# HP 98705A/B/C Graphics Processor CE Handbook

## HP 9000 Series 300 Computers

HP Part Number 98705-90039



HEWLETT PACKARD

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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.

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# Notices

## Radio Frequency Interference Statements

### FCC Statement

**Federal Communications Commission**
**Radio Frequency Interference Statement**
**(U.S.A. Only)**

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.

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# Safety Considerations

## WARNINGs, CAUTIONs, and Notes

Warnings, cautions and notes are used throughout this document to alert the user to conditions of importance. They are used as follows:

- WARNINGS contain information which, if not observed, could result in injury to personnel or loss of life.
- CAUTIONS contain information which, if not observed, could result in damage to or destruction of equipment.
- Notes contain information that will assist you in accomplishing the job.

## Examples:

**WARNING**

**The power supply presents a hazard to personnel. Extreme care must be taken when connecting voltmeter probes to the test points. De-energize the product by turning it off and removing its power cord before connecting or removing test probes.**

**CAUTION**

The printed circuit assemblies in this product are susceptible to damage by electro-static discharge. Extreme care must be taken when handling printed circuit assemblies. Use an Anti-static Workstation while handling printed circuit assemblies.

**Note**

Hewlett-Packard supports repair of this product only to the assembly level. The fault is diagnosed to the assembly that is causing the problem. That assembly is then replaced with a new or rebuilt one.

# Table of Contents

# Product Information 1

## Introduction

This chapter contains information about the HP 98705A, HP 98705B, and HP 98705C Graphics Processors.

### Model HP 98705A:

| | |
|---|---|
| Transform and Scan Converter | 98705-66573 |
| 8 Plane Frame Buffer (FB0) | 98705-66570 |
| Color Map | 98705-66574 |

### Model HP 98705B:

| | |
|---|---|
| Transform and Scan Converter | 98705-66573 |
| 16 Plane Frame Buffer (FB0 & FB1) | 98705-66571 |
| Color Map | 98705-66574 |
| 16 Plane Z Buffer | 98705-66572 |

### Model HP 98705C:

| | |
|---|---|
| Transform and Scan Converter | 98705-66575 |
| 8 Plane Frame Buffer (FB0) | 98705-66570 |
| Color Map | 98705-66574 |

## Physical Dimensions

| | |
|---|---|
| Height | 100 mm (3.9 inches). |
| Width | 325 mm (12.8 inches). |
| Depth | 445 mm (17.5 inches). |
| Weight | 8.6 kg (20 lbs). |

## Regulatory

| | |
|---|---|
| Canada | CSA 22.2 #220; IEC 950 (EN-60950). |
| Germany | VDE 0871/6.78 Level B. |
| Japan | VCCI. |
| U.S.A. | FCC A; UL 1950. |

# Environment/Installation/ PM 2

## Environment

**CAUTION**

Electronic components and assemblies can be damaged by static discharge. Do not touch the traces or connector contacts.

Leave the HP 98702A Interface Card in its protective, anti-static container until required for installation.

When installing, removing, or handling printed circuit assemblies, use an anti-static workstation, HP part number 9300-0933.

| | |
|---|---|
| Operating Temperature | 0°C to 55°C (32°F to 131°F) ambient temperature to 7500 ft. |
| | 0°C to 47°C (32° to 117°F) ambient temperature to 15,000 ft. |
| Storage Temperature | −40°C to 71°C (−40°F to 160°F) ambient temperature. |
| Relative Humidity | Operating — 5% to 95% at 40°C (104°F) ambient temperature. |
| | Storage – 90% at 65°C (149°F) ambient temperature. |
| Maximum Operating Altitude | 4572 Meters (15,000 ft). |
| Non-operating Altitude | 15240 Meters (50,000 ft). |

# Installation

## Wiring

Refer to the *HP 9000 Series 200/300/500 Site Preparation Manual* to assist you in preparing for the installation of the HP 98705A/B/C Graphics Processor.

Verify electrical power receptacle wiring and contact retention force for all electrical receptacles supplying power to system devices. If wiring is not correct and safe, do not install equipment until corrected.

## Power Requirements

| | |
|---|---|
| Power Line Frequency. | 47 through 66 Hz. |
| Switch Selected Line Voltage. | 115 — 90 through 132 Vac.<br>230 — 180 through 240 Vac. |
| Fuse. | 6A/250 V. — Non customer replaceable. |
| Line Current. | 90 through 132 Vac 4 Amps.<br>180 through 240 Vac 2 Amps. |
| Power Consumption. | 260 Watts maximum. |
| Heat Dissipation. | 207 kcal/hr (822 BTU/hr). |

## Power Cord Option

The power cords (and the available options) are listed in Chapter 8.

## Installation Prodedure

The installation steps listed here are meant to be used as a reminder. They are comparable to the steps on the Installation (Picture) Guide.

Installation of these products is explained in a picture guide that is shipped with each system. Installation is also explained in Chapter 3 of the *HP 98705A/B/C Graphics Processor Hardware Support Manual.* Refer to these documents if you need more information.

1. Unpack and inventory the HP 98705 Graphics Processor.

---

**WARNING**

**The monitor is heavy. Have someone help you unpack it.**

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**Note**

The monitor is included in the installation process but is not a part of the Graphics Processor product.

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2. Check with the system administrator (or refer to the appropriate computer documentation for the procedure) and turn-off the computer.
3. Find the HP 98702A Interface Card.
4. Install the interface card into a DIO-II slot in the computer. Refer to the computer's documentation for instructions.

   The interface card's configuration switches are set to a default address (133-135) at the factory. See the section *Select Code Addresses* in Chapter 3 if you need to use a different address.
5. Find the Graphics Address and Data (GAD) bus cable and connect it to the interface card. Later, the other end will connect to the HP 98705.

6. Check that the voltage select switch is set for the correct power source. Also, check that the power switch is OFF.
7. Place the HP 98705 near, on, or under the computer (depending on the system configuration).

   Ensure air flow is not restricted at the front or rear of the Graphics Processor.
8. Connect the power cord to the HP 98705 Graphics Processor. Connect the other end to a power outlet.
9. Ensure power is OFF.

   Connect the Graphics Address and Data cable to the GRAPHICS BUS connector on the HP 98705.

   Ensure the connector locks into position.
10. Place the monitor near the computer.
11. Find the RGB cable and connect one end of it to the HP 98705A, B, or C; red to R, green to G, and blue to B.

