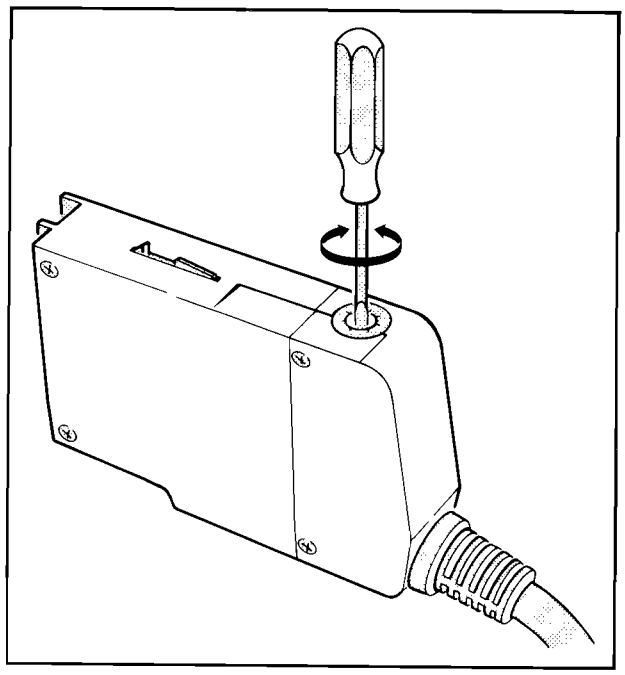
ALWAYS SWITCH OFF THE COMPUTER WHEN INSERTING OR REMOVING INTERFACES. FAILURE TO DO SO COULD DAMAGE THE EQUIPMENT.

Peripheral devices are connected to the 9845 computer with an interface. An interface can be inserted into any of the four I/O slots in the back of the computer, as shown.



Interface Select Codes

A select code is set on each interface at the factory. To change the select code, use a small screwdriver to rotate the switch which is accessible through the top of the interface rear housing. Do not set two or more interfaces to the same select code number.



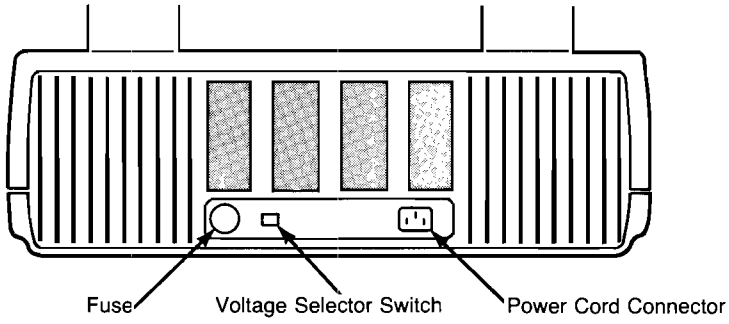
The following select codes are permanently reserved by the system and should not be set on any interface:

0 – Internal thermal printer and keyboard
13 – Graphics
14 – Left tape cartridge drive
15 – Right tape cartridge drive
16 – CRT

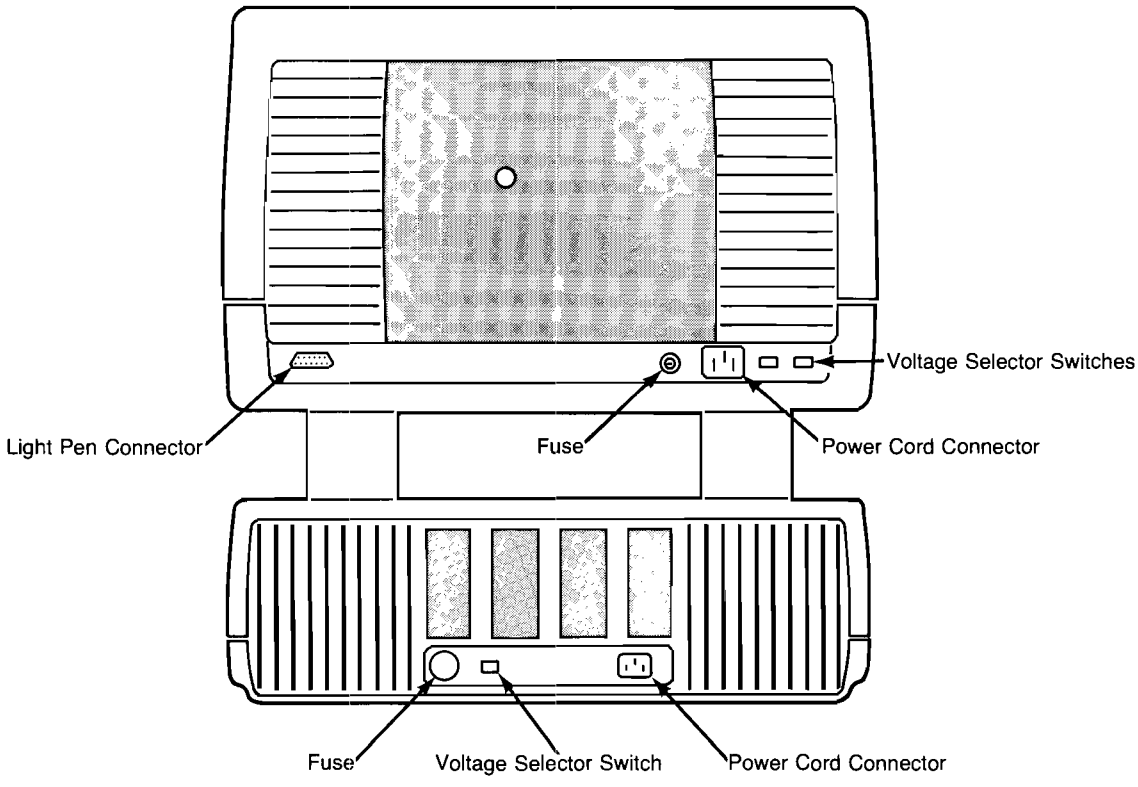
Checking Fuses, Voltage, and Power Cords

Introduction

The 9845B has a power cord connector, a fuse, and a voltage selector switch located on the rear panel of the mainframe, as shown.



The 9845C mainframe and CRT each has its own power cord connector and fuse. The mainframe has one voltage selector switch and the CRT has two. These are located on the rear panels of the CRT and mainframe, as shown.



Fuses

WARNING

TO AVOID THE POSSIBILITY OF SERIOUS INJURY, DISCONNECT THE AC POWER CORD(S) BEFORE REMOVING OR INSTALLING A FUSE.

A different fuse is required for each of the two voltage ranges of 120 Vac and 240 Vac. The proper types and ratings are shown in this table.

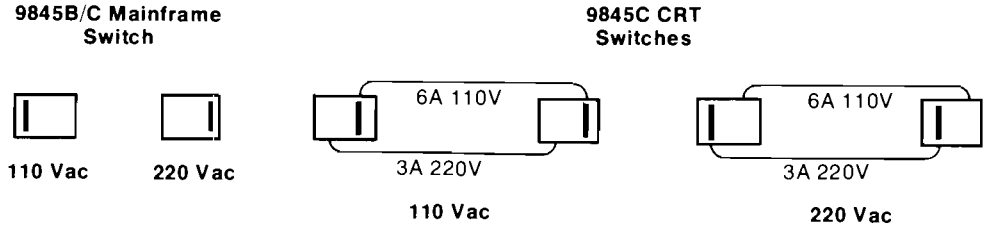
	9845C CRT		9845B/C Model 100 mainframe		9845B/C Model 200 mainframe	
Voltage Rating	Fuse Rating	Part Number	Fuse Rating	Part Number	Fuse Rating	Part Number
100,120	10 NB	2110-0051	8 NB	2110-0342	10 NB	2110-0051
220,240	6 NB	2110-0056	4 SB	2110-0365	6 NB	2110-0056

Always be sure that the correct fuse is installed. Failure to do so may result in damage to the computer. When changing a fuse, make sure that the replacement is the proper rating and type.

The previous drawings show the location of the fuse(s) on your System 45. (The 9845B has one fuse, the 9845C has two fuses.) To change a fuse, first disconnect the power cord(s) from the computer. Then remove the fuse cap by pressing downward while twisting it counterclockwise. Remove the fuse from the cap and insert the correct replacement fuse (either end) into the cap. Finally, put the fuse and cap back into the fuse holder. Press on the cap and twist it clockwise until it locks into place.

Voltage

Next, ensure that the voltage selector switch (three switches on the 9845C) is set for the nominal line voltage in your area, as shown here.



WARNING

ALWAYS DISCONNECT THE COMPUTER FROM ANY AC POWER SOURCE BEFORE SETTING A VOLTAGE SELECTOR SWITCH.

The 9845B voltage selector switch is located on the rear panel of the mainframe. The 9845C switches are located on the rear panels of the computer and CRT. To alter the setting of a switch, slide the switch so that the position of the slot corresponds to the correct voltage, as previously shown.

CAUTION

CHECK THE SELECTOR SWITCH SETTING BEFORE APPLYING POWER. DAMAGE TO THE COMPUTER WILL OCCUR IF A SELECTOR SWITCH IS SET TO 110 VOLTS AC AND 220 VOLTS AC IS APPLIED TO THE POWER INPUT CONNECTOR.

Power Requirements

The System 45 has the following power requirements:

AC Line Voltage:

Nominal Voltage	Operating Range
110	90 to 126 volts
220	198 to 252 volts

Line Frequency: 48-66 Hz

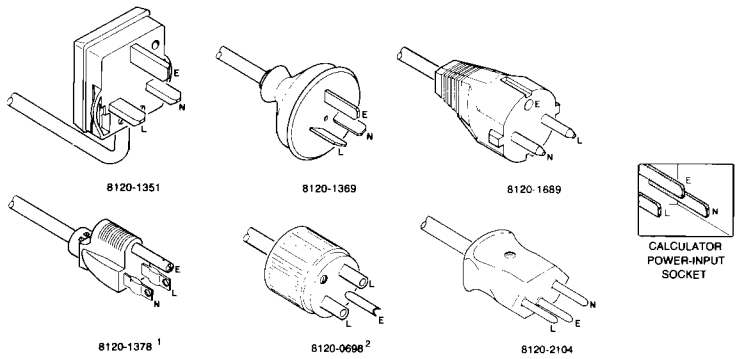
Maximum Power Consumption:

9845B Model 100	275 va
9845B Model 200	475 va
9845C Model 100:	
mainframe	275 va
CRT	670 va
CRT (idle power)[1]	35 va
9845C Model 200:	
mainframe	475 va
CRT	670 va
CRT (idle power)[1]	35 va

1 The 9845C CRT consumes a small amount of power when the mainframe power switch is OFF.

Power Cords

The 9845B has one power cord, and the 9845C has two (one for the mainframe, one for the CRT). Power cords with different plugs are available for the 9845. The cord(s) packaged with each computer depends upon where that computer is to be delivered. If your equipment has the wrong power cord(s) for your area, please contact your HP Sales and Service Office.



[1]UL and CSA approved for use in the United States of America and Canada with equipment set for either 100 or 120 Vac operation.

[2]UL and CSA approved for use in the United States of America and Canada with equipment set for either 200 or 240 Vac operation.

Power cords supplied by HP have polarities matched to the power-input socket on the computer:

- L = Line or Active Conductor (also called "live" or "hot")
- N = Neutral or Identified Conductor
- E = Earth or Safety Ground

WARNING

IF IT IS NECESSARY TO REPLACE A POWER CORD, THE REPLACEMENT CORD MUST HAVE THE SAME POLARITY AS THE ORIGINAL. OTHERWISE A SAFETY HAZARD FROM ELECTRICAL SHOCK TO PERSONNEL, WHICH COULD RESULT IN INJURY OR DEATH, MIGHT EXIST. IN ADDITION, THE EQUIPMENT COULD BE SEVERELY DAMAGED IF EVEN A RELATIVELY MINOR INTERNAL FAILURE OCCURRED.

Grounding Requirements

To protect operating personnel, the National Electrical Manufacturer's Association (NEMA) recommends that all equipment be properly grounded. HP 9845 systems are equipped with three-conductor power cables which, when connected to an appropriate power receptacle, ground the computer. To preserve this protection feature, do not operate the computer from an AC power outlet which has no ground connection.

FCC Radio Frequency Interference Statement

FEDERAL COMMUNICATIONS COMMISSION
RADIO FREQUENCY INTERFERENCE
STATEMENT

The Federal Communications Commission (in Subpart J of Part 15. Docket 20780) has specified that the following notice be brought to the attention of the users of this product.

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

Initiating Power

Once your computer is set up properly, it is ready to turn on. Before you do, here are some things to check:

- Is the proper type of fuse installed?
- Is the proper voltage set?
- Are the ROMs installed?
- Are the interfaces and peripherals connected?

Next connect the power cord (two on the 9845C) to the power input connector on the rear panel of the mainframe (and CRT – 9845C). Plug the other end of the cord into an AC power outlet.

Now that your system is set up, set the power switch on the right side of the machine to the "1" position to turn it on. Power is then automatically switched on to the CRT.

CAUTION

SHOULD A SINGLE, BRIGHT, HORIZONTAL LINE APPEAR ACROSS THE CENTER OF THE CRT, IMMEDIATELY SWITCH THE COMPUTER OFF TO AVOID DAMAGE. THEN CONTACT YOUR HP SALES AND SERVICE OFFICE FOR SERVICE ASSISTANCE.

What Should Happen

When the power is switched on, the computer begins its self-test. During the self-test, the computer tests every location in the read/write memory. While the self-test is in progress, this message:

```
MEMORY TEST IN PROGRESS
```

is displayed.

When the test is successfully completed, the computer is ready for use and:

```
9845 READY FOR USE
```

is displayed.

If there is any doubt that your computer is operating properly, you can test your machine using the System Exerciser Cartridges. Chapters 4 through 7 of this manual cover the test procedures.

Note

If nothing is displayed on the screen, adjust the CRT intensity dial. If the screen still appears blank, contact your HP Sales and Service Office.

If the computer does detect a bad memory location during the self-test, it attempts to complete the self-test by ignoring the block of memory which contains the bad location. If this is successful, you can use the computer when:

```
PART OF MEMORY FAILED SELF-TEST
```

is displayed. You should call your HP Sales and Service Office for assistance, but you can still use the System 45 for programs which don't need the entire memory. You can determine the severity of the memory failure by executing:

```
LIST
```

and comparing the amount of available memory shown with the amount of memory that should be present. (See "Read/Write Memory" and "ROMs" in this chapter.) If your 9845 has the internal printer (and if there is paper in it), one or more lines are printed if the self-test fails. Save this information. It will help your HP Customer Engineer isolate the memory failure.

If the self-test fails and the computer cannot meet its minimum memory requirements, it beeps repeatedly (about once per second) and no message appears on the display. Call your HP Sales and Service Office for assistance.

If no message appears during the self-test and the computer begins to beep continuously, check to see if the CRT is properly connected. Be sure to turn the power off before re-connecting the CRT.

Loading Printer Paper

The internal printer is an 80-character line printer used for hardcopy output. Five types of heat-sensitive paper are available, and each type comes in two widths: 8.5 inch (Standard) and 210 mm (European/Metric). Refer to the section entitled "Accessories Supplied" for these part numbers.

CAUTION

HP SUPPLIED THERMAL PAPER IS FORMULATED SPECIFICALLY TO WORK WITH THE SYSTEM 45 INTERNAL PRINTER. THERMAL PAPER FROM OTHER SOURCES MAY OR MAY NOT WORK WITH YOUR INTERNAL PRINTER AND THEREFORE HP IS NOT RESPONSIBLE FOR DAMAGES CAUSED BY USING NON-HP PAPER.

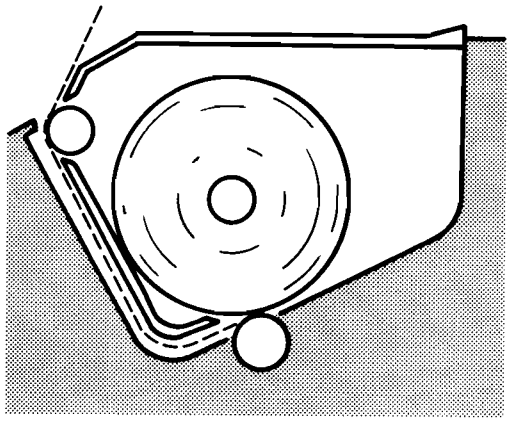
The average life of the internal thermal printhead is about 20 000 feet of paper, or about 100 rolls. However, the actual print life that you experience may vary widely from this average. If you expect to do a lot of printing, it is recommended that you consider using a heavy-duty printer, such as one of HP's line printers.

Two keys are used to control the printer paper. The PAPER ADVANCE key advances the paper until the key is released. The TOP OF FORM key advances the paper past perforations to the top margin (approximately 1.25 cm, or 1/2 inch, below the perforations). If the paper is not perforated, it is advanced 30.5 cm (12 inches).

Printer paper is loaded using the following procedure:

- Make sure the computer is switched ON.
- Lift or remove the access cover on the top of the printer by pushing down on the raised surface at the rear of the door. The door can be removed by lifting up and pulling it toward you.
- Remove and discard the paper core of any previous roll. If the remaining roll of paper is small and a new roll is to be installed, remove the old roll. To do this, first unroll and lift the old roll upward. Then tear the paper off using the paper guide.
- If any paper remains in the printer mechanism, remove it by pressing the PAPER ADVANCE key until the paper is completely out.
- Remove the first layer of paper from the new roll. Be sure the paper has a cleanly torn or cut edge. Fold the corners in to form a point.

- Insert the new roll such that the free end is positioned as shown. Press the PAPER ADVANCE key until the paper appears at the front of the printer. Then reinstall the access door by placing it on the hinge pins and pushing until it snaps into place.



Adjusting the CRT for Convergence

Introduction

Note

If you do not have a 9845C, you may skip this section which explains the procedure for adjusting color on the 9845C display.

Before using your 9845C for the first time (and periodically), it may be necessary to make some minor adjustments to the CRT. These adjustments "fine-tune" the CRT, assuring accurate and reliable color on your display.

Since the convergence of your CRT may be affected by the earth's magnetic fields, you may also need to perform the adjustment procedure if your 9845C is turned to face a different direction.

Note

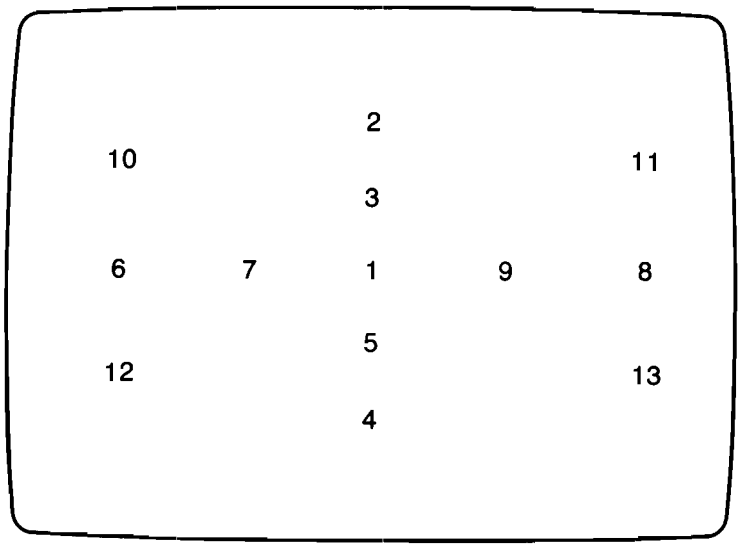
Before performing the adjustment procedure, the CRT screen should be cleaned. This can be done using a soft, damp cloth and a mild, non-abrasive cleaner.

