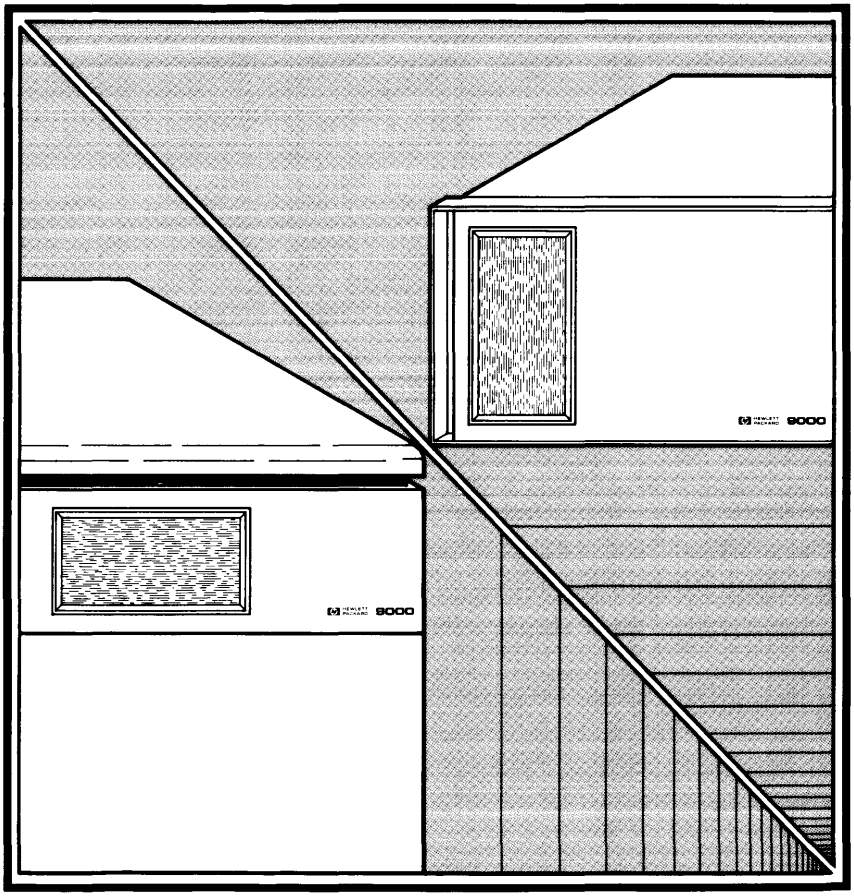
HP 9000 Series 500 Computers
Models 530/540

HEWLETT PACKARD

HP 9030/9040 CE Handbook



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9030/9040 CE Handbook

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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 1985...Edition 1

Chapter 1
9030/40 Product Information

Features

- 32-bit CPU and full 32-bit internal and external data paths.
- Add-on performance with multiple CPUs.
- Up to 10M bytes RAM.
- 36M byte/second memory processor bus.
- Seven internal HP-CIO slots expandable to 23.
- Virtual memory with 500M byte address space.
- Single-user or multi-user system.
- HP-UX Operating System with C language, supports FORTRAN 77 and Pascal languages.
- Error correcting and self-healing memory.
- Diagnostic service panel with switches and LEDs.
- Broad range of peripherals.

Central Processor Unit (CPU)

- 2 Types CPU board–Floating Point CPU has math chips.
- 32-bit single chip containing 450,000 transistors.
- Direct address range of 500M bytes.
- Supports IEEE Floating-point Format.
- Instruction set of 230 operation codes.
- 18M Hz clock rate with micro-instruction cycle time of 55 ns and memory cycle time of 110 ns.
- Typical execution times:

(CPU without math chips)
Load register from memory ..... 550 nanoseconds
64-bit floating-point multiply ..... 10.34 microseconds
32-bit integer multiply ..... 2.92 microseconds
64-bit floating-point add ..... 5.94 microseconds
(CPU with math chips)
1.4 times faster (overall)
2 times faster on B1D Program

Memory

- 256K byte RAM boards.
- 512K byte RAM boards.
- 1M byte RAM boards–2M byte increments.
- RAM expandable to 10M bytes.
- Single-bit error detection and correction.
- Double-bit error detection.

I/O Processor (IOP)

- Supports 8 I/O channels with DMA capability on every channel.
- Two additional IOPs and their associated 97098A I/O Expanders are supported.
- Nominal IOP bandwidth of 900K bytes/second.
- Maximum IOP bandwidth of 5.1M bytes/second.

Real-Time Clock

- Provides date and time of day.
- Accuracy within 30 seconds/month operating and 3 minutes/ month storage.
- Battery-maintained up to 30 days nominal and 10 days worst case.
- Located on System Control Module (SCM).

System Components

	Base Systems 9030A | 9040A | 9050A	**Bundled Systems** 9040AT	9040AM
RAM (Std.)	512K byte	1.5M byte	
RAM (Opt.)	Up to 10M bytes in 2M byte increments or up to 5M bytes in 512K byte increments		
Service/ Diagnostic Panel	Standard		
CPU Options	Single is standard; up to two additional CPUs are allowed.		
I/O Options	Models 9030/9040 – Up to two additional I/O Processors (IOP) allowed. Each IOP adds eight DMA-capable I/O slots.		
System Software	Optional (HP-UX)	HP-UX plus additional software options and compilers (single-user)	HP-UX plus additional software options and compilers (multi-user)

HP-UX System Software

HP Product No. Single-user	HP Product No. Multi-user	Software
97079B	97089B(16) 97088B(32)	HP-UX Operating System
97071A	97081A	FORTRAN 77 Compiler
97072A	97082A	HP Pascal Compiler
97073A	97083A	IMAGE-9000 DBMS
97075A	97085A	HP-UX GRAPHICS AGP
97077A	97087A	RJE Communications Software
2285A		Local Area Network
97086A		Applications Migration Package

Accessories Supplied

Installation and Test Manual, Part No. 09040-90011

Accessories Available

Power Line Conditioner, Product No. 35030A
9040 Workstation Table, Product No. 92170G

User Documentation

HP Part No.	Description
09000-90007	HP-UX Reference
97073-90006	IMAGE HP-UX Reference Supplement
98680-90025	Introducing the UNIX System by McGilton & Morgan
97089-90004	HP-UX Concepts and Tutorials (4 Vols.)
97089-90048	HP-UX System Administrator's Manual
97080-90093	Unpacking Instructions for the HP 9000 Series 500 Computers
92836-90005	Structured FORTRAN 77 Programming by Pollack
97081-90001	FORTRAN/9000 Reference
92832-90002	Programming in Pascal by Grogono
97082-90001	Pascal/9000 Reference
97089-90000	The C Programming Language by Kernighan & Ritchie
97086-90001	Applications Migration Reference
97086-90002	Applications Migration Users Guide
97059-90000	HP-UX Local Area Network (LAN) User's Guide
97059-90001	HP-UX LAN Node Manager's Guide
97076-90001	HP-UX Asynchronous Communications User's Guide
97077-90011	RJE Synchronous Data Communications User's Guide
97084-90000	DGL Programmer Reference
97084-90001	DGL Supplement for the Series 500
97084-90026	Graphics/9000 Device Handlers Manual
97085-90000	AGP User's Guide
97085-90001	AGP Supplement for the Series 500
97085-90005	AGP Reference
97082-90002	Programming in Pascal with Pascal/9000
97084-90002	DGL/AGP Demonstration Instructions
98680-90021	Fortran Comparison Notes
98680-90045	HP-UX Portability Guide

Service Documentation

HP Part No.	Description
09040-80030	Service Documentation Package (includes 09040-90011, 09040-90038, Sales and Support Offices List (5955-6587), and 1-1/2-inch binder (9282-0987)).
09040-90011	Installation and Test
09040-90038	Service Manual
09040-90035	CE Handbook
09000-90040	HP 9000 Series 200/500 Site Preparation Manual
97060-90030	HP 97060A Graphics Processor Service
97062-90020	HP 97062A Color Output Interface Installation and Service
97098-90020	HP 97098A I/O Expander Installation and Service
27132-91001	HP 27132A HP-CIO Technical Reference Manual

Tools List

HP Part No.	Description
8710-0899	#1 Pozidriv screwdriver
8710-0900	#2 Pozidriv screwdriver
8730-0001	Flat-blade screwdriver
8720-0006	7/16-inch nutdriver
8710-1220	5.5-millimetre nutdriver
8710-0881	1/8-inch Allen hex key
09855-67004	Power supply discharge tool
9300-0794	Antistatic kit

Safety Considerations

WARNING

SWITCH POWER OFF AND UNPLUG POWER CORD FROM AC OUTLET BEFORE REMOVING ANY ASSEMBLY. LETHAL VOLTAGES ARE PRESENT INSIDE THE COMPUTER. OBSERVE ALL WARNING LABELS.

PRIMARY WIRING CHANGE WARNING

AFTER MAKING A PRIMARY WIRING CHANGE, PERFORM CONTINUITY TEST BETWEEN POWER CORD GROUND AND METAL CHASSIS. RECORD RESULTS ON REPAIR ORDER.

POWER SUPPLY WARNING

WHEN POWER SUPPLY IS REMOVED FROM COMPUTER, YOU ARE EXPOSED TO LETHAL VOLTAGE FROM POWER SUPPLY CAPACITORS. WAIT AT LEAST 15 MINUTES AFTER POWER IS SWITCHED OFF BEFORE REMOVING SUPPLY, OR USE THE POWER SUPPLY DISCHARGE TOOL TO DISCHARGE THE CAPACITORS PRIOR TO REMOVING THE SUPPLY.