    In a like manner, connect the other end of the RGB cable to the monitor.
12. Connect the monitor's power cord to it. Connect the other end to a power outlet. Switch the monitor to ON.
13. Turn-on the HP 98705 Graphics Processor.

    Turn-on the computer.
14. Verify that the system works and will boot up.

### In Case of Trouble

If you have problems installing or turning-on your system:

1. Switch the system to OFF.
2. Check the seating of your interface board.
3. Check all cable connections.
4. Check for select code conflicts with other I/O cards (see *Select Code Addresses* in Chapter 3).
5. Turn-on the system and verify that it is working correctly.

If you still have problems, troubleshoot and repair the system.

**Note**

If you purchased an add on HP 98705 for either the HP A1421 or HP A1630 SPU, two attachment kits were included in the package. Part Number 98705-87904 is used with the HP A1630. Part Number 98705-87905 is used with the HP A1421.

Discard the attachment kit that is not needed.

# Preventive Maintenance

## Cleaning

The HP 98705 case is painted with a durable, long lasting, non-toxic paint. It will preserve its appearance for many years. To clean the case, follow these instructions.

**CAUTION**

Chemical spray on cleaners, used for appliances and other household applications, may damage the finish. These and other chemical cleaners should not be used.

The CRT display should be cleaned only with clean water.

Before cleaning, unplug the power cord and remove any interconnecting cables. Dampen a clean, soft, lint free cloth with a solution of clean water and mild soap. Wipe the soiled areas, ensuring that no cleaning solution gets inside the unit. For cleaning more heavily soiled areas, a 50% solution of clean water and isopropyl alcohol may be used. Then dry with a clean, soft, lint-free, dry cloth.

# Configuration 3

## Introduction

Configuration requirements for these Graphics Processors consist of changing the select code on the interface card (if the default setting can not be used).

## Select Code Addresses

If the system has a conflict with the interface's default select code address, or if a second interface is installed with the same select code, use the following procedure to change the select code address switches.

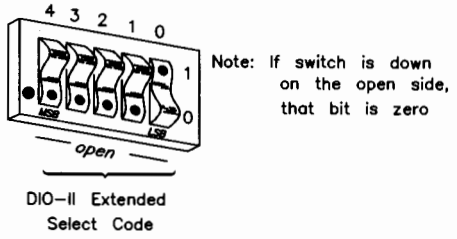



**Figure 3-1. Interface Address Switches**

Table 3-1 shows the translation between the interface's address switch settings, the DIO-II select code, and the mknod minor numbers for use on an HP-UX system.

Example mknod entry using default switch setting:

```
/etc/mknod /dev/crt c 12 0x850200
```

The HP-UX kernel must be configured to accept a 12 Mbyte device.

**CAUTION**

If "Instant Ignition" (or `/dev/crt` is used to automatically select the console) do not use a select code above 140.

A switch setting of 00000 is not a valid address code. The result will be a failure of the IODC test code to load and run at power-up (all LEDs on the interface will stay ON).

**Table 3-1. DIO-II Address Base**

| DIO-II Select Code | Switch MSB—LSB | mknod Minor Number | CTL_BASE |
|---|---|---|---|
| 133-135 | 00001 | 0x850200 | 0x01400000 |
| 137-139 | 00010 | 0x890200 | 0x02400000 |
| 141-143 | 00011 | 0x8d0200 | 0x03400000 |
| 145-147 | 00100 | 0x910200 | 0x04400000 |
| 149-151 | 00101 | 0x950200 | 0x05400000 |
| 153-155 | 00110 | 0x990200 | 0x06400000 |
| 157-159 | 00111 | 0x9d0200 | 0x07400000 |
| 161-163 | 01000 | 0xa10200 | 0x08400000 |
| 165-167 | 01001 | 0xa50200 | 0x09400000 |
| 169-171 | 01010 | 0xa90200 | 0x0A400000 |
| 173-175 | 01011 | 0xad0200 | 0x0B400000 |
| 177-179 | 01100 | 0xb10200 | 0x0C400000 |

**Table 3-1. DIO-II Address Base (Continued)**

| DIO-II Select Code | Switch MSB—LSB | mknod Minor Number | CTL_BASE |
|---|---|---|---|
| 181-183 | 01101 | 0xb50200 | 0x0D400000 |
| 185-187 | 01110 | 0xb90200 | 0x0E400000 |
| 189-191 | 01111 | 0xbd0200 | 0x0F400000 |
| 193-195 | 10000 | 0xc10200 | 0x10400000 |
| 197-199 | 10001 | 0xc50200 | 0x11400000 |
| 201-203 | 10010 | 0xc90200 | 0x12400000 |
| 205-207 | 10011 | 0xcd0200 | 0x13400000 |
| 209-211 | 10100 | 0xd10200 | 0x14400000 |
| 213-215 | 10101 | 0xd50200 | 0x15400000 |
| 217-219 | 10110 | 0xd90200 | 0x16400000 |
| 221-223 | 10111 | 0xdd0200 | 0x17400000 |
| 225-227 | 11000 | 0xe10200 | 0x18400000 |
| 229-231 | 11001 | 0xe50200 | 0x19400000 |
| 233-235 | 11010 | 0xe90200 | 0x1A400000 |
| 237-239 | 11011 | 0xed0200 | 0x1B400000 |
| 241-243 | 11100 | 0xf10200 | 0x1C400000 |
| 245-247 | 11101 | 0xf50200 | 0x1D400000 |
| 249-251 | 11110 | 0xf90200 | 0x1E400000 |
| 253-255 | 11111 | 0xfd0200 | 0x1F400000 |

**Note**

Frame Buffer addresses are always 4 Mbytes (0x400000) above the CTL_BASE address.

**12** Configuration

# Troubleshooting 4

## Introduction

Troubleshooting on this system consists of using off-line procedures to get messages to the display, then using the Online Diagnostic Subsystems to test the graphics functionality. The Online Diagnostics Subsystems are documented in Chapter 5.

### Off Line Procedures

#### Power Check

If fans are running (two fans — one for the power supply and one for the board set) — Power is on the Graphics Processor and +12 volts is getting to the fans.

If fans are not running:

- Check power cord.
- Check voltage select switch.
- Check fuse.
- Check voltages out of the Power Supply (Figure 4-1). Note that the voltages are marked on the boards next to the power supply connections to the board.
- If the above checks are okay:
  - For board set fan — Replace fan or Frame Buffer board.
  - For Power Supply fan — Replace the Power Supply.

