Service Handbook

HP 9000 Series 300 Computers
Models 330/350

HP Part Number 98562-90039

Hewlett-Packard Company
3404 East Harmony Road, Fort Collins, Colorado 80525

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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.

February 1987...Edition 1

Safety Considerations

WARNINGs, CAUTIONs, and Notes

WARNINGS, CAUTIONS and Notes are used in this manual to alert users to important situations. 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.

WARNING

The power supply is hazardous to personnel. Extreme care must be taken when connecting voltmeter probes to the test points. Turn off the unit and remove the power cord before connecting or removing test probes.

CAUTION

Integrated circuits on PC boards are susceptible to damage by electro-static discharge. Extreme care must be taken when handling printed circuit boards. Use an Anti-static Workstation.

Note

Hewlett-Packard supports field repair of these products only to the board or assembly level. Component level information and repair is not within the scope of this manual, nor available.

Service Information Locator

On the next page is a Service Information Locator. First, find the information to reference in the left-hand column. Next, move to the right to a chapter number. Last, move up to the abbreviated manual title that has the information documented.

Chapter identifiers in the Locator use the following codes:

Chapter Number:	Numbers, such as 2. Inclusive chapters, such as 4-6.
Appendices:	Letters, such as A for Appendix A.
Entire Manual:	All
Varies:	* (Check Table of Contents or Index.)

Manuals identified in this locator are abbreviated by their initials:

SIM	Service Information Manual
SHB	Service Handbook
CRM	Configuration Reference Manual
TTM	Series 300 Test Tools Manual
SPM	Site Preparation Manual
IRM	Installation Reference Manual
PIN	Product Installation Note
TDS	Technical Data Sheet/Price List
ADG	Accessory Development Guide

Service Information Locator

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Product Information 1

Introduction

Information in this handbook refers to the HP 9000 Series 300 Model 330 and 350 computers. These computers are product numbers HP 98562A and HP 98562B, respectively

Where applicable, the information also applies to the HP 98568A Opt. 132 and HP 98570A Direct-Connect System/DIO Slot Expanders.

Hewlett-Packard Support

Support services and policies mentioned in this section are subject to change. Please consult your local Hewlett-Packard Sales and Service Office for the current support policies.

Repair Philosophy

Field Repair Philosophy for the Model 330/350 Computers and the HP 98568A Opt. 132 and 98570A Expanders is assembly, or board level. This means that when a failure occurs, the problem is diagnosed to the assembly having the failed part. That assembly is then replaced. Replacement assemblies are available through local HP Sales and Service Offices.

Some assemblies may be exchanged for rebuilt ones. Other assemblies are only available as new ones. Refer to Chapter 6, or the Service Handbook, Chapter 8, for information on replacement parts.

Schematics

In support of the repair philosophy, this manual contains information to the assembly level. Schematics are not available for these products.

Supported Configurations

Only computer systems with Hewlett-Packard approved parts, accessories, peripherals, operating systems and application programs are supported by Hewlett-Packard. Any computer system with other than HP approved hardware or software connected or installed must have the non-HP approved hardware and software removed by the customer before On-Site or Service Center repair is accomplished.

Refer to the Series 300 Configuration Reference Manual (98561-90020) for supported hardware/software products and combinations thereof.

Repair Services

Hewlett-Packard provides repair services in three ways:

- On-Site Repair.
- Service Center Repair.
- Customer Repair.

On-Site Repair

For On-Site Repair, an HP Customer Engineer goes to the customers site, troubleshoots, and repairs the hardware to the assembly level. The defective assembly is replaced with a new or rebuilt assembly. This service is available through a service contract or a time-and-materials basis.

Hewlett-Packard Service Center Repair

The customer returns the defective product to the nearest HP Repair Center. An HP Customer Engineer repairs the product to the assembly level in the same manner as On-Site Repair. Upon being repaired, the product is returned to the customer. Contact your nearest HP Sales and Service Office for the location of the HP Repair Center, typical turn-around times, and shipping instructions.

Customer Repair

Customers have the option of repairing their own HP computer products. Contact your nearest HP Sales and Service Office for information concerning service training, special tools and test equipment, and spare parts.

Hewlett-Packard offers a Customer Cooperative Support Program to assist customers in maintaining their HP computer products. A variety of technical services and information are available. Your local HP Sales and Service can provide you with information about the Cooperative Support Program.

Hardware Support Services

There are many hardware support options available, from utilizing on-site maintenance groups to buying full support from the local sales office. Please contact your local Hewlett-Packard Sales and Service Office for these services.

Operating Systems Support

Primary Support

There are numerous operating system support options:

- Account Management Support (AMS) provides a local SE, on-site assistance, one Response Center caller and one alternate for telephone assistance, and a Software Materials Subscription.
- Response Center Support (RCS) provides one Response Center caller and one alternate for telephone assistance, and Software Materials Subscription.
- Software Materials Subscription (SMS) provides software and manual updates, Software Status Bulletins, and HP communicator magazine. Updates to ROM-based systems are not provided.

Support For An Additional System

The following options support an additional system:

- Additional System Coverage extends AMS or RCS coverage on the operating system to one additional system under the same system manager. All support is delivered through the central system.
- Extended Materials Support extends SMS by providing the right to make one copy of all central system materials for use on one additional system.
- Additional Response Center Caller provides one additional caller and one alternate for access to the HP Response Center
- Manual Update Service (MUS) provides one copy of updates to software reference manuals.
- Software Notification Service (SNS) provides issues of the HP Communicator and Software Status Bulletin.

System Features

Computers

Table 1-1. Computer Features

Product Number	Description
Model 330 (HP 98562A)	Model 330 system processing unit featuring: MC68020 CPU, 16.67 MHz MC68881 Floating Point Co-CPU, 16.67 MHz MC68851 Memory Management Unit, 16.67 MHz 4 Mbytes of Processor On-Board RAM 4 Mbytes RAM Standard, Maximum 8 Mbytes
Model 350 (HP 98562B)	Model 350 system processing unit featuring: MC68020 CPU, 25 MHz MC68881 Floating Point Co-CPU, 20 MHz HP Custom Memory Management Unit 8 Mbytes RAM Standard, Maximum 32 Mbytes 32-bit High-Speed System Bus
Common Features	4 Gbytes Virtual Memory address space 32-bit DIO-II I/O Bus IEEE-488 HP-IB Interface RS-232C Serial Interface IEEE 802.3/Ethernet LAN Interface with ThinMAU and "T" Connector High-speed IEEE 488 Disc Interface (optional on Model 330) Two channel DMA Controller HP-IB, HP-HIL, and RS-232 adapter cables.
Memory Boards	HP 98258A 4 Mbyte RAM Board Optional Model 350 Memory: HP 98258B 4 Mbyte RAM Add-on HP 98258C 12 Mbyte RAM Add-on

Expanders

Table 1-2. Expander Features

Product Number	Description
Direct-Connect I/O Expanders	HP 98568A Opt. 132, 8 DIO Card Slots HP 98570A 2 DIO-II System Board Slots 4 DIO Card Slots
Backplane Upgrades	HP 98242A 4-slot DIO backplane. Can be added to 98562B or to 98570A. HP 98242B 2-slot DIO backplane. Can be added to 98562B or to 98570A. HP 98570A Opt. 004 provides 2 DIO slots and 3 system slots.

Serial Numbers

Serial No.
2623A01234

Location: Behind the power supply access cover on the inside bottom of the chassis.

Description:

5-digit unique identifying number.

Country of Origin Code.

Product Code, decoded as:
First 2 digits + 60 = Last 2 digits of year product was introduced or significantly changed.
Last 2 digits = number of week in year product was introduced or significantly changed.

Specifications

Electrical

Line voltage/Frequency	120 V ac @ 48-66 Hz 240 V ac @ 48-66 Hz
Fuse	8AF 250V
Backplane Power Available Computers and, Expanders	Total Power Available from motherboard: 95 Watts @ +5 V dc 40 Watts @ +12 V dc 12 Watts @ −12 V dc Each system slot: 23 Watts @ +5 V dc 10 Watts @ +12 V dc 3 Watts @ −12 V dc DIO backplane, all slots combined 23 Watts @ +5 V dc 10 Watts @ +12 V dc 3 Watts @ −12 V dc
Line transient spike immunity (1 nsec rise, 800 nsec duration)	1 KV dc
Power Consumption	250 Watts maximum
Current Requirements	5.0 A @ 120 V ac 3.0 A @ 240 V ac
Maximum Heat Dissipation	853 BTU/hr 250 Kcal/hr
Battery Back-up	Real-Time Clock on System Interface Board

Environmental

Operating temperature	0 - 55° C
Operating humidity	5 - 95% relative
Operating altitude	4 572 metres (15 000 feet)

Electromagnetic Interference

Standards met	FCC Class A VCCI Class 2 VDE Class B, VDE 1046/84

Regulatory Requirements

Standards met	UL 478, 5th Edition CSA 154M-1983 IEC 380, 3rd Edition; 435, 2nd Edition

Physical

Dimensions (Computer or Expander)	
Height	130 mm (5.12 inches)
Width	325 mm (12.8 inches)
Length	376 mm (14.8 inches)
Weight	11.8 kg (26 pounds) maximum
Vibration Standard	Meets Class B requirements

Shipping Information

The shipping container for each computer includes the Localization Kit, which includes power cords, fuse, keyboard cable, HP-HIL cable, Installation Reference, and Installation Picture Card.

Models 330 or 350 Computer

Shipping Weight	15.9 kg (35 pounds)
Container Dimensions	Width - 502 mm (19.75 inches) Length - 559 mm (22 inches) Depth - 267 mm (10.5 inches Cube - 0.07 m^3 (2.65 $feet^3$)

HP 98568A Opt. 132 or 98570A Expander

Shipping Weight	12 kg (26.4 pounds)
Container Dimensions	Width - 502 mm (19.75 inches) Length - 502 mm (19.75 inches) Depth - 241 mm (9.5 inches) Cube - 0.06 m^3 (2.03 $feet^3$)

Model 350 Processor Board

CPU	MC68020 at 25 MHz
Floating Point Co-CPU	MC68881 at 20 MHz
Memory Management	
Type	HP Custom MMU
Virtual Memory	4 Gbytes per process
Contexts	84 default, user settable
Page size	4 Kbytes/page
Cache Memory	
Type	Write through, instruction, data (external to MC68020 instruction cache)
RAM	16 Kbytes, 8K words of 32-bit entries
Cycle time	120 nsec
Partitioning	Four 32-bit words each; 2K partitions
Timers	
Match interrupt	Match on time of day 0.00 - 86 400.00 seconds
Delay interrupt	10 msec - 1.94 days
Cyclical interrupt	10 msec - 1.94 days
System Timer	4 μsec resolution, accurate to 25 ppm
Beeper	Three independent tone generators controllable over 30 db.
Frequency range	81.46 Hz - 8.33 KHz
Resolution	Capable of approximate tone scale over 5 octaves
Duration	0.01 second to 2.55 seconds per tone

Model 330 Processor Board

CPU	
Type	Motorola MC68020
Clock Frequency	16.67 MHz
Internal Architecture	32-bit data and address registers
Address range	4 Gbytes virtual mapped to 4 Gbytes physical
Data bus	32-bit synchronous to: 4 Mbytes On-board RAM
Co-processors	
Floating point	
Type	Motorola MC68881
Clock Frequency	16.67 MHz
MMU	
Type	Motorola MC68851
Clock Frequency	16.67 MHz
On-Board memory	
Size	4 Mbytes
Type	Byte parity error-checking
Average cycle time	300 nsec

Memory

Memory Boards	
Type	Byte parity error-checking
System bus width	32 bits address; 32 bits data
Bandwidth	22.2 Mbyte/sec read; 14.3 Mbyte/sec write
Average cycle time	180 nsec
Memory Sizes	
330 Standard RAM	4 Mbytes on processor board
330 Maximum RAM	8 Mbytes (4 Mbytes on processor plus one 4 Mbyte RAM controller board)
350 Standard RAM	8 Mbytes: 4 Mbyte controller board plus 4 Mbyte add-on board
350 Maximum RAM	32 Mbytes (2 boards of 16 Mbytes each)

DIO-II I/O Bus

Width	32 bits address; 32 bits data
Bus bandwidth	6 Mb/sec

System Interface Board

LAN Interface	
Media	ThinLAN coax cable (RG 58U)
Protocols	IEEE 802.3, Ethernet
Data Rate	10 Mbits /sec
Disc Interface	
Type	IEEE 488
Data Rate	1 Mbyte/sec
Connected drives	8 per interface supported. (Additional disc interfaces are available as optional accessories)
Parallel Interface	
Type	IEEE 488
Data Rate	350 Kbyte/sec
Connected devices	15 per interface devices supported
Serial Interface	
Type	RS-232C standard
Connector	DB9 with cable; adapter to DB25
Battery-backed Real-Time Clock	
Resolution	10 milliseconds
Accuracy	±5 seconds/day
Battery type	Lithium; 1 year expected life
Keyboard requirements	HP 46021A (ITF) with HP-HIL interface, 107-key low profile with numeric keypad, 8 special-function keys
	HP 98203C with HP-HIL interface, 106-key with rotary control knob, including 10 special-function keys.