Chapter 2

9030/40 Environmental/Installation/PM

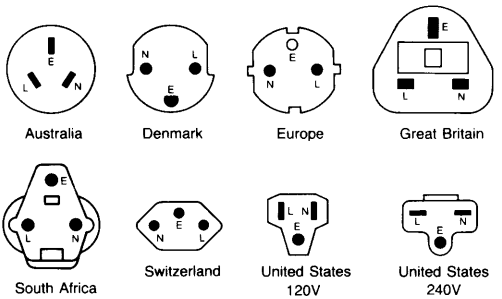
Physical and Environmental Specifications

	System II Enclosure*	Stand-alone Mini-cabinet
Width	17 in. (43.2 cm.)†	14 in. (35.6 cm.)
Depth	23.0 in. (58.4 cm.)	28.0 in. (71.1 cm.)
Height	8.75 in. (22.2 cm.)	28.0 in. (71.1 cm.)
Shipping weight (typical)	65 lb. (29.4 kg.)	114 lb. (51.6 kg.)
Temperature: Operating Storage	 0° to 55°C −40° to 75°C	
Humidity	95% RH at 40°C, machine operating	
Altitude	15,000 ft. (570 mbars barometric pressure), machine operating	
Voltage ranges	90 – 125 Vac or 198 – 250 Vac	
Max. power dissipation	650 Watts (2200 BTU/hr.)	
Frequency range	48 – 66 Hz	
Current requirements	11 A at 90 Vac, 5.5 A at 198 Vac	
Vibration (peak to peak amplitude deflection)	.125 in. at 5 to 10 Hz .060 in. at 10 to 25 Hz .015 in. at 25 to 55 Hz	

* *Industry standard EIA mounting.*
† *Add 2 in. (5.6 cm.) for rack-mount "ears".*

Installation Procedure

1. Unpack the computer.
2. Position the computer. Leave about 6 inches of space at each side of computer (9030) or 6 inches at back (9040).
3. Connect power cord to power source.



Country	P/N	Opt.	Voltage
Australia	09855-61601	901	250V, 6A
Denmark	09855-61606	912	250V, 6A
Europe	09855-61602	902	250V, 6A
Great Britain	09855-61605	900	250V, 6A
Switzerland	09855-61604	906	250V, 6A
United States	09855-61600	903	110V, 10A
United States	09855-61603	904	220V, 10A

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

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

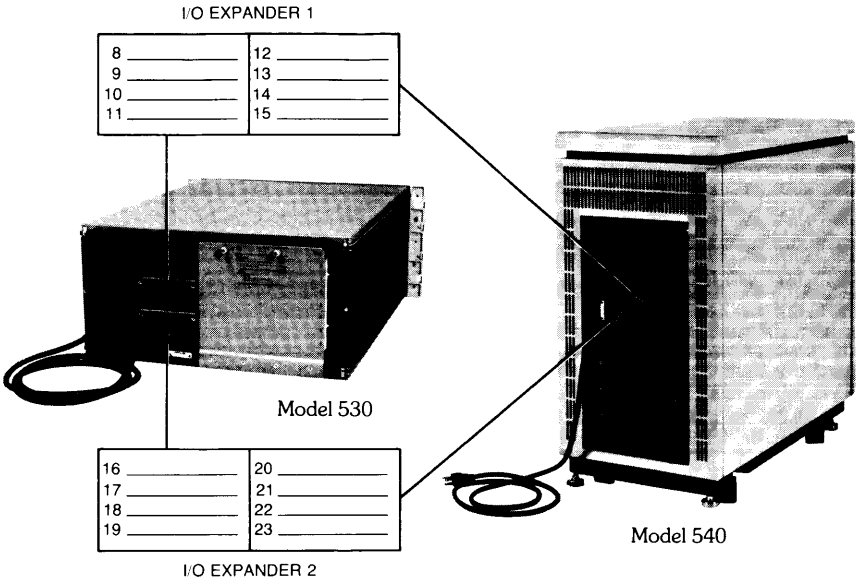
4. Check switch settings of interface cards (Chapter 7).
5. Install interface cards and connect the cables.
   a. System Terminal (console) Interface Card in slot 0.
   b. System Disc HP-IB in slot 5.
6. Check the switches on the peripheral devices.
   a. Terminals

LocalEcho:	OFF	Xmit Pace:	XON/XOFF
CapsLock:	OFF	Line Block Mode:	Line
XmitFnctn(A):	NO	Return Def:	CR
InhHndShk(G):	YES	Remote*:	ON
InhD2(H):	YES	Auto LF:	OFF
BaudRate:	9600	Display Function:	OFF
Bits/Character:	8		
Parity:	None		
EnqAck:	YES		
RecvPace:	XON/XOFF		

   b. Disc Drives

      Set HP-IB address switch for system disc drive to "0".

7. Install and connect the peripheral devices.
8. Connect the HP 97098A I/O Expander(s)



HP 97098A I/O Expanders

Preventive Maintenance

There are no scheduled preventive maintenance procedures.

Finstrate Installation Instructions for HP-Qualified Personnel:

Start on page 2-6 (RAM/CPU), or 2-7 (IOP) and follow the instructions that apply to the installation you are performing. For example, if you are installing a 2nd IOP in a 520 computer you would start on page 2-7, and perform all steps that begin with: (ALL), (ALL 2nd IOP), (ALL EXCEPT 520-3rd IOP), (520), (520 ONLY), and (520-2nd IOP).

ALL RAM and CPU Instuctions start on 2-6.
ALL IOP Instructions start on 2-7.

When completed with the installation of the finstrate, Insert the following pages in your CE Handbook (after page 2-4 of either the 9020 or 9030/9040 section).

RAM/CPU Finstrate Installation

1. **(ALL)**
   TURN THE POWER OFF AND DISCONNECT THE POWER CORD.

2. **(520)**
   Open the left door.

   (530)
   Remove the front panel.

   (540)
   Remove the front bottom panel.

3. **(530/540 ONLY)**
   From the front of the computer, remove the Radio Frequency Interference (RFI) shield by loosening the six thumbscrews.

4. **(ALL)**
   Open processor stack door.

CAUTION

ELECTROSTATIC DISCHARGE DAMAGE CAN OCCUR IN THE FOLLOWING STEPS. FOLLOW THE PRECAUTIONS IN CHAPTER 4 OF THE SERVICE MANUAL.

DO NOT TOUCH EDGE CONNECTOR OR FINSTRATE PLANE. HOLD FINSTRATE BY EJECTORS OR SIDE EDGES ONLY. HANDLING FINSTRATE INCORRECTLY COULD CAUSE ELECTROSTATIC DISCHARGE DAMAGE. WHEN INSTALLING FINSTRATE, HOLD BY EJECTORS AND MOVE AIR CONTROLLER OUT OF THE WAY WITH THE SIDE EDGE OF THE FINSTRATE.

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5. **(ALL)**
   Install the finstrate in the first unoccupied slot from the bottom. DO NOT LEAVE EMPTY SLOTS BETWEEN FINSTRATES.

6. **(ALL)**
   Close the processor stack door. Firmly tighten thumbscrews to prevent RFI radiation. Replace the label that is used as a seal for the processor stack door (Part Number 5180-5201).

7. **(530/540 ONLY)**
   Replace RFI shield.

8. **(520)**
   Close left door.

   (530)
   Replace front panel.

   (540)
   Replace the front bottom panel.

9. **(ALL)**
   Connect power cord to ac outlet.

IOP Finstrate Installation

WARNING

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

1. **(ALL)**
   TURN THE POWER OFF AND DISCONNECT THE POWER CORD.

2. **(520 - 2nd IOP)**
   Remove the left door.

   (520 - 3rd IOP)
   Open the left door. Remove the I/O expander cable from the I/O EXPANDER 1 slot on the processor stack door (if connected).

   (530)
   Remove front panel.

   (540)
   Remove both front panels and flip-top cover.

3. **(520 - 2nd IOP)**
   Remove the trim piece on the left side of the computer by loosening the two #2 Pozidriv screws (Figure 1). The screws do not have to be completely removed to remove the trim piece.

   (520 - 3rd IOP)
   Continue with next step.

   (530/540)
   Remove top and bottom covers from System II enclosure. From the front of the computer remove the Radio Frequency Interference (RFI) shield by loosening 6 thumbscrews.

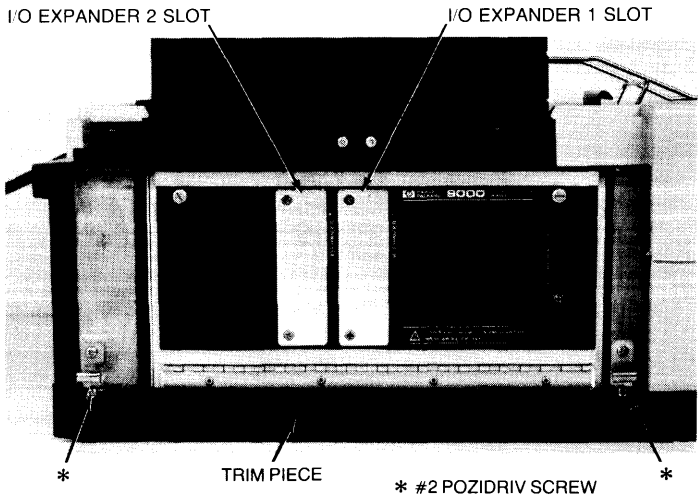

Figure 1. Model 520 Computer Stack.

4. **(520 ONLY)**
   Remove the flat metal plate covering the appropriate I/O EXPANDER connector slot by removing the two #2 Pozidriv screws (Figure 2):
   (2nd IOP) I/O EXPANDER 1.
   (3rd IOP) I/O EXPANDER 2.

(530/540)
Continue with next step.

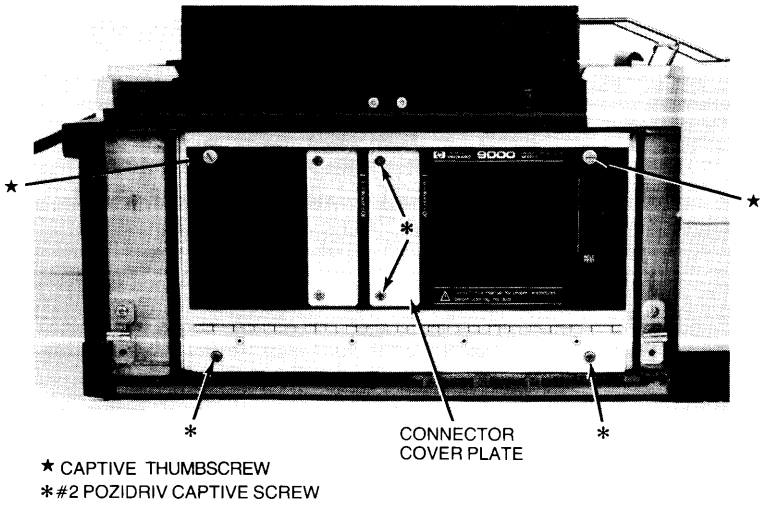

Figure 2. Series 500 Computer Stack Door Removal.

5. **(ALL EXCEPT 520 - 3rd IOP)**
   Loosen the two #2 Pozidriv captive screws at the bottom of the processor stack door (Figure 2).

(520 - 3rd IOP)
Continue with next step.

