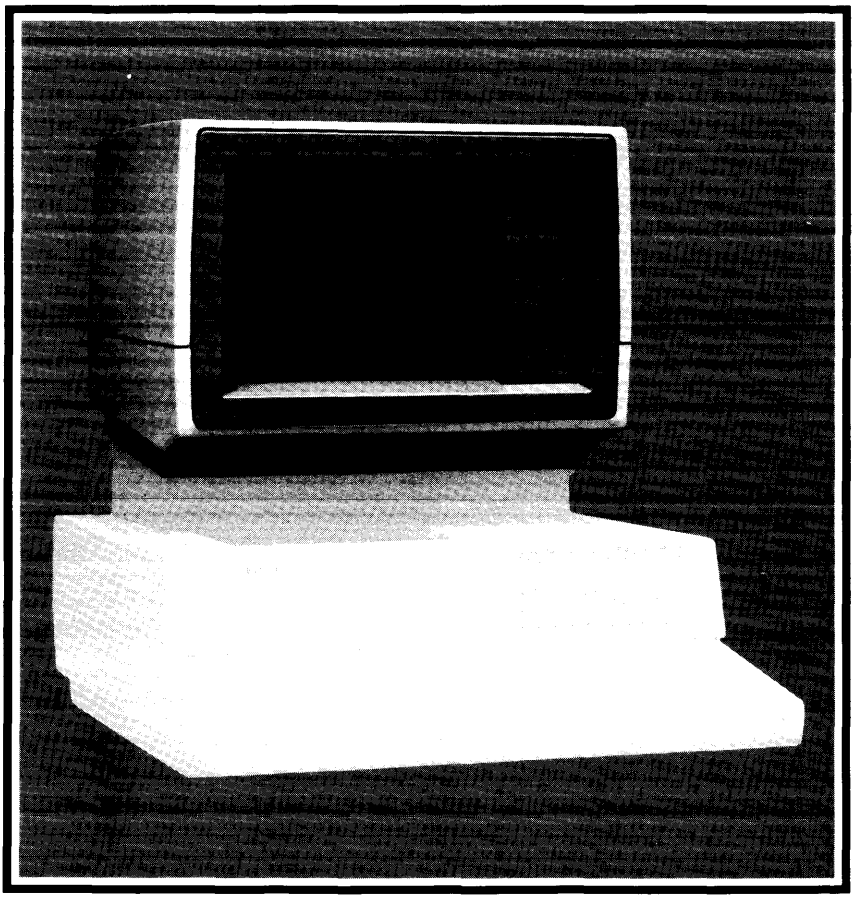
HP 9000 Series 500 Computers
Model 520

HEWLETT PACKARD

98760 CE Handbook



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First Edition, March 1984

98760 CE Handbook

for the HP 9000 Series 500
Model 520 Computer

Manual Part No. 98760-90039

Note

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Printing History

New editions of this manual will incorporate all material updated since the previous edition. Update packages may be issued between editions and contain replacement and additional pages to be merged into the manual by the user. Each updated page will be indicated by a 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.

March 1984...First Edition

Warranty Statement

Hewlett-Packard products are warranted against defects in materials and workmanship. For Hewlett-Packard Fort Collins Systems Division products sold in the U.S.A. and Canada, this warranty applies for ninety (90) days from the date of delivery.* Hewlett-Packard will, at its option, repair or replace equipment which proves to be defective during the warranty period. This warranty includes labor, parts, and surface travel costs, if any. Equipment returned to Hewlett-Packard for repair must be shipped freight prepaid. Repairs necessitated by misuse of the equipment, or by hardware, software, or interfacing not provided by Hewlett-Packard are not covered by this warranty.

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* For other countries, contact your local Sales and Support Office to determine warranty terms.

98760 Product Information

Chapter 1

Display Features

Cathode Ray Tube:	13-inch diagonal, inline gun
Scan:	Non-interlaced raster scan
Vertical Refresh Rate:	60 Hz and 50 Hz, switch selectable
Horizontal Refresh Rate:	24.9 kHz

Alphanumeric Display

Alpha Raster Size:	207 mm x 163 mm (720 dots x 390 dots)
Screen Capacity:	2080 characters (26 lines of 80 characters)
Character Font:	7 dot x 9 dot in a 9 x 15 matrix
Character Size:	2.01 mm wide x 3.76 mm high (7 x 9 character)
Character Colors:	Black, white, red, yellow, green, cyan, blue, and magenta
Character Highlighting:	Inverse video, blinking, and underline
Character Blinking Rate:	1/64 of refresh rate
Standard Character Set:	128 ASCII characters with line drawing and HP European extension
Optional Character Set:	Katakana extension replaces European extension
Cursor:	Blinking underline, same color as character cell
Cursor Blinking Rate:	Register selectable, 1/16 or 1/32 of refresh rate

Graphics Display

Graphics Raster Size:	217 mm x 163 mm (512 dots x 390 dots) Note: graphics pixel is 1.5 times wider than alpha pixel.
Matrix Size:	512 dots x 390 dots (199,680 addressable points)
Bits Per Point:	4
Memory Size:	100K bytes
Graphics Colors:	16 levels of red, green, and blue
Color Map:	16 of 4096 colors may be defined for use on screen at any one time
Resolution:	0.423 mm vertical spacing; 0.418 mm horizontal spacing
Cursor:	No hardware cursor
Vector Drawing Speed:	318 vectors per second at 100 pixels per vector

Configurations

The 98760 is available as part of the 9020 Product. The 9020 Product is also referred to as the Model 520. The 98760 is the Standard Color Display for the 9020 Product.