Procedure

The adjustment procedure is simple, and requires only that you are able to distinguish among the colors which appear on the display.

Step 1: Open the door to the right of the display to expose 39 alignment locations and the alignment tool. Remove the alignment tool from inside the door by pressing its top.

The 39 locations are organized in rows by adjustment number (13 in all) and in columns by color (red, blue, and green). Each adjustment number is associated with an area on the display, as shown.



Each display area must be "fine-tuned", one at a time and in order from 1 to 13. This is done by merging 13 sets of small colored cursors ("+" 's) in each of the 13 areas on the display.

Step 2: From the keyboard, type `CONVERGE` and press the EXECUTE key. A small white cursor appears if the first area does not need to be adjusted. If so, press CONT to check the next area. Continue checking each area (by pressing CONT) until you see a white cursor with shaded edges or two or three colored cursors. Then follow the adjustment procedure explained in Step 3.

Step 3: The number which appears along the right-hand edge of the display is a reminder to you of the row of alignment locations you should use to adjust the area. Using the alignment tool in the appropriate row of alignment locations, merge the colored cursors shown on the display into one white cursor as if you were slowly turning a screw with a screwdriver. Simply insert the alignment tool into the proper opening until the tool fits into the notch. A red cursor is controlled by the left alignment location, blue by the center, and green by the right. As diagrammed below the alignment locations, the cursors move across the screen according to the following rules:

- the red cursor moves along a line from lower left to upper right
- the blue cursor moves along a vertical line
- the green cursor moves along a line from upper left to lower right

You may find that the easiest way to merge the cursors is to follow two steps: First, merge the red and green cursors together, forming a yellow cursor, which is either directly above or directly below the blue cursor. Then merge the blue cursor (up or down) into the yellow cursor, forming a white cursor.

If you see a white cursor with shaded edges instead of the colored cursors, very little adjustment is needed. Experiment with the alignment tool and the appropriate row of alignment locations to discover which color is slightly off-center.

Step 4: To continue with the next alignment, press CONT until you find another area which needs to be adjusted. Then repeat Step 3 using the new adjustment (row) number shown at the right of the screen, the appropriate row of alignment locations, and the cursors shown. If you want to step backward, to a previous alignment, press SHIFT CONT.

After the thirteenth alignment is finished, press CONT, and all of the resulting white cursors appear on the screen in their appropriate locations. Now you should check to see that each cursor is indeed white (with no shaded edges). If you wish to run the procedure again to correct one or more areas, press CONT (returning you to execution mode), and begin with Step 2.

If you are satisfied with the results, and wish to return to execution mode, simply press CONT.

Note

If after several attempts you are unable to merge a blue cursor with a yellow cursor that you have formed (the yellow cursor is not in the blue cursor's vertical path), call your HP Sales and Service Office for assistance.

If for any reason you wish to stop the convergence procedure, press STOP. The adjustments you had completed will remain as adjusted.

A **degaussing cycle** is automatically performed at each power-on of the 9845C. This removes residual magnetic fields which may affect color purity and cause some areas of the display to have off-tone color. Degaussing can also be performed by typing DEGAUSS and pressing EXECUTE[1]. The DEGAUSS command should be executed whenever you feel that color purity has been affected.

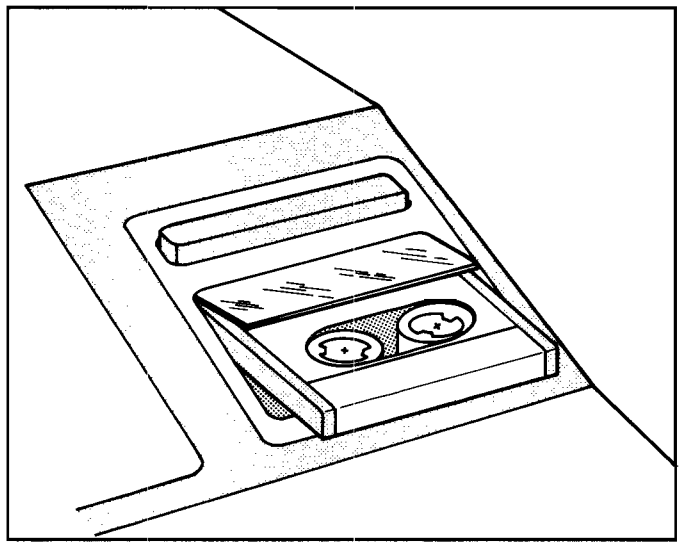
Note

The CONVERGE and DEGAUSS commands can be executed from a 9845B Model 200. However, since the 9845B Model 200 does not have a color display, nothing happens when these commands are executed.

Inserting and Removing the Tape Cartridge

The internal tape cartridge drives allow high density, high quality tape cartridges to be used for a maximum of 217 K-bytes of data and program storage per cartridge. For heavy use of mass storage files, such as nonconsecutive file sorts or data base management applications, flexible discs or hard discs are recommended for optimum performance and reliability.

Insert the tape cartridge so that its label is up and the open edge is toward the computer, as shown below. Both the drive window and the door beneath it open when a cartridge presses on the lower door. The cartridge can then be inserted.



To remove the tape cartridge, press the eject bar. If it is pulled out without pressing the eject bar, another cartridge cannot be inserted until the eject bar is pressed. Do not remove the tape or execute reset while it is moving; damage to the tape may result.

1 The DEGAUSS command can only be executed from the keyboard. It does not affect the contents of the graphics memory.

Peripheral Hardware Requirements

Many HP peripherals are available for use with the System 45. General information about peripherals can be found in the System 45 BASIC Programming Manual.

Peripheral	Interface	ROM Required	ROM for Extended Control
2608 Line Printer	98034	None	I/O
2631 Line Printer	98034	None	Graphics (2631G)
7225 Plotter	98034 or 98032A	Graphics	
7245 Printer/Plotter	98034	Graphics	
7260 Card Reader	98032A Opt.469	I/O	
7580 Plotter	98034	Graphics	
7905 Disc Drive	98041A	Mass Storage	
7906 Disc Drive	98041A	Mass Storage	
7910 Disc Drive	98034	Mass Storage	
7920 Disc Drive	98041A	Mass Storage	
7925 Disc Drive	98041A	Mass Storage	
7970E Opt. 826 Tape Drive	98041A	None	Mass Storage
9111 Graphics Tablet	98034	None	Graphics
9866 Thermal Printer	98032A Opt.466	None	I/O
9871 Impact Printer	98032A Opt.471	None	I/O
9871 Impact Printer Opt.001	98034	None	
9872 Plotter	98034	Graphics	I/O
9874 Digitizer	98034	Graphics	I/O
9875 Cartridge Tape Unit	98034	Graphics	I/O
9876 Thermal Graphics Printer	98032A Opt.476 or 98034	None	
9878 I/O Expander	Included	None	
9883 Paper Tape Reader	98032A Opt.483	I/O	
9884 Tape Punch	98032A Opt.484	None	I/O
9885 Flexible Disc Drive	98032A Opt.485	Mass Storage	
9895 Flexible Disc Drive	98034	Mass Storage	

Learning to Use the System 45

Training Tapes

Training tapes provide self-instructing programs which enable you to become familiar with the System 45 while operating it.

The 9845B Introductory Training Package includes:

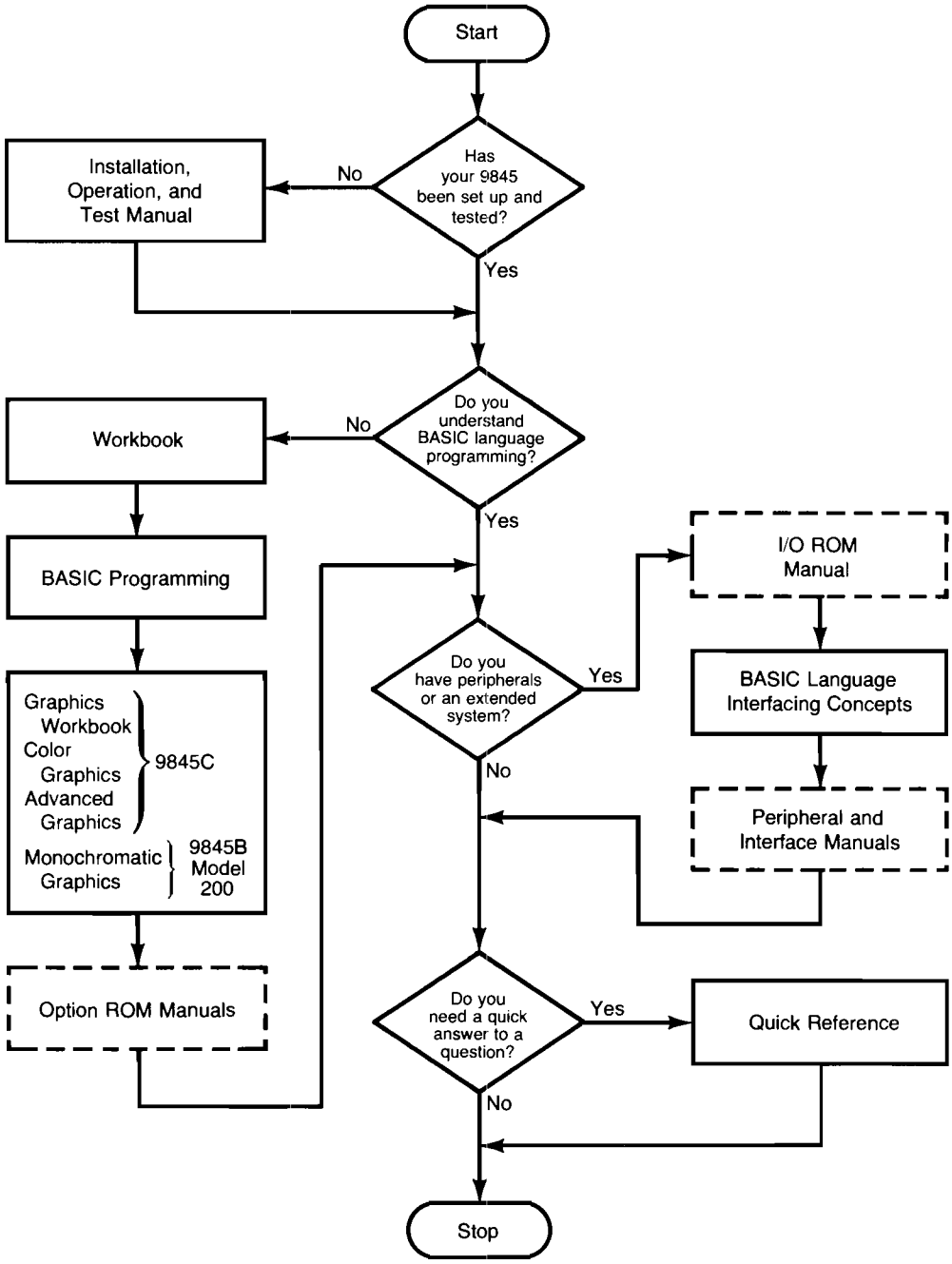
- The 9845B Introductory Training Cartridge which covers keyboard familiarity.
- System 45 Workbook.

The 9845C Introductory Training Package includes:

- The 9845B Introductory Training Package described above.
- The Graphics Training Cartridge which covers the basics of color graphics.
- System 45 Graphics Workbook.

Manuals

The following flowchart shows manuals that are included in the System 45 documentation scheme, and the suggested progression. Dotted-line borders indicate those manuals available with specific options; solid borders indicate those manuals that are shipped with every System 45.



A manual package (P/N 09845-80032) is available if you want to purchase an additional set of manuals at a reduced price. The manuals listed below in bold face type are included in the package.

Manuals relating to operating and programming are supplied with your System 45:

- **Installation, Operation and Test Manual** (P/N 09845-93005)
- **BASIC Programming:** This manual covers the keyboard, the BASIC language, and fundamental and advanced programming concepts. (P/N 09845-93000)
- **Workbook:** This manual is for use with the Introductory Training Cartridge. (P/N 09845-93090)
- **Graphics Workbook:** For the 9845C. This manual is for use with the Graphics Training Cartridge. (P/N 09845-93091)
- **Quick Reference:** This manual serves as a "mind-jogger" for 9845 programmers. A brief description and syntax for each statement, command, and function are included, along with error messages and summary tables of other information. After you have become familiar with the System 45, this small booklet is all you will need to continue using your computer. (P/N 09845-93015)
- **Color Graphics:** For the 9845C. This manual covers basic and advanced concepts of color graphics theory. It also provides reference information for beginning and advanced programmers. (P/N 09845-92051)
- **Advanced Graphics:** For the 9845C. This manual is for use with the Color Utilities tape cartridge and the Color Examples tape cartridge. (P/N 09845-93055)
- **Monochromatic Graphics:** For the 9845B Model 200. This manual covers basic and advanced graphics concepts and provides reference information for beginning and advanced programmers. (P/N 09845-93050)

Other manuals are available for specific option ROMs and interfaces.

Option ROM	Manual Title	Manual Part Number
Graphics	**Graphics ROM Manual**	09845-91051
I/O	**I/O ROM Manual**	09845-93060
	BASIC Language Interfacing Concepts	09835-90600
Mass Storage	**Mass Storage ROM Manual**	09845-93070
Structured Programming	**Structured Programming ROM Manual**	09845-93066
Advanced Programming	**Advanced Programming ROM Manual**	09845-93065
Assembly Execution	Assembly Execution ROM Manual	09845-91082
Assembly Execution and Development	Assembly Development ROM Manual	09845-91085
	Assembly Language Quick Ref.	09845-91081
Basic Datacomm	Datacomm Basics	98046-90000
	Async ROM Programming	98046-90010
RJE Bisync Datacomm	RJE Synchronous Datacomm ROM Programming	98046-90020
Data Base Management	QUERY/45 User's Guide	09845-91056
	IMAGE/45 Programming	09845-91055
	Data Base Design Kit	09845-91057

Interface	Manual Title	Manual Part Number
98032	98032A 16-Bit Interface Installation and Service Manual	98032-90000
98033	98033A BCD Interface Installation and Service Manual	98033-90000
98034	98034A HP-IB Interface Installation and Service Manual	98034-90000
98035	98035A Real Time Clock Installation and Service Manual	98035-90000
98036	98036A Serial I/O Interface Installation and Service Manual	98036-90001
98040	98040A Incremental Plotter Interface Installation and Service Manual	98040-90000
98041	98041A Disc Interface Installation Manual	98041-90000
98046	98046B Interface Installation and Service Manual	98046-90030

Manual Structure

The System 45 manuals that you receive should be placed in the two binders supplied as follows:

System 45 Operating and Programming:

- Installation, Operation and Test Manual
- Workbook
- Graphics Workbook (9845C only)
- BASIC Programming

System 45 ROM Programming:

- Graphics ROM Manual (9845B Model 100 with graphics)
  Monochromatic Graphics (9845B Model 200)
  Color Graphics (9845C)
- Advanced Graphics (9845C only)
- I/O ROM Manual
- Advanced Programming ROM Manual
- Structured Programming ROM Manual
- Mass Storage ROM Manual
- Reference Tables and Error Messages
- Subject Index

Keyboard Magazine

Keyboard is a magazine containing general information about HP desktop computers and related equipment. It includes articles and programs written by desktop computer users, descriptions of the latest equipment and preprogrammed software, programming tips, and many other items of general interest to desktop computer users.

To receive your free subscription, complete and mail the order form supplied with your computer.

BASIC User's Club

The BASIC User's Club is especially for System 45 users. It maintains a library of BASIC language programs contributed by users - you can submit as many programs as you like, and for each program you contribute, you can choose three others from the library. A catalog contains descriptions of all the programs the club offers.

To receive the BASIC User's Club catalog, complete and mail the order form supplied with your computer.

Chapter 3
Maintenance

WARNING

LETHAL VOLTAGES ARE PRESENT INSIDE THE 9845. THERE ARE NO CUSTOMER SERVICEABLE PARTS INSIDE THE 9845.

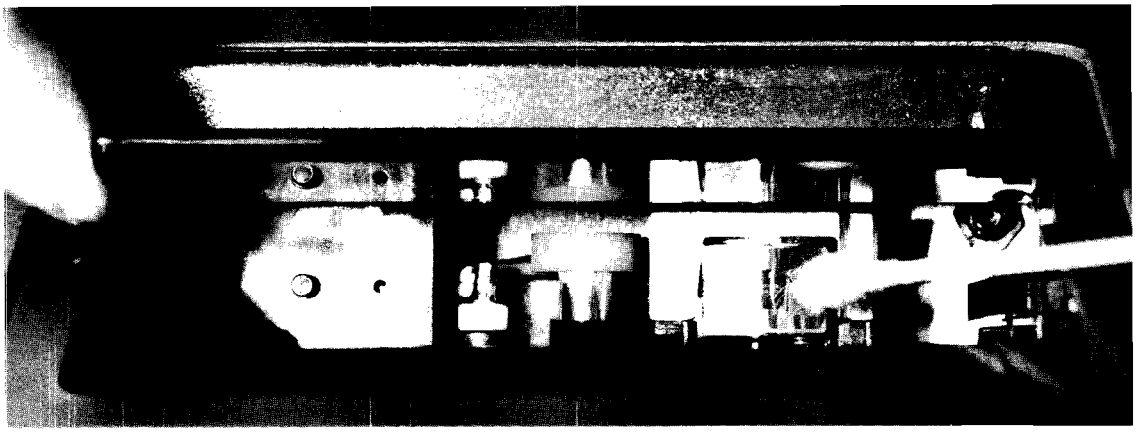
Cleaning

Your 9845 can be cleaned with a soft cloth dampened either in clean water or in water containing a mild detergent. Do not use an excessively wet cloth or allow water to get underneath the computer's case. Do not use abrasive cleaners, especially on the CRT screen or tape drive window.

Tape Drives

A dirty tape drive is the most frequent cause of cartridge-related errors. Cleaning the tape head on a regular basis can reduce this problem.

Clean the tape drive head at least every eight hours of use, or more frequently in dirty and dusty environments (manufacturing floors, for example). Use a cotton applicator dampened with magnetic head cleaner to wipe the tape head a few times. Be sure the head is dry before inserting a cartridge in the drive. It is a good idea to clean the head before making an important recording.



Air Filters

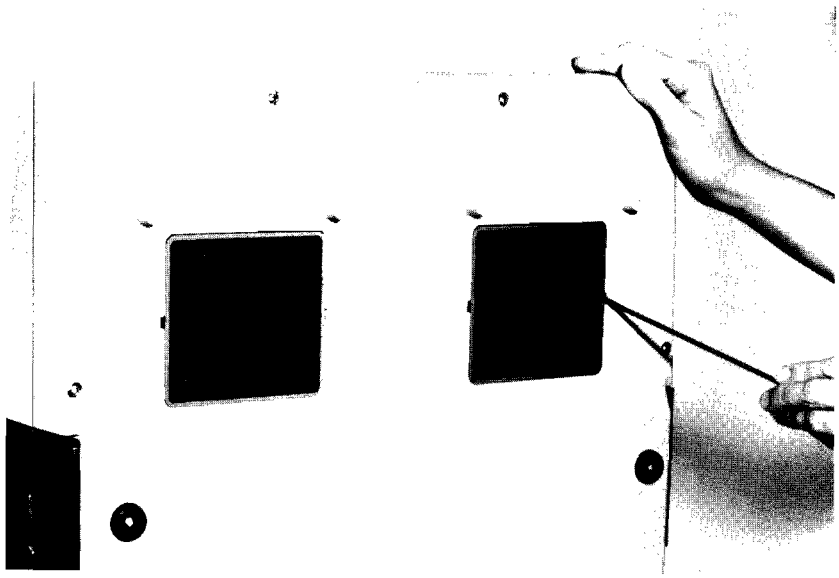
There are two air intakes which are located under the keyboard, in the bottom surface of the computer. These must be inspected periodically (every three months, approximately) and the filters must be cleaned if found to be dirty.