6. **(ALL EXCEPT 520 - 3rd IOP)**
   Remove the processor stack door by loosening the two captive thumbscrews (Figure 2).

(520 - 3rd IOP)
Open processor stack door.

CAUTION

DO NOT TOUCH EDGE CONNECTOR OR FINSTRATE PLANE. HOLD FINSTRATE BY EJECTORS OR SIDE EDGES ONLY. HANDLING FINSTRATE INCORRECTLY COULD CAUSE ELECTROSTATIC DISCHARGE DAMAGE. WHEN INSTALLING FINSTRATE, HOLD BY EJECTORS AND MOVE AIR CONTROLLER OUT OF THE WAY WITH THE SIDE EDGE OF THE FINSTRATE.

7. **(ALL - 2nd IOP)**
   Move all finstrates above slot 2 up one slot.

   (ALL - 3rd IOP)
   Move all finstrates above slot 3 up one slot (Slot 3 is first accessible finstrate without removing door).

8. **(520 - ONLY)**
   Remove cable clamp from processor stack door by removing two #1 Pozidriv screws.

9. **(ALL)**
   Slide the IOP finstrate into the appropriate slot without seating finstrate into the motherboard. Open the connector gate (Figure 3):
   (2nd IOP) Slot 3.
   (3rd IOP) Slot 4.

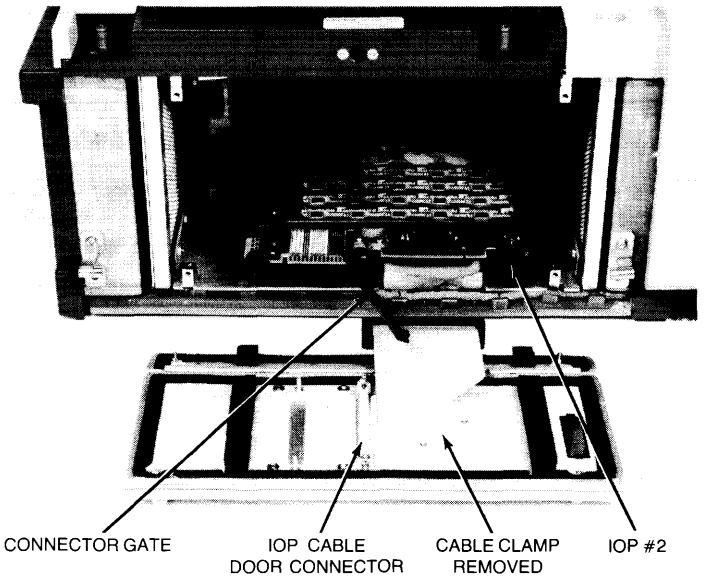

Figure 3. Series 500 Computer IOP Installation.

10. **(520)**

    Place IOP cable door connector over studs on ends of appropriate I/O EXPANDER connector slot, and tighten connector to door with two nuts (Figure 3):

    (2nd IOP) I/O EXPANDER 1 slot.
    (3rd IOP) I/O EXPANDER 2 slot.

    (530/540)

    Continue with step 12.

11. **(520 ONLY)**

    Install cable clamp on door so that it holds cable(s) in position (Figure 4).

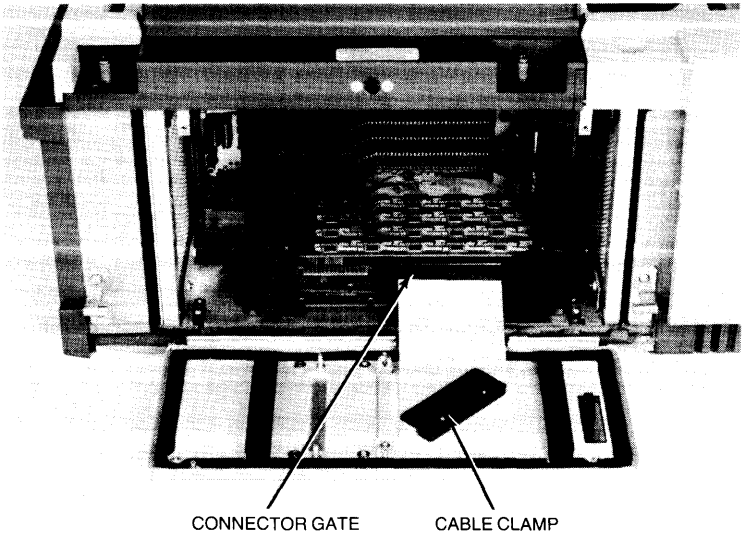

Figure 4. 520 Computer Stack Door.

12. **(520)**

    Connect the IOP cable finstrate connector to the IOP finstrate with cable pointing down. Close the connector gate and seat the finstrate into the motherboard connector (Figure 4).

    (530/540)

    Route IOP cable through base plate. Connect IOP cable finstrate connector to finstrate. Close connector gate and seat board into motherboard connector.

13. **(ALL EXCEPT 520 - 3rd IOP)**

    Install processor stack door with two captive #2 Pozidriv screws at bottom.

    (520 - 3rd IOP)

    Continue with next step.

14. **(ALL)**

Close processor stack door. Tighten thumbscrews to prevent Radio Frequency Interference (RFI) radiation. Replace the label that is used as a seal for the processor stack door (Part Number 5180-5201).

CAUTION

ENSURE THE I/O EXPANDER CONNECTOR ON THE PROCESSOR STACK DOOR IS COVERED, AS EXPLAINED IN THE NEXT STEP, TO PREVENT RFI RADIATION.

15. **(520)**

Attach I/O expander cable(s) to the appropriate I/O EXPANDER connector (Figure 5), or cover connector with plastic connector cover (Figure 6).

(530/540 - 2nd IOP)

Route IOP cable along outside of base plate and attach IOP cable strain relief clamp to base with four #2 Pozidriv screws. Ensure cable is centered in clamp and is not pinched.

(530/540 - 3rd IOP)

Remove I/O cable strain relief clamp which holds 2nd IOP cable in place on outside of base plate. Route IOP cable along outside of base plate and attach IOP cable strain relief clamp to base with four #2 Pozidriv screws. Ensure cable is centered in clamp and is not pinched.

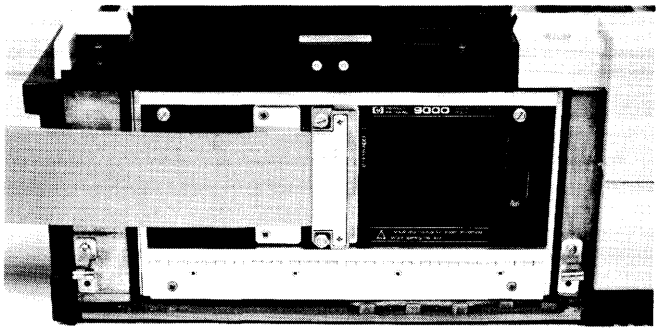

Figure 5. IOP Connector Attached to Door.

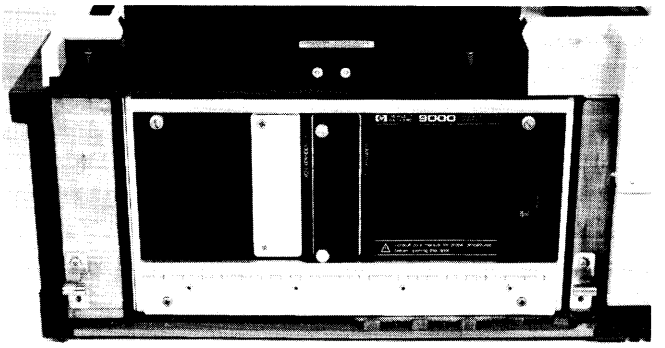

Figure 6. Plastic IOP Connector Cover.

16. **(530/540 ONLY)**
    Route cable between terminal block and base plate into enclosure.

17. **(530/540 ONLY)**
    Remove cover plate from appropriate IOP expander slot in the computer rear panel. Insert IOP cable connector into the appropriate slot and secure in place with two nuts on the posts: (slots viewed from rear.)
    (530 - 2nd IOP) Upper slot.
    (530 - 3rd IOP) Lower slot.
    (540 - 2nd IOP) Right slot.
    (540 - 3rd IOP) Left slot.

> **CAUTION**
> ENSURE THE I/O EXPANDER CONNECTOR ON THE PROCESSOR STACK DOOR IS COVERED TO PREVENT RFI RADIATION.

18. **(530/540 ONLY)**
    Attach I/O expander cable to connector on rear panel, or cover connector with plastic connector cover.

19. **(520 - 2nd IOP)**
    Replace the trim piece and the left door.

    (520 - 3rd IOP)
    Close the left door.

    (530)
    Replace RFI shield, top and bottom covers of System II enclosure, and front panel.

    (540)
    Replace RFI shield, top and bottom covers of System II enclosure, front panels and flip top cover.

20. **(ALL)**
    Plug the power cord into the ac outlet and switch on the power.

512K RAM Board Installation Information

Instructions For HP-Qualified Personnel:

Follow the instructions that apply to the installation you are performing. For example, if you are installing the RAM card in a 520 computer you would perform the steps that begin with: (ALL), and (520).

Load Board

Systems that are shipped from the Fort Collins Systems Division with 1 CPU. 1 IOP. and one 512K Byte RAM Board, will also have a Load Board in the slot that is adjacent to the RAM board (top occupied slot). If any other Finstrates, or RAM, is added to this configuration, the Load Board must be removed from the computer.

Any time the Processor Stack configuration is reduced to 1 CPU, 1 IOP, and one 512K Byte RAM Board, A Load Board (09855-66525) is required. Load Board (09855-66525) is a replaceable part.

CE Handbook

When completed with the installation, insert this page and the following page in your CE Handbook (after page 2-12 of either the 9020 or 9030/9040 section).

Part Numbers

512K Byte RAM	(exchange)	97047-69805
	(new)	5061-6805
Load Board		09855-66525

512K Byte RAM Board Installation

1. **(ALL)**
   TURN THE POWER OFF AND DISCONNECT THE POWER CORD.
2. **(520)**
   Open the left door.

   (530)
   Remove the front panel.

   (540)
   Remove the front bottom panel.
3. **(530/540 ONLY)**
   From the front of the computer, remove the Radio Frequency Interference (RFI) shield by loosening the six thumbscrews.
4. **(ALL)**
   Open processor stack door.

CAUTION

ELECTROSTATIC DISCHARGE DAMAGE CAN OCCUR IN THE FOLLOWING STEPS. FOLLOW THE PRECAUTIONS IN CHAPTER 4 OF THE SERVICE MANUAL.