Related Documentation

HP Part No.	Description
09020-90038	HP 9000 Model 520 Service Manual
09020-90039	HP 9000 9020 CE Handbook
09040-90040	HP 9000 Site Preparation Manual
09020-90011	HP 9000 Model 520 Installation and Test Manual
09020-90000	HP 9000 System Integrity Tests Users Manual

Product Support Package

The 98760 requires no special tools for service other than those which are provided in other product support packages.

Safety

WARNING

LETHAL VOLTAGES ARE PRESENT INSIDE THE 98760. REFER TO THE GENERAL SAFETY GUIDELINES IN THE HP 9000 MODEL 520 SERVICE MANUAL.

98760 Environmental/Installation/ Preventive Maintenance

Chapter 2

Environmental

Environmental Range

Operating Temperature:	+10°C to +40°C
Storage Temperature:	−40°C to +75°C
Ambient Humidity:	20 to 80%

Size/Weight

Height:	25 cm
Width:	42 cm
Depth:	48 cm
Net Weight:	22.2 kg

Power Requirements

Ac Line Voltage:	110 Vac (90 to 125 Vac) 220 Vac (198 to 250 Vac)
Line Frequency Range:	48 to 66 Hz
Power Consumption:	130 watts maximum

Installation

CAUTION

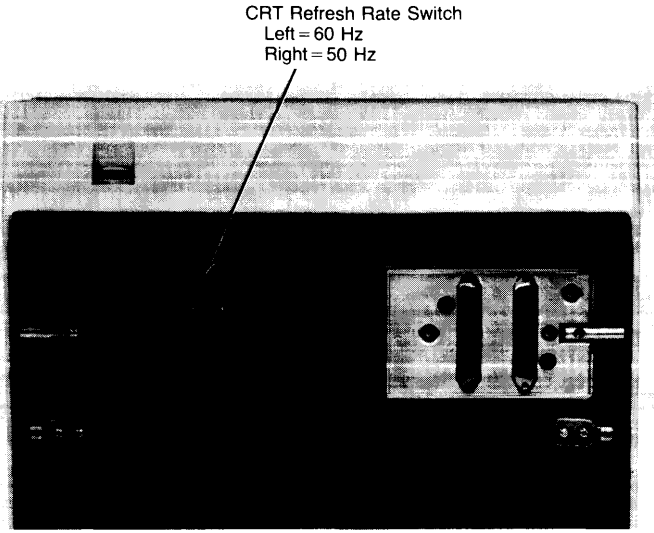
ENSURE THAT MAINFRAME POWER IS OFF BEFORE INSTALLING THE DISPLAY.

1. Place the display on its top and ensure that the position of the CRT refresh switch matches the input line frequency (50 Hz or 60 Hz).
2. Pull out both locking rods at the front of the mainframe support legs until they are fully extended.
3. Place the display on the computer so that the beveled support legs on the computer base fit into the grooves on the underside of the display. The two pegs on the top of the computer base fit into the alignment holes on the display.
4. Gently push down on the top of the display to ensure proper seating and electrical connection.
5. Push in the locking rods until they are flush with the computer.
6. Ensure that the voltage selector switch on the back of the display is set for the correct ac input voltage.
7. Ensure that the correct fuse is intalled at the back of the display (250 V, 5 A, NB; Part Number 2110-0010).

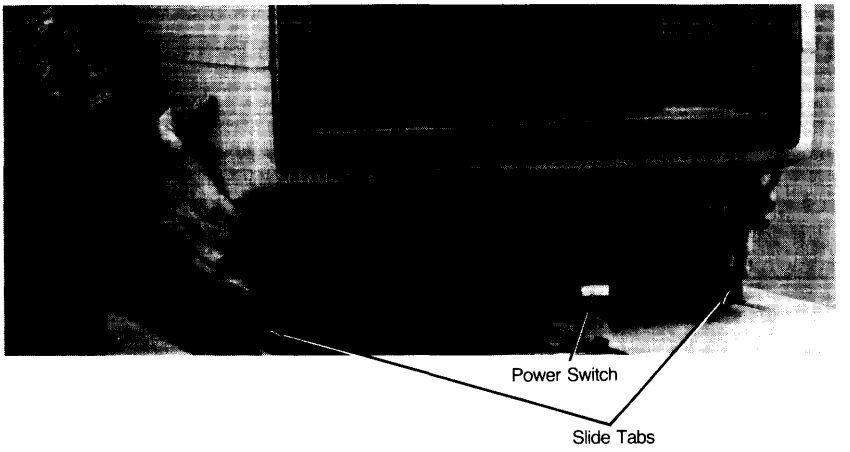
CAUTION

ALWAYS SWITCH THE COMPUTER POWER SWITCH TO THE OFF POSITION BEFORE CONNECTING THE 98760 POWER CORD. THE 98760 HAS NO POWER SWITCH. IT IS SWITCHED ON VIA A RELAY WHICH IS ACTIVATED WHEN THE COMPUTER IS SWITCHED ON.