HP-HIL and Video Accessories

Listed below are HP-HIL and video accessories compatible with the Model 350 workstations. For a complete list, consult the *HP 9000 Series 300 Model 350 Hardware Price List*, Part Number 5954-7061D.

Table 1-3. HP-HIL Devices

Product Number	Product Name/Description
HP 46021A	ITF keyboard
HP 46060A	2-button Mouse
HP 46083A	HP-HIL Knob
HP 46084A	ID Module
HP 46085A	Control Dial Module
HP 46086A	32-button Control Box
HP 46087A	ANSI A/ISO A4-size digitizer
HP 46088A	ANSI A/ISO A3-size digitizer
HP 46089A	4-button cursor for 46087A and 46088A
HP 46094A	Quadrature port
HP 46095A	3-button mouse for 46094A
HP 98203C	Large Keyboard with Knob

Monitors

Table 1-4. Monitors Supported on Model 330/350 Computers

Product Number	Description (required video board)
HP 35731A/B	Medium-resolution monochrome (use HP 98542A)
HP 35741A/B	Medium-resolution color (use HP 98543A)
HP 98781A/B/C	High-resolution monochrome (use HP 98544A)
HP 98782A/B/C	High-resolution color (use HP 98545A)
HP 98784A/B/C	High-resolution monochrome (use HP 98544A)
HP 98785A/B/C	High-resolution color (use HP 98545A)
HP 98786A/B/C	High-resolution color (use HP 98545A)

Table 1-5. Video Boards/Cards

Bus and Type	Product Number	Product Name/Description
DIO Video Card	HP 98546A	Display Compatibility Interface
DIO-II System Boards	HP 98287A	HP 98700A Interface
	HP 98542A	Medium Resolution Monochrome Video Board
	HP 98543A	Medium Resolution Color Video Board
	HP 98544B	High Resolution Monochrome Video Board
	HP 98547A	6-plane High-performance Color Video Board

System Software

Table 1-6. Model 330/350 HP-UX Operating System

Product Number	Description
HP 98515A	HP-UX 5.2 AXE (Single-user)
HP 98595A	HP-UX 5.2 AXE (Multi-user)
HP 98517A	HP-UX 5.2 Pgm. Env. (Single-user)
HP 98597A	HP-UX 5.2 Pgm. Env. (Multi-user)
HP 98518A	HP-UX 5.2 FORTRAN 77 Compiler (Single-user)
HP 98598A	HP-UX 5.2 FORTRAN 77 Compiler (Multi-user)
HP 98519A	HP-UX 5.2 Pascal Compiler (Single-user)
HP 98599A	HP-UX 5.2 Pascal Compiler (Multi-user)
HP 97054A	HP-UX 5.2 Ada Compiler (Single-user)
HP 97055A	HP-UX 5.2 Ada Compiler (Multi-user)
HP 97066A	HP-UX 5.2 Technical BASIC
HP 98678A	Development Env. for Common LISP
HP 98679A	Execution License for Common LISP
HP 50952B	NS-ARPA Services/300 Ntwk. Software
HP 79232U	PROLOG
HP 98674A	Starbase Display List
HP 36590A	HP-UX SNA 3270 for Series 300
HP 36591A	HP-UX Gateway/SNA 3270 for each Series 300

Table 1-7. Model 330/350 Language Systems

Product Number	Description
HP 98613C	RAM BASIC 5.0 Language System
HP 98603B	ROM BASIC 5.0 Language System
HP 98615D	Pascal 3.2 Language System

Rack Mount Kits

Table 1-8. Rack Mount Kits

Product Number	Description
HP 98567A	For 19-inch medium-resolution monochrome monitor
HP 98567B	For 19-inch medium-resolution color monitor
HP 98569A	For 19-inch high-resolution monochrome monitor

Standard Tools

The following tools are needed to service the computer and expander:

Table 1-9. Standard Tools

Part/Product Number	Description
(various)	General electronic tools
9300-0933	Anti-static workstation
(various)	#1 Pozidriv Screwdrever
(various)	#2 Pozidriv Screwdrever
HP 3476B	Digital Multimeter

Computer/System Tests

Table 1-10. Series 200/300 Test Tools

Part No.	Description
09800-12700	Series 200/300 Test Tools, one 0.25-inch tape
09800-12300	Series 200/300 Test Tools, eight 3.5-inch discs

Discs in the 3.5-inch disc package are listed below.

Part No.	Contents
09800-90001	Series 200/300 Test Tools Manual
09800-10336	Series 200 Computer Tests Disc Rev. 1.1
98561-11334	Series 300 Computer Tests Disc Rev. 2.0
	Series 200/300 System Functional Tests Discs:
09800-00334	SFT0 Disc Rev. 1.2
09800-11335	SFT1 Disc Rev. 1.2
09800-11336	SFT2 Disc Rev. 1.2
09800-11337	SFT3 Disc Rev. 1.2
09800-11338	SFT4 Disc Rev. 1.2
09800-11304	CS/80 Exerciser Disc Rev. 3.1

Environmental/Installation/PM 2

Environmental

Environmental Specifications

Operating temperature	0 - 55° C
Operating humidity	5 - 95% relative
Operating altitude	4 572 metres (15 000 feet)
Maximum Heat Dissipation	853 Btu/hr 250 Kcal/hr

Electromagnetic Interference

Standards met	FCC Class A VCCI Class 2 VDE Class B, VDE 1046/84

Regulatory Requirements

Standards met	UL 478, 5th Edition CSA 154M-1983 IEC 380, 3rd Edition; 435, 2nd Edition

Physical

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Vibration Standard	Meets Class B requirements

Shipping Information

The shipping container for each computer includes the Localization Kit, which includes power cords, fuse, keyboard cable, HP-HIL cable, Installation Reference, and Installation Picture Card.

Models 330 or 350 Computer

Shipping Weight	15.9 kg (35 pounds)
Container Dimensions	Width - 502 mm (19.75 inches) Length - 559 mm (22 inches) Depth - 267 mm (10.5 inches Cube - 0.07 m^3 (2.65 $feet^3$)

HP 98568A Opt. 132 or 98570A Expander

Shipping Weight	12 kg (26.4 pounds)
Container Dimensions	Width - 502 mm (19.75 inches) Length - 502 mm (19.75 inches) Depth - 241 mm (9.5 inches) Cube - 0.06 m^3 (2.03 $feet^3$)

Installation

Model 330/350 computers are customer-installable, unless a non-customer-installable peripheral is included in the order. The HP 98570A and 98568A Opt. 132 expander is likewise customer-installable.

Mounting

Tabouret or mini-rack, or unmounted (desktop).

Cabling

Table 2-1. Interface and Video Cables

Cable Type	Product Number, Description
Standard HP-IB	HP 10833D, 0,5 metre HP 10833A, 1 metre HP 10833B, 2 metre HP 10833C, 4 metre
High-Speed HP-IB	98562-61600 (connects to high-speed disc add-on.)
9-Pin RS-232C	HP 92221M DTE to DCE HP 92221P DTE to DTE HP 92222F female to female gender converter HP 92222W custom wiring kit
RGB Video	HP 98290A 3-metre, 3-wire for color monitors
Standard Video	5061-6533, 3-metre, 1-wire for monochrome monitors
Audio	8120-4704, 3-metre

Preventive Maintenance

The real-time clock contains a lithium battery which should be replaced once a year. The real-time clock is located on the system interface board.

Although the battery is available from Hewlett-Packard, it usually can be obtained locally. It is a 3V, 160 mAh battery.

Make	Part Number
Panasonic	BR2325

WARNING

Battery may explode if mistreated. Do not recharge, disassemble or dispose of in fire.

When changing the battery, remember that the real-time clock will reset to its default state, and it is necessary to set it to the current time. Note also that the battery retainer clip is a conductor, and merely lifting it up without changing the battery will still cause the real-time clock to reset.

Configuration 3

Bundled Systems

Refer to the current Model 330/350 Hardware Price List to determine what HP products are bundled into Model 330 and 350 computer systems.

Supported Configurations

Refer to the *Series 300 Configuration Reference Manual (98562-90020)* for thecurrent hardware and software products that are supported.

Board Installation Precautions

CAUTION

Two-board assemblies must not be installed in the top slot directly under the top cover. Assemblies involved are:

System Interface Board with High-Speed Disc Interface.

4 Mbyte RAM Board with 4 or 12 Mbyte Add-On.

These assemblies may be installed in any of the three lower slots.

8 and 16 Mbyte 2-board RAM assemblies are keyed to prevent them from being installed in the top slot.

CAUTION

Do not use excessive force to seat boards in the system slot connectors.

If excessive force seems to be needed to install a board, remove the board, and inspect the systen slot connector for bent pins. Straighten any pins that appear to be bent.

Remove the top cover and all boards above the one that is difficult to seat.

Re-insert the board in the system slot connectors and adjust the position of the board's connector to mate correctly with the slot connector. Carefully seat the board in the connector. Reinstall the other boards the same way and the top cover.

RAM Configuration

Each RAM assembly must be configured for the total RAM it contains:

- 4 Mbyte RAM controller board without add-ons must be set to 4 Mbyte block boundaries.
- 4 Mbyte RAM controller board with 4 Mbyte add-on must be set to 8 Mbyte block boundaries.
- 4 Mbyte RAM controller board with 12 Mbyte add-on must be set to 16 Mbyte block boundaries.

Maximum RAM is:

- Model 330 is 8 Mbytes, or one 4 Mbyte RAM controller board with the processor.
- Model 350 is 32 Mbytes, or two 16 Mbyte 2-board assemblies.

The following addresses can be set on the 4 Mbyte RAM Controller Board in the Model 350 computer.

Note

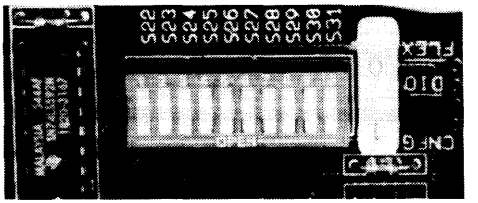
Model 330 computer support up to 8 Mbytes of RAM. Only the top two switch settings (address FFF and FFB) can be used on the Model 330.