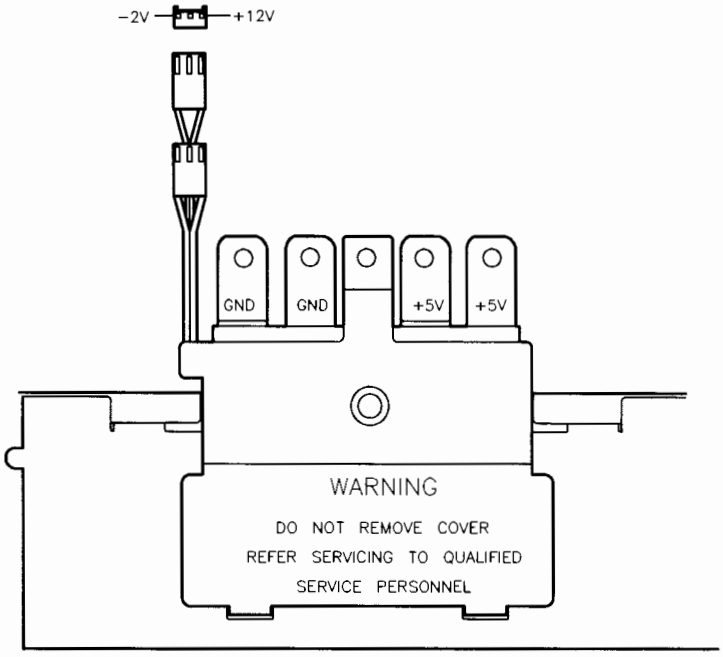



**Figure 4-1. Power Supply Output**

### HP 98705 Output and Monitor Check

Press the MONITOR TEST button on the back of the HP 98705. The monitor should have a white, stable raster while the button is held in. If not:

1. Check that the monitor and HP 98705 are powered-up and the RGB cable is connected correctly between the units.
2. Suspect (in order):
    a. Monitor.
    b. RGB cable.
    c. Color Map board.
    d. HP 98705 power supply (+5.1 volts).

## IODC Test LEDs

**CAUTION**

To prevent corruption of the operating system or application programs in case of trouble, power down disks during testing.

- Z Buffer is not tested but could affect the IODC tests. If you suspect this, remove Z Buffer and repeat tests.
- All failures are reported to interface board LEDs as well as the console.
- Eight LEDs — six used for error status. (First six from the left or top) when facing the handle end of board.
- During testing, the current module number (of six) is displayed. At end of "last" module, LEDs display error conditions or are off if all IODC tests pass.
- Limited set of hardware is tested (to get ITE messages to console).
- Analog path from the Color Map to the video connector is NOT tested

## Domain System

At power up, the ITE tests are run which checks most of the HP 98705 system. However, the window system must be up and running before SAX Diagnostics can be used. Therefore, a "Self Test Subset" is automatically run to ensure the circuitry for the windows system is operational.

If no self test error messages are generated at power up, the SAX program can be run to thoroughly test the Graphics Processor.

Refer to: *Using Domain Diagnostics, Volume 1* Part Number 009329-A02 for information on error messages and the SAX (or GR) diagnostics tests.

## IODC LED Operation

Power ON reset lights all LEDs. When SPU power is cycled, the Boot ROM accesses the Graphics Processor, and tries to load the test code. If successful the LEDs go off and testing starts. If test code cannot be loaded and run, all LEDs stay ON.

While test code is running, LEDs flash. Eventually tests stop with an error code, or tests finish and LEDs indicate a pass condition (all LEDs OFF).

More than one LED can be lit at one time. If this occurs, replace the assembly corresponding to the first LED. The test path is sequential.

## LEDs and Console Messages

**Table 4-1. Interface LEDs**

| LED | Label | Console Message |
|---|---|---|
| 1 | Interface | HP98702 Interface Failure |
| 2 | Cable and Transform | Cable/HP98705-66573 Error |
| 3 | Transform | HP98705-66573 Error (or 98705-66575 board error) |
| 4 | Frame Buffer | HP98705 FB Memory/Access Error or HP98705 FB Block Move Error |
| 5 | Color Map | HP98705 Color Map Error or HP98705 Color Map R/W Error |
| 6 | Bus | HP98702 Bus Error or HP98705 Bus Error |

## Error Definitions

If all LEDs are lit, check GAD cable or interface switches all set to zero.

1. Interface LED — Indicates problem on interface board.
2. Cable and Transform LED — Indicates failure of Transform and Scan Converter board. Can be due to:
    a. GAD bus cable.
    b. Transform and Scan Converter board (either 98705-66573 or 98705-66575).
    c. Bad HP 98702A Interface board.
3. Transform LED — Message gets to the Transform and Scan Converter board, but data is incorrect. Generally, this LED is used with LED number two to indicate that GAD bus cable or Interface board are not causing LED two to be lit.
4. Frame Buffer LED — Lit when error is on Frame Buffer board.
5. Color Map LED — Indicates error on Color Map board.
6. Bus LED — Indicates a Graphics Address Strobe (GAS) was sent to the Graphics Processor (any of the three boards may answer) and a Data Transfer ACKnowledge (DTACK) signal was not returned.

# Diagnostics 5

## Introduction

This chapter contains:

- IODC Self Test console error messages.
- The use of SAX Diagnostics for Domain.
- The use of Online Diagnostic Subsystem for HP-UX.

## IODC Self Test Error Messages

IODC error messages are output to the system console. If unable to print on the console, interface LEDs display the results (Chapter 4).