The easiest way to inspect the filters is to turn the computer off, then slide it forward on the table until you see the filters. If this degree of access is inadequate for removing the filters for cleaning, you can remove the CRT, then lift the mainframe up onto its rear panels for better access. Be sure to turn the power off and disconnect any cabling before doing this.

CAUTION

IF YOU HAVE A 9845B MODEL 200 OR A 9845C, THE CRT MUST BE REMOVED BEFORE TILTING THE MAINFRAME ONTO ITS REAR PANELS. OTHERWISE, DAMAGE TO THE COMPUTER MAY RESULT.

The filters can be removed by inserting a screwdriver or a key into one of the slots on either side of each filter and prying them out. Clean the filters thoroughly either by holding them under running water or by washing them in warm soapy water and then rinsing them in clean water. Dry the filters thoroughly before snapping them back into place.



Light Pen

You should periodically clean the lens of your light pen to remove dust that can interfere with its operation. Wipe the lens a few times with a cotton applicator that is dampened with magnetic head cleaner. Make sure that the lens is dry before using the light pen.

Tape Cartridge Care

The HP-supplied tape cartridge has a typical life span of 50 to 100 hours. It has been tested for reliability between 0° and 45°C (32° to 113°F) and between 20% and 80% humidities (30°C maximum wet bulb temperature). Environmental conditions of 25°C (77°F) and 20-50% relative humidity are most favorable for long tape life.

The following conditions decrease tape life:

- High duty cycle (the percent of time the tape is accessed during the total time the computer is in use).
- High turning resistance.
- Continuous use for long periods of time (greater than 1/2 hour).

Note

A backup copy of vital programs or data should always be maintained on a separate tape cartridge.

Cartridge-related errors can be reduced by following these tape care suggestions:

- Remove your tape cartridge from the drive when you are finished using it, and keep the cartridge in the plastic container supplied with it. Physical damage to the tape, such as a wrinkle or fold, can cause recording or loading problems.
- Rewind the tape before removing it from the drive. This also makes the directory easy to access for the next use.
- Never eject the tape cartridge while the tape is moving. Damage to information can be severe if a write or directory operation is in progress.
- Strong magnetic fields can erase programs and data stored on the tape. Keeping the cartridge in a metal box, such as card file, protects it.
- Clean the tape drive regularly (approximately every eight hours of use).

Note

Occassionally when using the tape cartridge, unexpected high-speed movements may occur. Ignore these. They do not affect usage, but merely assure proper tape tension.

Any tape cartridges supplied by HP which contain programs or data should be duplicated immediately. HP tape cartridges are very reliable, but, being mechanical devices, they are subject to wear over a period of time. To avoid having to purchase a replacement medium, we recommend that you immediately duplicate the contents of each tape onto a permanent backup tape or disc. You should also keep backup copies of your important programs and data on a separate medium to minimize the risk of permanent loss.

Chapter 4
Testing the System 45

Introduction

The programs on the System Exerciser Cartridges (HP P/N 09845-92041 Revision C and 09845-92042 Revision A) are designed to assure you that your System 45 is operating properly, and if it is not, to identify problem areas which may exist. Some exercisers require that you compare what is displayed or printed to what is described in this manual. All of the exercisers display error messages when errors are detected.

If any exerciser should fail, please note the error and contact your HP Sales and Service Office for assistance.

The exercisers are divided into three types: internal mainframe, peripheral, and interface. The internal mainframe exercisers should be run first to exercise the System 45 mainframe thoroughly before running any of the external peripheral or interface exercisers.

See Appendix A of this manual for a summary table of all the exercisers.

Starting Procedure

Before starting, use the following checklist to ensure that your system is ready for testing.

- Switch power off.
- On the computer and peripherals, check to ensure that the line voltage selector switches are set, and that the correct fuse(s) is(are) installed.
- Configure the interfaces as shown for the interfaces you want to run. (Refer to Chapter 7.)
- Verify that the ROMs and interfaces are properly installed, and that each peripheral is connected to the proper interface. Then switch on the peripherals.

Latch the AUTOST key on your computer. Begin by inserting System Exerciser Cartridge #1 in the right-hand tape drive so that the cartridge label faces up and out. Switch on power to the System 45, and the computer should load and run the supervisory exerciser program. If this does not happen, or if a blinking cursor does not appear on the CRT within about 20 seconds after turn-on and cannot be obtained by pressing CONTROL STOP, call your HP Sales and Service Office for assistance.

The supervisory exerciser program can also be loaded by typing `LOAD "AUTOST:T15"` and pressing EXECUTE.

When the supervisory exerciser program begins to run, the following information is displayed:

```
9845B/C SYSTEM EXERCISER Do you want PRINTED output (Y,N)?
```

Answer `Y` for yes or `N` for no, and press CONT. If you want the printout to appear on the CRT, answer no. If you answer yes, you are asked to:

```
Please enter the PRINTER select code...
```

For non-HP-IB printers, enter the interface select code. (Enter 0 for the internal printer.)

If you have an HP-IB printer, answer with the select code and the device address entered together as a three or four digit number. The interface select code can be a one or two digit number which represents a valid select code. The device address must be a two digit number. For example, a 9871A Printer (HP-IB option only) connected on interface 7 with its address set to 6 is entered as "706". (Secondary addressing of HP-IB devices is not allowed.)

The choices of exercisers for System Exercsier Cartridge #1 are then printed on the specified printer (or the CRT):

```
MAINFRAME          PERIPHERALS              INTERFACES          MEMORY

COMP               7905A       9872A          98032A           MEMORY
DISPLA             7906A       9874A          98033A
TAPE               7920A       9875A          98034A
PRNTR              7925A       9876A          98035A
GRPHC              9866A       9883A          98036A
CLRGR              9866B       9884A          98040A
ENHGR              9871A       9885MS

*  STATUS SHOWS THESE OPTIONS NOT INSTALLED.
```

An asterisk (*) appearing before any of the MAINFRAME exercisers shows that that particular option is not installed.

Use the same procedure to run the exercisers on System Exerciser Cartridge #2. These are the exercisers available on that cartridge:

```
MAINFRAME          PERIPHERALS              INTERFACES          MEMORY

ROMREV             9895A
                   7910H
                   9111A

*  STATUS SHOWS THESE OPTIONS NOT INSTALLED.
```

Now you should select the specific exerciser(s) you want to run, using the instructions found in the following chapters.

Chapter 5
Internal Mainframe Exercisers

Selecting an Exerciser

There are five exercisers that you should run to exercise your System 45:

- The memory (MEMORY) exerciser performs a checksum on the System 45 ROMs and also checks the read/write memory.
- The display (DISPLA) exerciser checks the CRT display functions. If the adjustment parameter ADJ is entered, a pattern is output to the CRT print area for you to check.
- The tape (TAPE) exerciser checks the tape drive(s) on the System 45. It first exercises the right-hand tape drive, and then the left-hand tape drive (if it is present).
- The printer (PRNTR) exerciser checks the operation of the thermal printer (if it is installed).
- One of three graphics exercisers (GRPHC, CLRGR, or ENHGR) checks the CRT graphics (unless you have a 9845B Model 100 without graphics):

  GRPHC - Checks 9845B Model 100 graphics (98750A CRT). An adjustment parameter (ADJ) can be entered for use by your HP service engineer.

  CLRGR - Checks 9845C color graphics (98770A CRT). Two parameters (KEY and PEN) are available for you to check the softkeys and light pen.

  ENHGR - Checks 9845B Model 200 enhanced graphics (98780A CRT). A parameter (MENU) is available for checking the softkeys and light pen, and for running sections of the exerciser individually.

The ROM revision (ROMREV) exerciser (located on System Exerciser Cartridge #2) determines the components (processor, CRT, and ROMs) that comprise your System 45. You do not need to run it unless you want to know exactly what your internal system includes.

If you have decided that you want to run only one of the mainframe exercisers, type its name and press CONT. If you want to include a parameter (described above) for the exerciser, it is done as shown here:

```
DISPLA,ADJ
```

It is possible to enter up to eight exercisers, to be run one after another, as long as they are all located on the same exerciser cartridge. The exercisers are run starting with the first one in the list. Each exerciser name is separated from the next with the divide (/) symbol, as shown here:

```
PRNTR/TAPE/DISPLA,ADJ/9872A,701/98035A,5
```

or `ROMREV/9111A,706`

Entering COMP as the exerciser results in four (DISPLA, TAPE, PRNTR, and GRPHC, CLRGR, or ENHGR) of the exercisers being run.

Once you have entered the exerciser name(s) and pressed CONT, you are asked to enter the number of times you want each exerciser to be run. The maximum number of repetitions is 25. However, the MEMORY exerciser cannot be run more than once at a time. Before you enter the number of times the exerciser(s) should be run and press CONT, refer to the appropriate section(s) of this chapter for more detailed information about each exerciser.

Each exerciser should run as described in this chapter. If any exerciser does not run properly, note the error and contact your HP Sales and Service Office for assistance.

After any exerciser has completed its operation, the following message is displayed:

```
_ message(s), # runs = _, Press CONT
```

This tells you the total number of errors which occurred during the total number of exerciser repetitions.

Note

Except for MEMORY and the graphics memory tests, you can stop an exerciser at any time for careful examination of the display by pressing PAUSE. A program line will also appear on the screen. Press CONT to complete the exerciser.

Memory Exerciser (MEMORY)

Due to the comprehensive nature of the MEMORY exerciser, the following special circumstances exist:

- There is no printed output available. Test results are displayed on the CRT.
- Multiple repetitions of the MEMORY exerciser are not allowed.
- When you wish to run the MEMORY exerciser, it must be the only exerciser selected.

Pressing any keys on the keyboard while the MEMORY exerciser is running may cause an error. Error messages are displayed if errors occur. If you want to stop the exerciser while it is running, press the STOP key.

The exerciser begins by displaying a blinking:

```
ROM CHECKSUM TEST RUNNING
```

A ROM checksum failure is indicated by the message:

```
ROM CHECKSUM FAILURE BLK X ADDRESS XXXXXX-XXXXXX
```

This information should be noted for your HP service representative, since it can result in a shorter service call. If this message is displayed, press CONT to continue the exerciser. The memory check is run next while the CRT displays a blinking:

```
R/W MEMORY EXERCISER RUNNING
```

During the memory check, the CRT displays various characters and lines on its print area. This is normal.

A read/write memory failure is indicated by the message:

```
MEMORY ERROR BLK X ADDRESS XXXXXX HAS XXXXXX NOT XXXXXX
```

This information should also be noted for your HP service representative.

Note

The display may have a variety of patterns on it for a short period of time during the MEMORY exerciser. This is normal.

A message is displayed when the exerciser has completed.

Display Exerciser (DISPLA)

If you enter DISPLA ,ADJ, the result is:

```
HeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHe
HeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHe
HeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHe
HeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHe
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HeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHe
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HeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHe
HeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHe
HeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHe
HeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHeHe
```
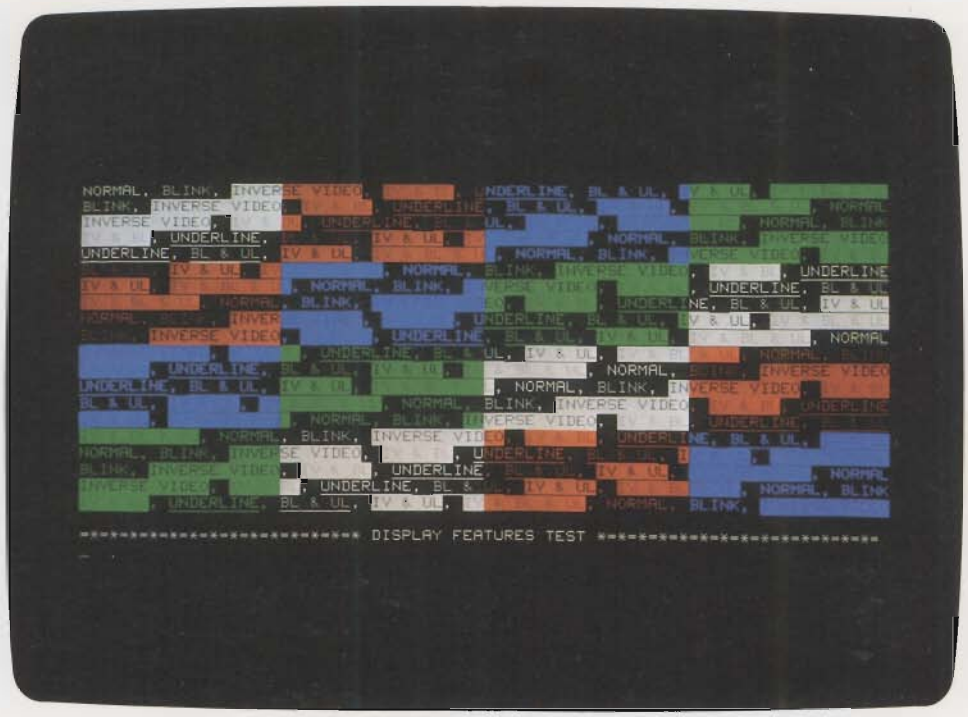

Check to see that the display edges are not curved in or out, and compare letters in different areas of the screen to see if they are equal in size, clarity, and intensity.

If you do not enter the ADJ parameter, and you have a 9845B, compare your resulting display with this:

```
NORMAL, BLINK, INVERSE VIDEO, IV & BL, UNDERLINE, BL & UL, IV & UL, IV & BL & UL
BLINK, INVERSE VIDEO, IV & BL, UNDERLINE, BL & UL, IV & UL, IV & BL & UL, NORMAL
INVERSE VIDEO, IV & BL, UNDERLINE, BL & UL, IV & UL, IV & BL & UL, NORMAL, BLINK
IV & BL, UNDERLINE, BL & UL, IV & UL, IV & BL & UL, NORMAL, BLINK, INVERSE VIDEO
UNDERLINE, BL & UL, IV & UL, IV & BL & UL, NORMAL, BLINK, INVERSE VIDEO, IV & BL
BL & UL, IV & UL, IV & BL & UL, NORMAL, BLINK, INVERSE VIDEO, IV & BL, UNDERLINE
IV & UL, IV & BL & UL, NORMAL, BLINK, INVERSE VIDEO, IV & BL, UNDERLINE, BL & UL
IV & BL & UL, NORMAL, BLINK, INVERSE VIDEO, IV & BL, UNDERLINE, BL & UL, IV & UL
NORMAL, BLINK, INVERSE VIDEO, IV & BL, UNDERLINE, BL & UL, IV & UL, IV & BL & UL
BLINK, INVERSE VIDEO, IV & BL, UNDERLINE, BL & UL, IV & UL, IV & BL & UL, NORMAL
INVERSE VIDEO, IV & BL, UNDERLINE, BL & UL, IV & UL, IV & BL & UL, NORMAL, BLINK
IV & BL, UNDERLINE, BL & UL, IV & UL, IV & BL & UL, NORMAL, BLINK, INVERSE VIDEO
UNDERLINE, BL & UL, IV & UL, IV & BL & UL, NORMAL, BLINK, INVERSE VIDEO, IV & BL
BL & UL, IV & UL, IV & BL & UL, NORMAL, BLINK, INVERSE VIDEO, IV & BL, UNDERLINE
IV & UL, IV & BL & UL, NORMAL, BLINK, INVERSE VIDEO, IV & BL, UNDERLINE, BL & UL
IV & BL & UL, NORMAL, BLINK, INVERSE VIDEO, IV & BL, UNDERLINE, BL & UL, IV & UL
NORMAL, BLINK, INVERSE VIDEO, IV & BL, UNDERLINE, BL & UL, IV & UL, IV & BL & UL
BLINK, INVERSE VIDEO, IV & BL, UNDERLINE, BL & UL, IV & UL, IV & BL & UL, NORMAL
INVERSE VIDEO, IV & BL, UNDERLINE, BL & UL, IV & UL, IV & BL & UL, NORMAL, BLINK
IV & BL, UNDERLINE, BL & UL, IV & UL, IV & BL & UL, NORMAL, BLINK, INVERSE VIDEO

=*=*=*=*=*=*=*=*=*=*=*=*=*=* DISPLAY FEATURES TEST *=*=*=*=*=*=*=*=*=*=*=*=*=*=
```

If you have a 9845C, compare your display with this:



These parts of the previous displays should be blinking on and off: BLINK, IV&BL, BL&UL, and IV&BL&UL

The standard character set and the nationalized and drawing characters are then displayed. Check your display with this:

STANDARD CHARACTER SET

```
 !  "  #  $  %  &  '  (  )  *  +  ,  -  .  /  0
 1  2  3  4  5  6  7  8  9  :  ;  <  =  >  ?  @
 A  B  C  D  E  F  G  H  I  J  K  L  M  N  O  P
 Q  R  S  T  U  V  W  X  Y  Z  [  \  ]  ^  _  `
 a  b  c  d  e  f  g  h  i  j  k  l  m  n  o  p
 q  r  s  t  u  v  w  x  y  z  {  |  }  ~
```

NATIONALIZED AND DRAWING CHARACTERS

```
 Á  Í  Ó  Ú  À  È  Ò  ´  `  ^  ¨  ~  Ë  Ø  £  ¯
 Ã  ã  º  Ç  ç  Ñ  ñ  ¡  ¿  ¤  £  ¥  §  ª  ·  à
 è  ô  û  á  é  ó  ú  à  è  ò  ù  ä  ë  ö  ü  Å
 î  ø  Æ  à  í  ø  æ  Ä  Î  Ö  Ü  É  ï  ß     ↑
 ┣  ┏  ┳  ━  ┓  ┫  ┃  ╋  ├  ┌  ┬  ─  ┐  ┤  ┼  →
 ┠  └  ┴  ┼  ┘  ┨  ↓  ←  ┸  ┗  ┻  ╂  ┛  ┯  ▒
```

Tape Exerciser (TAPE)

In order to run this exerciser, the system exerciser cartridge in the right-hand tape drive must be unprotected (tab slid to the right). If you want to exercise the left tape drive, an unprotected tape cartridge (which has been initialized) must be installed in it.

Note

If files named DATA1, DATA2, DATA3, DATA4, or DATA5 exist on the tape which you insert in the left tape drive, they will be purged by this exerciser.

It is suggested that you set the print all mode by pressing and latching the PRT ALL key. This enables you to see every message which is displayed. When the exerciser has completed, press and unlatch the PRT ALL key to turn off the print all mode.

The tape exerciser begins by prompting you with these messages:

```
CREATING FILE DATA1
CREATING FILE DATA2
CREATING FILE DATA3
CREATING FILE DATA4
CREATING FILE DATA5
ASSIGNING & FILLING FILE DATA1
ASSIGNING & FILLING FILE DATA2
ASSIGNING & FILLING FILE DATA3
ASSIGNING & FILLING FILE DATA4
ASSIGNING & FILLING FILE DATA5
```

followed by various read and write messages.