DO NOT TOUCH EDGE CONNECTOR OR BOARD PLANE. HOLD BOARD BY EJECTORS OR SIDE EDGES ONLY. HANDLING THE RAM BOARD INCORRECTLY COULD CAUSE ELECTROSTATIC DISCHARGE DAMAGE. WHEN INSTALLING THE RAM BOARD, HOLD BY EJECTORS AND MOVE AIR CONTROLLER OUT OF THE WAY WITH THE SIDE EDGE OF THE BOARD.

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5. **(ALL)**
   Remove the Load Board (09855-66525) from the Processor Stack, if it is present and at least one RAM board is installed. The load board will no longer be required. It is the property of the customer.
6. **(ALL)**
   Install the new RAM board in the first unoccupied slot from the bottom. DO NOT LEAVE EMPTY SLOTS BETWEEN BOARDS.
7. **(ALL)**
   Close the processor stack door. Firmly tighten thumbscrews to prevent RFI radiation. Replace the label that is used as a seal for the processor stack door (Part Number 5180-5201).
8. **(530/540 ONLY)**
   Replace RFI shield.
9. **(520)**
   Close left door.

   (530)
   Replace front panel.

   (540)
   Replace the front bottom panel.
10. **(ALL)**
    Connect power cord to ac outlet.

1 Megabyte RAM Board Installation

Instructions

Read the following information then follow the instructions that apply to the installation you are performing. For example, if you are installing the RAM Boards in a 520 computer you would perform all steps that begin with: (ALL), and (520).

RAM Boards

1 Megabyte RAM Boards can only be installed in pairs. Any combination of 256K, 512K, and pairs of 1 Megabyte boards can be used.

Load Board

If a system is shipped with 1 CPU, 1 IOP, and one 512K RAM Board, it will also have a Load Board (09855-66525) in the top occupied slot. When the 1 Megabyte RAM Boards are added to the stack, the Load Board is no longer required and must be removed (assuming the 512K RAM board remains in the system).

When the only RAM boards in the stack are 1 Megabyte RAM boards, a load board is required if there are six or less. The load board should be removed when there are more than six 1 Megabyte RAM boards in the stack, or if there is a mixture of 256K, 512K, and 1 Megabyte RAM boards in the stack.

Any time the Processor Stack configuration is changed so that it contains one of the above configurations, a Load Board is required. The load Board (09855-66525) is a replaceable part in spares. If the load board is used it must be in the top **OCCUPIED** slot of the Processor Stack. Do not leave any empty slots between finstates or boards.

Boot Loader ROM

When the Processor Stack contains 1 Megabyte RAM Boards, Boot Loader ROM Rev. B (09020-80001) must be used, and UNIX 4.0 or Basic 2.0 software must be used.

Boot Loader ROM 09020-80000 can be used with UNIX 4.0 or Basic 2.0 (or any previous software versions) as long as the stack **DOES NOT** contain a 1 Megabyte RAM Board.

Boot Loader ROM Rev. B (09020-80001) can be used with any RAM configuration but **MUST** use UNIX 4.0 or BASIC 2.0 software (any earlier versions of software cannot be used with this boot loader).

Access Times

When the 1 Megabyte RAM Boards are installed in a computer, the access times will be slower. The customer may notice this slower process time during operation.

System Integrity Test

The previous SFT tests (Part Number 09020-10010 Rev. 2.0) are not compatible with the Basic 2.0 Operating System. The updated version of the SFT must be used with this operating system.

The 4.0 HP-UX Operating System contains the same System Functional Tests (SFT) as the previous HP-UX. They are located in the CE. utilities dictionary.

Part Numbers

1 Megabyte RAM Board	(exchange)	97046-69704
	(new)	5061-7704
Boot Loader ROM *		09020-80000 (Rev.A)
		09020-80001 (Rev.B)
Load Board		09855-66525

* See BOOT LOADER ROM on the previous page for part number applicability. When ordering the ROM, the serial number and model number of the computer **must** be given to the individual taking the order.

CE Handbook

When completed with the installation, insert these pages in your CE Handbook (after page 2-14 of either the 9020 or 9030/9040 section).

RAM Board Installation

1. **(ALL)**
   TURN THE POWER OFF AND DISCONNECT THE POWER CORD.
2. **(520)**
   Open the left door.
   (530)
   Remove the front panel.
   (540)
   Remove both front panels and the fliptop cover.
3. **(530/540 ONLY)**
   From the front of the computer, remove the Radio Frequency Interference (RFI) shield by loosening the six thumbscrews.
4. **(ALL)**
   Open processor stack door.

CAUTION

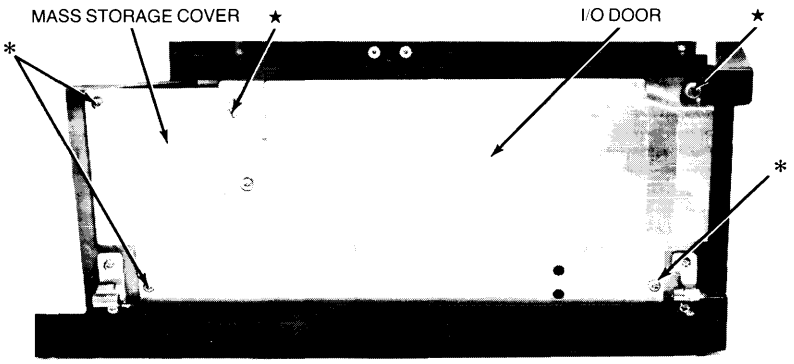
ELECTROSTATIC DISCHARGE DAMAGE CAN OCCUR IN THE FOLLOWING STEPS. FOLLOW THE PRECAUTIONS IN CHAPTER 4 OF THE SERVICE MANUAL.

DO NOT TOUCH EDGE CONNECTOR OR BOARD PLANE. HOLD BOARD BY EJECTORS OR SIDE EDGES ONLY. HANDLING THE RAM BOARD INCORRECTLY COULD CAUSE ELECTROSTATIC DISCHARGE DAMAGE. WHEN INSTALLING THE RAM BOARD, HOLD BY EJECTORS AND MOVE AIR CONTROLLER OUT OF THE WAY WITH THE SIDE EDGE OF THE BOARD.

---

5. **(ALL)**
   Remove the Load Board (09855-66525) from the Processor Stack, if it is present.
6. **(ALL)**
   Install the RAM boards starting with the first unoccupied slot from the bottom. DO NOT LEAVE EMPTY SLOTS BETWEEN BOARDS. If a Load Board is required, install it in the next slot above the RAM. (See "Load Board" in the information at the front of the procedure.)
7. **(ALL)**
   Close the processor stack door. Firmly tighten thumbscrews to prevent RFI radiation. Replace the label that is used as a seal for the processor stack door (Part Number 5180-5201).

8. **(520)**
   Close the left side door.
   (530/540)
   Replace the RFI shield.
9. **(520)**
   Remove right side door.
   (530/540)
   Remove the top cover of the System II enclosure. The cover has one captive screw at the back of the box. Loosen the screw and slide the cover back and away from the box.
10. **(530/540 ONLY)**
    Disconnect the ac module cable and the service module cable.
11. **(520)**
    Remove three #2 Pozidriv screws from the mass storage cover (Figure 1).
    (530/540)
    Remove the four #2 Pozidriv screws that attach the I/O lid. Remove the lid.



* #2 POZIDRIV MASS STORAGE COVER SCREW
★ I/O DOOR CAPTIVE THUMB SCREW

Figure 1. Removing Mass Storage Cover

12. **(520 ONLY)**
    Loosen two captive thumbscrews on I/O door (Figure 1) and swing door open, allowing door to rest in open position.
13. **(520 ONLY)**
    Slide mass storage cover towards front cover of computer, disengaging cover from slot in front card guide.
14. **(520 ONLY)**
    Lift mass storage cover with attached I/O door up and away from computer.

15. **(520 With Bootstrap Loader Card)**
Remove Bootstrap Loader card and replace the Bootstrap Loader ROM with the new ROM. Use tool 8710-0585. Reinstall the card in the I/O card cage.
(520 With Fixed Disc Drive Controller Assembly)
Remove both cable connectors from controller assembly. Remove controller assembly and replace the Bootstrap Loader ROM with the new one (Figure 2). Reinstall the card in the I/O card cage.
(530/540)
Remove the SCM and replace the Bootstrap Loader ROM with the new ROM (Figure 3). Use tool 8710-0585. Reinstall the card in the box.