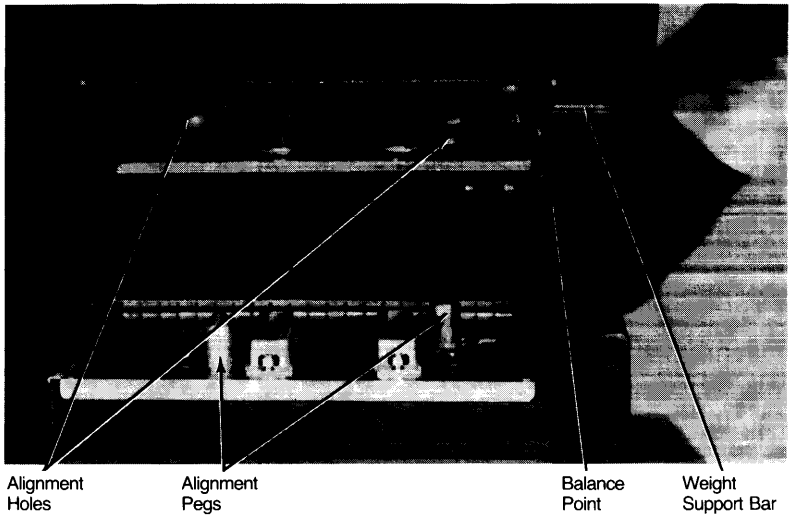
8. Connect the power cord to the display, and plug cord into ac outlet.



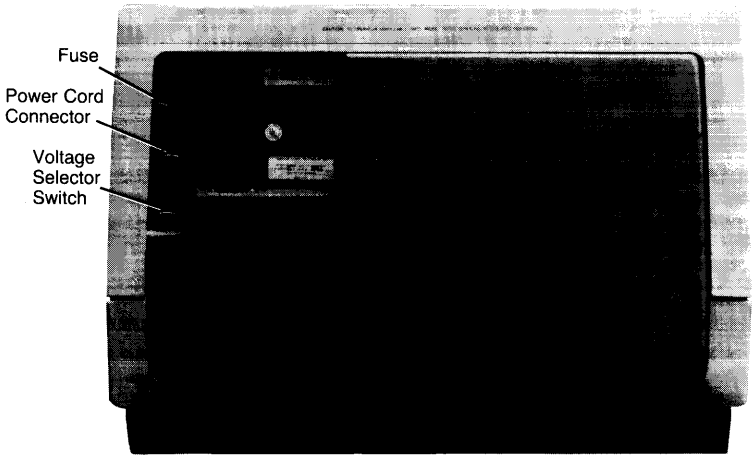
CRT Refresh Switch



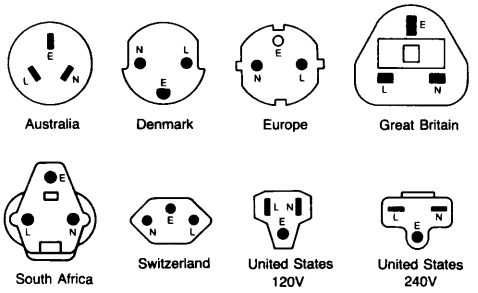
Placing Display on Computer



Aligning Display with Computer



Back of Display



Country	Part Number	Opt.	Voltage
Australia	8120-1369	901	250V, 6A
Denmark	8120-2956	912	250V, 6A
Europe	8120-1689	902	250V, 6A
Great Britain	8120-1351	900	250V, 6A
South Africa	8120-4211	917	250V, 10A
Switzerland	8120-2104	906	250V, 6A
United States	8120-1378	903	120V, 10A
United States	8120-0698	904	240V, 10A

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

NOTE: Plugs are viewed from connector end. Shape of molded plug may vary within country.

Power Cords

Preventive Maintenance

Clean the display as required according to the following instructions.

CAUTION

ONLY CLEAN WATER SHOULD BE USED FOR CLEANING DISPLAY GLASS. CHEMICAL SPRAY-ON CLEANERS USED FOR APPLIANCES AND OTHER HOUSEHOLD APPLICATIONS MAY DAMAGE THE FINISH. THESE OR OTHER CHEMICAL CLEANERS SHOULD NOT BE USED. DO NOT USE DETERGENTS THAT CONTAIN AMMONIA, BENZENES, CHLORIDES, OR ABRASIVES. DISPLAY GLASS SHOULD NOT BE CLEANED WITH ANY CLEANER.

Before cleaning the display, turn off the computer power switch and unplug the display power cord. Dampen a clean, soft, lint-free cloth with a solution of clean water and mild soap. Wipe the soiled areas of the display, ensuring that no cleaning solution gets inside the display. For cleaning more heavily soiled areas, a solution of 80% clean water and 20% isopropyl alcohol may be used. Using a clean, soft, lint-free cloth dampened with clean water, wipe over all areas that were cleaned with cleaning solution. Then dry the computer with a clean, soft, dry cloth. A non-abrasive eraser may be used to remove pen and pencil marks.