Table 3-1. 4 Mbyte RAM Controller Board Configurations

Decimal Address	3 Hex MSDs	Switch Settings
4 294 967 295	FFF	1111 1111 11
4 290 772 991	FFB	1111 1111 10
4 286 578 687	FF7	1111 1111 01
4 282 384 383	FF3	1111 1111 00
4 278 190 079	FEF	1111 1110 11
4 273 995 775	FEB	1111 1110 10
4 269 801 471	FE7	1111 1110 01
4 265 607 167	FE3	1111 1110 00

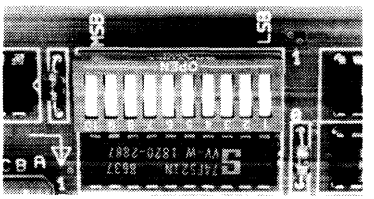
RAM Configuration Examples

Table 3-2. Example Model 350 RAM Configurations



Top Add.	32 Mbyte System Assy./Config. Sw.	16 Mbyte System Assy./Config. Sw.	20 Mbyte System Assy./Config. Sw.
FFF	16 Mbyte 1111 1111 11	8 Mbyte 1111 1111 11	4 Mbyte 1111 1111 11
FFB	↓	↓	16 Mbyte 1111 1111 10
FF7	↓	8 Mbyte 1111 1111 01	↓
FF3	↓	↓	↓
FEF	16 Mbyte 1111 1110 11		↓
FEB	↓		
FE7	↓		
FE3	↓		

Table 3-3. Example Model 330 RAM Configurations



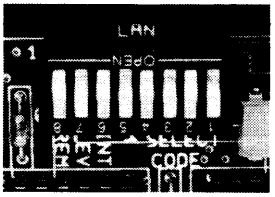
Top Add.	8 Mbyte System Assy./Config. Sw.	8 Mbyte System Assy./Config. Sw.
FFF	Proc. Bd. 1111 1111 11	4 Mbyte 1111 1111 11
FFB	4 Mbyte 1111 1111 10	Proc. Bd. 1111 1111 10

One of these configurations will permit the fastest application program execution time.

System Interface Board

HP-IB and RS-232 Switches

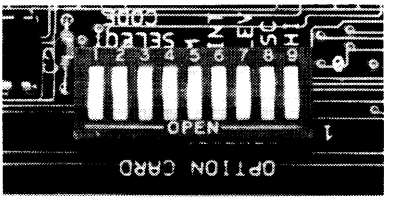
Table 3-4. HP-IB and RS-232 Configuration Switches



Switch Label	Function/How It's Used
MEN	Modem Enable 1 = Modem lines enabled (Shipped setting) 0 = Modem lines disabled
REM	Remote Terminal Enable 1 = Remote Mode 0 = Local Mode (Shipped setting)
DIS	RS-232 Disable 0 = Enabled(Shipped setting) 1 = Disabled
SC	Internal HP-IB System Controller 1 = System Controller (Shipped setting) 0 = Not System Controller

High-Speed Disc Add-On Switches

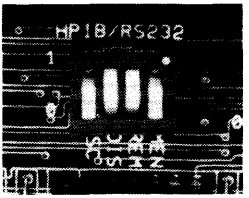
Table 3-5. High-Speed Disc Add-On Configuration Switches



Switch Label	Function/How It's Used
$\overline{\text{SELECT}}$ (1 - 5)	Select Code: 1 (L) is LSB, 5 (M) is MSB Shipped with SC-14
INT (6) LEV (7)	Interrupt Level: LEV (7) is MSB 7 6 - - 0 0 = Level 3 0 1 = Level 4 (Shipped setting) 1 0 = Level 5 1 1 = Level 6
SC (8)	System Controller 1 = System Controller (Shipped setting) 0 = Not System Controller
LOW (9)	Low/High Speed 0 = Low Speed 1 = High Speed (Shipped setting)

LAN Switches

Table 3-6. LAN Configuration Switches



Switch Label	Function/How It's Used
$\overline{\text{SELECT}}$ (1 - 5)	Select Code: 1 (L) is LSB, 5 (M) is MSB. (Shipped with 10100, SC-20)
INT (6) LEV (7)	Interrupt Level: LEV (7) is MSB 7 6 - - 0 0 = Level 3 0 1 = Level 4 1 0 = Level 5 (Shipped setting) 1 1 = Level 6
REM (8)	Local/Remote 0 = Local (Shipped setting) 1 = Remote

Accessories

Supported Accessory Boards/Cards

Table 3-7. HP Accessories and their Power Requirements

(Watts required shown for each dc voltage)

Product Number	Description	+5	+12	−12	Total Watts
13264A	Data Link Pod	0.2	1.9	0.3	2.4
13265A	Modem	0.5	0.5	0.5	1.5
13266A	Current Loop Pod	1.0	1.0	1.0	3.0
98028A	Resource Mgmt. MUX	2.2	6.4		8.6
98204B	Video w/o Graphics	7.5			7.5
98204B	Video with Graphics	15.0			15.0
98253A	EPROM Programing Card	5.7			5.7
98255A	EPROM Card	2.8			2.8
98258A	4 Mbyte RAM Cont. Board	26.0			26.0
98258B	4 Mbyte RAM Add-On Board	2.0			2.0
98258C	12 Mbyte RAM Add-On Board	6.5			6.5
98259A	128 Kbyte Bubble RAM Card	2.4	2.9		5.3
98262A	Sys. Intfc. Bd. w/HS Add-On	20.0	12.6		32.6
98287A	HP 98700A Graphics Interface	3.5			3.5
98542A	Med. Res. Mono Video Board				

Table 3-7. HP Accessories and their Power Requirements (cont.)

(Watts required shown for each dc voltage)

Product Number	Description	+5	+12	−12	Total Watts
98543A	Med. Res. Color Video Board	9.0			9.0
98544B	Hi-Res. Color Video Board	10.0			10.0
98547A	6-plane Hi-Res Color Video Bd.	20.0			20.0
	Model 330 Processor Board	26.5			26.5
	Model 350 Processor Board	28.5			28.5
98622A	GPIO Interface	3.8			3.8
98623A	BCD Interface	2.5			2.5
98624A	HP-IB Interface Card	2.4			2.4
98626A	RS-232 Interface Card	2.0	0.6	0.6	3.2
98627A	Color Video Card	5.5			5.5
98628A	Datacomm Interface Card	3.6	0.5	0.7	4.8

Table 3-7. HP Accessories and their Power Requirements (cont.)

(Watts required shown for each dc voltage)

Product Number	Description	+5	+12	−12	Total Watts
98629A	Resource Mgmt. w/o HP 98028A	3.7	0.5	0.5	4.7
98629A	Resource Mgmt. with HP 98028A	5.9	6.9	0.5	13.3
98630A	Breadboard Card	1.3			1.3
98640A	Analog – Digital Card	2.6	0.7	0.2	3.5
98642A	RS-232 Multiplexer Card	5.7	0.8	0.1	6.6
98643A	LAN/300 Link (for Thick-LAN)				
98644A	Serial I/O Card	2.0	0.3	0.1	2.4
98691A	Prog. Datacomm Card	6.4	2.0	1.3	9.7
98695A	IBM 3270 Coax	7.2			7.2

HP-HIL Accessories

HP-HIL devices are limited to a total of 1 A of current and seven addresses per computer.

Table 3-8. HP-HIL Devices and Current/Power Requirements

Product Number	Device Name	mA	Watts
HP 35723A	Touchscreen Bezel	250	3.0
HP 46021A	ITF Keyboard	100	1.2
HP 46021A	ITF Keyboard	145	1.74
HP 46060A	HP Mouse	200	2.4
HP 46080A	Extension Module	25	0.3
HP 46081A	3 Metre Ext.	25	0.3
HP 46082A/B	15/30 Metre Extension[1]	50	0.6
HP 46083A	Rotary Control Knob	110	1.32
HP 46084A	ID Module	60	0.72
HP 46085A	Control Dials	350	4.2
HP 46086A	Button Box	80	0.96
HP 46087A[2]	"A"-Size Digitizer[2]	200	2.4
HP 46088A[2]	"B"-Size Digitizer[2]	200	2.4
HP 46094A	Quadrature Port Device[3]	80	1.2
HP 46095A	Three-Button Mouse	80	0.96
HP 92916A	Barcode Reader	100	1.2

Notes:
[1] Extension cables have two boxes, each draws 25 mA.
[2] Includes HP 46089A 4-Button Cursor.
[3] Port devices require 80 mA; devices attached cannot exceed 120 mA.

Troubleshooting 4

Analytic Troubleshooting

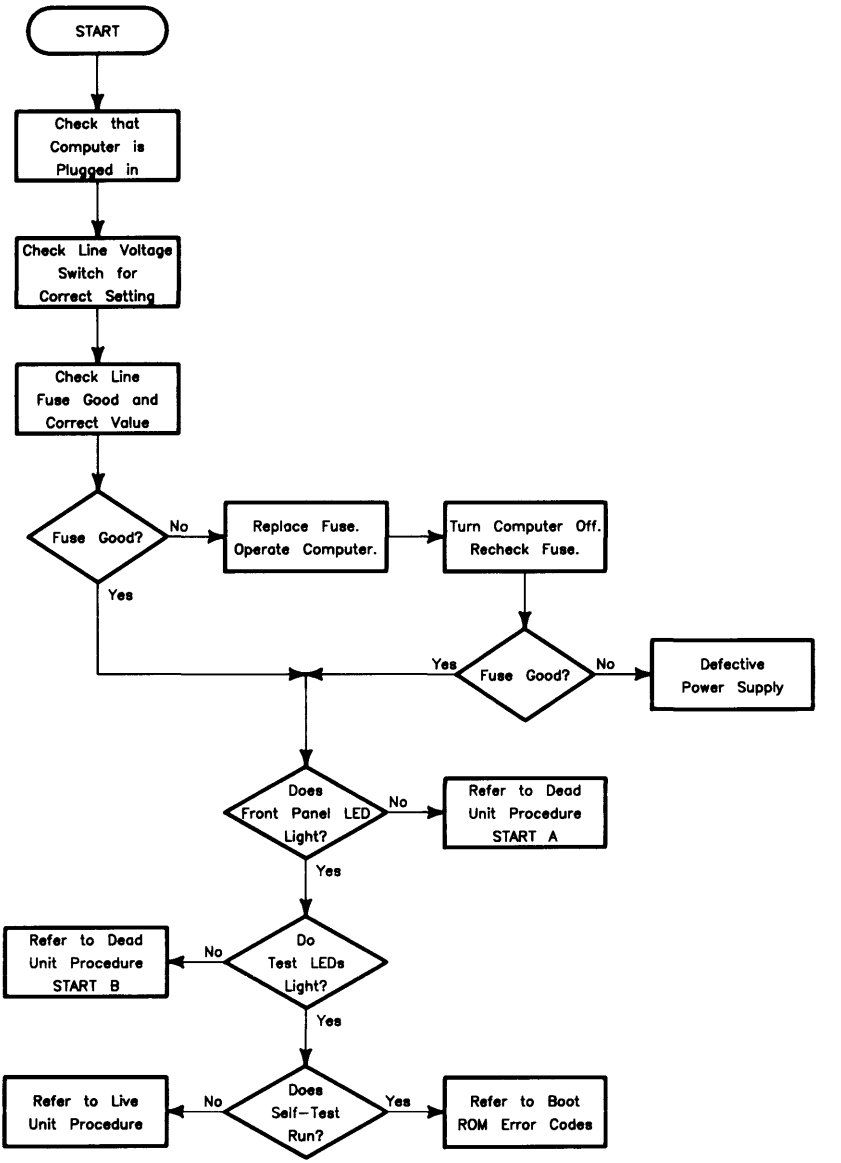
Troubleshooting computers is the process of getting answers to these five questions:

- What exactly is wrong, or what are the bad symptoms?
- Where are the bad symptoms appearing?
- When do the bad symptoms occur?
- How bad is the problem or to what extent does it occur?
- What actually caused the problem in the first place?