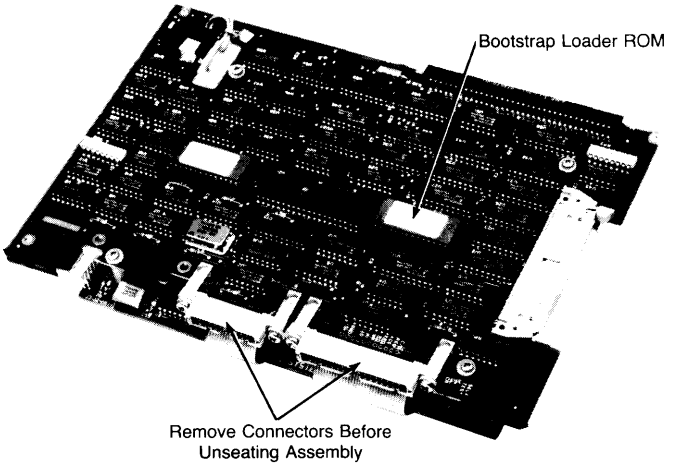


Figure 2. Fixed Disc Controller Assembly

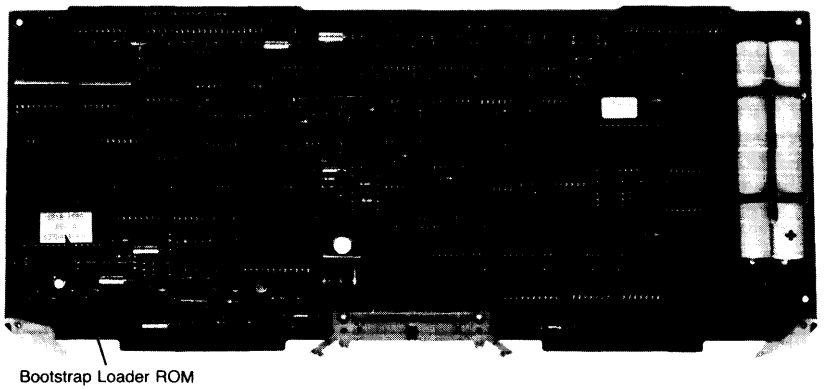
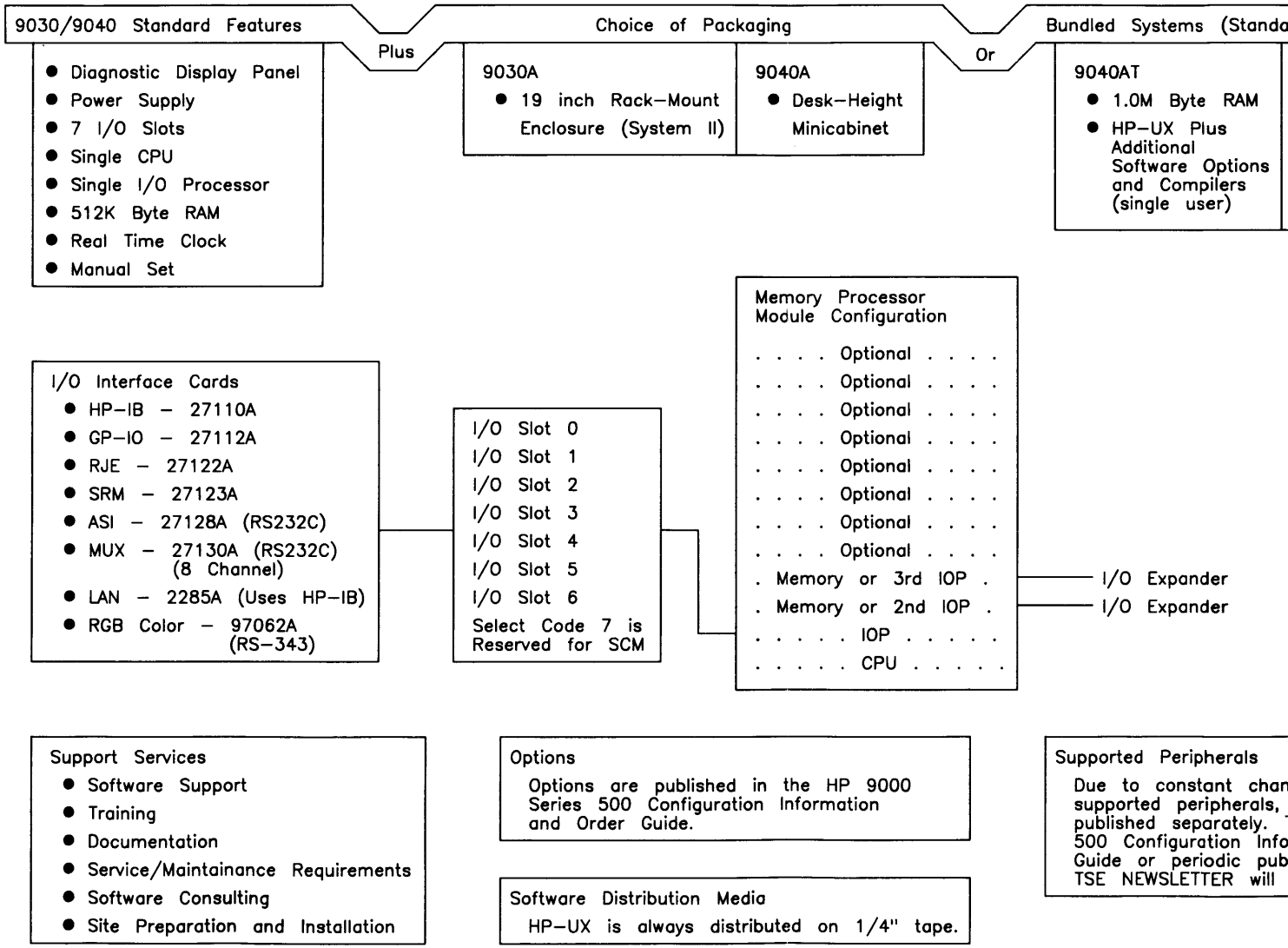
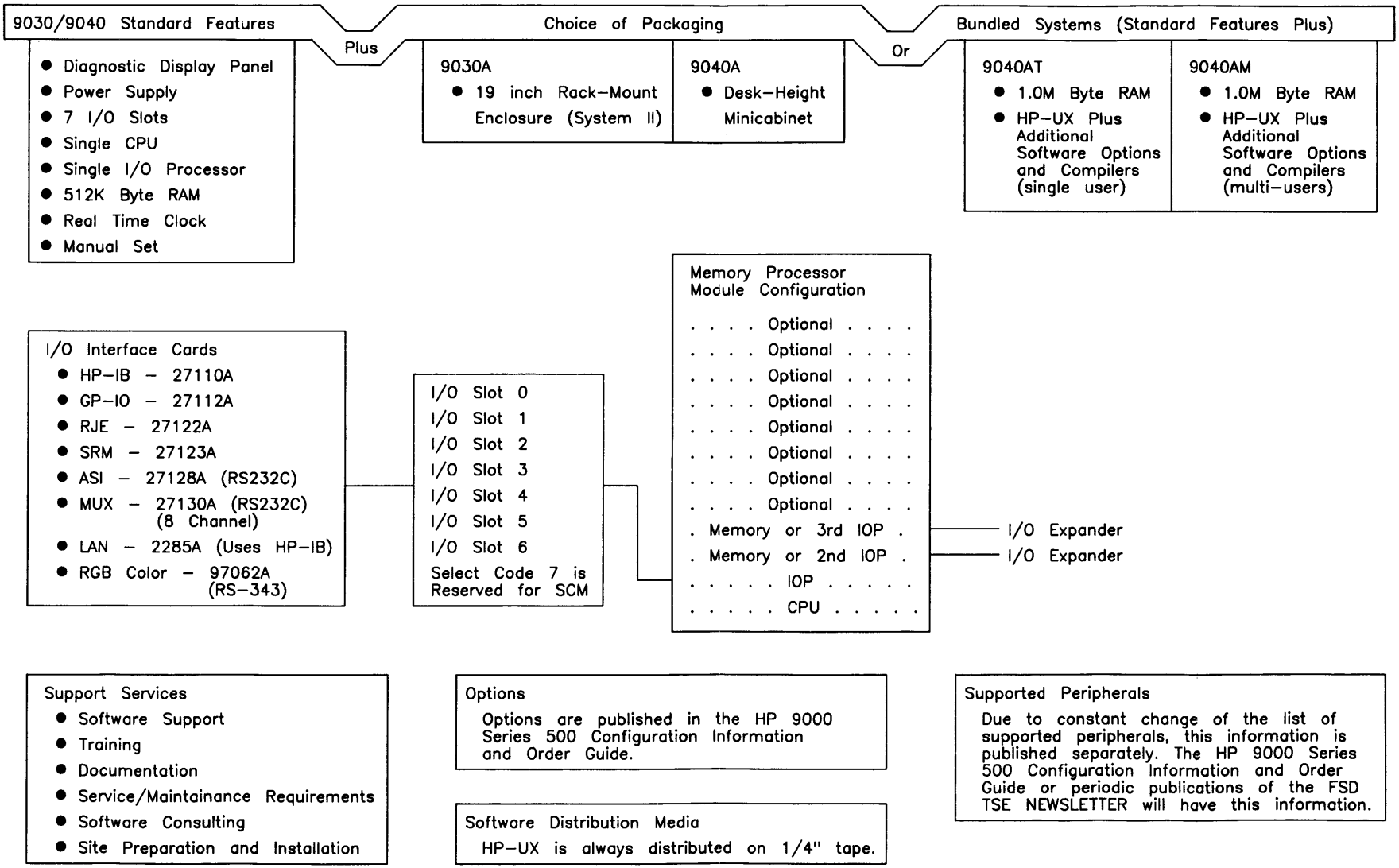


Figure 3. 530/540 SCM Board

16. **(520)**
    Reinstall mass storage cover and right side door.
    (530/540)
    Reinstall I/O lid and connect the ac module cable and service module cable.
17. **(530/540 ONLY)**Reinstall the top cover on the System II enclosure.
18. **(520)**
    Close the right side door.
    (530)
    Replace front panel.
    (540)
    Replace the flip top cover and both front panels.
19. **(ALL)**
    Connect power cord to ac outlet.


9030/9040 Standard Features
Plus
Choice of Packaging
Or
Bundled Systems (Standa
● Diagnostic Display Panel
● Power Supply
● 7 I/O Slots
● Single CPU
● Single I/O Processor
● 512K Byte RAM
● Real Time Clock
● Manual Set
9030A
● 19 inch Rack–Mount Enclosure (System II)
9040A
● Desk–Height Minicabinet
9040AT
● 1.0M Byte RAM
● HP–UX Plus Additional Software Options and Compilers (single user)
I/O Interface Cards
● HP–IB – 27110A
● GP–IO – 27112A
● RJE – 27122A
● SRM – 27123A
● ASI – 27128A (RS232C)
● MUX – 27130A (RS232C) (8 Channel)
● LAN – 2285A (Uses HP–IB)
● RGB Color – 97062A (RS–343)
I/O Slot 0
I/O Slot 1
I/O Slot 2
I/O Slot 3
I/O Slot 4
I/O Slot 5
I/O Slot 6
Select Code 7 is Reserved for SCM
Memory Processor Module Configuration
. . . . Optional . . . .
. . . . Optional . . . .
. . . . Optional . . . .
. . . . Optional . . . .
. . . . Optional . . . .
. . . . Optional . . . .
. . . . Optional . . . .
. . . . Optional . . . .
. Memory or 3rd IOP .
. Memory or 2nd IOP .
. . . . . IOP . . . . .
. . . . . CPU . . . . .
I/O Expander
I/O Expander
Support Services
● Software Support
● Training
● Documentation
● Service/Maintainance Requirements
● Software Consulting
● Site Preparation and Installation
Options
Options are published in the HP 9000 Series 500 Configuration Information and Order Guide.
Software Distribution Media
HP–UX is always distributed on 1/4" tape.
Supported Peripherals
Due to constant chan
supported peripherals,
published separately.
500 Configuration Info
Guide or periodic pub
TSE NEWSLETTER will