### Messages:

| | |
|---|---|
| *HP98702 Interface Failure* | Interface sends test to itself. If reply is not returned, error message is generated. |
| *Cable/HP98705-66573 Error* | Cable and Transform Error Message. Indicates failure of cable or Transform and Scan Converter board. Error can be due to: GAD bus cable being bad; Transform and Scan Converter board being bad (either 98705-66573 or 98705-66575); or bad interface as the third possibility. |
| *HP98705-66573 Error* | Transform Error Message. Test can get to the Transform and Scan Converter board, but data is incorrect. In general, message is used in conjunction with *Cable/HP98705-66573 Error* to indicate that GAD bus cable, or the HP 98702A Interface board is not causing the *Cable/HP98705-66573 Error.* |
| *HP98705 FB Memory/Access Error* | Frame Buffer Error Message. |

| | |
|---|---|
| *HP98705 FB Block Move Error* | Frame Buffer Error Message. |
| *HP98705 Color Map Error* | Color Map Error Message. |
| *HP98705 Color Map R/W Error* | Color Map Error Message. |
| *HP98702 Bus Error* | Bus Error Message. Indicates that a Graphics Address Strobe was sent to the Graphics Processor (any of the three boards may answer) and a Data Transfer ACKnowledge (DTACK) signal was not returned. |
| *HP98705 Bus Error* | Bus Error Message. Indicates that a Graphics Address Strobe was sent to the Graphics Processor (any of the three boards may answer) and a Data Transfer ACKnowledge (DTACK) signal was not returned. |

# SAX Diagnostics

Refer to: *Using Domain Diagnostics, Volume 1* Part Number 009329-A02 for information on error messages and the SAX (or GR) diagnostics tests.

# Online Diagnostic Subsystem

## Introduction

The Online Diagnostic Subsystems is documented in *Online Diagnostics Subsystem Manual.* The program is run by executing Diagnostic User Interface (DUI).

The 98705A Graphics Subsystem Diagnostic (g98705dg) is a part of the Online Diagnostic Subsystem and tests all Graphics Processor boards regardless of model configuration.

Diagnostic is available on:

- Series 300 SPU.
- Running HP-UX software release 7.03 or later.
- Which supports the Online Diagnostic Subsystem.

The HP 98705 may be system console or graphics peripheral. If possible run diagnostics from different terminal than one being tested. The diagnostic can be run from a remote system if the unit is networked (use `rlogin`).

The diagnostic can be run in windows from a different terminal than the unit under test. Do not attempt to use windows on the unit under test.

While the diagnostic is executing, no input device associated with the HP 98705 under test should be activated (such as, keystrokes, mouse movements, etc). This will probably occur if testing from a window.

## Hardware Requirements

System should pass IODC tests and MONITOR TEST before using Online Diagnostic Subsystem.

If Z Buffer is installed it will be tested.

---

**CAUTION**

This diagnostic destroys all data in the device under test.

---

## Help Screens

A help screen is available for the Online Diagnostic Subsystem after entering the Diagnostic User Interface (DUI). This may be accessed by typing a "?".

Five help screens are available in the HP 98705 Graphics Subsystem Diagnostic. They are accessed after entering the DUI by entering one of the following commands:

```
help g98705dg

help g98705dg sections

help g98705dg parms

help g98705dg commands

run g98705dg dev=/dev/<device_filename> section=1
```

## Device File Entries

Before running the HP 98705 Graphics Subsystems Diagnostic (G98705DG), a device file with a major number of 10, must be in the operating system.

---

**Note**

A major number of 10 is used ONLY for this `mknod` when executing this diagnostic program. For other `mknod` commands, a major number of 12 is used.

---

A device file is created by executing the following command:

```
/etc/mknod   /dev/<device_filename>   c   10   0xNNNNc0
```

Where `<device_filename>` is any name you choose.

Where NNNN is a function of the switch setting on the interface board.

---

**Note**

A Setting of 00000 is not allowed.

The default setting on a new card is 00001 (select code 133-135).

---

**Table 5-1. Switch Settings**

| Setting | NNNN | Setting | NNNN |
|---|---|---|---|
| 00000 | —— | 10000 | 1040 |
| 00001 | 0140 | 10001 | 1140 |
| 00010 | 0240 | 10010 | 1240 |
| 00011 | 0340 | 10011 | 1340 |
| 00100 | 0440 | 10100 | 1440 |
| 00101 | 0540 | 10101 | 1540 |
| 00110 | 0640 | 10110 | 1640 |
| 00111 | 0740 | 10111 | 1740 |
| 01000 | 0840 | 11000 | 1840 |
| 01001 | 0940 | 11001 | 1940 |
| 01010 | 0A40 | 11010 | 1A40 |
| 01011 | 0B40 | 11011 | 1B40 |
| 01100 | 0C40 | 11100 | 1C40 |
| 01101 | 0D40 | 11101 | 1D40 |
| 01110 | 0E40 | 11110 | 1E40 |
| 01111 | 0F40 | 11111 | 1F40 |

## Tunable Parameters

It may be necessary to increase some of the HP-UX tunable system parameters due to the size of DIO II mapping for the HP 98705 Graphics Processor. See the section for the HP 98705 in the *Starbase Device Drivers Library* for the minimum values for these tunable parameters.

## Running the Diagnostic

- You must be superuser (or have a security level that will allow access to the programs) to run the diagnostic programs.
- The diagnostics can automatically determine the hardware configuration, or you can insert the configuration manually.

  If automatic configuring is selected, user should verify the configuration.

  Some hardware failures will prohibit use of automatic configuring. Insert the configuration manually.
- While running diagnostics, visual patterns will be generated on the screen.
- A software termination signal (usually CNTL-C) will terminate the g98705dg diagnostic.

### Start

1. To start diagnostic, enter:

   ```
   /usr/diag/bin/dui
   ```

2. Diagnostic must be run in single user mode (SUM). Enter:

   ```
   mode sum
   ```

3. At this point you can run the diagnostics or call the help messages. To call help messages invoke help commands.

   To run entire diagnostic, enter:

   ```
   run   g98705dg   dev=/dev/<device_filename>
   ```

4. To run section diagnostics, specify the sections you desire to run.

   Example:

   ```
   run   g98705dg   dev=/dev/<device_filename>   section=1

   run   g98705dg   dev=/dev/<device_filename>   section=10,11,12
   ```

   See the list of sections in the *Diagnostic Section Descriptions* to determine what sections you want to run.

5. Message heading will be displayed. Then prompts for configuration setup are displayed. (Default is [Return].)

   Example:

   ```
   Are you running the diagnostic from the 98705A you are testing? (y/n) [y]

   Do you want this program to determine the unit configuration? (y/n) [y]
   ```

   If you answer "n", insert configuration manually.

   When configuration has been determined, program will ask if you want to continue.

   Example:

   ```
       98702-66501 Present  (DIO II Interface)
       98705-66573 Present  (Transform Engine and Scan)
       98705-66571 Present  (Frame Buffer 0 and 1)
       98705-66572 Present  (Z Buffer)
       98705-66574 Present  (Color Map)

   Do you wish to continue with this unit configuration? (y/n) [y]
   ```

   A yes answer starts diagnostics execution. During test, results are printed for each section.