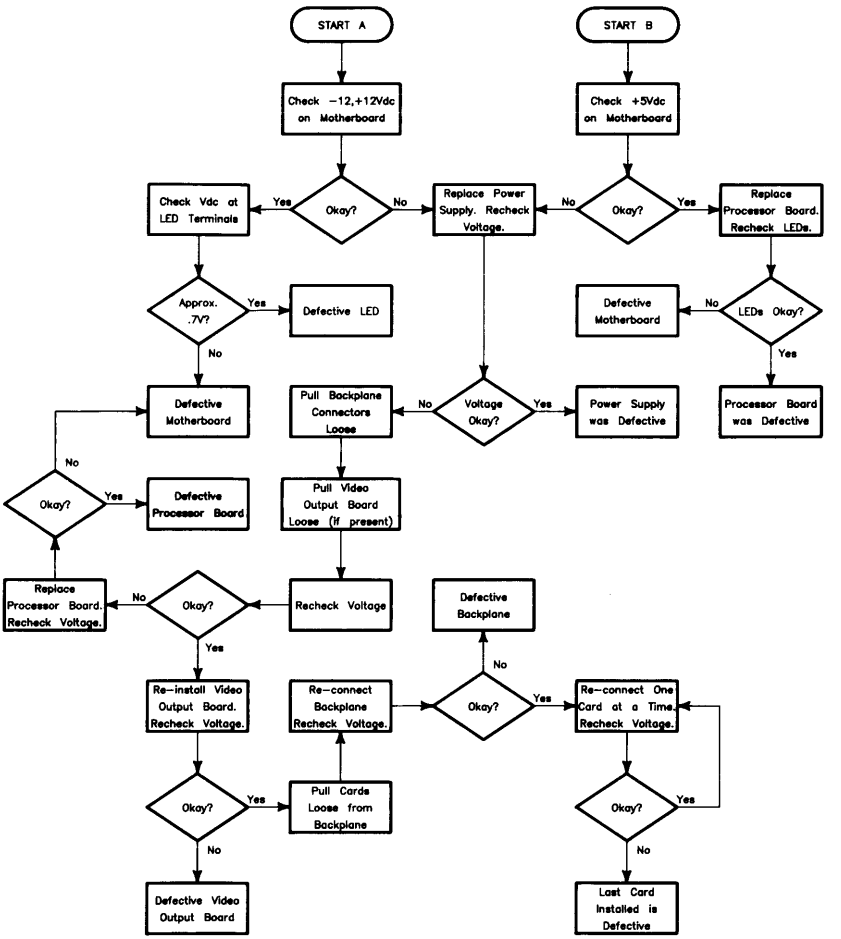
Getting the answers to these questions usually makes the troubleshooting process much more effective and less costly. When a failure in a computer system occurs, remember these questions and get the answers to each of them.

After you have all answers possible, decide what's the most probable cause of the problem. Sometimes you'll arrive at several choices for a cause. For each choice, qualify it against the answers to the questions above. The most probable cause is the one that logically justifies the correct answers to these questions.

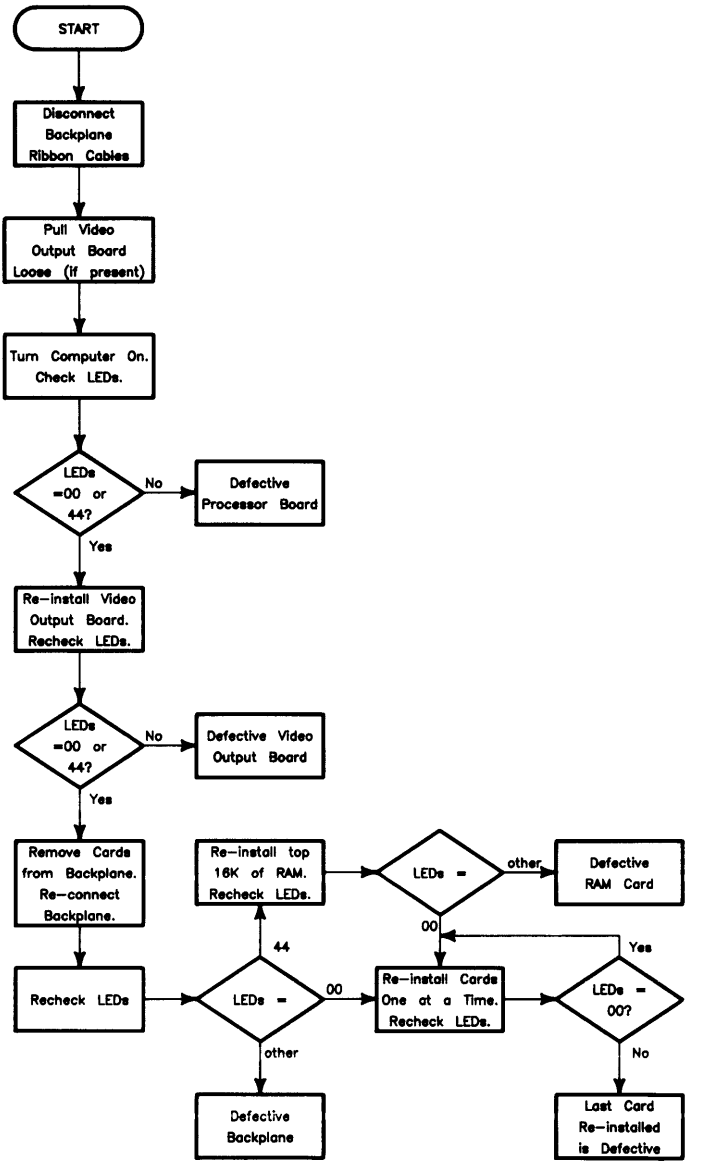
Initial Troubleshooting Flowchart



Dead Unit Troubleshooting Flowchart



Live Unit Troubleshooting Flowchart



Power Supply Specifications

Make sure that the computer is properly grounded. It requires a three-wire power cable and the power supply retaining/grounding screw must be installed. Also, make sure that the power supply access door is properly installed.

Voltage	Tolerance	Maximum Current
+5 V dc	4.89 to 5.25 V dc	20 A
+12 V	11.86 to 12.72 V dc	3.6 A
−12 V	−11.86 to −12.72 V dc	1.1 A

Voltage Indicators

Voltage	Visual Indication	Physical Indication
−12 V dc	Front Panel "ON" LED Lit	Small Fan Running
+5 V	Self-test LED lit at turn-on.	Small Fan Running
+12 V dc	Front Panel "ON" LED Lit	Large Fan Running

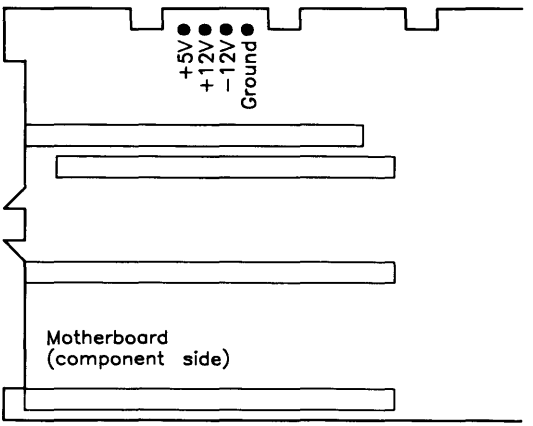


Figure 4-1. Power Supply Test Points

General Failure Indications

Table 4-1. Self-Test LED General Failure Indications

Failure Indications via Upper Two LEDs	LED Pattern General Description of Failure
State Indication Only	○○ss ssss, Where ss ssss Indicates State of Power-up
Required Device Missing or DTACK Failure	○●dd dddd, where dd dddd Indicates Device
Failing Device	●○dd dddd, where dd dddd Indicates Device
Special Codes (Special Case Highest Priority Codes)	●●●● ●●●● LEDs Never Accessed (or Unused Code) ○●●● ●●●● LEDs Failed to DTACK ○○○○ ○●○● Timer on processor board has failed or is missing.

State or Device Codes Via Lower 6 LEDs	LED Pattern General Description of Failure
Miscellaneous (Highest Priority)	xx○○ ffff Where ffff indicates Failureλ(xs are don't-care bits)
Internal Peripheral Failure (Medium Priority)	xx○● pppp Where pppp is Peripheral Number
I/O Card Failure (Lowest Priority)	xx●s ssss Where s ssss is Select Code

Boot ROM Error Codes

Table 4-2. Boot ROM LED Error Codes

LEDs	Probable Cause	Replace or Do
○○○○ ○○○○	No Failure Detected	
○○○○ ○●○●	CPU Timer Missing	Processor Board
○●○○ ○●○○	Top RAM Failed	Check RAM Configuration.
○●●● ●●●●	LEDs failed to acknowledge	Processor Board
●○○○ ○○○●	CPU Failed	Processor Board
●○○○ ○○●●	Boot ROM Failed Checksum	Processor Board
●○○○ ○●○○	Top RAM Failed	Check RAM Configuration. RAM Board or 330 Processor Board.
●○○○ ●○○●	RAM Failure	Check RAM Configuration. RAM Board or 330 Processor Board.
●○○○ ●○●○	Insufficient RAM	Check RAM Configuration. RAM Board or 330 Processor Board.
●○○● ●●○●	ROM OS Failed Checksum	ROM OS Board. DIO Backplane.
●○●● ○○●○	Keyboard Controller Failed	System Interface Board.
●○○● ○○●●	Accessory Keyboard Controller Failed	Accessory Keyboard Controller.
●○○● ○●○○	HP-IB Failed	System Interface Board.
●○○● ●○○○	DMA Failed	System Interface Board.

Table 4-2. Boot ROM LED Error Codes (cont'd.)

LEDs	Probable Cause	Replace or Do
●○○○ ●●○○	Bit Map Font Failed	Video Board.
●○○○ ●○○●	Bit Map Failed	Video Board.
●○○○ ●●●○	Alpha Video Board Failed	Video Board.
●○○○ ●●●●	Graphics on Alpha/Graphics Video Bd. Failed	Video Board.
●○xx xxxx	I/O Card at xx xxxx Failed	I/O Card at Select Code xx xxxx. I/O Backplane.
●●●● ●●●●	LEDs Never Accessed	Check −12 V dc. If okay, replace Processor Board. Otherwise, replace Power Supply.

Remote Computer Analysis

The Model 330/350 computers provide for remote analysis of problems by means of the beeper. To test the computer remotely, follow this procedure:

1. Establish a telephone connection with someone at the location of the computer.
2. Have them hold the receiver near the speaker output of the computer. The speaker is located in most monitors, or in the speaker module.
3. Now have them turn the computer on.
4. The computer will go through its self-test and report problems as a series of beeps. These beeps correlate with the above error codes.
5. The beeper annunciates the seven least significant bits. A high beep indicates a one and a low beep indicates a zero.

For example, suppose that on power-up a computer emits three low beeps, a high beep, two low beeps and a high beep. This will be of the form ooo •oo•, where o represents a low beep, • represents a high beep and x represents an unbeeped high or low. Referring to the table of Boot ROM Error Codes shows a RAM Failure as the probable cause.

Locating Defective RAM Boards

Remember that RAM is on the Model 330 processor board in addition to the 4, 8, 16 Mbyte RAM assemblies.