Chapter 3
9030/40 Configuration



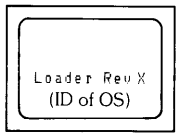
Chapter 4

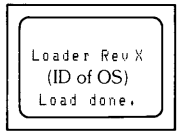
9030/40 Troubleshooting

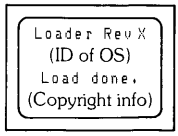
Power On

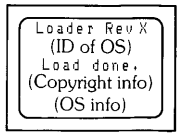
Total Elapsed Time in Seconds

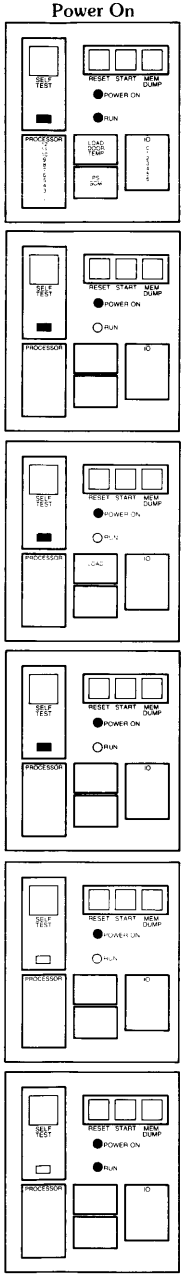
System Console Messages



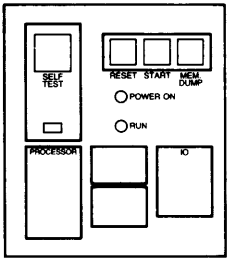
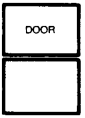
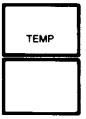
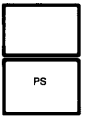
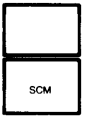
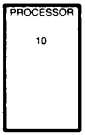
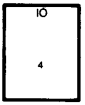






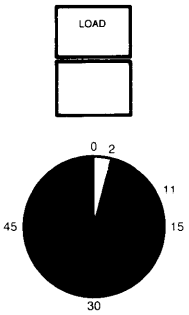


Fault-free Power-up Sequence

Indication	Procedure
 Note: No LEDs on.	Check/Replace: 1. Ac power cord 2. Service panel cable 3. Power supply cable 4. Power supply assembly 5. Ac module
	Close/Tighten: 1. I/O door 2. Processor stack door
	Check/Replace: 1. Ambient air temperature 2. Clogged filter/airflow blockage 3. Fans 4. Power supply assembly
	Check/Replace: 1. Power supply assembly 2. I/O cards 3. Stack boards 4. System control module 5. Motherboard/IO backplane
	Check/Replace: System control module
 Note: Any one of the 12 PROCESSOR LEDs may be on.	Check/Replace: Stack boards
Note: Any one or more of the 7 I/O LEDs may be on. 	Check/Replace: 1. I/O card 2. Peripheral device 3. Interface cable

Fault Indicators (Sheet 1 of 3)

Indication **Procedure**

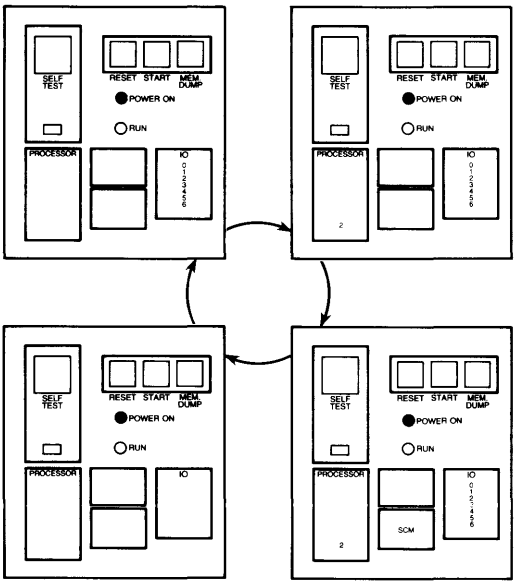
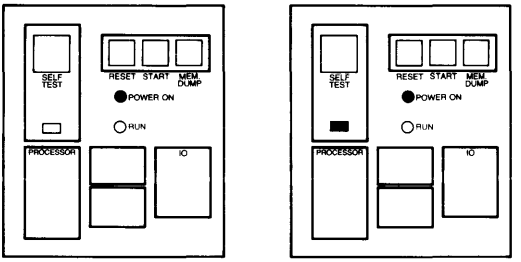


Press:
MEM DUMP
(3 to 5 second delay)
All I/O LEDs on for 1/2 second? — No
Yes
Any I/O LEDs left on? → No → Check/Replace:
1. System control module
2. Service panel
3. Service panel cable
Yes
Read error number from table and fix problem.

Error No.	I/O LEDS (1 = on; 0 = off) 6 5 4 3 2 1 0	Description
0	0 0 0 0 0 0 0	*
1	0 0 0 0 0 0 1	*
2	0 0 0 0 0 1 0	Operating system not found; will retry
3	0 0 0 0 0 1 1	*
4	0 0 0 0 1 0 0	Bad operating system file
5	0 0 0 0 1 0 1	Not enough usable memory
6	0 0 0 0 1 1 0	I/O card or connected device failed self-test
7	0 0 0 0 1 1 1	*
8	0 0 0 1 0 0 0	*
9	0 0 0 1 0 0 1	Media or device not ready
10	0 0 0 1 0 1 0	*
11	0 0 0 1 0 1 1	Part of operating system not readable
12	0 0 0 1 1 0 0	Attempted address or read past end of volume
13	0 0 0 1 1 0 1	Controller/unit failed after passing self-test
14	0 0 0 1 1 1 0	I/O timeout; device did not respond in time
15	0 0 0 1 1 1 1	CS80 error occurred
16	0 0 1 0 0 0 0	Tape error occurred
17	0 0 1 0 0 0 1	Bad status from HP-IB (I/O card)
18	0 0 1 0 0 1 0	Bad I/O bus
19	0 0 1 0 0 1 1	NVM chip failed test
20	0 0 1 0 1 0 0	RTC chip not ticking
21	0 0 1 0 1 0 1	Service processor failed self-test
22	0 0 1 0 1 1 0	Test card found (Not an error)
23	0 0 1 0 1 1 1	Test module did not find SCM
24	0 0 1 1 0 0 0	Memory test in progress (Not an error)
25	0 0 1 1 0 0 1	Looking for operating system (Not an error)

* These codes are not used.

Fault Indicators (Sheet 2 of 3)

Indication	Procedure
	Check/Replace: 1. I/O cards 2. IOP in slot 2 3. System control module 4. IOP cable
	Check: 1. Operating system 2. Insufficient RAM

Fault Indicators (Sheet 3 of 3)

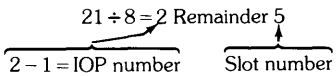
Chapter 5
9030/40 Diagnostics

System Loader Messages

Trailer NNNNN indicates Rev. A loader select codes.

Example:

Where: NNNNN is 21



Trailer SELECT CODE NN indicates Rev. B loader select codes; 0 through 7 = 1st IOP, 8 through 15 = 2nd IOP, and 16 through 24 = 3rd IOP.

Messages

Loader XXX – Informational message identifying the revision of the system loader. This message is usually followed by a single line message identifying the operating system the computer is attempting to load.

Error Code #24 — Testing Memory... – Informational message that follows the "Loader XXX" message indicating that the loader is performing memory tests and configuring memory. This can take up to 15 seconds. (NOT AN ERROR)

Error Code #25 — Looking for System... – Informational message that follows the "Testing Memory..." message indicating that the loader is searching for an operating system.

Please mount next volume. – Informational message. The loader is ready to load another portion of the operating system. Mount the volume containing an unloaded portion of the operating system. Volumes may be mounted in any order without affecting the loading process.

Error Code #2 — SYSTEM NOT FOUND; WILL RETRY: XXX
SYSTEM NOT FOUND; WILL RETRY IN XXX
– Unable to find an operating system on any mass storage device. The loader will attempt to find an operating system again in XXX seconds. Possible causes: mass storage device not powered up, no media in mass storage device, wrong disc in disc drive, computer or mass storage device hardware failure, media failure, incompatible loader/system revision numbers, etc.

Error Code #4 — BAD SYSTEM FILE: NNNNN
BAD SYSTEM FILE: SELECT CODE NN
– Operating system loaded. However, an error has been detected in the operating system code during loading. Possible causes: corrupt system, media failure, mass storage hardware failure, or computer hardware failure.

Error Code #5 — INSUFFICIENT USABLE MEMORY: XXXX
NOT ENOUGH USABLE MEMORY; TOTAL IS XXXX
– The amount of usable memory is too small to load the operating system. The total amount of good memory is "XXXX" bytes. However, the amount of memory available for the Rev. A operating system is "XXXX" minus 32K bytes. The amount of memory available for the Rev. B operating system is "XXXX" minus 98 304 bytes. Possible causes: corrupt system or hardware (memory) failure.

Error Code #6

`BAD CARD OR DEVICE: NNNNN`
`BAD CARD OR DEVICE: SELECT CODE NN`
– Informational message. A hardware failure has been detected (interface card or mass storage device did not pass the Module Self-Test). The loader continues searching for an operating system. Possible causes: bad interface card or mass storage device.

Error Code #9

`DEVICE NOT READY: NNNNN`
`VOLUME NOT MOUNTED: NNNNN`
`MEDIA/DEVICE NOT READY: SELECT CODE NN`
– While loading, the media (Volume) was removed from the device (e.g. a floppy disc was pulled out of a disc drive), the device went offline, or a hardware problem caused the device to become "not ready".

`DMA FAILED: NNNNN` – Data did not transfer properly from the mass storage device to the computer. Possible cause: Mass storage device hardware failure or computer hardware failure.

Error Code #11

`UNRECOVERABLE DATA: NNNNN`
`UNRECOVERABLE DATA: SELECT CODE NN`
– Part of the operating system is not readable. Possible causes: media failure or mass storage device hardware failure.

Error Code #12

`END OF VOLUME: NNNNN`
`END OF VOLUME: SELECT CODE NN`
– Attempt to address or read past the end of a volume. Possible causes: corrupt system, media failure or mass storage device hardware failure.

Error Code #13

`CTRLR/UNIT FAULT: NNNNN`
`CTRLR/UNIT FAULT: SELECT CODE NN`
– Hardware passed initial self-test. However, it failed while being used to load the operating system. Possible causes: computer (interface card) hardware failure or mass storage device hardware failure.

Error Code #14

`IO TIMEOUT: NNNNN`
`IO TIMEOUT: SELECT CODE NN`
– Mass storage device failed to respond fast enough while attempting to load from it. Possible cause: computer hardware failure or mass storage device hardware failure.