6. At end of tests, table is printed summarizing results.

   Example:

```
The following table summarizes results of the diagnostic
  sections.  Here is the key to table entries:

  [FFF]   Testing this FRU was a major goal (section FAILED)
  [ppp]   Testing this FRU was a major goal (section PASSED)
  [ F ]   Exercising a portion of this FRU was necessary
            to achieve the section goal (section FAILED)
  [ p ]   Exercising a portion of this FRU was necessary
            to achieve the section goal (section PASSED)
  [ - ]   This FRU was not exercised
```

| Result: / FRU Tested: | ITF | TE-SC | FB | Z | CM |
|---|---|---|---|---|---|
| Section 4 Passed | ppp | - | - | - | - |
| Section 10 Passed | p | ppp | - | - | - |
| Section 11 Passed | p | ppp | - | - | - |
| Section 12 Passed | p | ppp | - | - | - |
| Section 20 Passed | p | p | ppp | - | - |
| Section 21 Passed | p | p | ppp | - | - |
| Section 22 Passed | p | p | ppp | - | - |
| Section 23 Passed | p | p | ppp | - | - |
| Section 24 Passed | p | p | ppp | ppp | - |
| Section 25 Passed | p | p | ppp | ppp | - |
| Section 30 Passed | p | p | - | - | ppp |
| Section 31 FAILED | F | F | FFF | - | FFF |
| Section 32 Passed | p | p | ppp | - | ppp |
| Section 33 FAILED | F | F | FFF | - | FFF |
| Section 39 Passed | p | ppp | ppp | ppp | - |

## Diagnostic Section Descriptions

| | |
|---|---|
| Section 1 | Help Information — Gives information about running the test. |
| Section 2 | Reserved for future use. |
| Section 3 | Reserved for future use. |
| Section 4 | HP 98702A DIO II/GAD Interface Board Test — Primarily tests the registers on the interface board. |
| Section 10 | Transform Engine Test — Tests the Transform Engine for functionality. |
| Section 11 | Scan Converter/Transform Engine Test — Tests the interface between the Transform Engine and the Scan Converter by testing DCRAM from the Transform Engine side. The hardware tested is primarily the 98705-66573 board (Transform/Scan Converter in HP Models 98705A and 98705B). |
| Section 12 | Scan Conversion Logic Test — Tests the LGB and DCRAM Scan Converter registers from the Scan Converter side. |
| Section 20 | Frame Buffer Controller Logic Test — Tests miscellaneous Frame Buffer logic circuitry and control registers. |
| Section 21 | Frame Buffer 0 RAM Test — Tests the 8 planes of RAM on the 8 Plane Frame Buffer board (98705-66570) or the first 8 planes of a 16 Plane Frame Buffer board (98705-66571). |
| Section 22 | Frame Buffer 1 RAM Test — Tests the second 8 planes of RAM on a 16 Plane Frame Buffer board (98705-66571). |
| Section 23 | Overlay RAM Test — Tests the overlay RAM on the Frame Buffer board (either 98705-66570 or 98705-66571). |
| Section 24 | Z Buffer RAM Test — Utilizes the Frame Buffer Controller to test the Z Buffer RAM. |

| | |
|---|---|
| Section 25 | Frame Buffer System Test — Tests the Frame Buffer and its feature set. Includes the Frame Buffer Controller, Frame Buffer and Overlay Planes, and the Z Buffer assembly. |
| Section 30 | Color Map Logic Test — Tests the Color Map logic circuitry and associated control registers. |
| Section 31 | Color Map - Frame Buffer 0 Test — Tests the Color Map data path from Frame Buffer 0. |
| Section 32 | Color Map - Frame Buffer 1 Test — Tests the Color Map data path from Frame Buffer 1. |
| Section 33 | Overlay RAM Test — Tests the Color Map data path from the overlay planes. |
| Section 39 | Transform Engine, Scan Converter, and Frame Buffer Test — Tests the graphics pipe from the Transform Engine, through the Scan Converter, to the Frame Buffer. All available Frame Buffer memory, overlay plane memory, and Z Buffer memory is used. |
| Section 40 | Visual Test — Draws a series of patterns on the monitor. This section does not check the images or report failures. As the name implies, it provides a visual output for the user to observe and verify that the function of the video portion of the Color Map assembly and the monitor are operational. |

# Adjustments 6

There are no adjustments in this Graphics Processor.

# Peripherals 7

There are no peripherals for this Graphics Processor.

# Replaceable Parts 8

## Introduction

This chapter contains lists of replacement parts and exchange assemblies. Parts are available from:

Support Materials Organization (SMO)
Hewlett-Packard Company
Roseville, California, 95678

Telephone (916) 786-8000

Part numbers in the form 98705-69xxx refer to rebuilt boards that are available on an exchange basis. Part numbers in the form 98705-66xxx, -67xxx, or -68xxx are new boards. Unloaded printed circuit boards are not available.