A RAM failure message may be decoded to determine which RAM block caused the failure. For example, in the message

```
Memory Failed at FFB3A900
W:F58A8C2C,R:F78A8C2C
```

the failure occured at memory address FFB3A900. To correlate this with a RAM board, take the first three hex digits of the address and translate them into binary. Then find a board whose address switches are set to the first ten bits of the top address in that 4 Mbyte address block.

In the above example, FFB is 1111 1111 10(01) in binary. A RAM board with switches set to 1111 1111 10 has its top address as FFBFFFFF. FFB3A900 is below FFBFFFFF and above FF7FFFFF (next 4 Mbyte RAM block down). Therefore, the switches on the defective RAM board would be set to 1111 1111 10.

Boot ROM Self-Tests

Table 4-3. LED State Codes In Numerical Order

LEDs	Test Activity
oooo oooo	No failure
oooo ooo●	LED ripple (all on, then off in sequence from MSB)
oooo oo●o	Resetting I/O
oooo oo●●	Checksumming Boot ROM (or LED ripple)
oooo o●oo	Testing top RAM (or maybe the Boot ROM checksum failed)
oooo o●●o	Searching for boot extension ROMs
oooo o●●●	Starting test vector list (or LED ripple)
oooo ●ooo	Preloading RAM
oooo ●oo●	Testing RAM
oooo ●●o●	Checksumming ROM operating systems
oooo ●●●●	LED ripple
ooo● oo●o	Testing internal keyboard (or an interrupt line is stuck)
ooo● o●oo	Testing external keyboard
ooo● o●●o	Testing internal HP-IB
ooo● ●ooo	Testing DMA
ooo● ●●o●	Checksumming ID/INIT ROM on bit-mapped video board
ooo● ●●●o	Testing alpha video board
ooo● ●●●●	Testing graphics on alpha/graphics (or LED ripple)
oo●o oooo	Testing I/O card on select code 0
through	through
oo●● ●●●●	Testing I/O card on select code 31, or LED ripple

Error Codes

Table 5-2. Boot ROM LED Error Codes

LEDs	Probable Cause	What to Do
○○○○ ○○○○	No Failure Detected	
○○○○ ○●○●	CPU Timer Missing	Replace Processor Board
○●○○ ○●○○	Top RAM Failed	Check RAM Configuration
○●●● ●●●●	LEDs failed to acknowledge	Replace Processor Board
●○○○ ○○○●	CPU Failed	Replace Processor Board
●○○○ ○○●●	Boot ROM Failed Checksum	Replace Processor Board
●○○○ ○●○○	Top RAM Failed	Check RAM Configuration Replace RAM Board or 330 Processor Board
●○○○ ●○○●	RAM Failure	Check RAM Configuration Replace RAM Board or 330 Processor Board
●○○○ ●○●○	Insufficient RAM	Check RAM Configuration Replace RAM Board or 330 Processor Board
●○○● ●●○●	ROM Operating System Failed Checksum	Replace ROM OS Board Replace DIO Backplane
●○●● ○○●○	Keyboard Controller Failed	Replace System Interface Board
●○○● ○○●●	Accessory Keyboard Controller Failed	Replace Accessory Keyboard Controller
●○○● ○●○○	HP-IB Failed	Replace System Interface Board
●○○● ●○○○	DMA Failed	Replace System Interface Board

Table 5-2. Boot ROM LED Error Codes (con't.)

LEDs	Probable Cause	What to Do
•ooo• ••oo	Bit Map Font Failed	Replace Video Board
•ooo• ••o•	Bit Map Failed	Replace Video Board
•ooo• •••o	Alpha Video Board Failed	Replace Video Board
•ooo• ••••	Graphics on Alpha/Graphics Video Bd. Failed	Replace Video Board
•oxx xxxx	I/O Card at xx xxxx Failed	Replace I/O Card at Select Code xx xxxx Replace I/O Backplane
•••• ••••	LEDs Never Accessed	Check -12 V dc If okay, replace Processor Board. Otherwise, replace Power Supply.

Computer Tests 5

Test Tools

Package Contents

The combined Series 200/300Test Tools software package is provided on both 3.5-inch discs and 0.25-inch tape as shown below:

Part Number	Description
09800-12700	Series 200/300 Test Tools, one 0.25-inch tape
09800-12300	Series 200/300 Test Tools, eight 3.5-inch discs

Discs in the 3.5-inch disc package are listed below.

Part Number	Contents
09800-90001	Series 200/300 Test Tools Manual
09800-10336	Series 200 Computer Tests Disc Rev. 1.1
98561-11334	Series 300 Computer Tests Disc Rev. 2.0
	Series 200/300 System Functional Tests Discs:
09800-11334	SFT0 Disc Rev. 1.2
09800-11335	SFT1 Disc Rev. 1.2
09800-11336	SFT2 Disc Rev. 1.2
09800-11337	SFT3 Disc Rev. 1.2
09800-11338	SFT4 Disc Rev. 1.2
09800-11304	CS/80 Exerciser Disc Rev. 3.1

Adjustments 6

There are no adjustments in the computer. For adjustments to the monitor, refer to the monitor's Service Manual or Handbook.

Peripherals 7

Supported Peripherals List

Due to constant changes of supported peripherals, this information is published separately in the *Series 300 Configuration Reference Manual* (part number 98561-90020).

The Model 330/350 Hardware Technical Data Sheet and Hardware Pricing List also has supported peripheral information.

Parts Lists 8

Replacement Parts Information

Introduction

Field replaceable parts are listed in this chapter for the computers and expanders. Components, such as ICs, are not available for field repair.

Parts are available direct from:

Corporate Parts Center
333 Logue Avenue
Mountain View, California 94042 USA

Telephone: (415) 968-9200

Parts may be ordered through your local HP Sales and Service Office. To help get parts as soon as possible, please write the address and telephone number of your local HP Office in the spaces below.

Name: _____

Address: _____

City, State ZIP: _____

Telephone: _____

Cooperative Support Program

HP's Cooperative Support Program is available for customers that can provide technical assistance, manual updates, and other helpful information for hardware support. Your local HP Sales and Service Office can provide the information for this support service.

Exchange Parts

Exchange parts are available for some items at a reduced cost. When an exchange part is ordered, your account will be charged for a new part. Customers have 15 days to return the failed part to receive credit for the difference between a new and exchange part.

Please return failed exchange parts to your local HP Sales and Service Office as soon as possible. Place them in anti-static bags (see Parts List for part numbers) and package them securely in a sturdy container. It's a good idea to save the containers and static-free bags you receive parts in and use them to ship parts in.

Part Number Lists

The parts listed in this section apply to both Models 330/350 computers and the HP 98568A Opt. 132 and HP 98570A expander, unless noted otherwise. Various interfaces, accessories and HP-HIL devices are also listed.

Static-Free Bags

Part No.	Description	Notes
9222-0978	9-inch by 10-inch cushioned pouch, for DIO cards	
9222-0980	9-inch by 15-inch cushioned pouch, for system boards	

Labels

Part No.	Description	Notes
98562-84002	Identification Label	
5958-4325	UL Info Label	
7120-3428	CSA Label	
7121-4858	Service Warning Label	
7121-4733	Serial Label	
7124-2083	Voltage warning label	
98570-84002	FCC Label, Expander	
7121-4859	Fuse Rating Label	
98562-84005	Battery Warning Label	
5955-8036	Computer compliance label	
5955-8037	Peripheral compliance label	
9320-5673	Blank ID# label	

Computer Electrical Parts

Miscellaneous Electrical Parts

Part No.	Description	Notes
1250-0781	BNC coax adaptor	
5180-0410	Large fan	
5180-1303	Small fan	
5180-0407	LED cable assembly	
98561-61601	DIO Bus cable (short)	
98561-61602	DIO Bus cable (long)	
98561-61604	RS-232 cable	
98562-61600	Fast HP-IB cable	

Printed Circuit Boards

Exchange Part No.	New Part No.	Description	Notes
	0950-1760	Power supply (without switch shaft)	
	98561-66500	DIO-II backplane	
98562-69511	98562-66511	Model 330 Processor board	
98562-69516	98562-66516	Model 350 Processor board	
98562-69520	98562-66520	4 Mbyte RAM controller board	
98562-69521	98562-66521	4 Mbyte RAM add-on board	
98562-69522	98562-66522	12 Mbyte RAM add-on board	
98562-69530	98562-66530	System interface board	
98562-69531	98562-66531	High-speed disc add-on board	
	98562-66501	Motherboard	
	98562-66502	2-connector system bus	
	98562-66503	3-connector system bus	
	98562-66506	2-slot DIO backplane	
98542-69570	98542-66570	Med-res monochrome video board	
98543-69570	98543-66570	Med-res color video board	
98544-69570	98544-66570	Hi-res monochrome video board	
98545-69570	98545-66570	Hi-res color video board	
98546-69571	98546-66571	Display compatibility video card	
98547-69570	98547-66570	Hi-res color video board	
98204-69577	98204-66577	Display compatibility graphics card	

Computer Case Parts

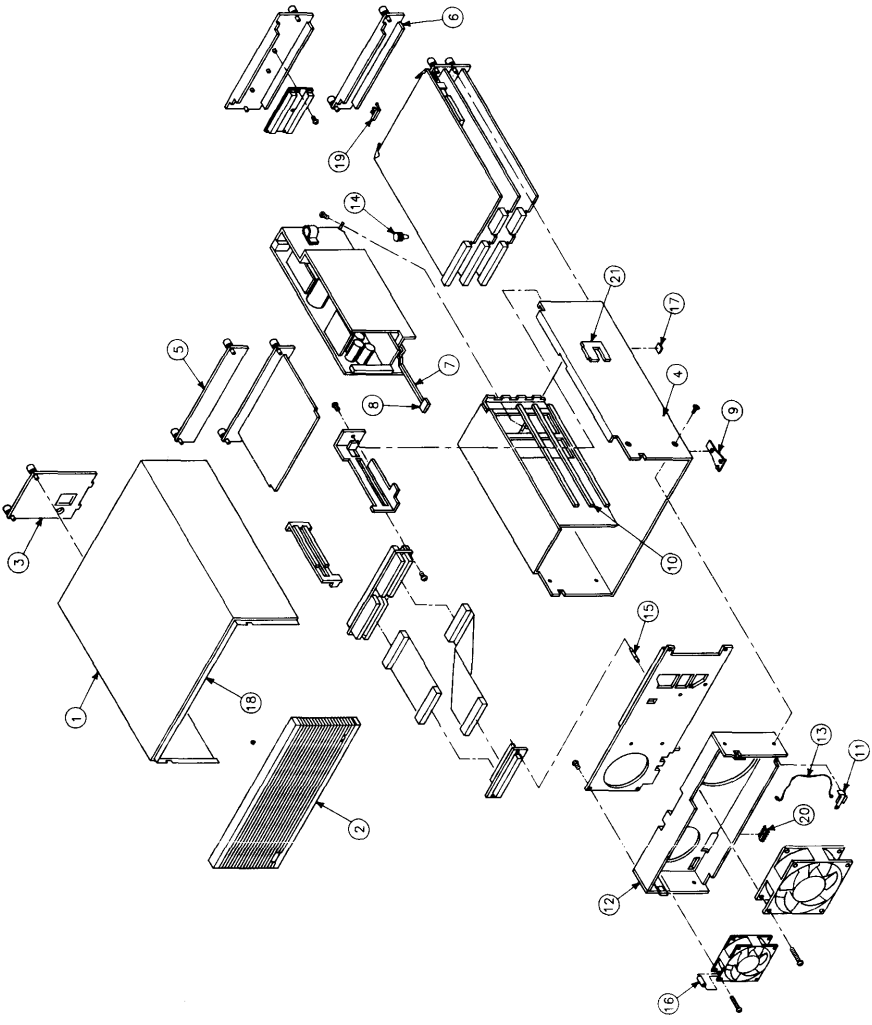
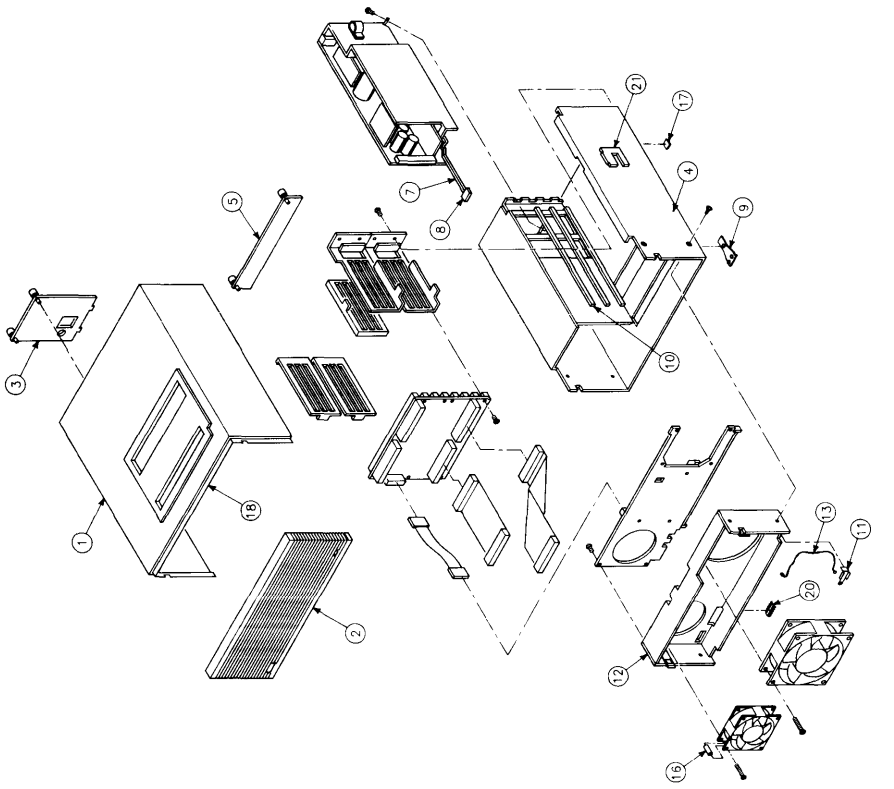