Error Code #15

`CS80 DEVICE: NNNNN`
`CS80 DEVICE: SELECT CODE NN`
– Indicates a mass storage device hardware failure.

Error Code #16

`TAPE DEVICE: SELECT CODE NN` –Usually indicates a tape device (HP 7970, HP 7974, HP 7978) hardware failure. Can also indicate a failure on the HP 27110A HP-IB Interface (or the Internal HP-IB interface). Tape errors covered are: "Command Rejected", "Interface Busy", "Rewinding", "Tape Runaway", "Data Timing Error", and "Command Parity Error".

Error Code #17

`HPIB CARD: NNNNN`
`HPIB CARD: SELECT CODE NN`
– Transaction to the indicated HPIB interface card was terminated due to a probable interface card failure.

Error Code #18

`BAD IO BUS: NNNNN`
`BAD IO BUS: SELECT CODE NN`
– Indicates a computer hardware failure on the computers first IOP.

Error Code #19

`BAD NVM: NNNNN`
`BAD NVM: SELECT CODE NN`
– Indicates that Non-Volatile Memory failed its self-test. Possible cause: computer hardware failure.

Error Code #20 `BAD RTC: NNNNN`
`BAD RTC: SELECT CODE NN`
– Indicates that the built in Real Time Clock is not operating correctly.

Error Code #21 `BAD SP: SELECT CODE NN` – Indicates that the HP 9030 and HP 9040 computer's service processor failed self-test.

Error Code #22 `Test card found` – (Not an error.)

Error Code #23 `Test module did not find SCM`

HP-UX 4.0 Operating System Error Messages

Warning and Error Messages

`Clock and date not set.` – This message indicates that either the contents of the NVM are not valid at powerup or the clock has not been set since this condition was detected. Possible causes: a bad battery on the SCM board, or computer powered down for more than 2 weeks. The condition does not stop the system operation.

`Self test error 1: I/O address AA, SS STATUS: XXXXXXXX`

Where: AA = Select code

SS = Subaddress

XXXXXXXX = Device or card dependent error information (in hexadecimal).

This error message is displayed as a result of the self-test failure of an I/O device. The select code subaddress denote the device, and the device dependent error information indicates the nature of the failure. System operation can continue provided that use of the failed device is not required.

`Self test error 2: CHECKSUM for segment NN` – When the system is powered up, or a system reset is executed, the checksum for every code segment of the operating system is computed and compared to a checksum in the operating system code. When the checksums do not agree for a segment, the segment number is stored. As a result, the segment reported is the last segment for which a checksum error was detected. The operation of the system is not halted, however, further operation is at your own risk.

`Self test error 3: XXXX NN`

Where: XXXX = "CPU#", "IOP#", or "MC#_".

NN = The Nth of that type of component (counting from the bottom of the stack).

This error occurs when the system is able to get completely through the board self-test and the loader self-test, but a failed stack component is detected by the operating system. The message indicates the type of component which has failed and its relative position in the stack. Operation of the system can continue, if the failed board is not required,

`Self test error 4: Memory reduced to: NNNNNNNN Bytes, MCs:<list>`

Where: NNNNNNNN = number of bytes (in decimal) that are available.

<list> = A list of Memory Controller numbers which had failures. Up to 10 MC numbers are printed in 10 two character fields, with no intervening spaces. For example: "MCs: 1 210" indicates that Memory Controllers 1, 2, and 10 have failed the memory test. Memory boards (and memory controllers) are numbered from 1, starting at the bottom of the RAM.

This number represents all usable RAM in the system including memory used to hold code segments.

`Self test error 5: Fewer finstrates were found than expected.` – This message is displayed when the number of boards recorded in the Non-Volatile Memory (NVM) is greater than the actual number of boards in the stack. If the number of boards in the stack is greater than the number stored in the NVM, the number in the NVM is updated to reflect the larger stack size.

Fatal Error Messages

`System halted due to double bit memory error on MC # NN CCCCCCCC`

Where: NN = MC #

CCCCCCCC = Last healer content for that MC (in hexadecimal).

This message is displayed when a double bit error has been detected by the memory controller hardware. The MC# is in terms of memory controller boards (counting up from the bottom of the stack). This information is also recorded in the NVM.

If more than one MC with a double bit error is found, only the last error is displayed. If no double bit errors are found, "No DBE found" replaces NN XXXXXXXXX. DBE information is stored in the NVM.

`SYSTEM_HALTED: Insufficient memory to start system` – This message is displayed when there is insufficient memory for the operating system and user subsystem. Check the stack self-test lights to see if any stack components have failed self-test. Also, check the memory configuration of the computer to see if it is large enough to accomodate the system and options which are being loaded.

`SYSTEM HALTED: Incompatible IOPs` – This message indicates that an illegal combination of IOP boards were found at power up. IOPs of Revision 2.1 or earlier are not compatible with IOPs of Revision 2.2 or later.

System Error Message

`System halted->SYSTEM ERROR:....` – This message is displayed when the operating system software encounters either:

- an unanticipated trap,
- an unrecoverable system software error.

The "trap" is distinguished from the software error by the word "trap:" which is added to the first line of the message.

Before displaying any messages, the currently executing CPU disables its interrupts and causes all other CPUs to stop operating. The message text is multiple lines information dumped from memory and internal registers. The message starts on the top line on the Display and overwrites any other messages on the CRT. If a printer is the output device and the message is more than 25 lines in length, the message continues to print (up to 500 lines).

Service Panel Switches

Switch	Function
SELF TEST	Pressing this latching switch initiates a continuous system self-test. As long as the switch is latched, continous self testing occurs. Pressing the switch again, unlatching it, terminates the self-test.
RESET	Pressing this switch resets the system, stopping all running programs and resetting all I/O select codes. After reset, the system waits for further instructions.
START	Pressing this switch initiates system run from an idle state. If the system does not restart, the computer must be turned off and then powered up.
MEM DUMP	Pressing this switch dumps the contents of main memory onto the system disc. This switch should be used only when a load fault occurs and no system message is displayed.

Service Panel LEDs

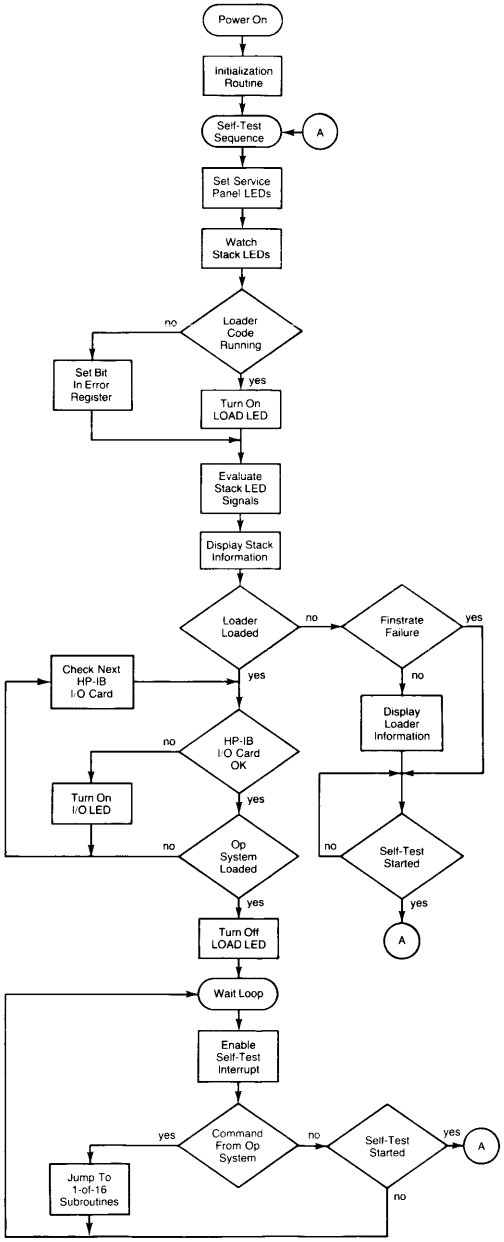
LED	Indication When Lit	Cure
POWER ON	Power supply is working, and power is being provided to the computer.	Normal operation.
RUN	Operating system is running.	Normal operation.
SELF TEST	Self-test is running. This LED turns on when the self-test begins and turns off when the self-test completes. It normally remains on when a failure occurs; another LED lights to indicate the nature of the failure.	Determined by other LEDs.
PROCESSOR 1-12	Finstrate in the specified processor stack slot failed to pass self-test.	Check finstrate.
IO 0-6	Interface card in the specified I/O slot failed to pass self-test.	Check I/O card, peripheral device, interface cable.
LOAD	Operating system is being loaded during the power-up sequence. The light goes off after the load is completed.	If light remains on, see Fault Indicators (Sheet 2) in Chapter 4.
DOOR	Interface card cage door or processor stack door is open.	Close door(s), tighten thumbscrews.
TEMP	Processor stack temperature has exceeded 100°C.	Check ambient air temperature, airflow, fans, power supply assembly.
PS	Main power has been shut down.	Check power supply assembly, I/O cards, finstrates, system control module, motherboard, I/O backplane.
SCM	System control module is faulty.	Check SCM.