## Replaceable Parts

**Table 8-1. Fuse**

| Fuse | Part Number |
|---|---|
| Fuse | 2110-0056 |

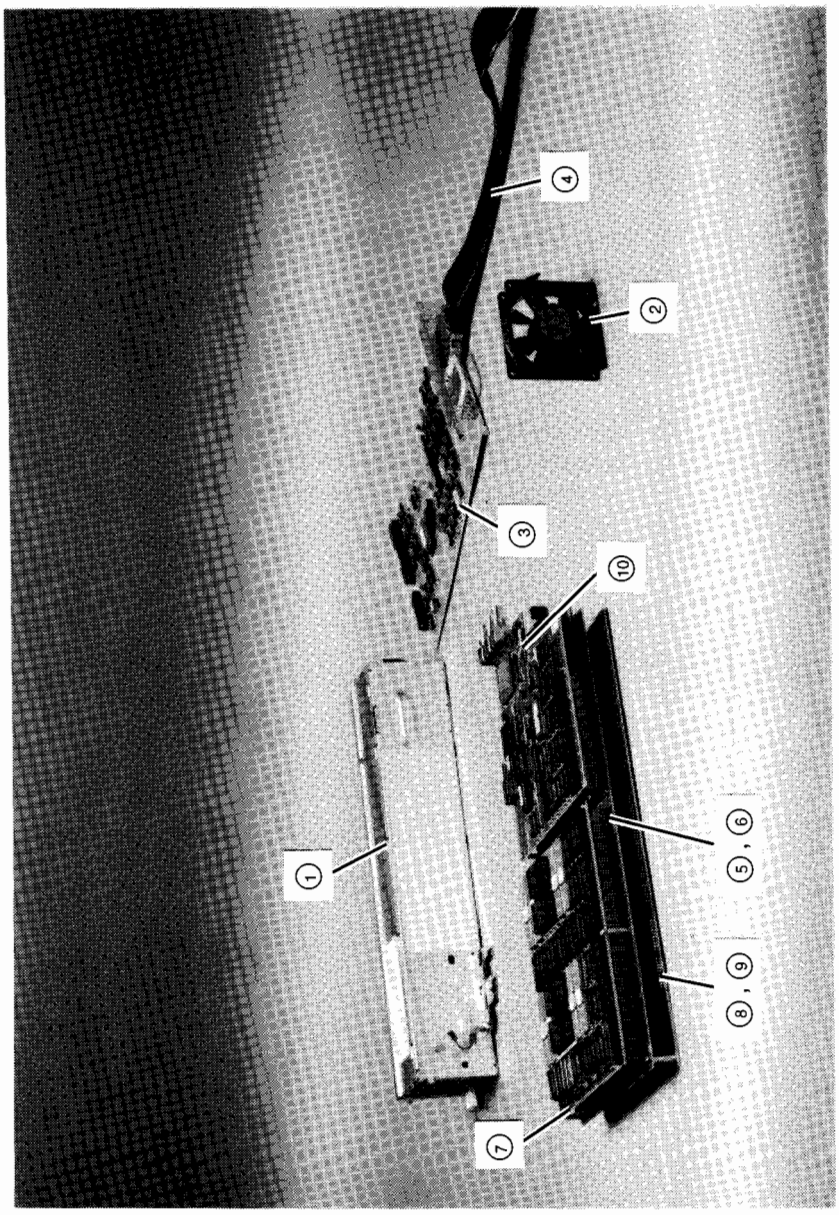



**Figure 8-1. HP 98705 Electrical/Electronic Parts**

**Table 8-2. Electrical/Electronic Parts**

| Drawing Number | HP Part Number | Description | Exchange |
|---|---|---|---|
| 1 | 0950-2022 | Power Supply | |
| 2 | 3160-0595 | Fan | |
| 3 | 98702-66501 | DIO II/GAD Interface | X |
| 4 | 98702-61601 | GAD Cable | |
| 5 | 98705-66570 | Frame Buffer 8 Plane | X |
| 6 | 98705-66571 | Frame Buffer 16 Plane | X |
| 7 | 98705-66572 | Z Buffer | X |
| 8 | 98705-66573 | Transform/Scan Converter — Models A and B | X |
| 9 | 98705-66575 | Transform/Scan Converter — Model C | X |
| 10 | 98705-66574 | Color Map | X |