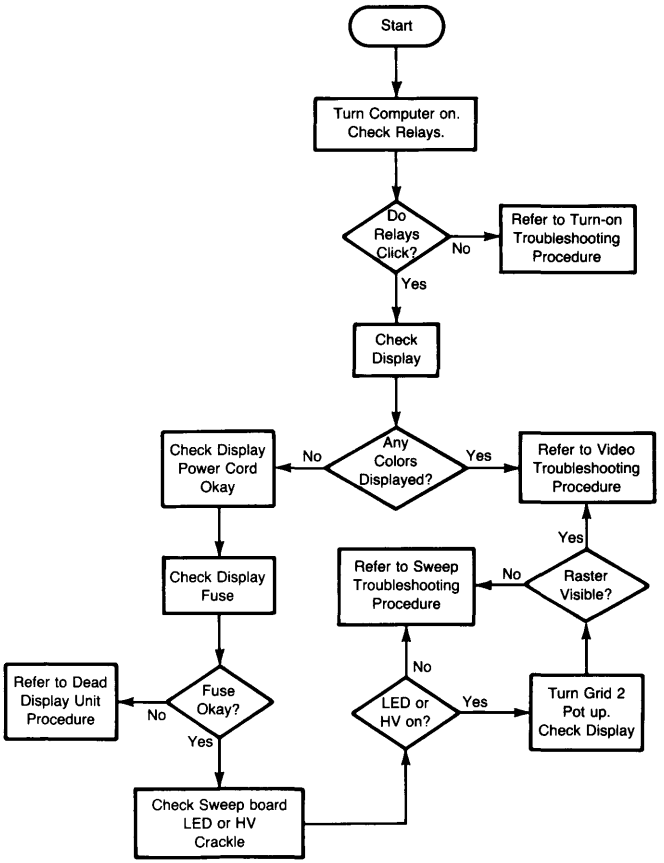
98760 Configuration

Chapter 3

There is no other configuration of the 98760.

98760 Troubleshooting

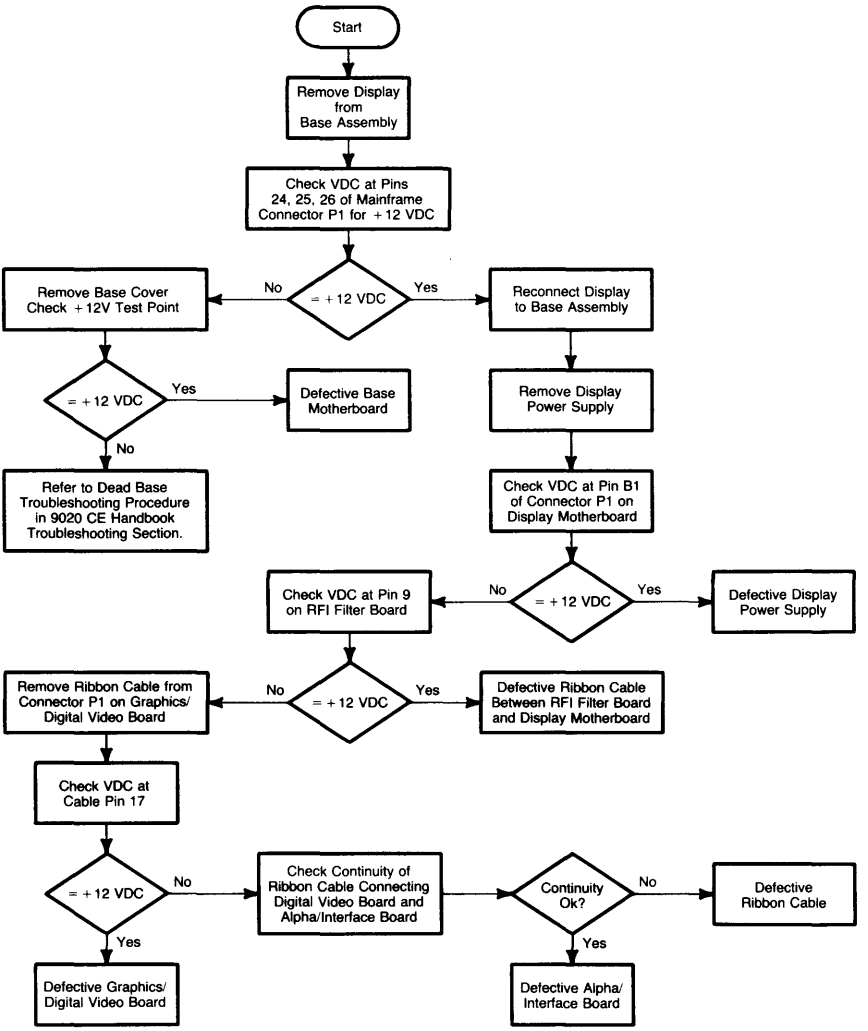
Chapter 4



Initial Display Troubleshooting Flowchart

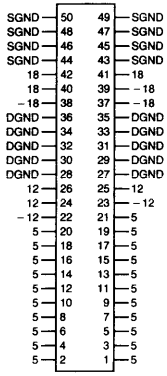
CAUTION

MAKE SURE THE SCREEN POTENTIOMETER IS TURNED BACK TO ITS ORIGINAL POSITION. FAILURE TO DO SO MAY DAMAGE THE VIDEO BOARD.

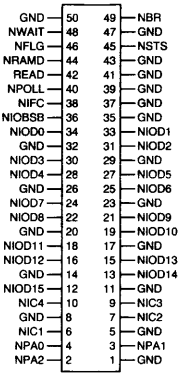


Turn On Troubleshooting Flowchart

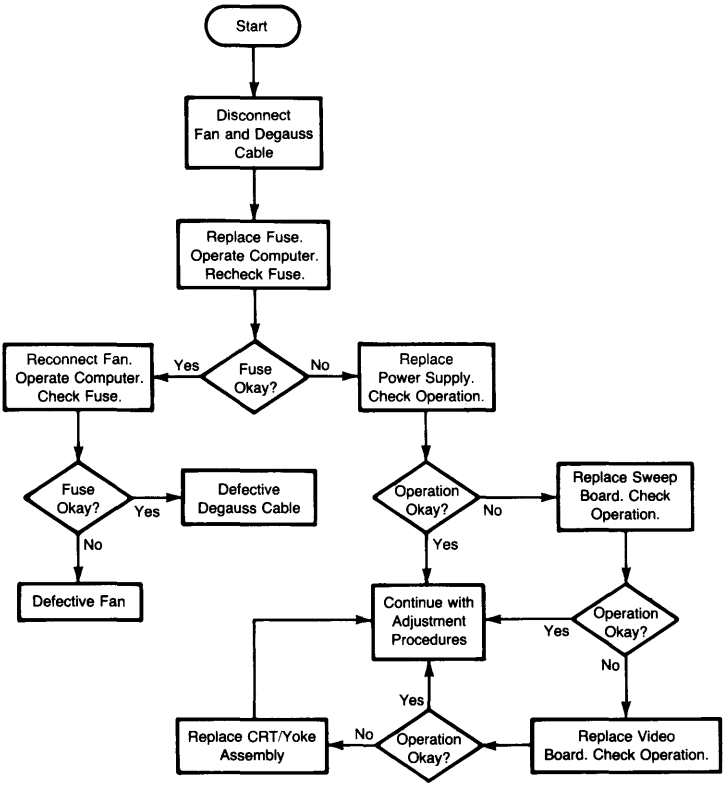
P1
To Alpha/Interface Board (A73)
Connector P3; Power