Figure 9-1 Model 330/350 Computer Case Parts.

Computer Case Parts List

Ref.	Part No.	Description	Notes
1	5001-9009	Top cover	
2	5041-2413	Front panel	
3	5001-3700	Power supply cover	
4	5001-3696	Chassis	
5	98561-04102	2-slot cover plate	
6	98561-04107	Cover plate	
7	5041-2412	Power switch shaft	
8	5041-1203	ON-OFF pushbutton	
9	09121-48303	Moulded foot	
10	0403-0379	PC board guide	
11	5001-9001	LED bracket	
12	5001-9011	Fan plate	
13	09817-47700	Light pipe	
14	0380-1655	Snap-in spacer	
15	0380-1901	Support post	
16	0380-0012	Round spacer, 0.875-in. long	
17	0403-0427	Mounting foot bumper	
18	5041-2420	Top cover insulator	
19	5180-0409	Spring clip	
20	8160-0389	Double RFI finger	
21	5001-3694	Card guide bracket	
	0515-0219	Screw M3 × 6, flat head	
	0515-0389	Screw M3.3 × 8, pan head, ext. lock washer	
	0515-0536	Screw M3 × 0.5, machine	
	0515-0990	Screw M3 × 3.5, pan head, ext. lock washer	
	0515-1146	Screw M3 × 6, pan head patch	

Expander Case Parts Diagram



HP 98570A and 98568A Opt. 132 Expander

Expander Case Parts List

Ref.	Part No.	Description	Notes
1	5001-9015	Top cover (with cable slots)	
2	5041-2413	Front panel	
3	5001-3700	Power supply cover	
4	5001-9014	Chassis	
5	98561-04102	2-slot cover plate	
6	5001-9016	System slot cover plate	
7	5041-2410	Power switch shaft	
8	5041-1203	ON-OFF pushbutton	
9	09121-48303	Moulded foot	
10	0403-0397	PC board guide	
11	5001-9001	LED bracket	
12	5001-9011	Fan plate	
13	09817-47700	Light pipe	
14	0380-1655	Snap-in spacer	
15	0380-1901	Support post	

Ref.	Part No.	Description	Notes
16	0380-0012	Round spacer, 0.875-in. long	
17	0403-0427	Mounting foot bumper	
18	5041-2420	Top cover insulator	
19	5180-0409	Spring clip	
20	8160-0389	Double RFI finger	
21	5001-3694	Card guide bracket	
	5041-2414	Ganged card guide	
	5041-2418	Pin cover	
	5041-2419	Channel-lock	
	98561-04107	Cover plate	
	0515-0219	Screw M3 × 6, flat head	
	0515-1146	Screw M3.5 × 8, pan head, ext. lock washer	
	0515-0898	Screw M4 × 7, 6mm long	
	0515-0913	Screw M4 × 7, 10mm long	
	0515-0990	Screw M3 × 3.5, pan head, ext. lock washer	

Printed Circuit Boards

Part No.	Description	Notes
0950-1760	Power supply (without switch shaft)	
98570-66501	HP 98570 Standard motherboard	
98562-66508	Adaptor Board/Cable	
98561-66501	4-slot DIO Backplane	
98568-66500	HP 98668 Opt. 132 8-slot backplane	

Miscellaneous Electrical Parts

Part No.	Description	Notes
5180-0410	Large fan	
5180-1303	Small fan	
5180-0407	LED cable assembly	
98561-61601	DIO Bus cable (short)	
98561-61602	DIO Bus cable (long)	

External Cables

Part No.	Description	Notes
8120-3616	Color Cable	
	Audio Cable, RCA-RCA	
09920-61602	Interface Cable	
8120-4483	Video Cable Adaptor, RCA-BNC Color Cable, High-resolution Cable, 4963-E-24	
5061-6533	Video Cable, RCA-RCA Audio Cable, RCA-earphone	

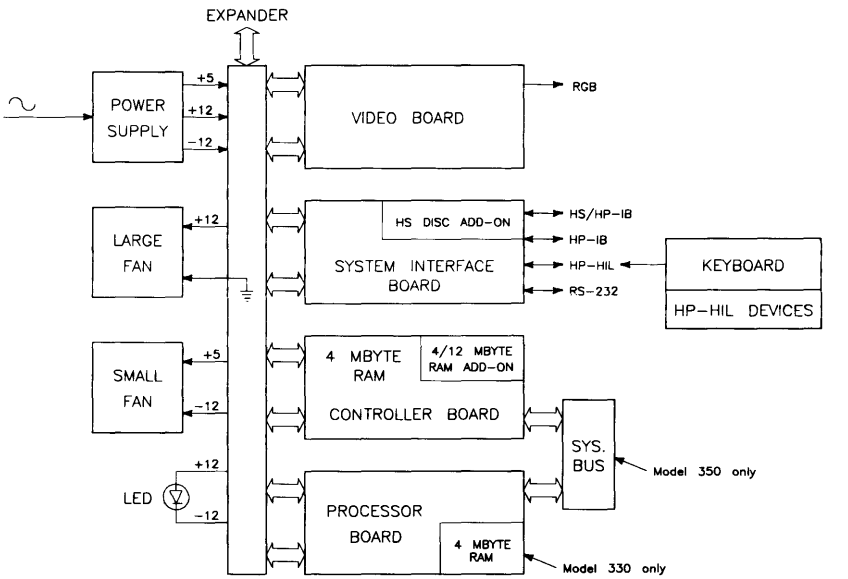
HP-HIL Devices

Exchange Part No.	New Part No.	Description	Notes
35723-69003	35723-66003	Touchscreen PC board	
	46021-60201	ASCII Keyboard	
	46020-60001	Keyboard Cable	
	HP 46060A	HP Mouse	
	46080-61601	Video Cable, 3-conductor	
	46081-61601	2.4-metre extension cable	
	46082-61601	Short audio cable	
	46082-61602	30-metre audio extension cable	
	46082-61603	30-metre video cable	
	46082-61604	15-metre remote cable	
	46082-61605	15-metre video cable	
	46083-61601	Short audio cable	
	46083-67901	Switch cap assembly	
	HP 46085A	Control dials	
	46085-85000	Overlay	
	0403-0430	Moulded foot	
	QEDS-7099	RPG Pot assembly	
	5041-2416	RPG knob	
	HP 46084A	ID module	
	HP 46086A	Button box	
	HP 46087A	"A" size digitizer	
	HP 46088A	"B" size digitizer	
	HP 46094A	Quadrature port device	
	HP 46095A	3-button mouse	
	HP 92916A	Bar code reader	