When the right-hand tape drive (T15) test is finished, this message is displayed:

```
TAPE VERIFY DONE :T15
```

Then the exerciser checks for the presence of the left tape drive (T14). If it is present, the exerciser is re-executed for T14. If it is not present, the exerciser continues normal operation. If your System 45 has a left tape drive, but a tape cartridge is not installed in it, the following message is displayed (or printed):

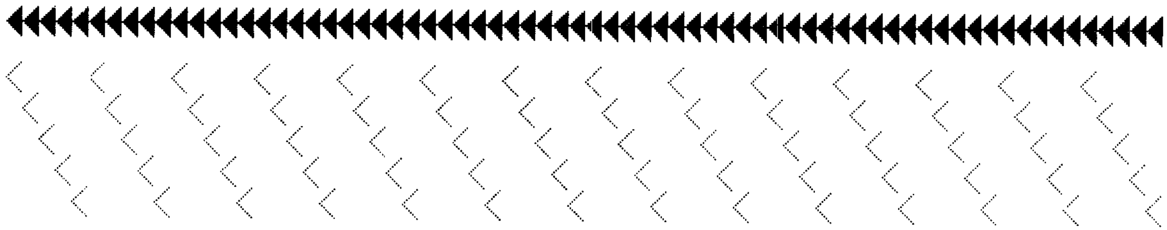
```
TAPE CARTRIDGE OUT :T14-EXERCISER NOT RUN
```

Printer Exerciser (PRNTR)

The exerciser begins with a formfeed and this print-out (which you should compare to your own):

```
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~▒

Alternate char set
 ÂÎÔÛÁÉÓ´`ˆ¨˜ÈÔ£¯Ãã°ÇçÑñ¡¿¤£¥§²•
âêôûáéóúàèòùäëöüÅîØÆåíøæÄìÖÜÉïß ↑┣┳┳┓┫┃╋┣┌┐┤╋┃└┼┘┃↓←┻┻╋┳▒

Control codes
[illegible]
[illegible]

TAB TAB TAB TAB TAB TAB TAB TAB TAB TAB TAB TAB TAB TAB TAB TAB TAB TAB TAB TAB

UNDERLINE
```

```
+++
Normal Big ▒▒) ▒▒▒▒)), BIG,Normal 123

++Nor ▒▒) ▒▒▒▒)), BIG,Normal 123

CARRIAGE RETURN
```



```
Random text
V15@^AL1qgo|3(Y5m~cq#dtwX1v6]k,iP!K$u~Sv0wHh(2t47wq]H:di[s7})cUJSk5n99>s]7$I^~8j
i]q@z3pPF$by?T~ZmI|@_<DQ"\fb"4U*EiC^c[e=RqZHYGG]Cr0^y~Gs4K^U1U9h6fW^,',@Gv%n2/^
7:G[GW;IPZAa2ss*^f&W(?(L==L9PQ_SDz![pZdu0pdvsnH23dV7;8pfaCAPtb_L&fUCB:!fr38u▒.xz
b,I;c3UI~MD9YmL%0eJ=# Nx*yPInvg!`tkb!URH1kj."g.ZMv pQ^jT2RQXM~s-9~${FP;R)J?4sS!b
vUEf?(\Gn/E'IJN71*x=of4XX4Hzf`K|V((WJ%u>YP[*'/,_3t0/JLM)^p[>|k+#d2g>vX[r!iIo,kc9
HEs&](xAgR1MKsTSb+855XgW'?_7WX8-)n 6Rz407^Qw)"LgbgknLA)sNh5SnMb1Vj|Qtn;\6EvYtnz[
x1\LPH)VHfPK(q._Kv*NM%'OZ^Kh▒UWG'FXaPq53I%SNTojW"D>3g|.GRJ=D5[>HY#|||y-krJC1_0tu
?2]u@Y:S.!5V+fHwj)Y8N%q0fb.JfdAJd>Ukp^/= $/Z(7t50_eUyaQR>n)mt$0Ru*Li`0orH*/Ht00j
2Ip:X-pvM~>u8MC|M$J:+pJ02@#(9t&v<w!e#q*EEuP<|%d*q]p0f)J<( 0amw@R3/:jv5)aZ[V"p8R)
:8H(*%~6rhu#A'T~s)V,<S~<)@IMX08/,&:VJZ>`w)+dmd"W0NDyXt\40#TGk[@0TgZ6KV"v0\'2wuTu
```

Graphics Exerciser (GRPHC)

The graphics exerciser for the 9845B Model 100 (98750A CRT, with the graphics option) consists of eight sections:

- Full Plotting Area On
- Full Plotting Area Off [1]
- Vertical Lines #1
- Vertical Lines #2
- Random Pattern #1
- Random Pattern #2
- Plotted Points
- Moving Cursor

Error messages are displayed if any errors are detected.

Color Graphics Exerciser (CLRGR)

The color graphics exerciser for the 9845C (98770A CRT) consists of seven sections. You should check your display with the following descriptions:

The **graphics memory test** consists of six sections. The first section turns the full plotting area on then off. The following five sections display a series of vertical lines. Error messages are displayed if any errors are detected.

The **memory plane color section** tests the graphics memory plane by filling the display with each of these eight colors: white, red, yellow, green, cyan, blue, magenta, black. The cycle is repeated for each of the three memory planes.

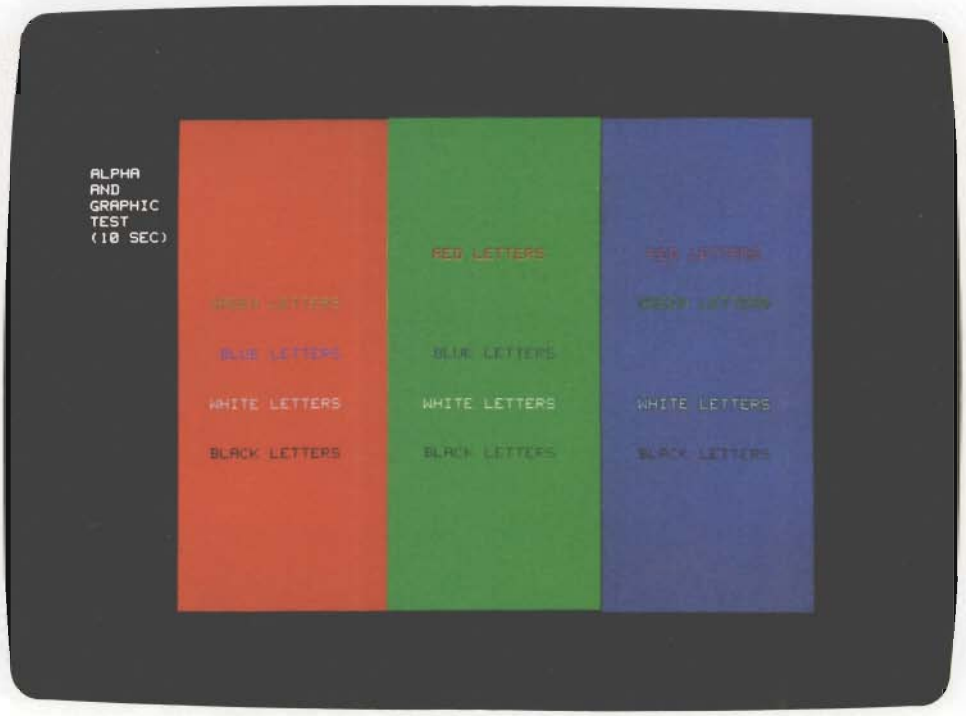
The **vector section** begins by displaying a star-like object formed by a series of white lines drawn in a clockwise direction. Another star appears, formed in a counter-clockwise direction by repeating white, blue, green, and red lines. The star is erased from top to bottom. Finally, 19 concentric white rectangles appear (with a white point at their center) and are also erased from top to bottom.

The **line type section** displays the ten line types in white, a border in cyan, and number identifications in the following colors: 1.white, 2.red, 3.yellow, 4.green, 5.cyan, 6.blue, 7.magenta, 8.white, 9.red, 10.yellow

1 The ADJ parameter causes the exerciser to stop here. Press CONT to exit.

The **shades section** draws a horizontal red band, increasing in luminosity from left to right. Green and blue bands are drawn below the red, also increasing in luminosity from left to right.

The **alpha and graphics section** follows with this display:

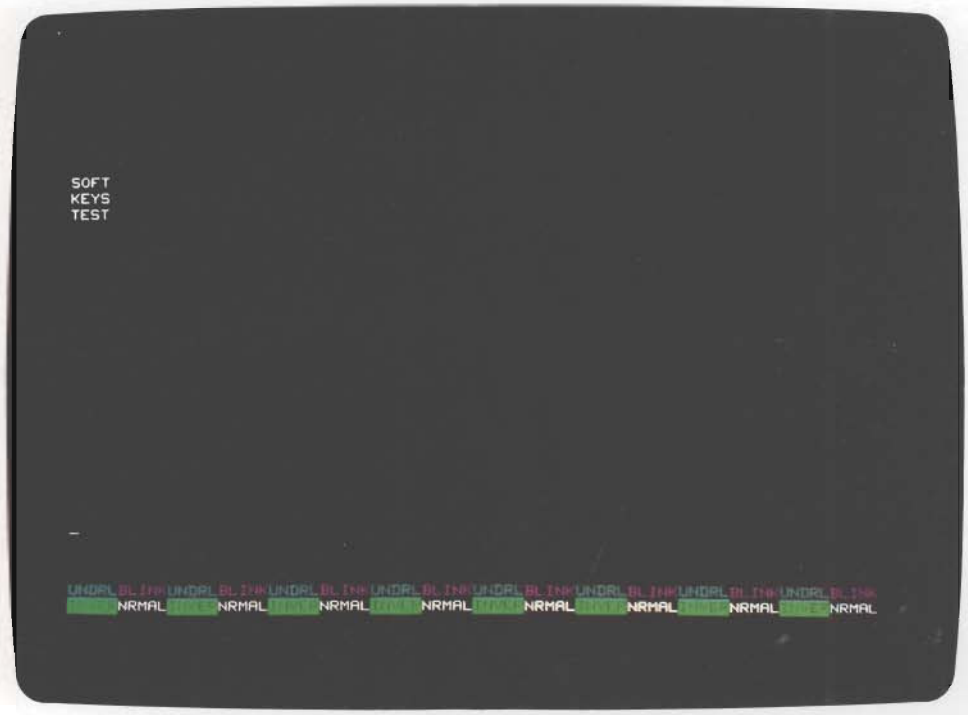


The **markers section** shows a vertical line (cyan) moving from left to right in the graphics plane while a horizontal line (also cyan) moves from the bottom of the display to the top. Then a cyan marker (+) moves across the screen in the graphics plane from lower left to upper right.

Softkeys Test (9845C only)

If you enter CLRGR ,KEY, the test result is:

Followed by:



Then you are asked to press the softkeys as directed by the prompt:

```
PRESS
ME NOW
```

above each of the keys.

Light Pen Test (9845C only)

If you enter CLRGR,PEN, the message:

```
DIGITIZE THE POINT WITH THE LIGHT PEN.
```

instructs you to place the light pen point (at a right angle to the screen) over the marker and press the pen button. If this is not done accurately or if the light pen is not operating properly, the message:

```
REDIGITIZE THE POINT.
```

appears, and you should try to digitize the point again. After four failures, the following is displayed:

```
LIGHT PEN TEST FAILED.
```

Four more points are displayed for you to digitize. If these are successfully digitized, the following message is displayed:

```
MOVE THE TRACKING CROSS WITH THE LIGHT PEN TO THE POINT AND
DIGITIZE THE POINT.
```

This instructs you to place the pen over the large marker, move across the screen to the small marker and press the pen button. If this is not done accurately, or if the light pen is not operating properly, the message:

```
REDIGITIZE THE POINT.
```

appears, and you should try to digitize the point again. After four failures, the following is displayed:

```
LIGHT PEN TEST FAILED.
```

Four more tracking crosses are displayed at various locations on the screen, for you to move. If five points are successfully digitized, the following message is displayed:

```
LIGHT PEN TEST PASSED.
```

Enhanced Graphics Exerciser (ENHGR)

You can run the enhanced graphics exerciser (for the 9845B Model 200) without any interaction, or you can select any sections that you want to run by including the MENU parameter when you specify the ENHGR exerciser. If you do not include the MENU parameter, the exerciser runs automatically, and you can ignore any instructions which are displayed during the exerciser.

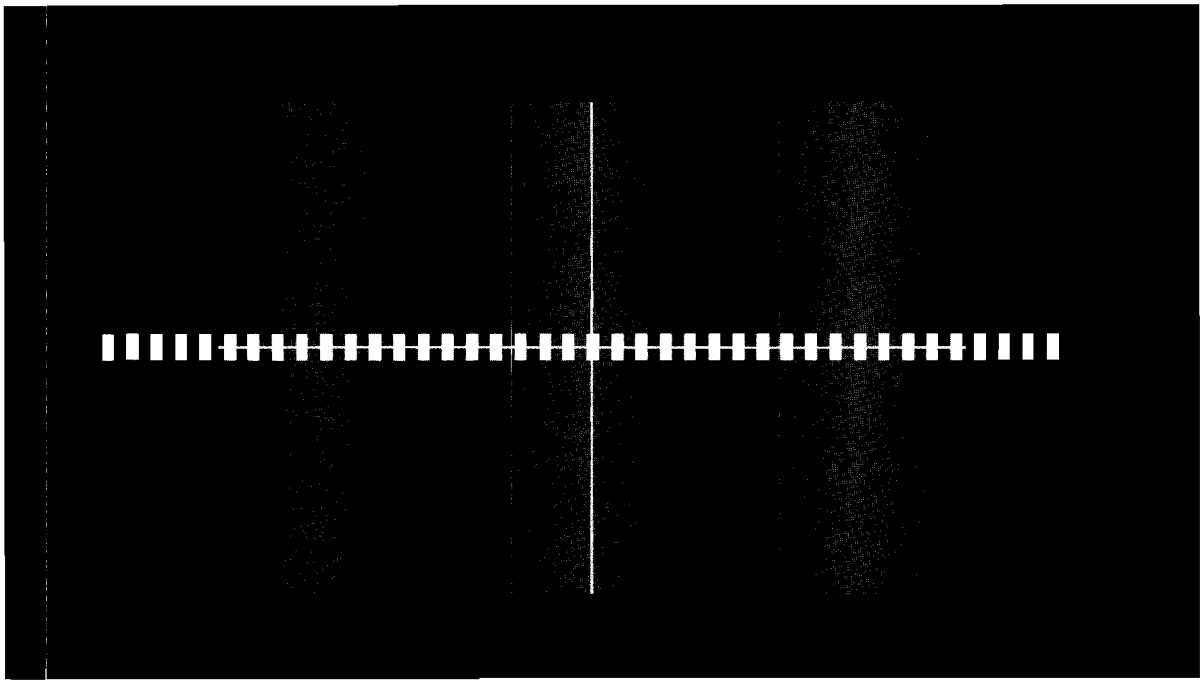
When MENU is included, you can a run a particular section by pressing a pre-defined key. Then you need to press CONT to progress through each section, as prompted by the display.

Section Name	"MENU" Key	Instructions
Focus Alignment Pattern	F	Make sure the % characters are clear and readable - a uniform focus over the entire display area.
Linearity	L	Check for horizontal and vertical symmetry on the display.
Full Line Buffer	B	Check for a full-width bar across the top of the screen.
Video Intensity	I	See description below.
Alphanumerics	A	See description below.
Alpha Raster	R	A full inverse video alpha raster should appear.
"B" Screen	S	Make sure the "B" characters on the inverse video alpha raster are a uniform size across the display.
Grid	G	A grid should appear.
Vector Test	V	See description below.
Cursor Types	T	See description below.
Graphics Memory Test	M	See description below.
Softkey Test[1]	K	Press each softkey and make sure a display appears above each key after it is pressed.
Light Pen[1]	P	See description below.
Auto Cycle[1]	X	See description below.
Exit[1]	E	Return to the main program.

1 These sections are not included in the exerciser if you have not specified the MENU parameter.

Video Intensity (I)

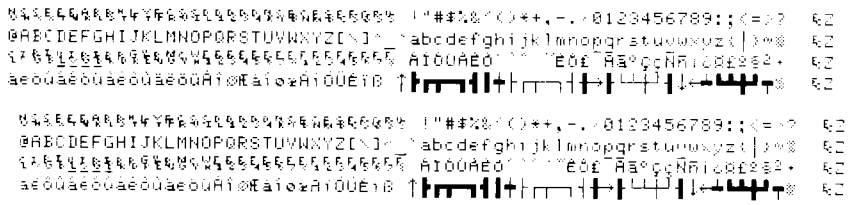
Compare your display with the one shown below, and make sure you can see three levels of intensity: 1) full-screen crosshair cursor, 2) graphics display, and 3) alpha display (small rectangles).

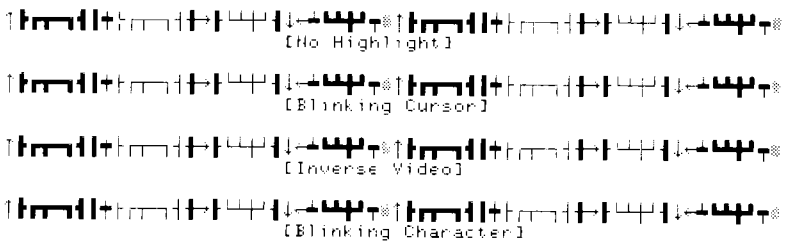


Then the large square should become bright (light pen bit test).