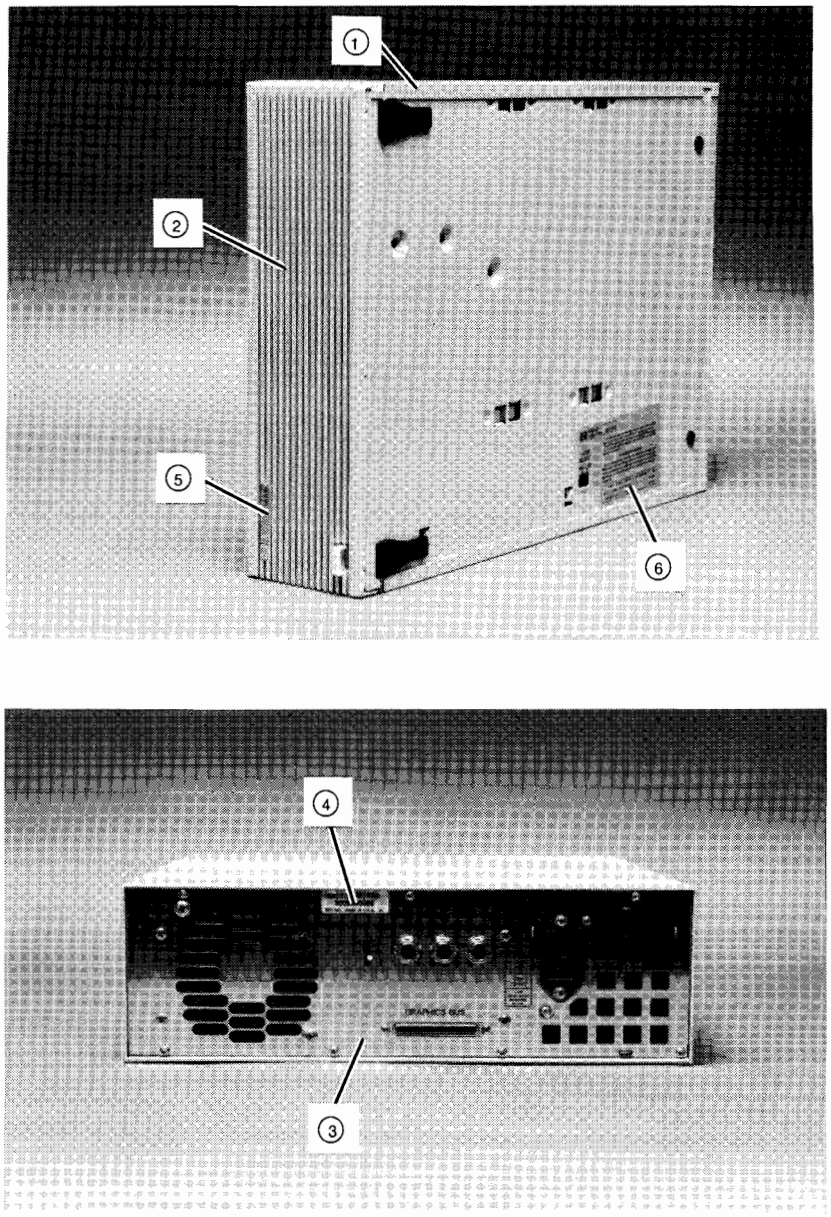


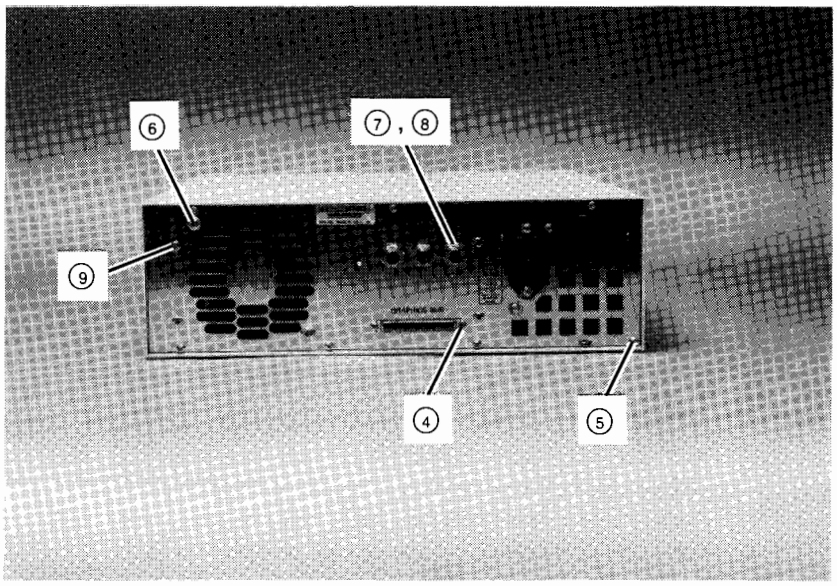

**Figure 8-2. HP 98705 Case Parts**

**Table 8-3. Case Parts**

| Drawing Number | HP Part Number | Description |
|---|---|---|
| 1 | 5001-9046 | Case — No Grill |
| 2 | 98705-40201 | Horizontal Grill |
| | 98705-40202 | Vertical Grill |
| 3 | 98705-00101 | Rear Panel |
| 4 | 7121-4733 | Label/Serial Plate |
| 5 | 98705-84001 | Label/Name Plate |
| 6 | 98705-84002 | Label/Voltage Select |

**Note**

When ordering a new case (or a new grill) the user must order both the grill and the case and put them together. You cannot remove the old grill from the case without damaging both beyond usability.



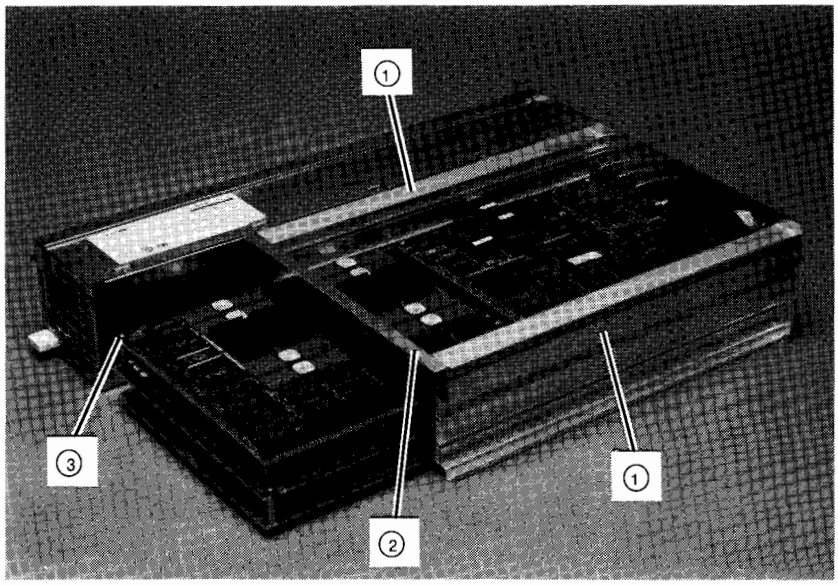



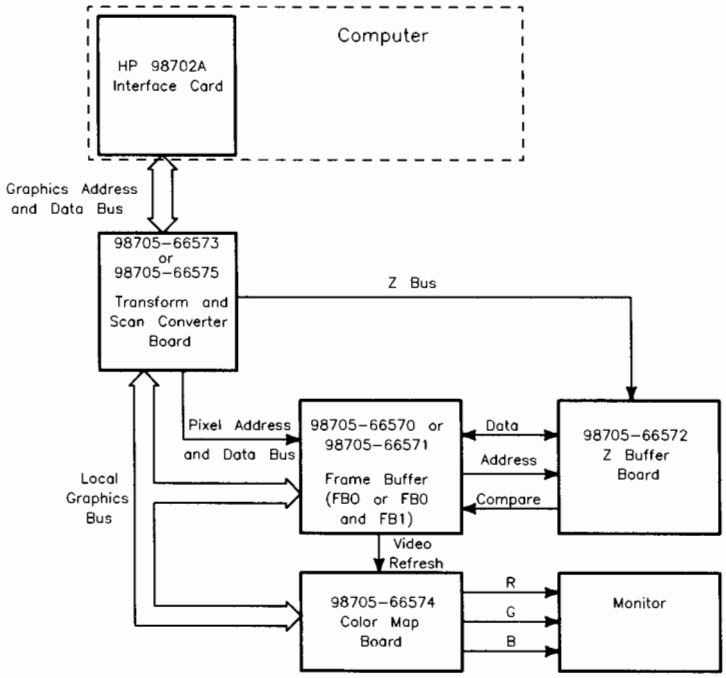

**Figure 8-3. HP 98705 Mounting Hardware**

**Table 8-4. Mounting Hardware**

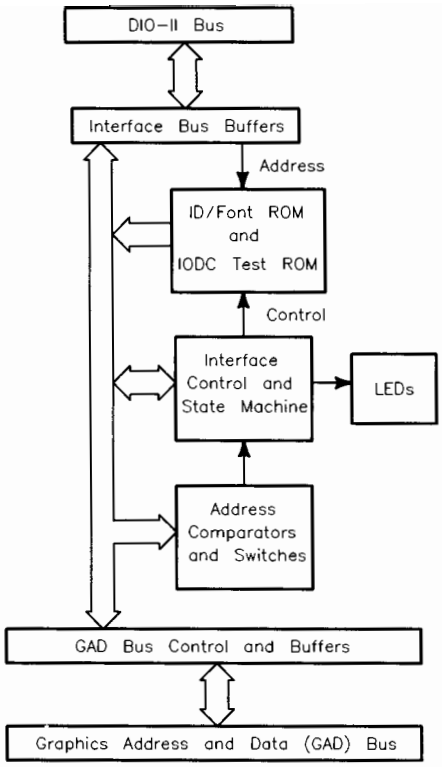
| Drawing Number | HP Part Number | Description | Quantity |
|---|---|---|---|
| 1 | 98705-01202 | Board Support — Aluminum | 2 |
| 2 | 98705-01201 | Bracket/Support | 1 |
| 3 | 0515-0825 | Screw — M 4x7 mm | 5 |
| 4 | 0515-1727 | Screw — M 2.5x12 mm | 2 |
| 5 | 0515-1851 | Screw — M 3x5 6mm Lg | 7 |
| 6 | 0624-0562 | Screw — 10-32 | 2 |
| 7 | 1250-2075 | Nut — Hex | 3 |
| 8 | 2190-0054 | Washer — LK | 3 |
| 9 | 0515-0225 | Screw — M 3.5x10mm Lg | 4 |