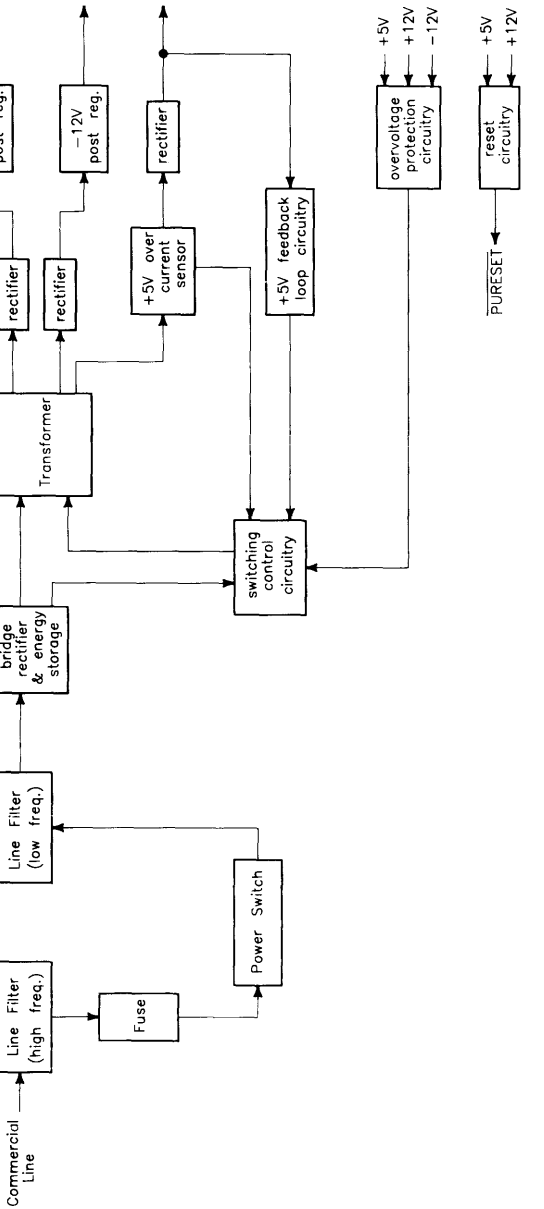
Diagrams 9

Model 330/350 Computer

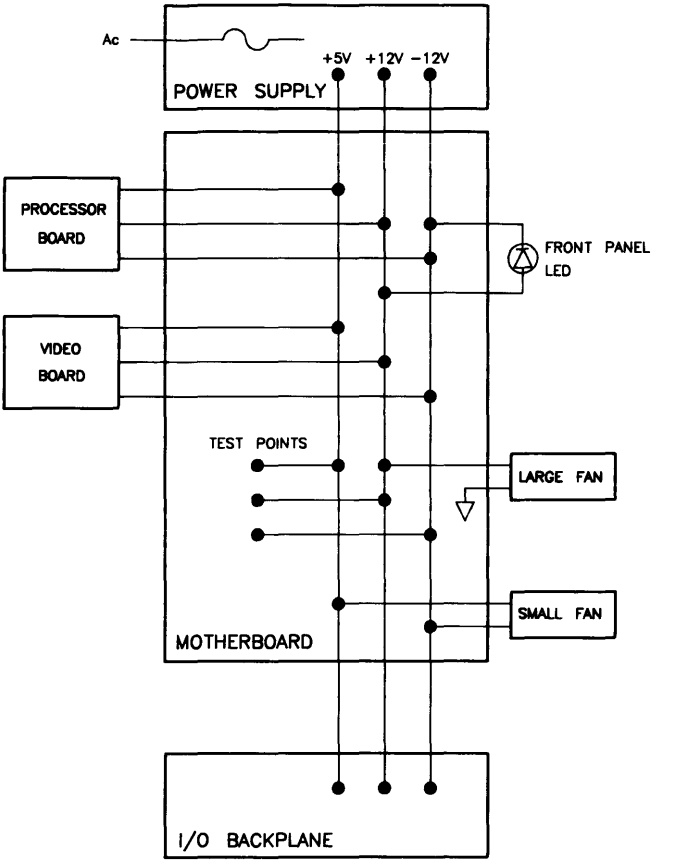
Computer Block Diagram



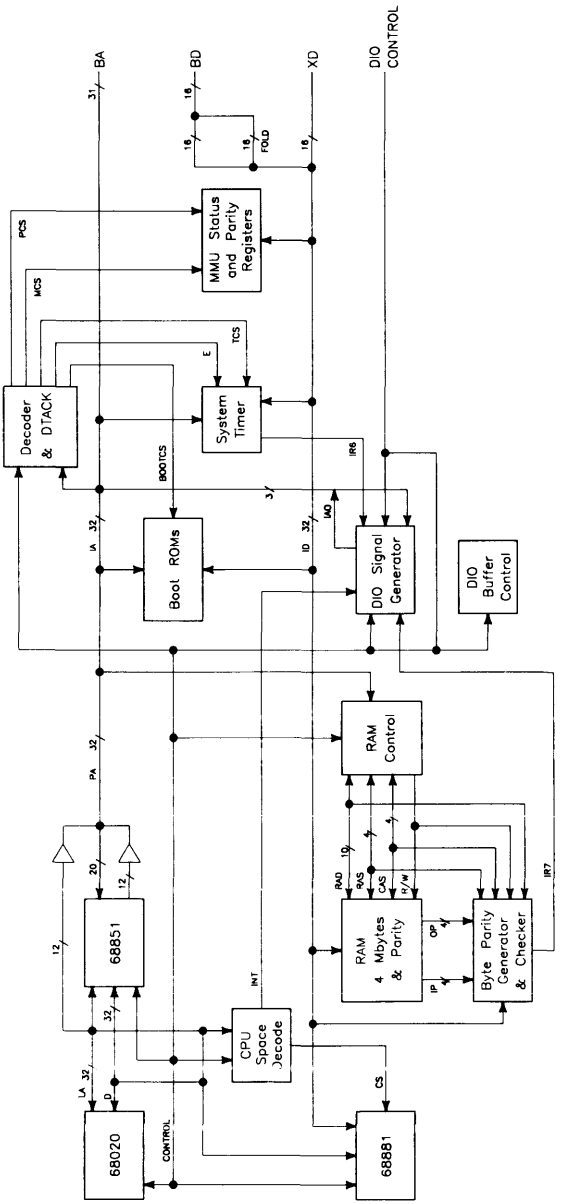
Power Supply



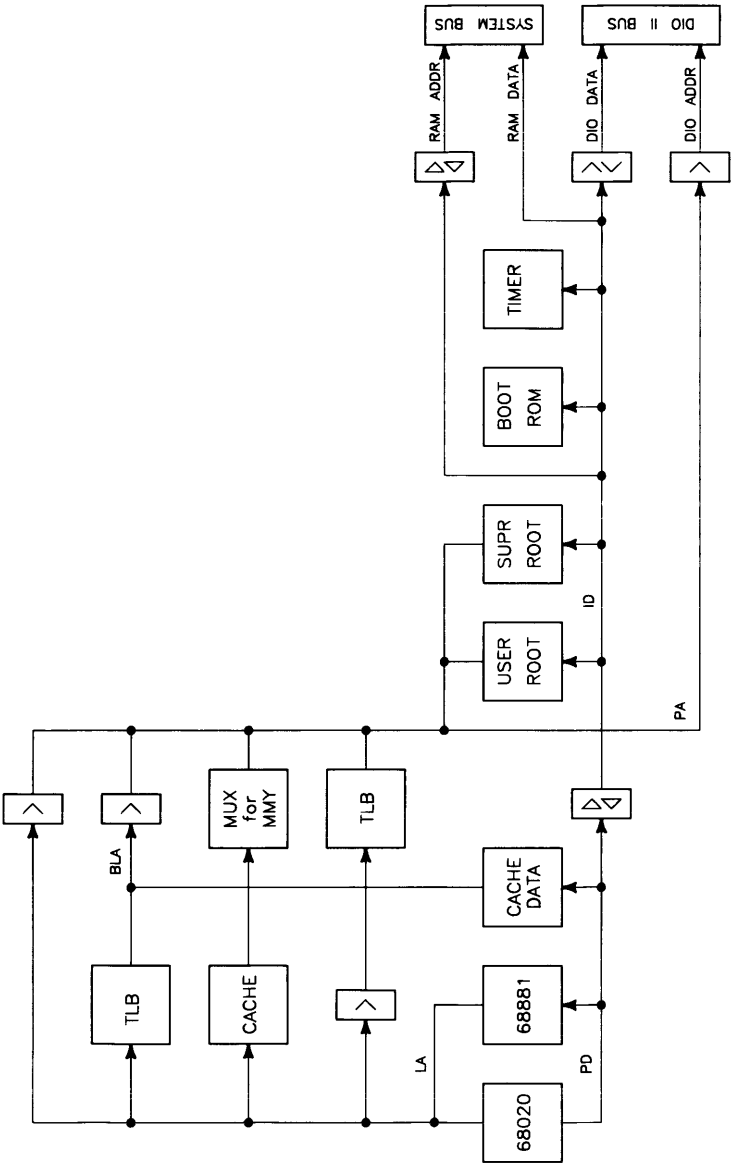
Power Distribution



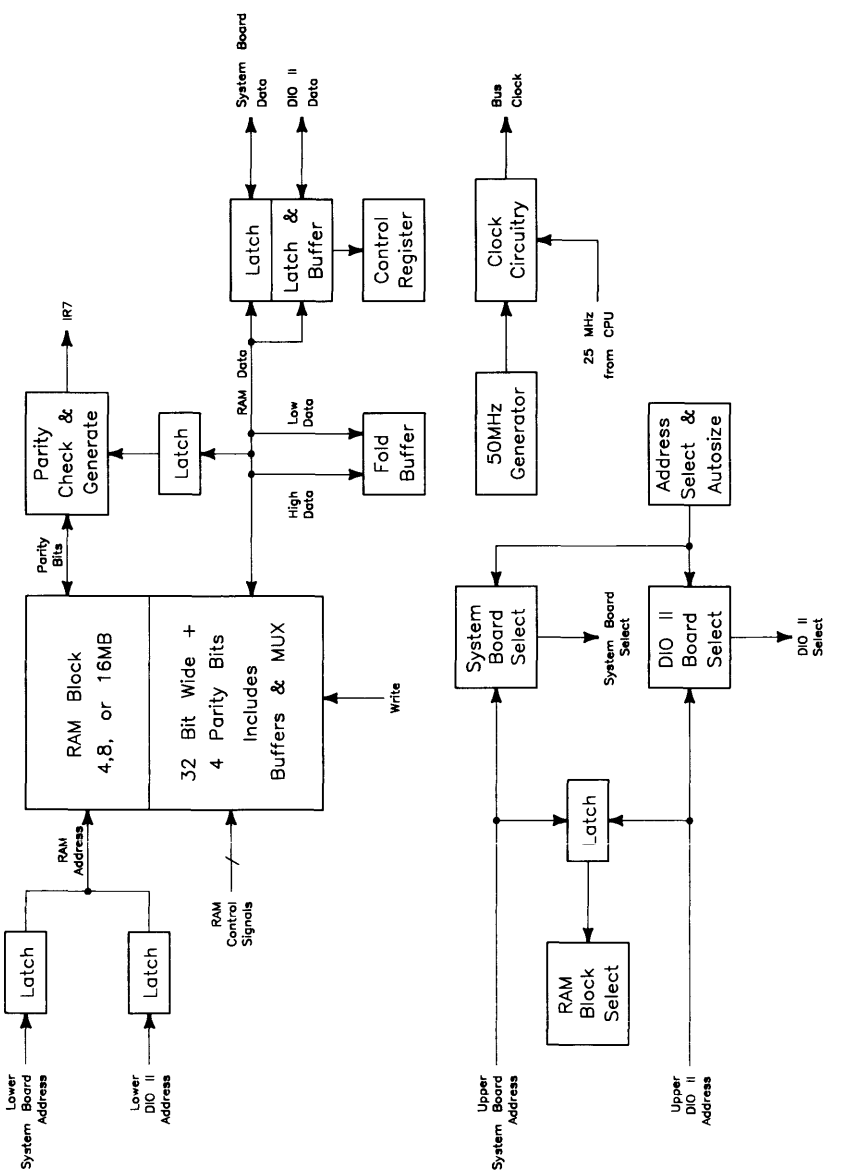
Model 330 Processor Board



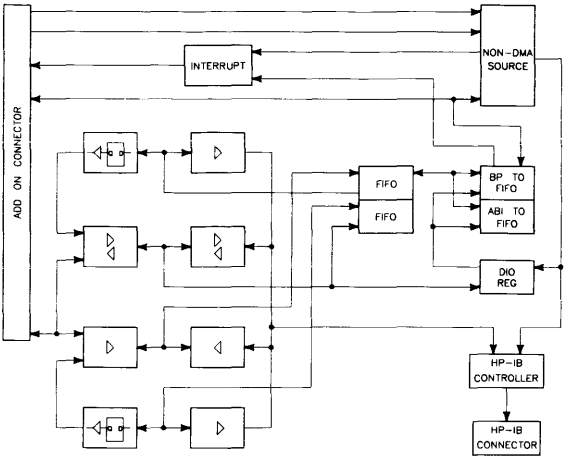
Model 350 Processor Board

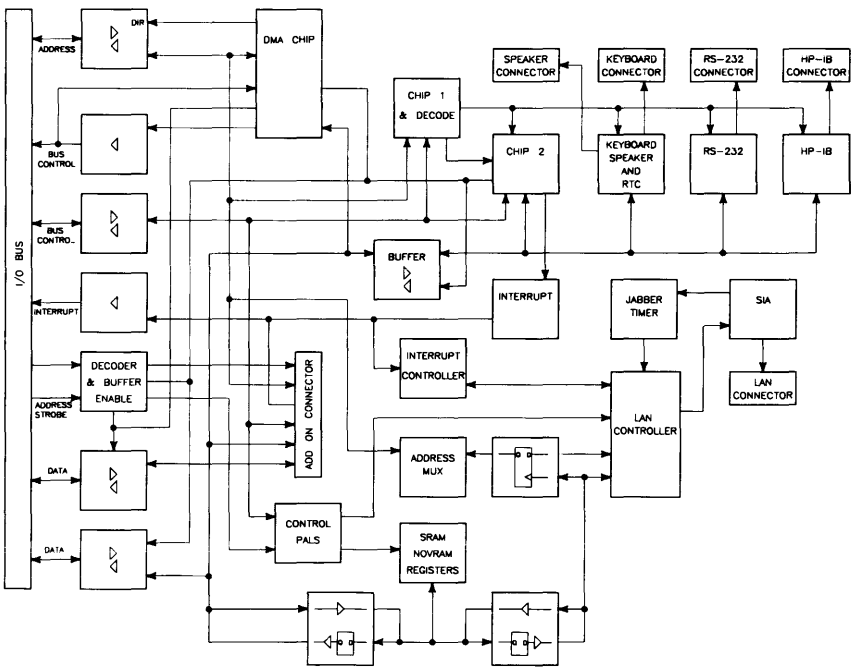


RAM Boards

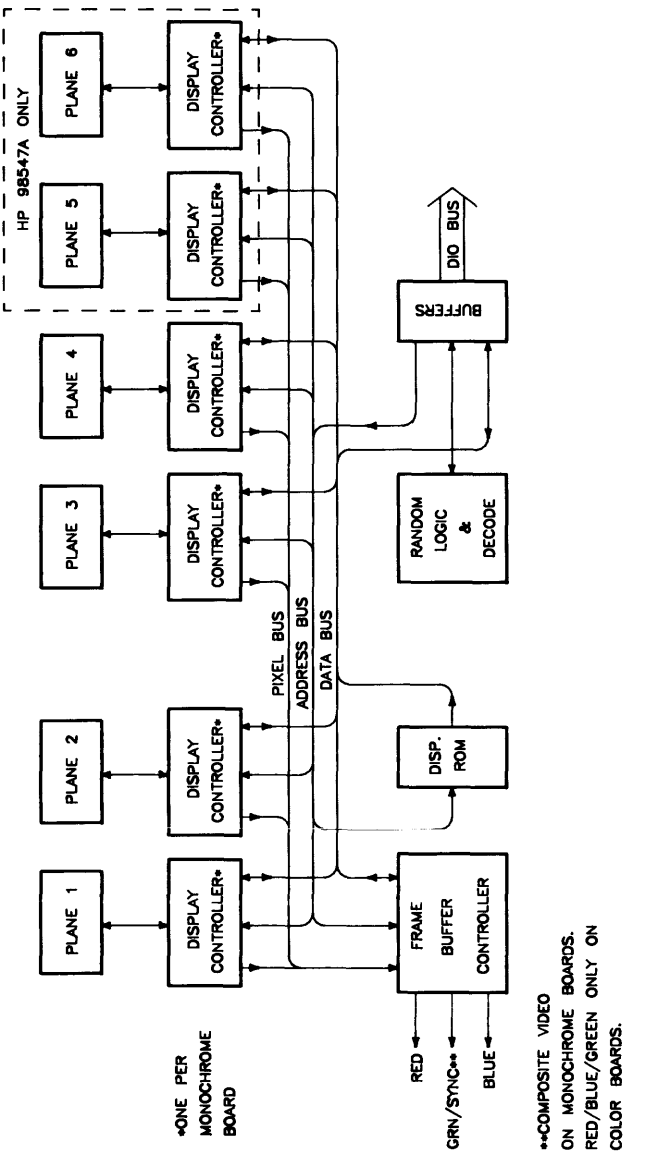

Lower System Board Address
Lower DIO II Address
Latch
Latch
RAM Address
RAM Control Signals
RAM Block 4,8, or 16MB
32 Bit Wide + 4 Parity Bits Includes Buffers & MUX
Write
Parity Bits
Parity Check & Generate
IR7
Latch
RAM Data
Low Data
High Data
Fold Buffer
Latch
Latch & Buffer
Control Register
System Board Data
DIO II Data
Upper System Board Address
Upper DIO II Address
Latch
RAM Block Select
System Board Select
System Board Select
DIO II Board Select
DIO II Select
Address Select & Autosize
50MHz Generator
Clock Circuitry
25 MHz from CPU
Bus Clock

System Interface Board



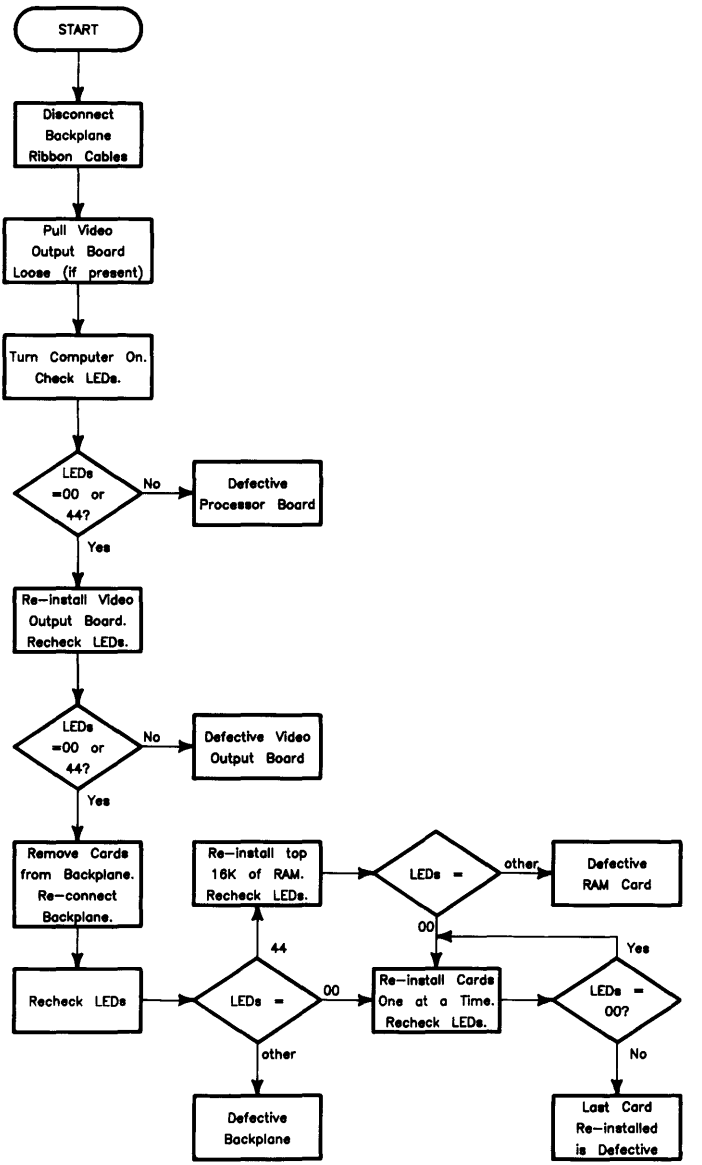


Video Boards

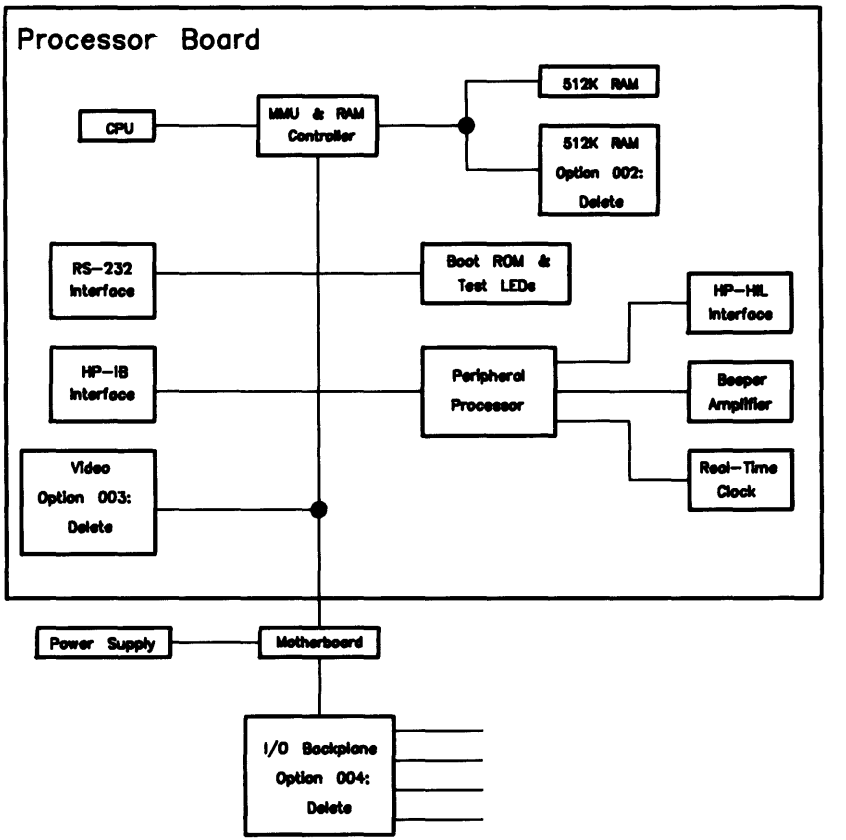


Expanders

Power Supply



Power Distribution



Reference 10

Hardware Support Documentation

Part Number	Manual Title
09000-90041	HP 9000 Series 200/300/500 Site Preparation Manual
98561-90020	Series 300 Configuration Reference Manual
98562-90005	HP 9000 Series 200/300 Test Tools Manual
09800-90001	HP 9000 Series 300 Model 330/350 DIO-II Accessory Development Guide