Alphanumerics (A)

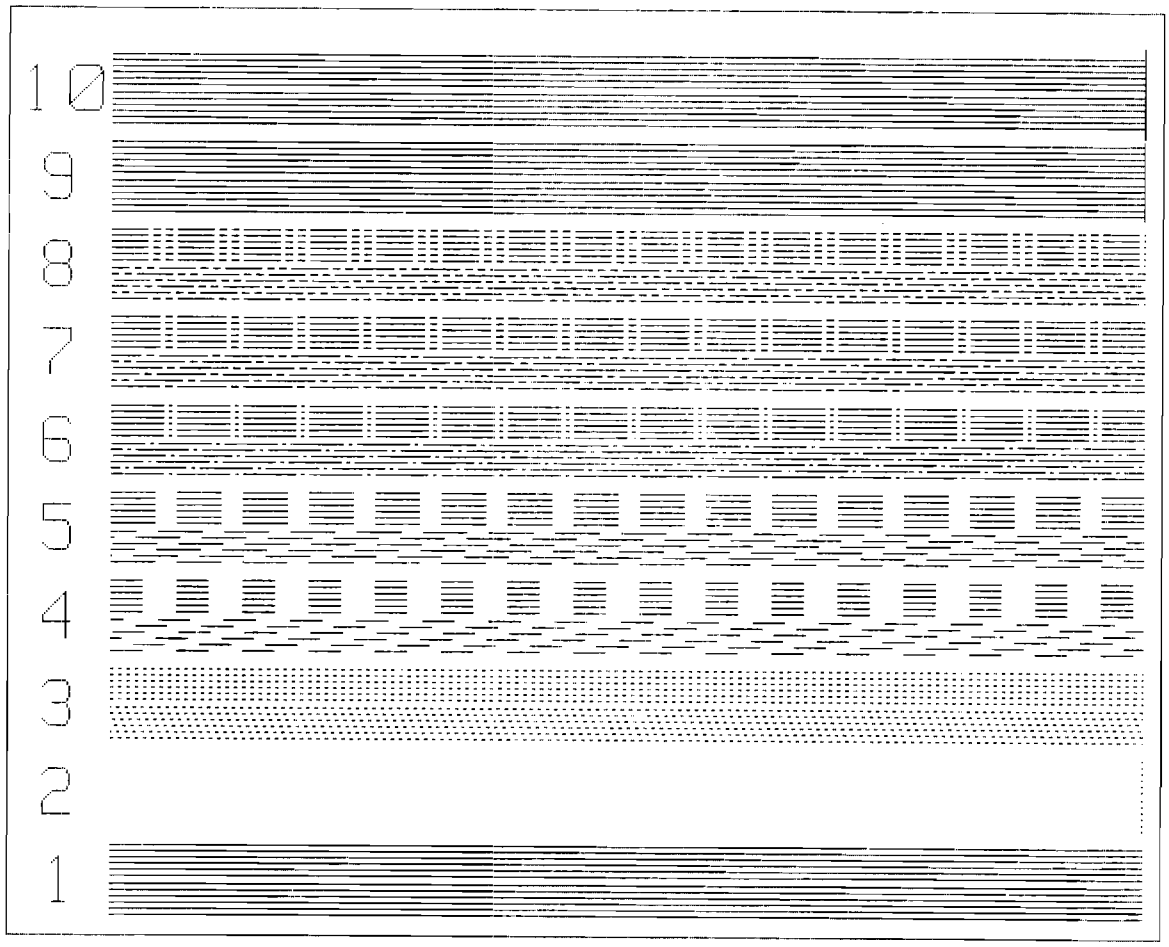
The test begins with the alphanumeric display on. It is turned off and back on again. Then the following is displayed:



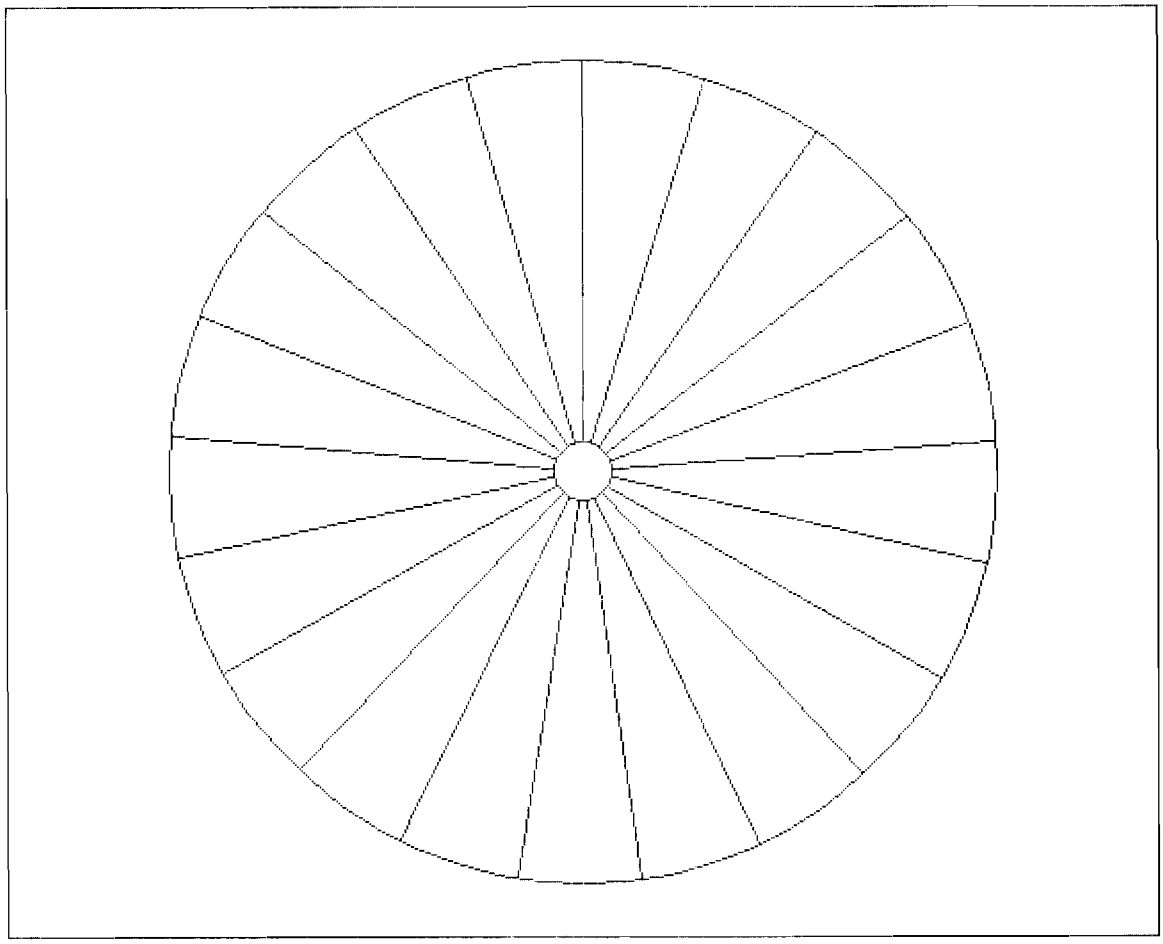


Vector Test (V)

The linetypes are displayed:

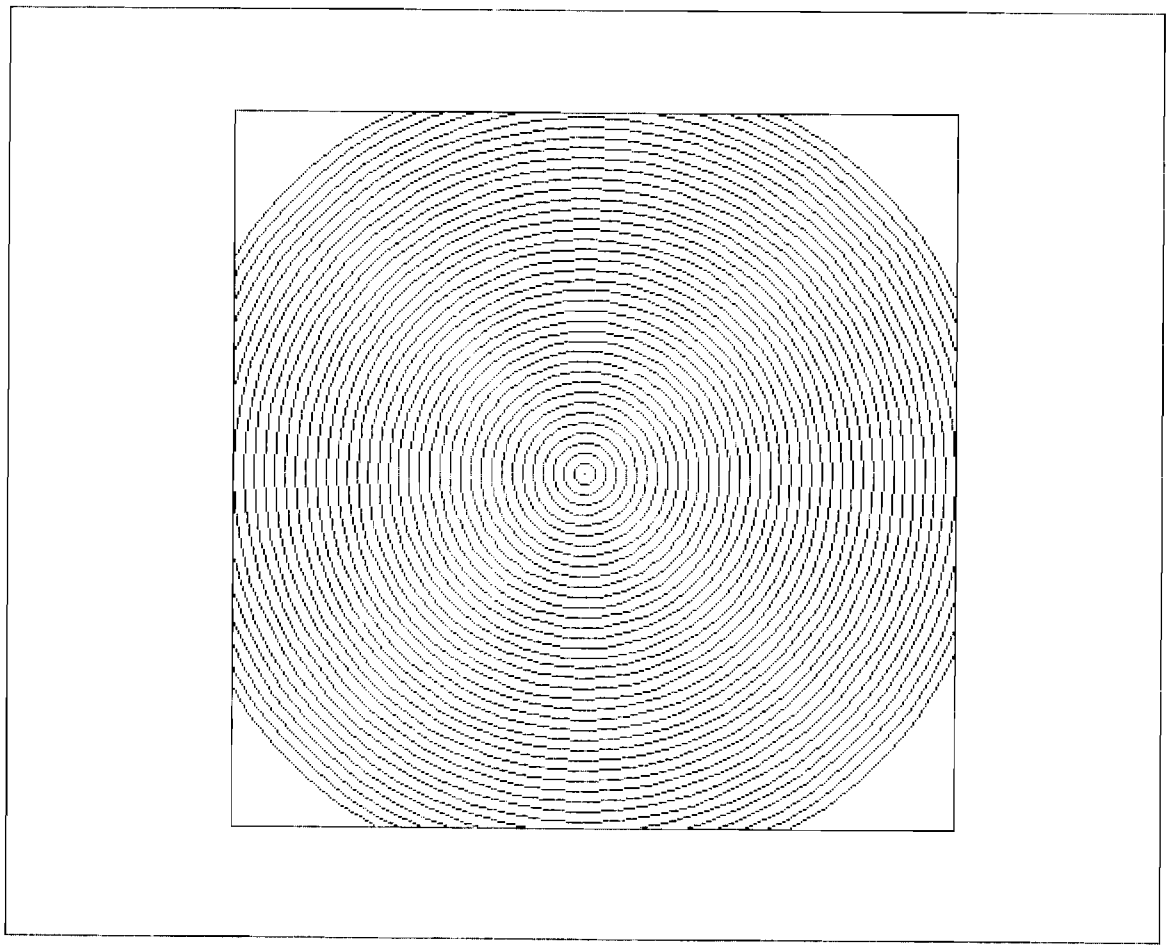


The following display demonstrates the vector drawing ability:



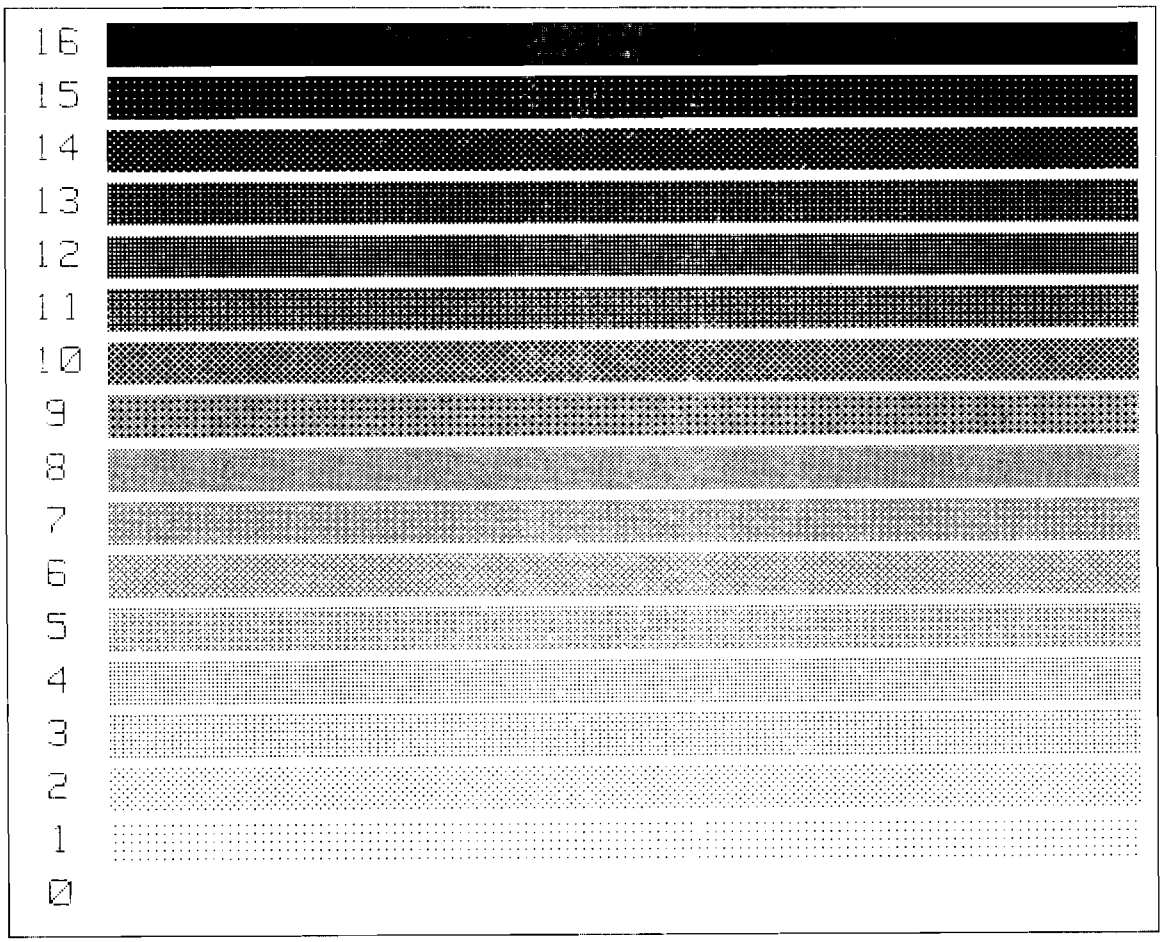
Make sure the vectors in this display are then completely erased.

Arcs are drawn in the next display:



Make sure the arcs in this display are also completely erased.

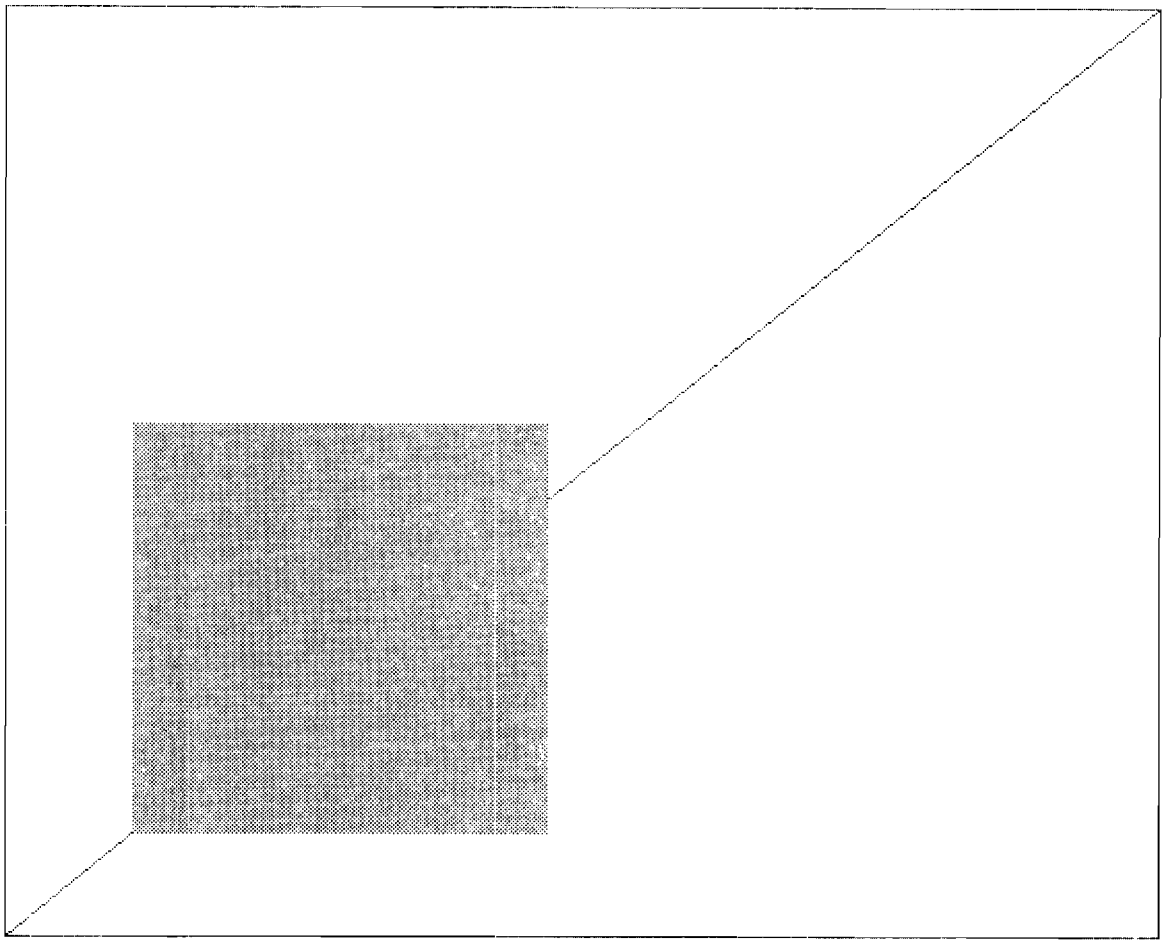
The various area fill patterns are displayed:



Cursor Types (T)

A box and a diagonal line are displayed. The full screen crosshair cursor moves from the lower left corner to the upper right corner. Then the small crosshair cursor is displayed followed by the small blinking underline cursor.

The rubberband capabilities are shown in this display:



Make sure the rubberband line does not erase anything in the box.

Graphics Memory Test (M)

A full graphics raster is displayed, then graphics is turned off and the display is blank. Graphics is turned on and the word "GRAPHICS" appears. The graphics memory is cleared and the memory test is performed. If a memory failure is detected, an error is displayed.

Light Pen (P)

If your computer has the light pen installed, the light pen test is included in the exerciser. No interaction is required, however, if you have not included the MENU parameter.

Place the light pen on the cursor and press the pen button. A value for the light pen's field of view is displayed. The value should be between 10 and 50.

A box with a diagonal line is displayed. The light pen cursor moves from the lower left corner to the upper right corner. Press CONT.

Using the light pen, place the light pen cursor at each corner of the box starting with corner number 1. Press the light pen button at each corner.

Auto Cycle (X)

The auto cycle enables you to run the ENHGR tests in sequence, with or without your intervention.

After pressing X, press O for an operator supervised test (you need to press CONT when instructed). Press A for the automatic test sequence.

ROM Revision Exerciser (ROMREV)

The ROM revision exerciser gives you a report similar to this one:

Rom Revision and Compatibility
Rev. A 1/7/81

Addr;Block	ROM Name	Revision	45B (Std LPU) BW	45B (Std LPU) Fast BW	45C (Std LPU) Color	45B (Fast LPU) BW	45B (Fast LPU) Fast BW	45C (Fast LPU) Color	Part Number	PROBLEMS??
00K;3	SYS Fast LPU	Rev. A				*	*	*	1818-1506/02	
20K;3	SYS Fast LPU	Rev. A				*	*	*	1818-1507/03	
40K;3	SYS Fast LPU	Rev. A				*	*	*	1818-1508/04	
60K;3	SYS Fast LPU	Rev. A				*	*	*	1818-1509/05	
00K;5	TOPS PPU	Rev. A		*	*		*	*	1818-1592/91	
20K;5	KBD PPU AMER	Rev. C	*	*	*	*	*	*	1818-0832/36	
40K;5	SYSTEM PPU	Rev. D	*	*	*	*	*	*	1818-0833/37	
60K;5	SYSTEM PPU	Rev. D	*	*	*	*	*	*	1818-0834/38	
20K;7	GRAPHICS	Rev. A		*	*		*	*	98780-65501	

To check for problems, first find your particular machine configuration at the top of the report (9845B (Fast LPU) Fast Black & White, for instance). Then check that column to see if it is filled with asterisks (*'s) If one or more are missing, of if there are any messages under "PROBLEMS??", call your HP Sales and Service Office for assistance.

Note

If your report shows the message "Unknown ROM!", you may or may not have a problem. It is possible that one of the ROMs in your machine is so new that this exerciser does not recognize it. Call your HP Sales and Service office to determine if that is the case.

Chapter 6
Peripheral Exercisers

Selecting an Exerciser

This chapter describes exercisers that you can run to test your peripherals. If you want to run one of these exercisers, enter the exerciser name with the interface select code and parameters, as described in the appropriate section of this chapter.

Some peripheral exercisers require that the device address be included with the interface select code, forming a three or four digit number. The interface select code can be a one or two digit number which represents a valid select code (0-12). The device address must be a two digit number (0-7). For example, a disc on interface 12 with a device address of 0 is entered as 1200. The following exercisers require this combination of select code and device address instead of just the interface select code:

7905A	9111A	9875A
7906A	9871A (with Opt. 001, HP-IB)	9876A
7920A	9872A	9895A
7925A		

Once you have specified the exerciser(s) and pressed CONT, you are asked to enter the number of times you want each exerciser to be run. The maximum number of repetitions is 25.

Each exericiser should run as described in this chapter. If any exerciser does not run properly, note the error and contact your HP Sales and Service Office for assistance.

After any exerciser has completed its operation, the following message is displayed:

```
_ message(s), # runs = _, Press CONT
```

This tells you the total number of errors which occurred during the total number of exerciser repetitions.

Disc Drive Exercisers

Each disc drive exerciser (for the 7905A, 7906A, 7920A, or 7925A disc drive) performs a check-read on the disc. The Mass Storage ROM must be installed.