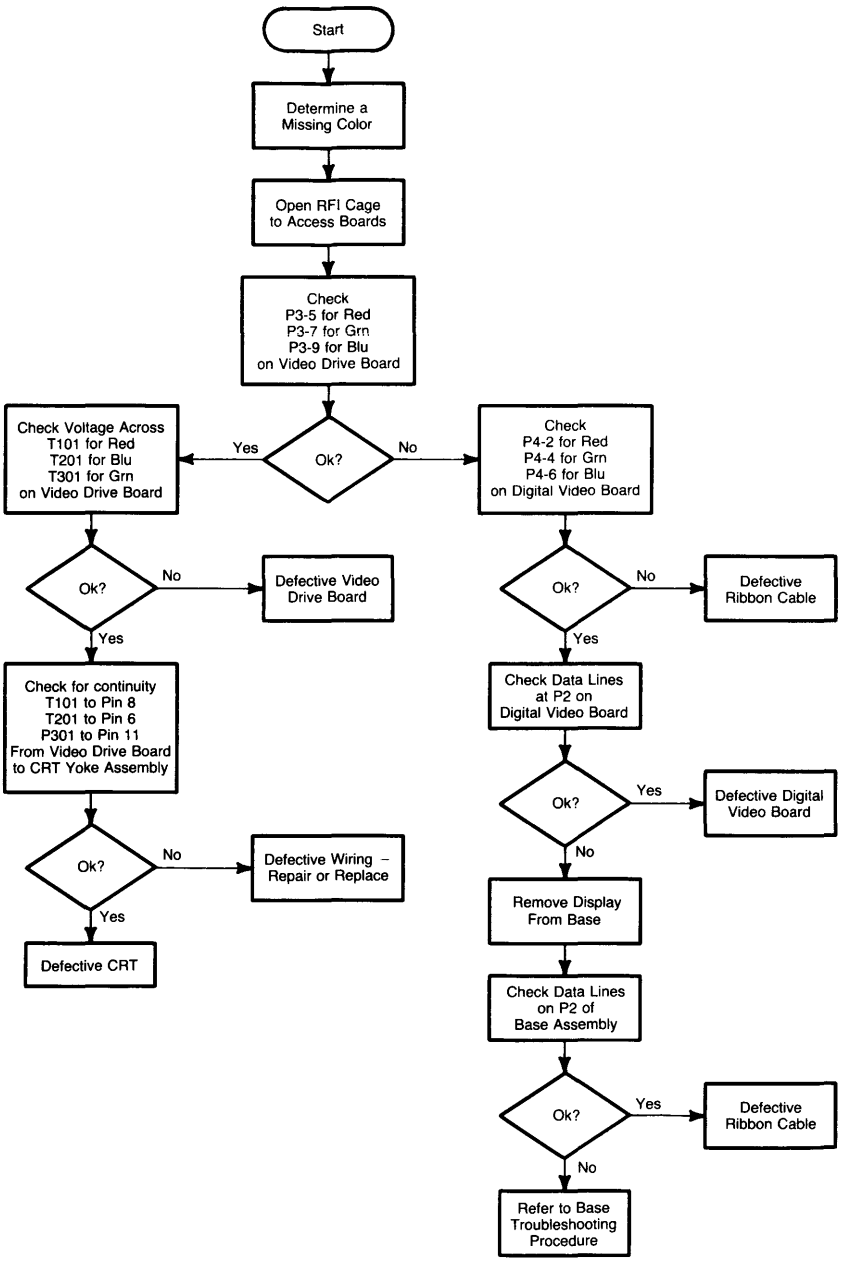
P2
To Alpha/Interface Board (A73)
Connector P4; IOP Bus



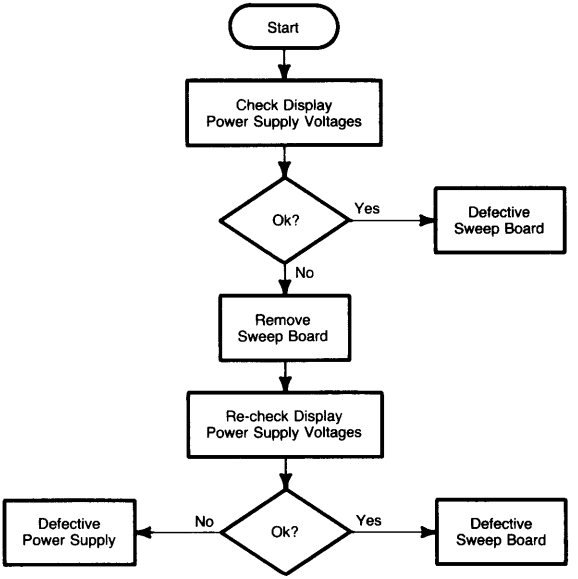
Mainframe To Display Connectors Pin Location