98562-90030	HP 9000 Series 300 Model 330/350 Service Information Manual
98562-90039	HP 9000 Series 300 Model 330/350 Service Handbook
98562-90099	HP 9000 Series 300 Model 330/350 Self-Paced Hardware Training Guide

Installation Manuals/Notes

Part Number	Manual Title
5958-4342	HP 98542/3/4/5A Video Board Inst. Note
5958-4343	HP 98569A Rack-Mount Kit Inst. Note
5958-4344	HP 98567A Rack-Mount Kit Inst. Note
5958-4351	HP 98567B Rack-Mount Kit Inst. Note
98242-90601	HP 98242B 2-Slot DIO Backplane Inst. Note
98244-90601	HP 98244A Core Upgrade Inst. Note
98245-90601	HP 98245A Model 330 Processor Board Inst. Note
98246-90601	HP 98246A Model 350 Processor Board Inst. Note
98247-90601	HP 98247A System Interface Board Inst. Note
98258-90601	HP 98258A 4 Mbyte RAM Controller Board Inst. Note
98258-90601	HP 98258A 4 Mbyte RAM Add-On Board Inst. Note
98262-90601	HP 98262A High-Speed Disc Add-On Board Inst. Note
98546-90600	HP 98546A Display Compatibility Interface Inst. Note
98560-90623	HP 98562B/98587B/98586B Inst. Note
98568-90600	HP 98568A Eight-Slot Bus Expander Inst. Note
98622-90000	HP 98622A GPIO Installation Manual
98623-90000	HP 98623A BCD Installation Note
98624-90000	HP 98624A HP-IB Installation Note
98625-90000	HP 98625A/B Disc Interface Installation Manual
98626-90000	HP 98626A RS-232 Installation Manual
98627-90000	HP 98627A Color Video Interface Inst. Manual
98628-90001	HP 98628/98691 Datacomm Installation Manual
98630-90000	HP 98630A Breadboard Installation Manual

Service Notes 11

Notes

HP Part Number
98562-90039
Microfiche No. 98562-99039
Requires Binder No. 9282-0683
Printed in U.S.A. 2/87