When the prompt:

```
Enter MODEL #, select code, and desired parameters ...
```

appears, you must enter the following items separated by commas:

- exerciser name (7905A, 7906A, 7920A, or 7925A)
- the select code and device address as a single number
- unit number - (0 through 7)
- head surface to be verified:
  7905A - 0 through 2, or ALL
  7906A - 0 through 3, or ALL
  7920A or 7925A - All heads are verified regardless of the parameter you enter. (However, you must enter some value.)
- (Optional) C for continuous operation. This causes the exerciser to run continuously, and the value for the number of runs prompt is then ignored. You can exit the continous operation by pressing the k_0 special function key.

When the exerciser has completed, this message is displayed:

```
MEDIA VERIFY COMPLETE
```

Note

These disc drive exercisers do not attempt any re-tries, and are more sensitive than normal read operations. Therefore, it is not unusual to see errors for problems which would not occur under normal operating conditions.

7910H Disc Drive Exerciser

7910H ,select code ,device address

This exerciser creates eight files on the disc, fills each file with a different pattern as it checkreads, then reads and verifies the file data patterns. Your disc must have been initialized and the Mass Storage ROM must be installed. You should latch the PRT ALL key.

Note

If files named PATRN1, PATRN2, ..., PATRN8 exist on your disc, they will be purged by this exerciser.

The following messages are displayed as the exerciser is running:

```
CREATING FILE PATRN1
CREATING FILE PATRN2
CREATING FILE PATRN3
CREATING FILE PATRN4
CREATING FILE PATRN5
CREATING FILE PATRN6
CREATING FILE PATRN7
CREATING FILE PATRN8

WRITING PATTERN #1  TO FILE  PATRN1
WRITING PATTERN #2  TO FILE  PATRN2
WRITING PATTERN #3  TO FILE  PATRN3
WRITING PATTERN #4  TO FILE  PATRN4
WRITING PATTERN #5  TO FILE  PATRN5
WRITING PATTERN #6  TO FILE  PATRN6
WRITING PATTERN #7  TO FILE  PATRN7
WRITING PATTERN #8  TO FILE  PATRN8

READING FILE PATRN1 RECORD#1
READING FILE PATRN1 RECORD#2
READING FILE PATRN1 RECORD#3
READING FILE PATRN1 RECORD#4
READING FILE PATRN1 RECORD#5
READING FILE PATRN1 RECORD#6
READING FILE PATRN1 RECORD#7
READING FILE PATRN1 RECORD#8
READING FILE PATRN2 RECORD#1
READING FILE PATRN2 RECORD#2
READING FILE PATRN2 RECORD#3
READING FILE PATRN2 RECORD#4
READING FILE PATRN2 RECORD#5
READING FILE PATRN2 RECORD#6
READING FILE PATRN2 RECORD#7
READING FILE PATRN2 RECORD#8
READING FILE PATRN3 RECORD#1
READING FILE PATRN3 RECORD#2
READING FILE PATRN3 RECORD#3
READING FILE PATRN3 RECORD#4
READING FILE PATRN3 RECORD#5
READING FILE PATRN3 RECORD#6
READING FILE PATRN3 RECORD#7
READING FILE PATRN3 RECORD#8
READING FILE PATRN4 RECORD#1
READING FILE PATRN4 RECORD#2
READING FILE PATRN4 RECORD#3
READING FILE PATRN4 RECORD#4
READING FILE PATRN4 RECORD#5
READING FILE PATRN4 RECORD#6
READING FILE PATRN4 RECORD#7
READING FILE PATRN4 RECORD#8
READING FILE PATRN5 RECORD#1
READING FILE PATRN5 RECORD#2
READING FILE PATRN5 RECORD#3
READING FILE PATRN5 RECORD#4
READING FILE PATRN5 RECORD#5
READING FILE PATRN5 RECORD#6
READING FILE PATRN5 RECORD#7
READING FILE PATRN5 RECORD#8
READING FILE PATRN6 RECORD#1
READING FILE PATRN6 RECORD#2
READING FILE PATRN6 RECORD#3
READING FILE PATRN6 RECORD#4
READING FILE PATRN6 RECORD#5
READING FILE PATRN6 RECORD#6
READING FILE PATRN6 RECORD#7
READING FILE PATRN6 RECORD#8
READING FILE PATRN7 RECORD#1
READING FILE PATRN7 RECORD#2
READING FILE PATRN7 RECORD#3
READING FILE PATRN7 RECORD#4
READING FILE PATRN7 RECORD#5
READING FILE PATRN7 RECORD#6
READING FILE PATRN7 RECORD#7
READING FILE PATRN7 RECORD#8
READING FILE PATRN8 RECORD#1
READING FILE PATRN8 RECORD#2
READING FILE PATRN8 RECORD#3
READING FILE PATRN8 RECORD#4
READING FILE PATRN8 RECORD#5
READING FILE PATRN8 RECORD#6
READING FILE PATRN8 RECORD#7
READING FILE PATRN8 RECORD#8
PURGING PATTERN TEST FILES
```

9111A Graphics Tablet Exerciser

9111A ,select code and device address as a single number

This interactive exerciser enables you to check the digitizing accuracy of the 9111A. The I/O and Graphics ROMs must be installed.

When a cursor (+) appears on the display, use the stylus to digitize points on all areas of the platen. Then use a non-conductive straight-edge to draw lines across the platen. Press k_0 when you have determined that the 9111A is operating properly.

Note

Metallic items, such as rings and watches, can cause distortion if they are near the platen while you are attempting to digitize.

9866A/B Thermal Printer Exercisers

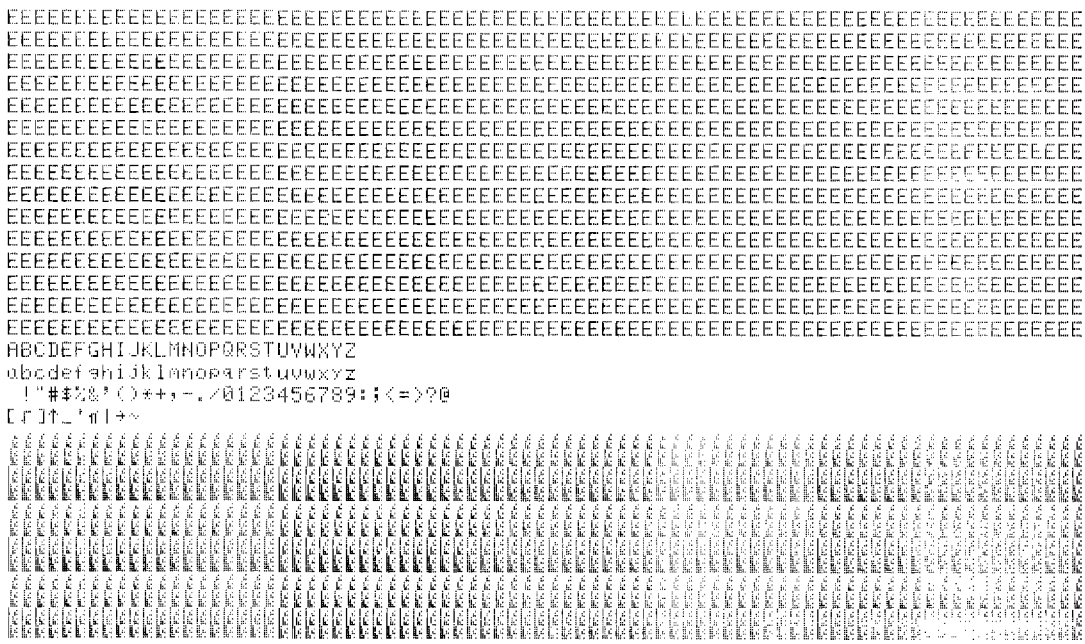
9866A ,select code[,ADJ]

9866B ,select code[,ADJ]

The 9866A/B exercisers check for proper character set generation. The 9866B exerciser also checks the printout by generating a binary progression dot matrix pattern. An adjustment parameter (ADJ) is available for use by your HP service representative.

The 9866A exerciser prints 15 lines of the character "E" followed by the character set:

The 9866B exerciser does the same, followed by 12 lines of a binary progression dot matrix pattern:



The ADJ parameter causes a continuous output of lines of the character "E". Pressing the k_0 special function key is the only way to exit this portion of the exerciser.

9871A Character Impact Printer Exerciser

9871A ,select code

9871A ,select code and device address as a single number (Opt 001)

The 9871A exerciser checks the printer's character set and its plotting capability. The tractor feed must be disconnected from the 9871A printer before running the exerciser.

The following is printed by the exerciser:

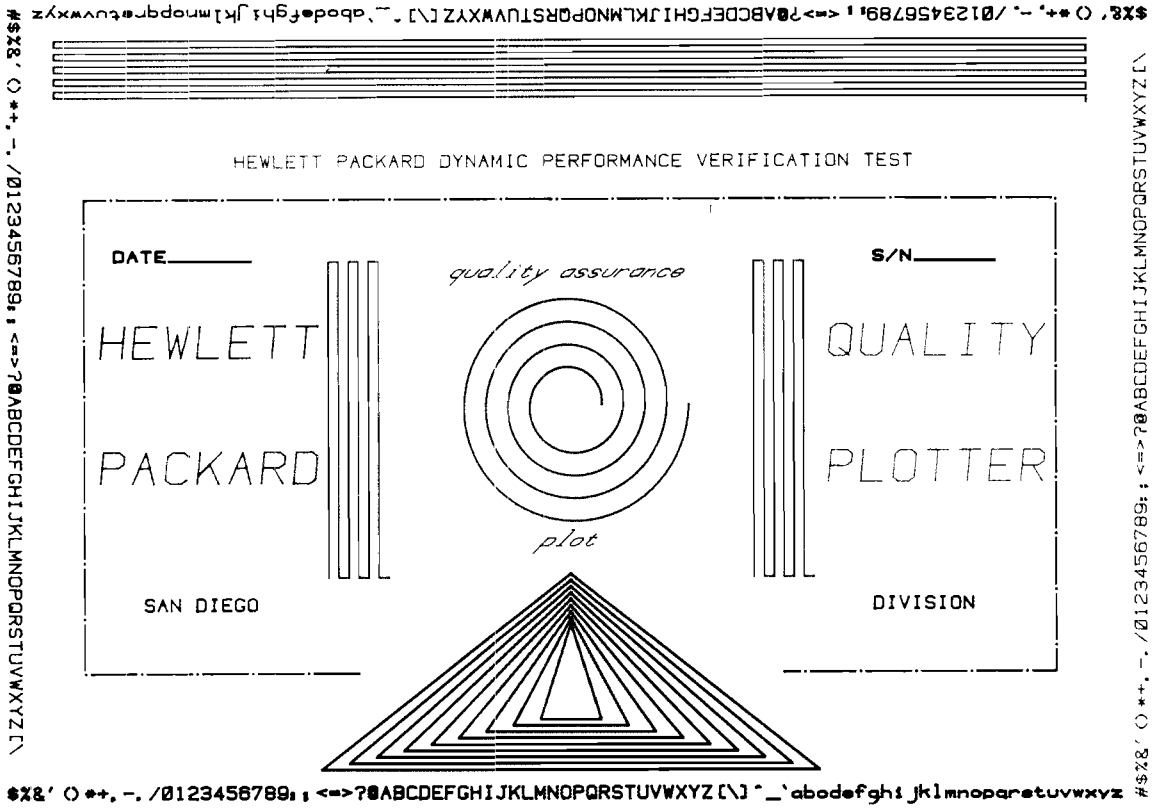
M.M.M.M.M.M.M.M.M.M.M!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[¥]^_`abcdefghijklmnopqrstuvwxyzπ|→~M.M.M.M.M.M.M.M.M.M
M.M.M.M.M.M.M.M.M.M.M!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[¥]^_`abcdefghijklmnopqrstuvwxyzπ|→~M.M.M.M.M.M.M.M.M.M

9872A Multicolor Plotter Exerciser

9872A ,select code and device address as a single number

This exerciser checks the plotter for accurate operation, including character set and color generation. Set your plotter pens as follows: 1 = black, 2 = red, 3 = green, and 4 = blue. If you have a 9845B Model 100, the Graphics ROM must be installed.

The exerciser plots the "HP quality assurance plot":



9874A Digitizer Exerciser

9874A ,select code

The 9874A exerciser checks the internal electronics of the digitizer, the audio tone generation system, and the digitizing capability. It is an interactive exerciser, so you must be present while it is running. The I/O ROM must be installed.

The first message displayed is:

```
Watch the digitizer display.
```

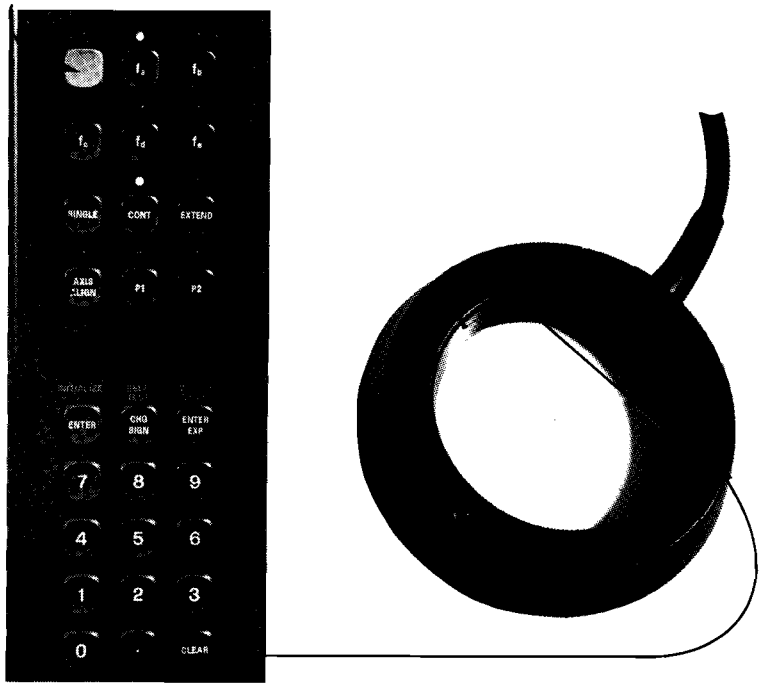
The 9874A takes a few minutes to complete its internal electronics checks. Then it momentarily lights all of the LED segments in the display, sequentially. You should verify that all of the character segments do light up.

The second section of the exerciser checks each of the indicator LEDs beginning with the one on the cursor, and then sequentially from the top row of the 9874A keyboard to the bottom row.

The third section of the exerciser requires that the digitizer's keyboard switches be pressed sequentially. The first keyboard prompt is:

```
PRESS SHIFT
```

It is located in the upper left-hand corner of the digitizer keyboard. The following photos show the proper sequence starting from the SHIFT key.



If a key is malfunctioning or if you should press the wrong key, the digitizer beeps and instructs you to press the key again. This prompting sequence can be repeated up to four additional times before the exerciser fails.

After the keyboard keys are pressed, the prompt directs you to press the two remaining keys on the cursor. You are first prompted to:

```
PRESS DIG
```

which is the D key on the digitizer cursor. If your 9874A is configured with the stylus, press the stylus down. The next message displayed (if you do not have the stylus installed) is:

```
PRESS VAC
```

which refers to the A key on the cursor.

The last section of the exerciser checks the digitizing capability of the 9874A. The System 45 displays these messages:

```
Place the cursor or stylus on the platen.
Press the digitize switch, and locate X=0, Y=0.
```

Follow these instructions. Now you must locate the X,Y intersection of 0,0 which is located at the center of the platen. Both the System 45 and the 9874A digitizer display the current X,Y coordinates of the cursor or stylus.

If you have the cursor, if may be necessary for you to press the A switch on the cursor to move the cursor along the platen. When point 0,0 (±10) is located, the 9874A generates an audio tone pattern.

When the 9874A exerciser has completed, the System 45 displays:

```
9874A EXERCISER PASSED.
```

9875A Cartridge Tape Unit Exerciser

9875A ,select code and device address as a single number ,# of drives ,SYSTEM|INTERACTIVE

This exerciser checks the operation of the cartridge tape unit. You need to have an initialized, unprotected (tab slid to the right), blank tape for each drive to be checked. The I/O ROM must be installed.

You can choose whether or not you need to be present when this exerciser is running. Simply enter one of two parameters: SYSTEM (requiring no interaction) or INTERACTIVE (requiring you to install and remove protected and unprotected tapes as the exercser is running).

To begin, the installed tape cartridge(s) should be initialized, blank, and unprotected.

If you choose the interactive test, follow the instructions displayed (for installing and removing tapes) and press CONT to continue running the exerciser.

When the exerciser has completed, one of the following messages is displayed:

```
9875A SYSTEMS EXERCISER DONE
INTERACTIVE EXERCISER DONE
```

If an error message is displayed while running the exerciser, more information is included in the HP 9875A Cartridge Tape Unit Installation and Operating Manual, Chapter 5: "Syntax", "Output Error" section.

A further explanation of P3 (third parameter returned) can be found in the HP 9875A Cartridge Tape Unit Service Manual, Chapter 3: "Troubleshooting", "Self Test Results" section. A single tape drive unit returns values for P3 and P4. A double tape drive unit returns values for P3, P4, and P5.

9876A Thermal Graphics Printer Exerciser

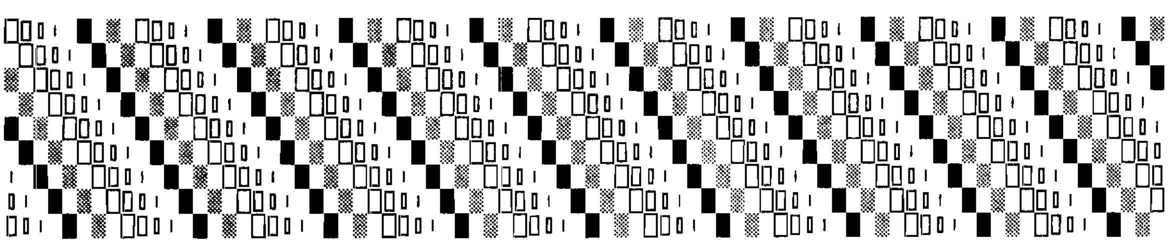
9876A ,select code and device address as a single number

The 9876A exerciser checks the printer by running a confidence test and by checking all secondary character sets and the character re-definition operation.

Begin with power off to the printer and the paper loaded at "top of form". Then turn printer power on before entering the exerciser name with the select code and device address.

Check your output with the following printout:

```
[illegible]
[illegible] !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]
^_`abcdefghijklmnopqrstuvwxyz{|}~▒

[illegible]
[illegible] !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]
^_`abcdefghijklmnopqrstuvwxyz{|}~▒

[illegible]
[illegible] !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]
^_`abcdefghijklmnopqrstuvwxyz{|}~▒

[illegible]
[illegible] !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]
^_`abcdefghijklmnopqrstuvwxyz{|}~▒

[illegible]
[illegible] ÀÂÈÊËÎÏ´`ˆ¨˜ÙÛ£¯Ýý°ÇçÑñ¡¿¤£¥§ƒ¢âêôûáéóúàèòùäëöüÅîØÆåíøæÄìÖÜÉïß


DANISH/NORWEGIAN SET
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZÆØÅ^_`abcdefghijklmno
pqrstuvwxyzæøå~▒

EUROPEAN EXTENDED SET
 ÀÂÈÊËÎÏ´`ˆ¨˜ÙÛ£¯Ýý°ÇçÑñ¡¿¤£¥§ƒ¢âêôûáéóúàèòùäëöüÅîØÆåíøæÄìÖÜÉïß


FRENCH SET
 !"#$%&'()*+,-./0123456789:;<=>?àABCDEFGHIJKLMNOPQRSTUVWXYZ°ç§^_`abcdefghijklmno
pqrstuvwxyzéùè¨▒

GERMAN SET
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZÄÖÜ^_`abcdefghijklmno
pqrstuvwxyzäöüß▒

KATAKANA SET
 。「」、・ヲァィゥェォャュョッーアイウエオカキクケコサシスセソタチツテトナニヌネノハヒフヘホマミムメモヤユヨラリルレロワン゛゜


SPANISH SET
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ¡Ñ¿°_`abcdefghijklmno
pqrstuvwxyz{ñ}~▒

SWEDISH/FINNISH SET
 !"#¤%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZÄÖÅÜ_éabcdefghijklmno
pqrstuvwxyzäöåü▒

UNITED KINGDOM SET
 !"£$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmno
pqrstuvwxyz{|}~▒
```



9883A Paper Tape Reader Exerciser

9883A ,select code

This exerciser checks the operation of the paper tape reader. You must be present while it is running so that you can load the test tape. The I/O ROM must be installed.