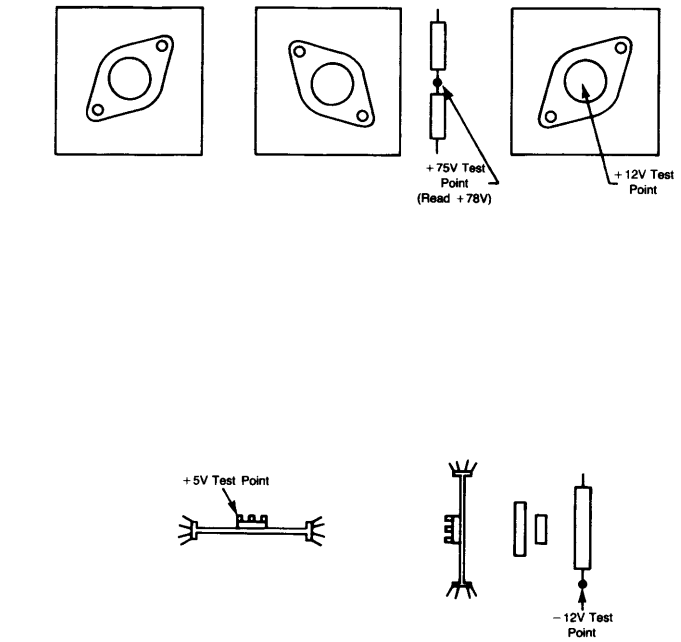
Dead Display Unit Troubleshooting Flowchart



Video Troubleshooting Flowchart



Sweep Troubleshooting Flowchart



Display Power Supply Test Points

Board Number 09836-66550

98760 Diagnostics

Chapter 5

Powerup

The green **SWEEP INDICATOR** lights at powerup to indicate that the vertical and horizontal scans are operating correctly. If the LED fails to light at powerup, or goes off during operation, a faulty scan is indicated.

Alpha and graphics logic is thoroughly tested at powerup, and appropriate messages are issued if failures occur.

System Integrity Test

The System Integrity Tests (SIT) include 98760 diagnostics. To load and run SIT (Part Number 09020-10010):

1. Load the SIT TEST system boot discs.
2. Load the SIT Mainframe Test Programs disc.
3. Enter on keyboard: `LOAD "TEST:INTERNAL",1` (EXECUTE)
4. Follow instructions and select AGRAPHICS when the test menu is presented.
5. Two tests are available under AGRAPHICS: STANDARD and INTERACTIVE. Select the STANDARD test to test vector generation and graphics memory. A message is provided only upon test failure.

   The INTERACTIVE test is described in Chapter 6.

98760 Adjustments

Chapter 6

Tools Required

Part No.	Description
09020-10010	System Integrity Test (SIT) Discs
HP 3476 (or equivalent)	Digital Multimeter
Photodyne 19XE	Radiometer
8710-1388	CRT Alignment Tool (or non conducting screwdriver)
8710-0900	#2 Pozidrive Screwdriver

Adjustments Summary

Adjustments to the 98760 consist of a color intensity alignment procedure, which is part of the System Integrity Test (SIT), and the horizontal and vertical centering adjustments that center the display raster on the CRT. The clamp and gain pots for each CRT gun (red, green, and blue) are located on the video drive board. The horizontal and vertical centering adjustments are located on the sweep board.

Note

The RFI Cage Door does not have to be opened to access the pots on the video drive board.

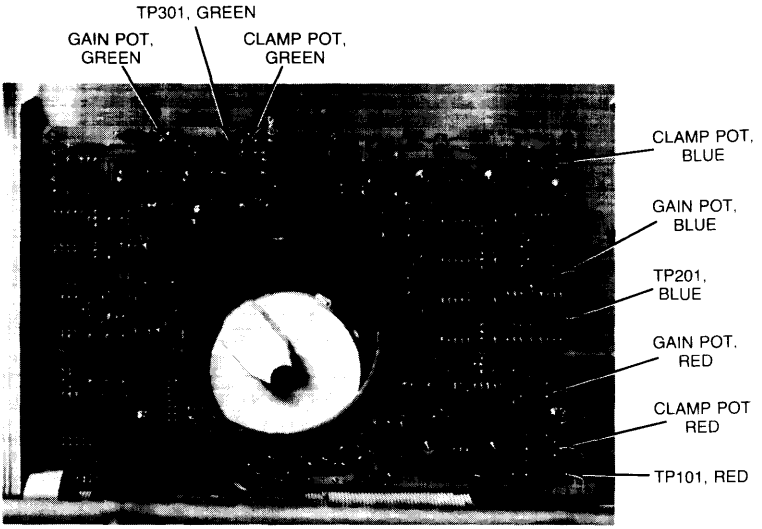
Adjustments

WARNING

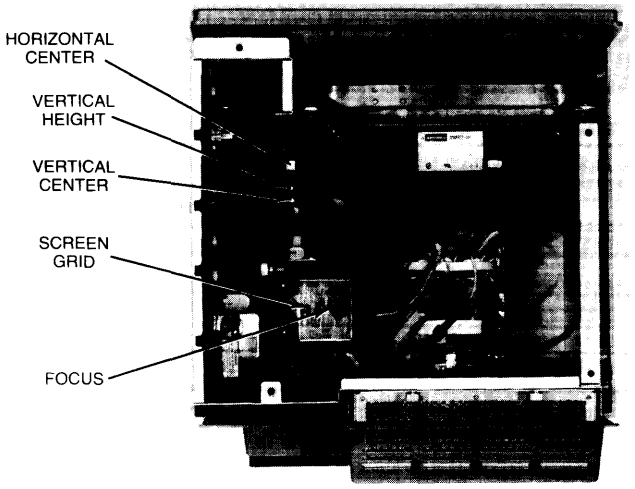
OBSERVE ALL WARNINGS AND SAFETY PROCEDURES IN THE SERVICE MANUAL. LETHAL VOLTAGES ARE PRESENT INSIDE THE COMPUTER.