# Diagrams 9

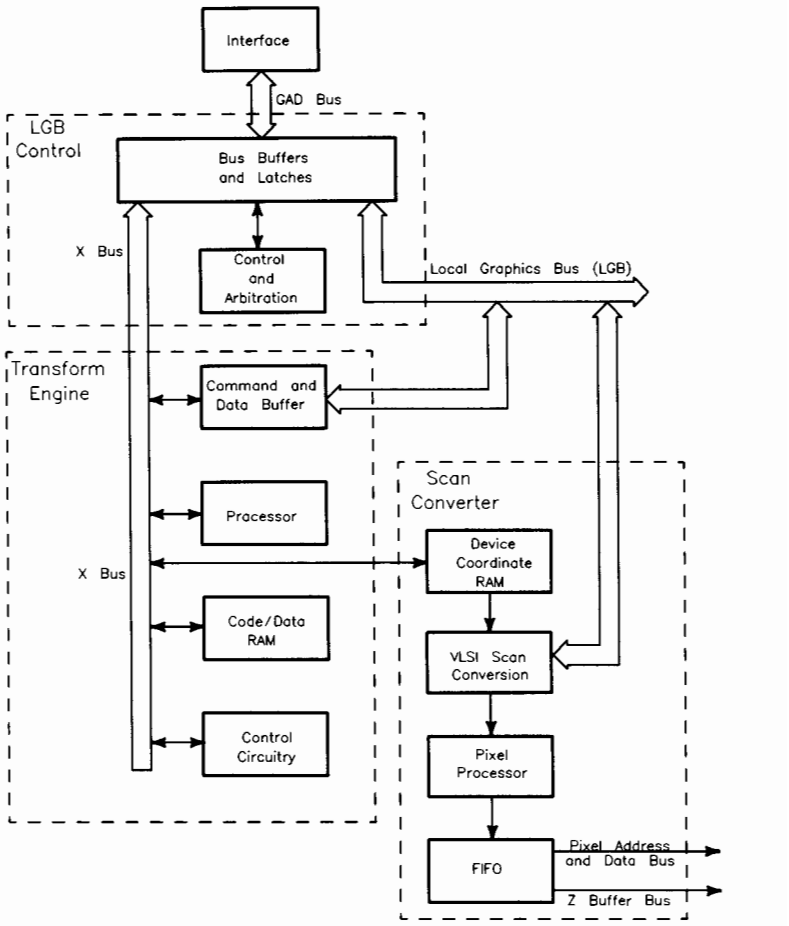
This section is for diagrams that will be helpful.



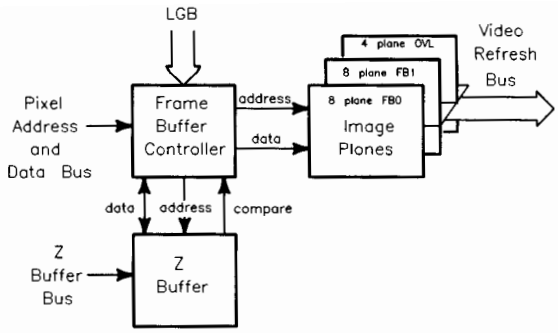

**HP 98705A/B/C System Block Diagram**



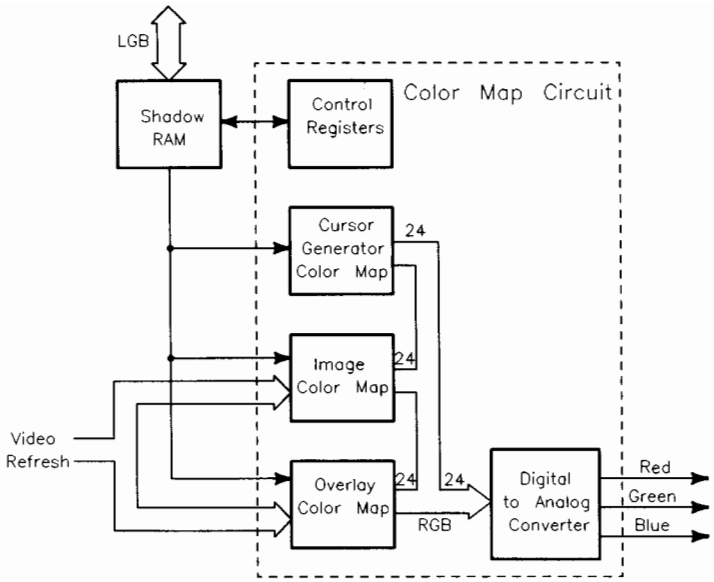

**HP 98702A Interface Block Diagram**




**Transform and Scan Converter Block Diagram**




**Frame Buffer and Z Buffer Block Diagram**




**Color Map Block Diagram**

# Reference 10

Use this section to keep reference notes and other reference documents.

# Reference Documents

**Table 10-1. Graphics Processor Documents**

| Part Number | Document |
|---|---|
| 98705-90030 | HP 98705A/B/C Hardware Support Manual |
| 98705-90039 | HP 98705A/B/C CE Handbook (insert) |
| 98705-90600 | HP 98705A/B/C Installation Guide |

**Table 10-2. Training Materials for CE92-98705A**

| Part Number | Document |
|---|---|
| 98705+49A-90002 | U.S. Internal Kit |
| 98705+49A-91002 | European Internal Kit |
| 98705+49A-90101 | Stand-alone Kit (workbook & final) |

# Service Notes 11

Use this section to keep application notes, service notes, and personal notes.