When the message:

LOAD THE PAPER TEST TAPE, PRESS CONTINUE.

is displayed, load the tape (P/N 09883-90030) which was supplied with your 9883A. Then press CONT. When the exerciser has completed, this message is displayed:

9883A TEST PASSED

9884A Paper Tape Punch Exerciser

9884A ,select code

The 9884A exerciser requires that the I/O ROM be installed. It tests the 9884A by punching a tape which you should compare to the tape on the next page.

Flexible Disc Drive Exercisers

9885MS ,select code[,unit code]
9895A ,select code and device address as a single number[,unit code]

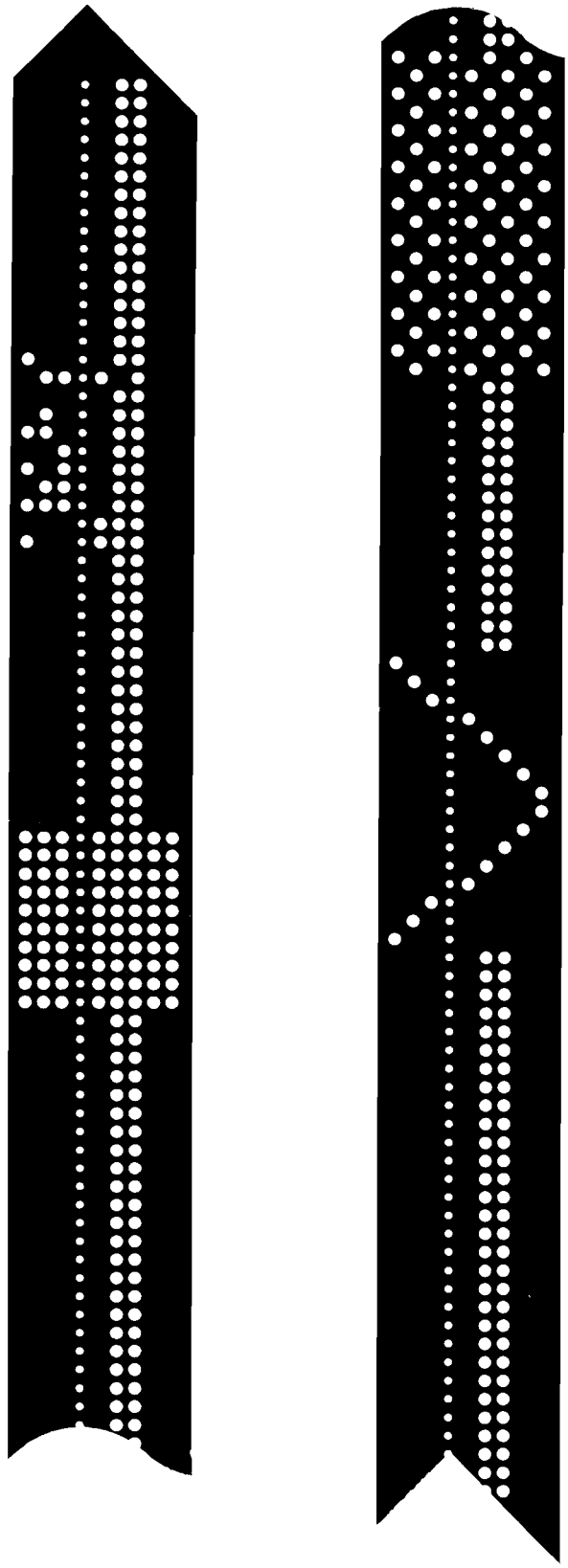
Each exerciser creates eight files on the disc, fills each file with a different pattern as it check-reads, then reads and verifies the file data patterns. Your disc should be unprotected and must have been initialized. The Mass Storage ROM must be installed. You should latch the PRT ALL key.

Specify the optional unit code as 0 for the master, 1 for the first slave, 2 for the second, and 3 for the third. The unit code defaults to 0 if unspecified.

Note

If files named PATRN1, PATRN2, ..., PATRN8 exist on your disc, they will be purged by this exerciser.

Refer to the 7910H Disc Drive Exerciser for the messages that should be displayed as this exerciser is running.



Chapter 7
Interface Exercisers

Selecting an Exerciser

There are six interface exercisers. You need to configure your interface cards with test connectors to check them adequately, and the I/O ROM must be installed. If you do not run these exercisers, running a peripheral exerciser successfully may be adequate to determine that an interface is good.

CAUTION

ANY INTERFACE CONFIGURATION OR CONNECTION SHOULD BE DONE WITH POWER OFF TO THE 9845. FAILURE TO DO THIS MAY DAMAGE THE EQUIPMENT.

The **98032A** 16-Bit Interface Exerciser checks data patterns, the I/O line, and extended control and status.

The **98033A** Binary Coded Decimal Interface Exerciser checks the operation of the 98033A interface.

The **98034A** HP-IB Interface Exerciser includes the following checks: status, control byte, self address, handshake, data transfer1, data transfer2, pass control, external address, service request, interrupt, and parallel poll. This exerciser requires that two HP-IB interfaces be connected to your System 45.

The **98035A** Real Time Clock Interface Exerciser includes the following checks: format, clock hardware, read, illegal format, interrupt and A,D,P check, interrupt, C,G,H,I-1,2V check, L,N check, and A,D,F,M,O,P check.

The **98036A** RS-232 Interface Exerciser consists of three sections: default modes, mode check, and R6 testing.

The **98040A** Incremental Plotter Interface Exerciser checks the various pen control functions: +X, -X, +Y, -Y, pen up, and pen down.

If you want to run one of these exercisers, configure the interface as described in the sections which follow and enter the information shown below:

exerciser name ,interface select code

Once you have entered the exerciser name(s) and pressed CONT, you are asked to enter the number of times you want each exerciser to be run. The maximum number of repetitions is 25.

Each exerciser should run as described in this chapter. If any exerciser does not run properly, note the error and contact your HP Sales and Service Office for assistance.

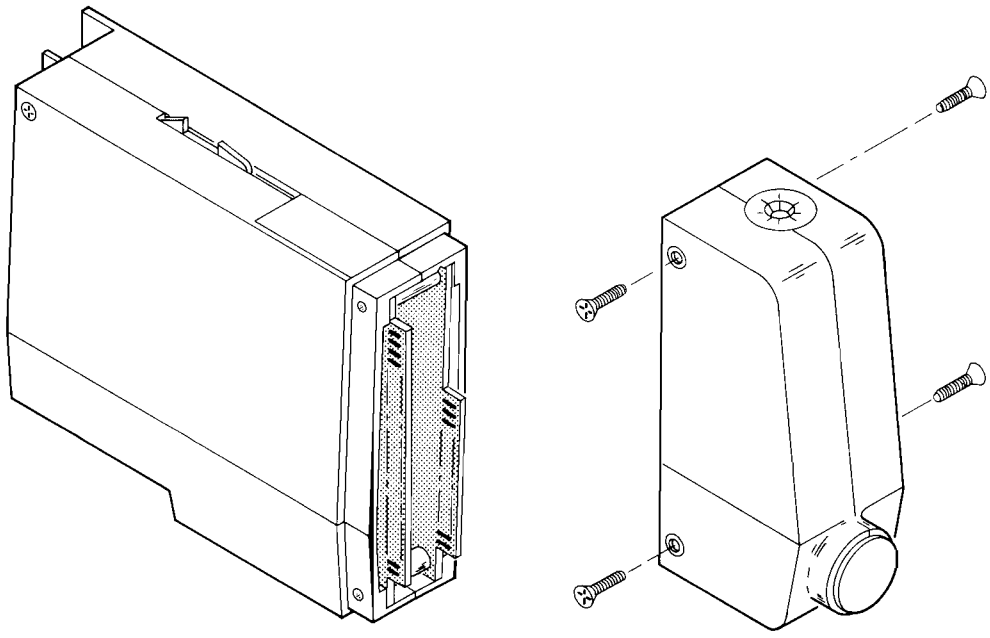
After any exerciser has completed its operation, the following message is displayed:

```
_ message(s), # runs = _, Press CONT
```

This tells you the total number of errors which occurred during the total number of exerciser repetitions.

98032A 16-Bit I/O Interface Exerciser

To configure the interface, remove the Peripheral Configuration Assembly and install the test connector (P/N 98241-67932).

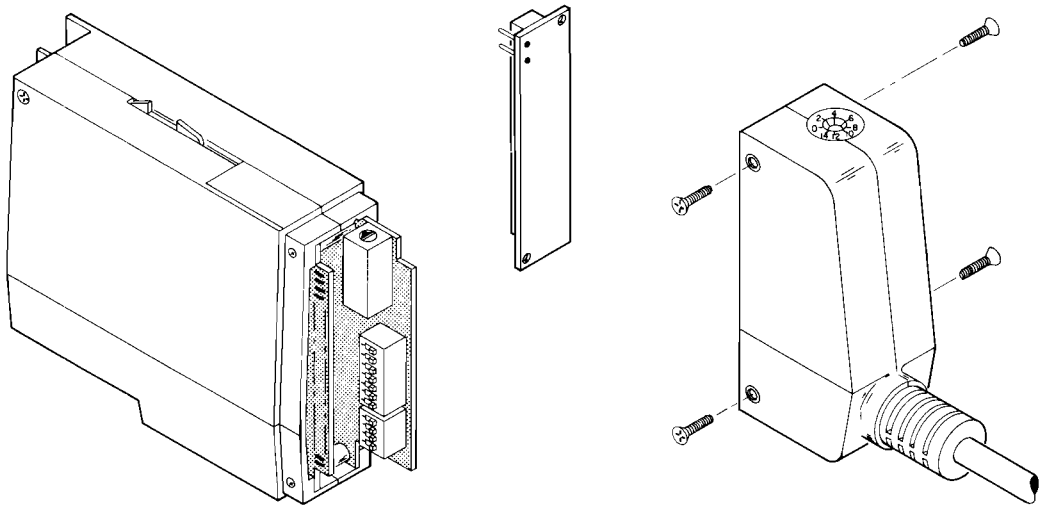


The following messages are displayed:

```
DOING 98032A DATA PATTERNS TEST
DOING I/O LINE TEST
DOING EXTENDED CONTROL AND STATUS
98032A TEST COMPLETE
```

98033A Binary Coded Decimal Interface Exerciser

To configure the interface, remove the rear housing, install the test connector (P/N 98241-67933), and set all of the configuration switches to OFF. (Refer to the 98033A BCD Interface Installation and Service Manual.)

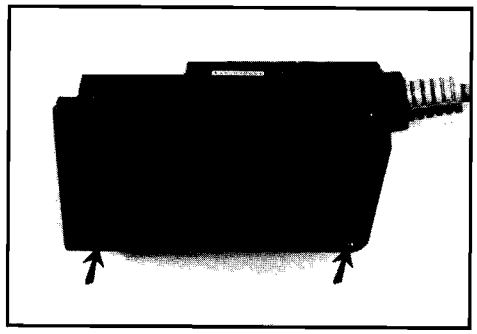


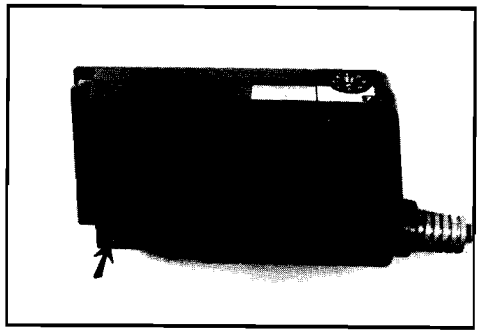
The following messages are displayed:

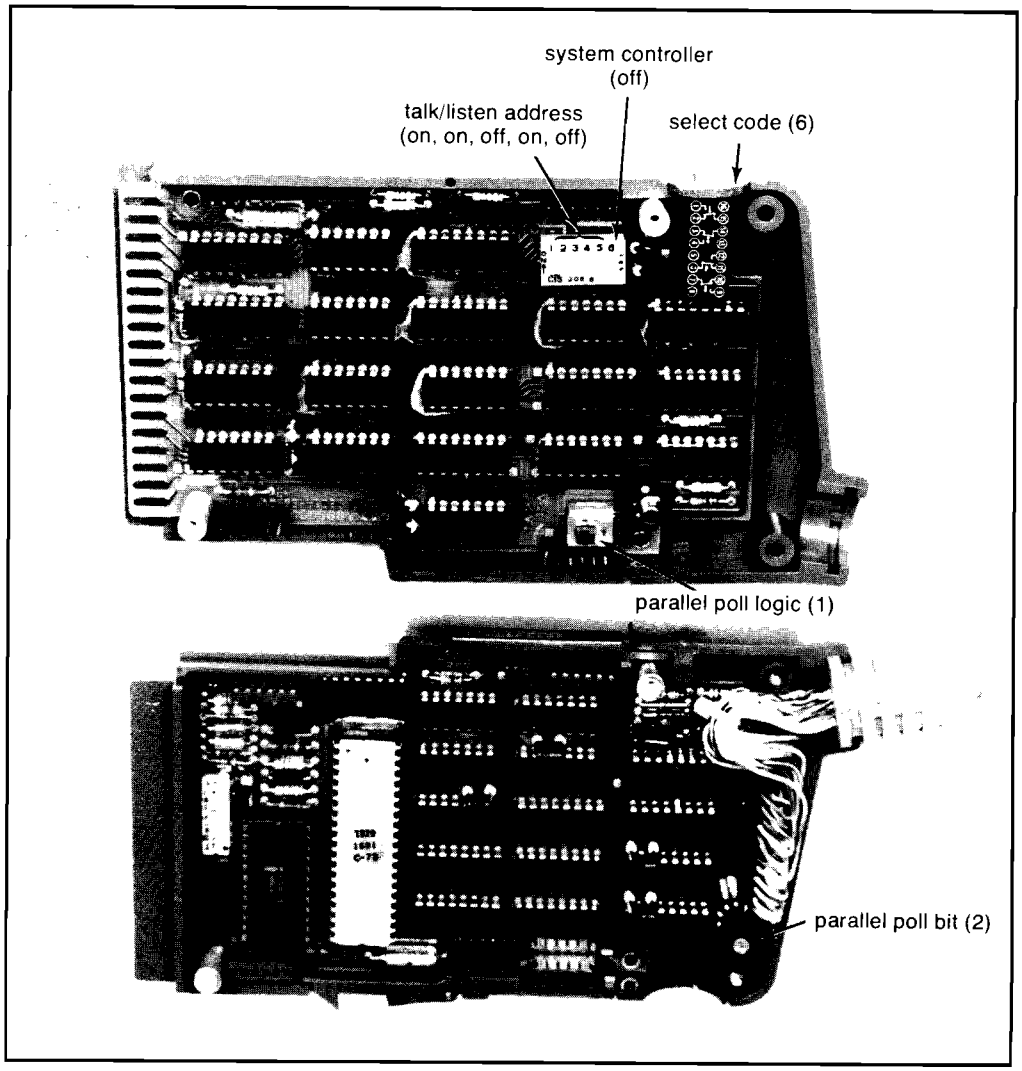
```
98033A BCD INTERFACE TEST
98033A TEST COMPLETE
```

98034A HP-Interface Bus Exerciser

This exerciser requires that two HP-IB interfaces be connected to your System 45. One interface is a standard HP-IB interface set to the factory configuration (found in the 98034A Installation and Service Manual). Configure the other (test) interface as shown in these photos:







Following the procedure in the Installation and Service Manual, remove the interface cover on the test interface. Separate case halves as shown. On the 98034-66502 board, change the parallel poll bit from 1 to 2 (as shown). Note the switch positions before you change them. On the 98034-66501 board, change the talk/listen address switches to ON, ON, OFF, ON, OFF (as shown). Set the system controller switch to OFF. Keep the parallel poll logic switch at the 1 position. Change the select code to 6.

Reassemble the test interface. Plug both interfaces into the back of the computer. Plug HP-IB connectors together and turn computer power on.

If you have any questions concerning the configurations of your HP-IB interfaces, contact your HP Sales and Service Office.

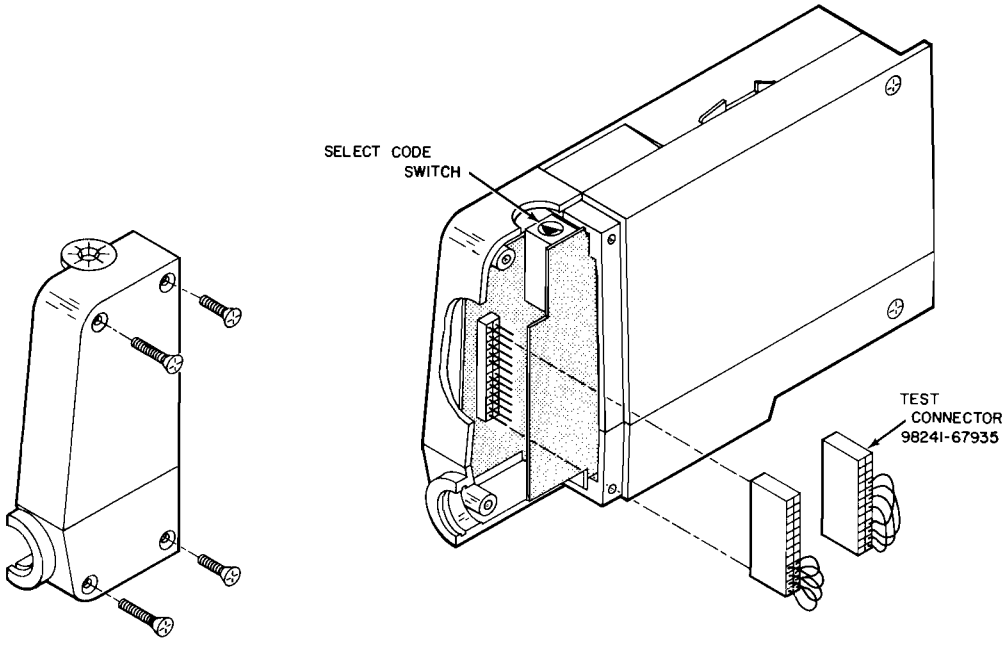
For each of eleven items tested, two messages are displayed. One tells the current test, and the other indicates that that test has completed.

When the entire exerciser has completed, this message is displayed:

```
TEST COMPLETE
```


98035A Real Time Clock Interface Exerciser

Configure the interface with the test connector (P/N 98241-67935) as shown.