Internal Intensity (Color Alignment)

1. Load the SIT TEST system boot discs.
2. Load the SIT Mainframe Test Programs disc.
3. Type: `LOAD "TEST:INTERNAL",1` EXECUTE
4. Follow instructions on the display and select AGRAPHICS when the test menu is presented.
5. Select the INTERACTIVE test under AGRAPHICS and step through the procedures as directed. The video board contains all clamp pots, gain pots, and test points. The sweep board contains the screen grid adjustment and several other adjustments.



Video Board Pots and Test Points



Sweep Board Adjustments

98760 Systems

Chapter 7

The 98760 is a part of the 9020 Product. It is the Standard Color Display for the Product. It is not used on other systems.

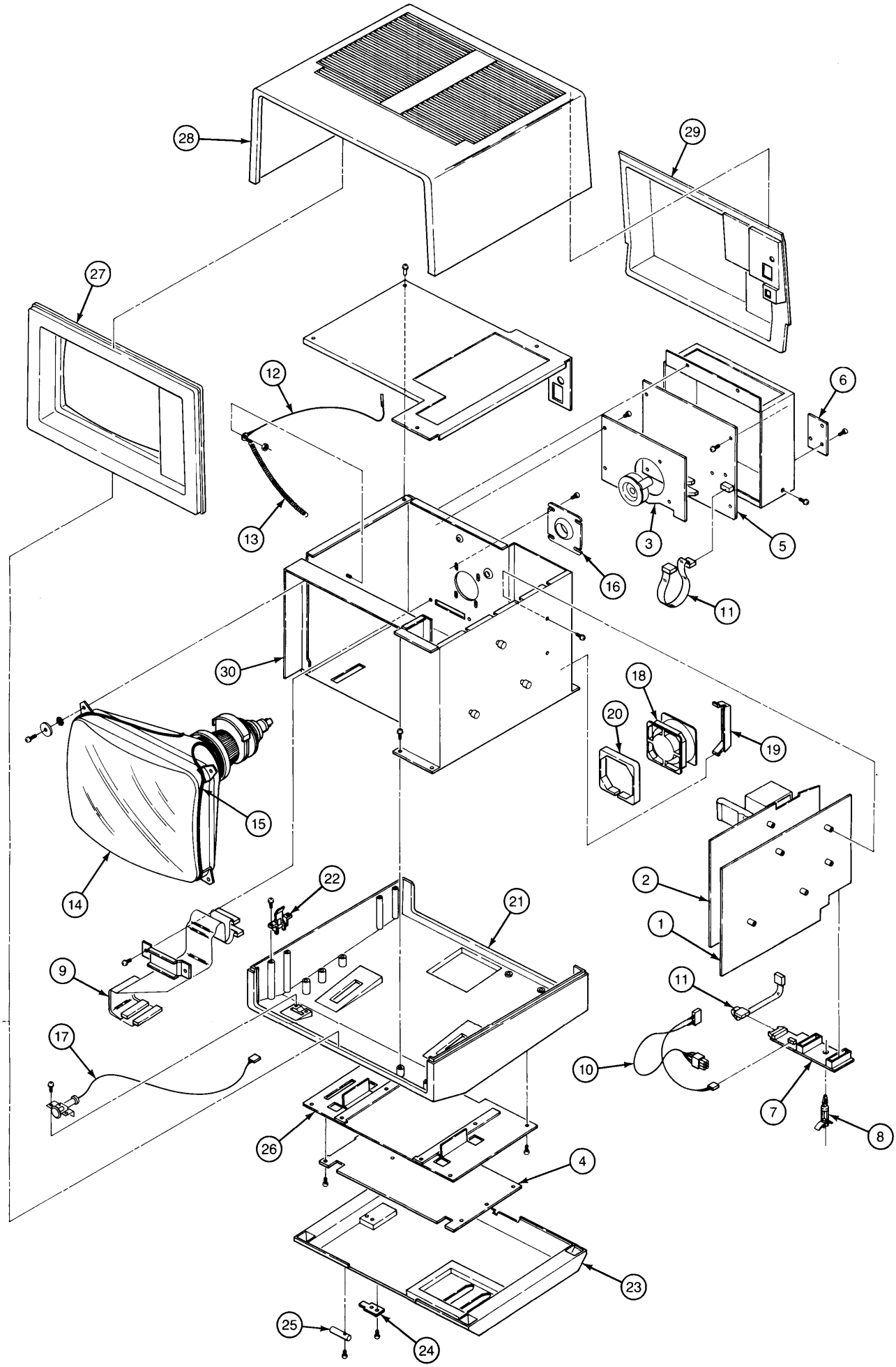
98760 Replaceable Parts

Chapter 8

Repair the 98760 by replacing the faulty assembly. There are exchange assemblies and non-exchange parts. If the faulty assembly is an exchange assembly, as indicated in the following table, return the exchange assembly to the Computer Support Division (CSD) for repair and obtain a rebuilt part. Otherwise, order the replacement part from the Corporate Parts Center.

Replaceable Parts

Index Number	HP Part Number	TQ	Description
1	09836-69550	1	Power Supply Board - Exchange
2	09836-69540	1	Sweep Board - Exchange
3	09836-69542	1	Video Board - Exchange
4	98760-69573	1	Alpha/Interface Board - Exchange
5	98760-69575	1	Graphics/Digital Video Board (ASCII) - Exchange
5	98760-69576	1	Graphics/Digital Video Board (Katakana) - Exchange
	0515-0212	23	Screw, M3.5 X 0.6
6	98760-66501	1	RFI Filter Board
7	98760-66500	1	Motherboard
8	0380-1624	4	Standoff, Snap-in
9	8120-4102	1	Cable, Digital Interconnect (sheathed dual ribbons)
10	8120-4100	1	Cable, Video Power
11	8120-4157	2	Cable, Video Data/Filter Board
12	09836-61603	1	Cable, Flashover Ground (Aquadag)
13	1460-1915	1	Spring, Aquadag Ground
14	2090-0070	1	CRT/Yoke Assembly
15	09836-61601	1	Degaussing Cable
	1400-0482	1	Cable Tie Wrap
16	98760-04102	1	Yoke Support Plate
	0400-0025	1	Grommet
	3050-0066	2	Flat Washer
	2190-0918	4	Lockwasher
17	8120-4099	1	Intensity Pot
	0510-0595	2	Retaining Clip
	5040-8149	1	Thumbwheel
18	98760-67901	1	Fan (includes cable and grill)
19	4040-1926	2	Fan Clip (side bracket)
20	4040-1923	1	Fan Boot
21	98760-40101	1	Base Assembly (With Latch Assembly)
22			Latch Assembly
	1460-1982	4	• Latch Spring
	0624-0403	8	• Latch Screw
	1480-0083	4	• Latch Dowel Pin
	1600-1310	8	• Latch Angle Bracket
	1600-1327	4	• Latch Pawl
23	0050-2091	1	Casting, Alpha/Interface Board
	0515-0356	17	Screw, M3.5 with lock washer
	2190-0918	6	Lock Washer
24	1600-1214	2	Spring Plate
25	1531-0231	2	Pivot
26	98760-04101	1	Lid, Alpha/Interface Board
	8160-0392	0.25 ft	RFI Gasketing
	0624-0400	8	Screw, RPG 6-19
	8160-0389	1.42 ft	RFI Gasketing, Double Finger
	0363-0170	2	RFI Gasketing, RFI Cage
	0624-0402	2	Plastic Screw .25
27	98760-40801	1	Front Bezel
	1000-0650	1	OCLI Glass
28	98780-40015	1	Top Cover
29	98760-44101	1	Back Cover
30	98760-00601	1	Purity Shield
	98760-01201	1	Free Bracket (Left)
	2680-0105	4	10-32X.75 Screw
	0361-1096	1	Rivet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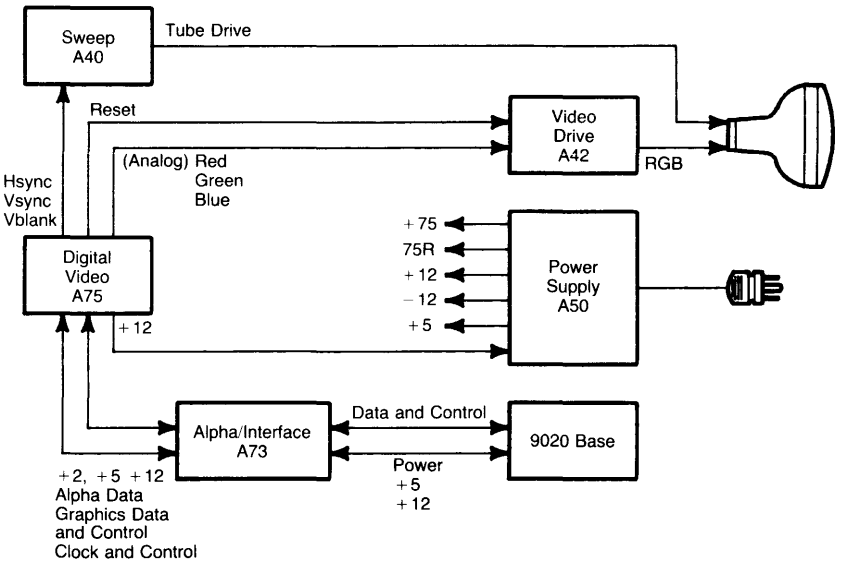
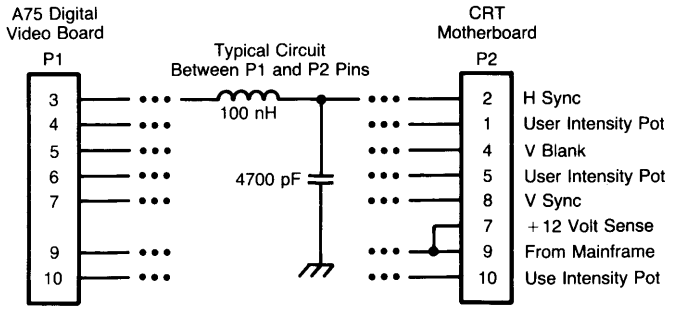
98760 Diagrams

Chapter 9



98760 Block Diagram



RFI Filter Board 98760-66501

98760 References

Chapter 10

There are no references.

98760 Service Notes

Chapter 11

Keep your service notes in this section.