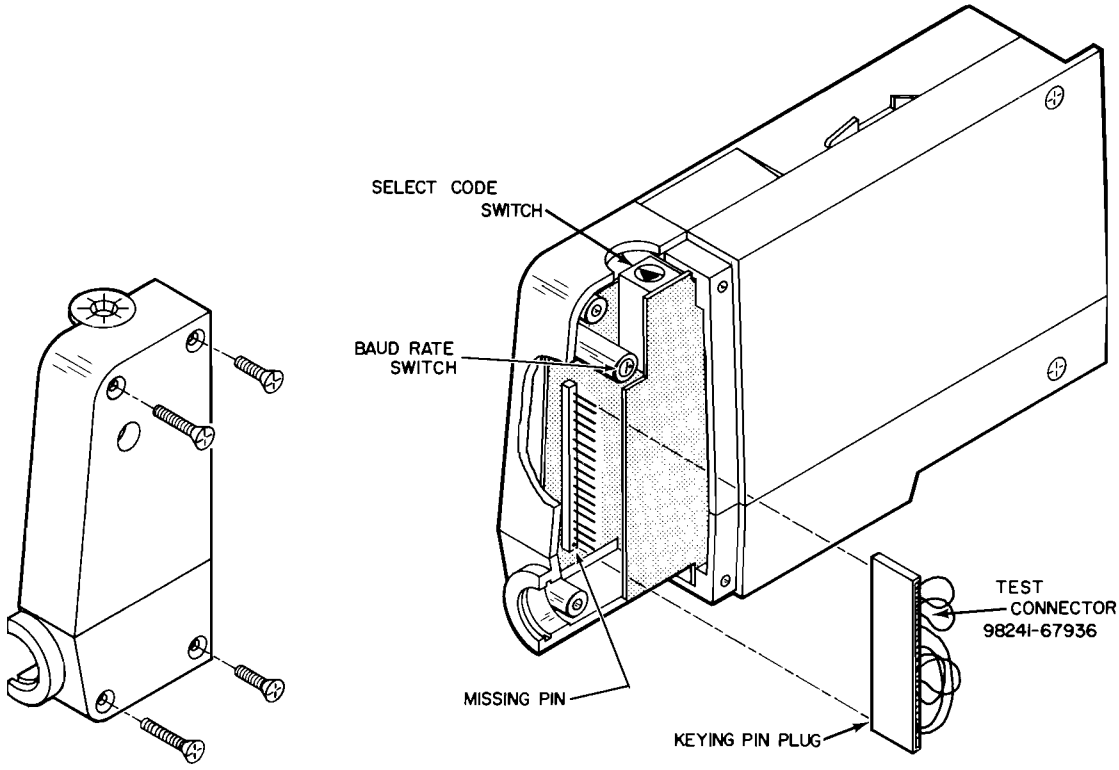
The time setting is changes on the clock during this exerciser. If you want the correct time, you will have to reset your 98035A Real Time Clock after running the exerciser.

The following messages are displayed:

```
FORMAT TEST
TIME SET
CLOCK HARDWARE TEST
SETTING TIME
READ TEST
ILLEGAL FORMAT TEST
INTERRUPT AND A,D,P CHECK
INTERRUPT TEST < 30 SECONDS
C G H I-1, 2 V CHECK
L N CHECK
A, D, F, M, O, P CHECK
TEST COMPLETE
```

98036A RS-232 Interface Exerciser

Configure the interface with the test connector (P/N 98241-67936) as shown:

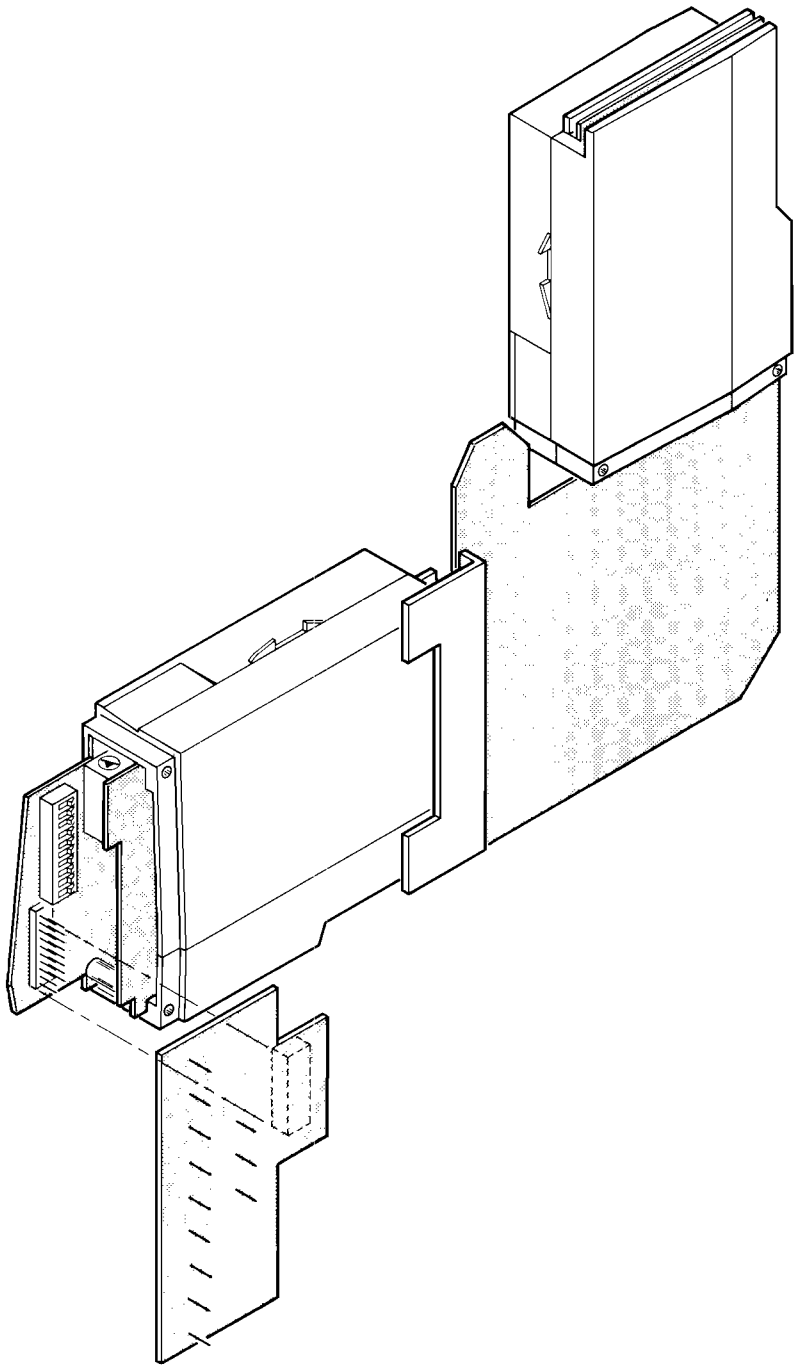


The following message are displayed:

```
TESTING DEFAULT MODES
TESTING MODE XXX
TESTING R4D
TESTING R6
TEST COMPLETE
```

98040A Incremental Plotter Interface Exerciser

To configure the interface, remove the rear housing and install the test connector (P/N 98241-67940). Connect the 98040A interface card to a card extender as shown.

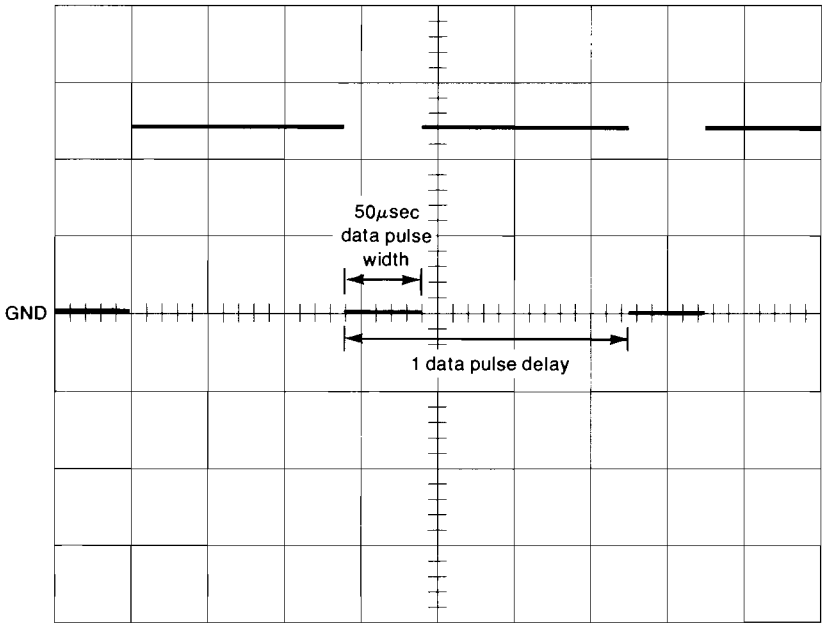


This exerciser generates timing pulses which must be monitored with an oscilloscope. The waveforms are shown on the following pages.

To run the exerciser, press the appropriate special function key to generate the timing pulse.

OSCILLOSCOPE SETTINGS
50μsec/div
5V/div

INTERFACE SWITCH SETTINGS
Highest data rate (S1-1 thru S1-6 closed)
50μsec pulse width (S1-9 open)
12V setting (S2 at 12V setting)



Data Pulse Display (+X,+Y)

OSCILLOSCOPE SETTINGS
0.5msec/div
5V/div

INTERFACE SWITCH SETTINGS
Highest data rate (S1-1 thru S1-6 closed)
50μsec pulse width (S1-9 open)
12V setting (S2 at 12 V setting)

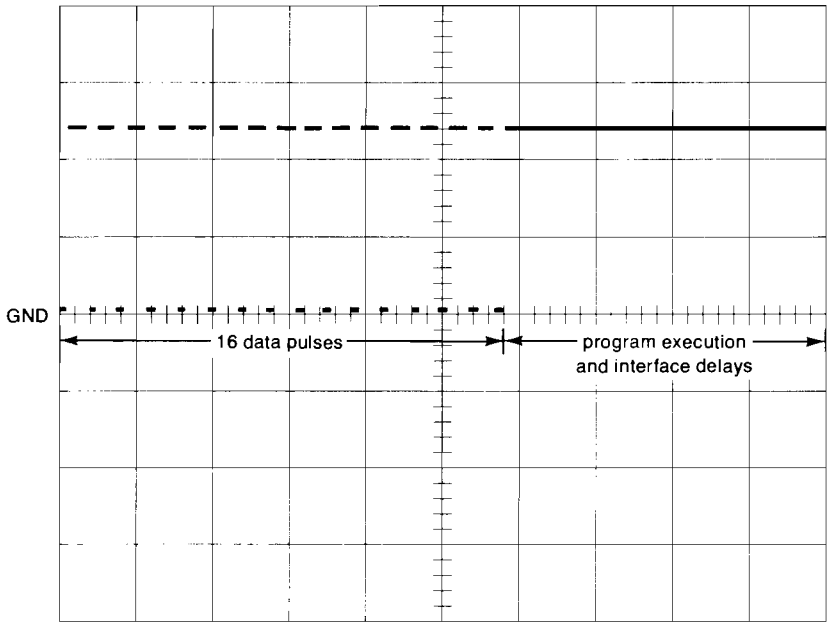
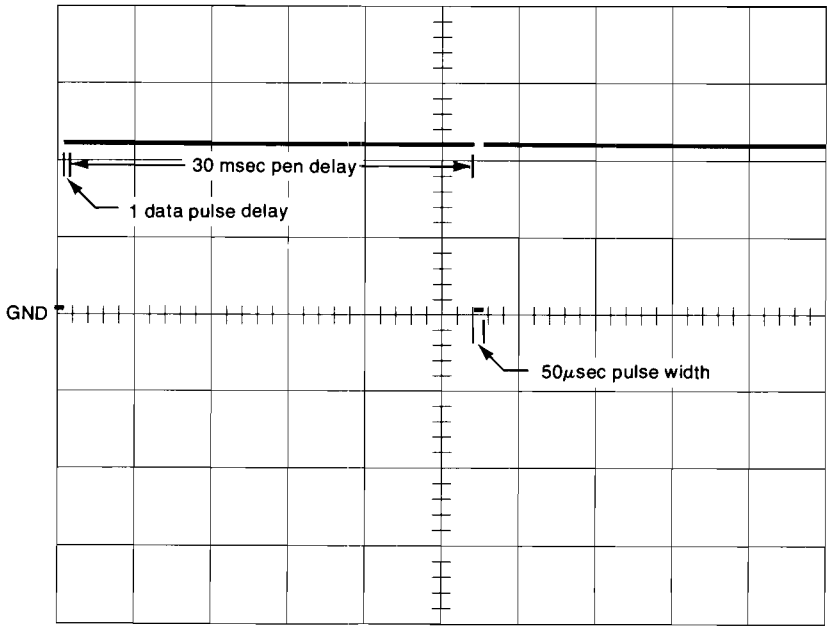


Illustration of Repeat Mode and Delay Before Next Cycle

OSCILLOSCOPE SETTINGS
5msec/div
5V/div

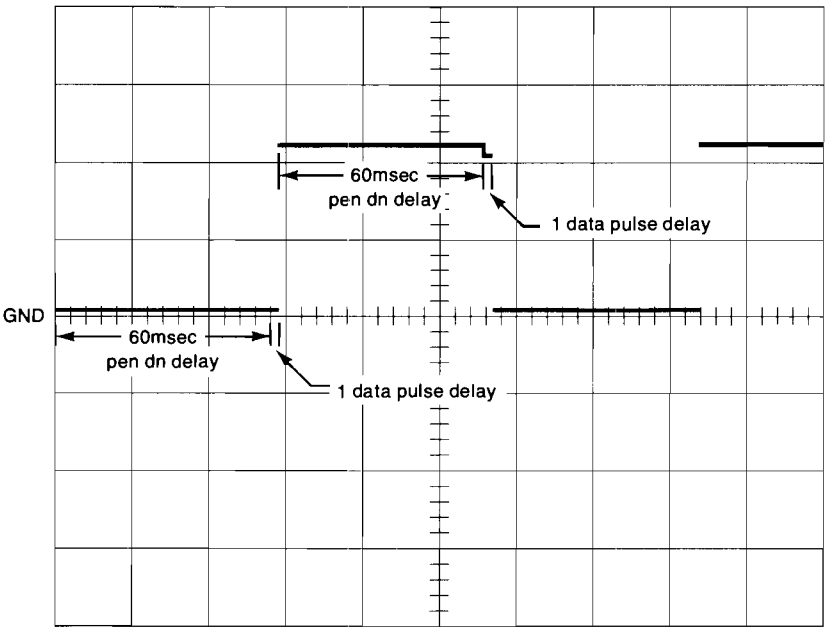
INTERFACE SWITCH SETTINGS
Highest data rate (S1-1 thru S1-6 closed)
50μsec pulse width (S1-9 open)
12V setting (S2 at 12 V setting)



Pen Up/Pen Down Display

OSCILLOSCOPE SETTINGS
20msec/div
2V/div

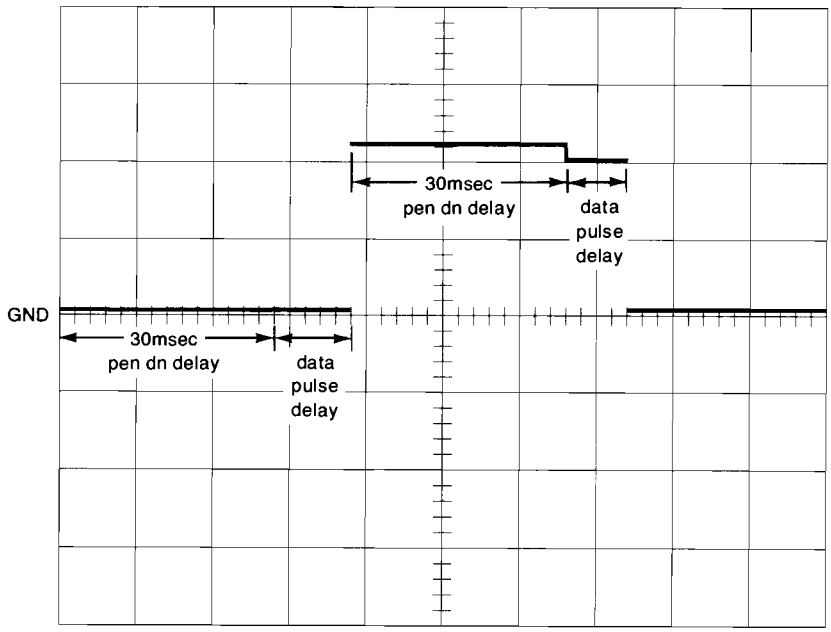
INTERFACE SWITCH SETTINGS
Highest data rate (S1-1 thru S1-6 closed)
20μsec pulse width (S1-9 closed)
60msec pen dn delay (S1-8 open)



Pen Select Display at High Data Rates

OSCILLOSCOPE SETTINGS
10msec/div
2V/div

INTERFACE SWITCH SETTINGS
Slowest data rate (S1-1 closed,S1-2 thru S1-6 open)
20μsec pulse width (S1-9 closed)
30msec pen delay (S1-7 open if pen up, S1-8 closed if pen dn)



Pen Select Display at Low Data Rates

Appendix A
System Exerciser Summary Table

Exerciser Form[1]	Model/ ROM Required	Cartridge Number	Interaction Required	Approximate Run Times
CLRGR[,KEY|PEN]	9845C	1	KEY/PEN	8 1/2 min
COMP		1	no	–
DISPLA[,ADJ]		1	no	1 min
ENHGR[,MENU]	9845B Model 200	1	MENU	4 min
GRPHC[,ADJ]	9845B Model 100 w/ Graphics	1	no	3 1/2 min
MEMORY		1	no	2 min (64 k-bytes)
PRNTR		1	no	1 min
ROMREV		2	no	1 min
TAPE		1	no	3 min (1 drive) 4 1/2 min (2 drives)
7905A ,sc&da ,unit # , surface[,C]	Mass Storage	1	C	1/2 min
7906A ,sc&da ,unit # , surface[,C]	Mass Storage	1	C	1/2 min
7910H ,select code , bus address	Mass Storage	2	no	1 min
7920A ,sc&da ,unit # , surface[,C]	Mass Storage	1	C	1 min
7925A ,sc&da ,unit # , surface[,C]	Mass Storage	1	C	1 min
9111A ,sc&da	I/O and Graphics	2	yes	–
9866A ,select code [,ADJ]		1	ADJ	1 min
9866B ,select code [,ADJ]		1	ADJ	4 min
9871A ,select code		1	no	1 min
9871A , sc&da (Opt 001)		1	no	1 min
9872A ,sc&da	Graphics	1	no	5 min
9874A ,select code	I/O	1	yes	–

1 Refer to your BASIC Programming Manual for more information about the syntax conventions used in this table. The term "sc&da" refers to the interface select code and device address entered as a single number.

Exerciser Form[1]	Model/ ROM Required	Cartridge Number	Interaction Required	Approximate Run Times
9875A ,sc&da ,#drives , SYSTEM|INTERACTIVE	I/O	1	INTERACTIVE	2 min
9876A ,sc&da		1	no	1 min
9883A ,select code	I/O	1	yes	2 min
9884A ,select code	I/O	1	no	1/2 min
9885MS ,select code [,unit code]	Mass Storage	1	no	2 min
9895A , sc&da [,unit code]	Mass Storage	2	no	1 1/2 min
98032A ,select code	I/O	1	no	5 min
98033A ,select code	I/O	1	no	4 min
98034A ,select code	I/O	1	no	5 min
98035A ,select code	I/O	1	no	5 min
98036A ,select code	I/O	1	no	5 min
98040A ,select code	I/O	1	yes	–

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