Power Supply LEDs

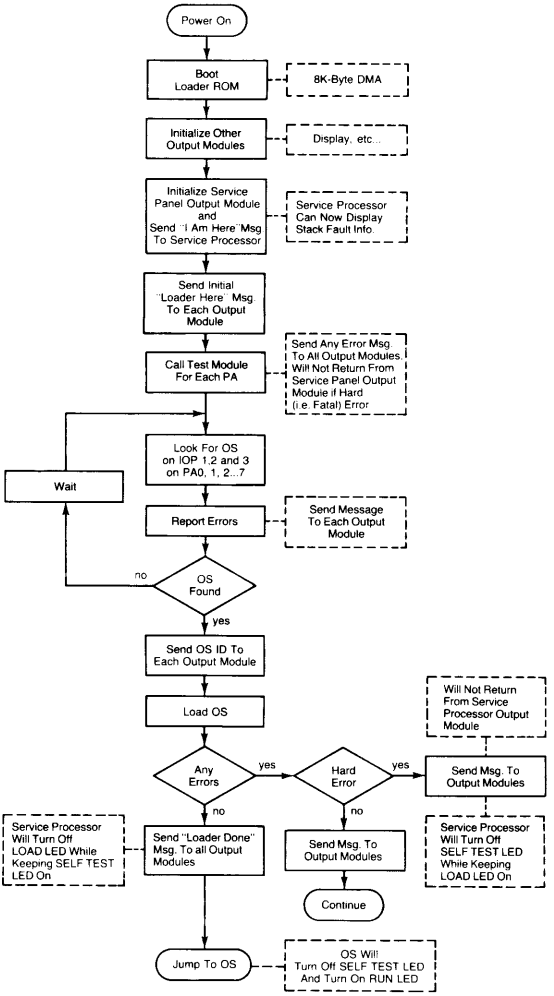
LED	Indication When Lit	Cure
DOORS OPEN	Interface card cage door or processor stack door is open. **OV** also lights.	Close door(s), tighten thumbscrews.
STACK TEMP	Processor stack temperature has exceeded 100°C.	Check ambient air temperature, airflow, fans, power supply assembly.
SEC BOARD	+12MM mass storage power supply has failed or temperature in power supply assembly has exceeded 100°C.	Check +12MM mass storage power supply and bus, ambient air temperature, airflow, fans, power supply assembly.
PWR	Peak primary current exceeded 9A.	Check power supply assembly, short circuits.
OV	Used in conjunction with voltage LEDs; "on" indicates an overvoltage condition on one or more of the supplies or door open, "off" indicates an undervoltage condition.	Close door(s), tighten thumbscrews. Check power supply assembly, short or open circuits.
−19 **−12** **−2** **3** **5** **6** **12** **19**	Fault condition exists on the indicated supply. If the **OV** LED is also lit, an overvoltage condition is indicated; if **OV** is not lit, an undervoltage condition is indicated.	Check power supply assembly, IOP bus, modules using the indicated voltage, short or open circuits.

System Functional Tests (SFT)

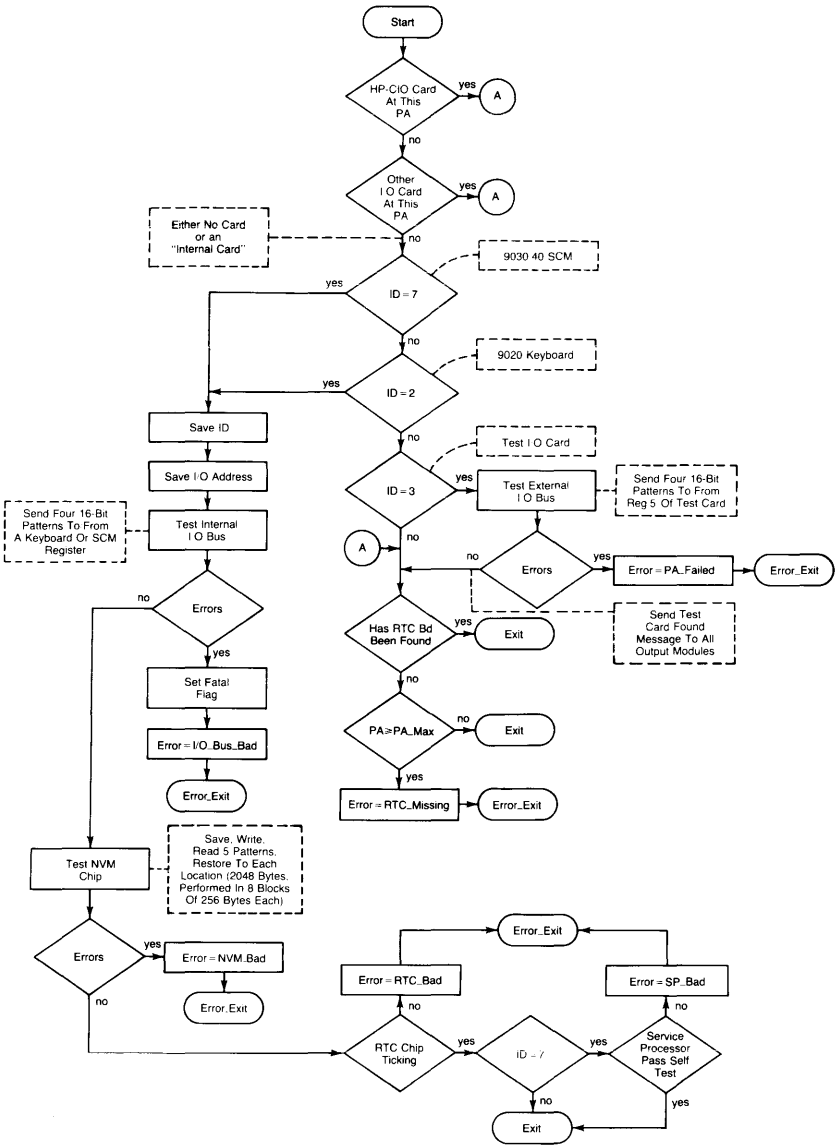
1. If not previously done, install and verify the HP-UX operating system.
2. In response to the `login:` prompt, type: `root` and press RETURN. You are now the super-user.
3. Type: `cd /usr/ptests`.
4. Type: `start` and press RETURN.
5. From the menu that appears on the system console, select the test you would like to run, enter its number, and press RETURN.



Service Processor Code Flowchart



Loader ROM Flowchart



Loader ROM Test Module Flowchart

Chapter 6
9030/40 Adjustments

The 9030/40 has no adjustments.

Chapter 7
9030/40 Peripherals

Select Codes

Select Code	Usage
0	I/O Slot 0
1	I/O Slot 1
2	I/O Slot 2
3	I/O Slot 3
4	I/O Slot 4
5	I/O Slot 5
6	I/O Slot 6
7	System Control Module

HP-CIO Interface Cards

HP 27110A Standard HP-IB

Features

- IEEE-488-1978 compatible.
- Supports DMA with two modes of performance: High Speed Mode for operation with fixed discs or other high-speed peripherals, and Standard Mode for instruments and slower peripherals.
- Supports up to 14 device loads.
- Selectable HP-IB controller or slave capabilities and parallel poll capabilities (BASIC Language System only).
- Built-in hardware self-test.

Configuration

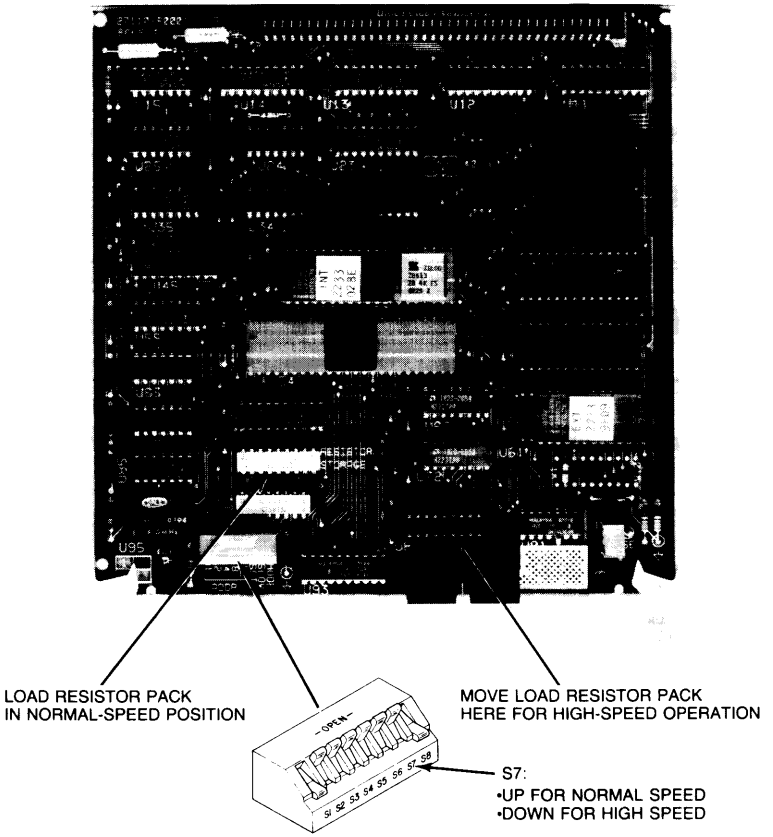
The normal switch settings are shown in the next figure.

The switch functions are:

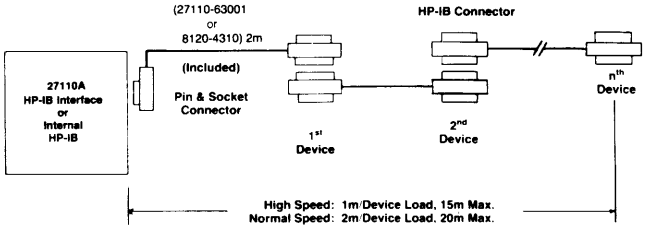
S1-S5: Address 30 (decimal); S1 is Least Significant Bit
S6: System Controller On
S7: Normal Speed
S8: Test Mode 1

High-speed devices can run on a normal-speed bus, but run slower than their capacity. Normal-speed devices cannot run on a high-speed bus. The following are high-speed devices:

- disc drives
- 7971A tape drive
- 2608S and 2631B/G printers



HP 27110A HP-IB Interface Card



HP 27110A HP-IB Interface Cabling

Available HP-IB Cables

Product Number	Length (in meters)
92220R	0.3
10833D	0.5
45529A	1.0
45529B	2.0
45529C	4.0
5060-9459	6.0
5060-9460	8.0

HP 27112A General Purpose I/O (GPIO) 16-Bit Parallel

Features

- Choice of programmable operating modes (clocked or transparent) for ease of use with instrumentation.
- Supports +5V level on all input and output signals, plus an optional +12V level on output signals.
- Programmed data detection for either positive true or ground true levels.
- Independent 16-bit input and output buses and storage registers.
- Two control and two status lines.

Configuration

The normal switch settings depend on which peripheral device is connected to the GPIO. The 97060A Graphics Processor requires the GPIO switch settings shown in the next figure.

The switches correspond to:

SW1

S1: DIN;
Up – Positive True.
Down – Negative True.

S2: CTS and STS;
Up – Positive True.
Down – Negative True.

S3: PSET;
Up – Positive True.
Down – Negative True.

S4: PDIR;
Up – Positive True.
Down – Negative True.

S5: DOUT;
Up – Positive True.
Down – Negative True.

S6: PEND;
Up – Positive True.
Down – Negative True.

S7: PFLAG;
Up – Positive True.
Busy – High.
Ready – Low.
Down – Negative True. (HP 97060A).
Busy – Low
Ready – High.

S8: PCNTL;
Up – Positive True.
Active – High.
Idle – Low.
Down – Negative True.
Active – Low.
Idle – High.

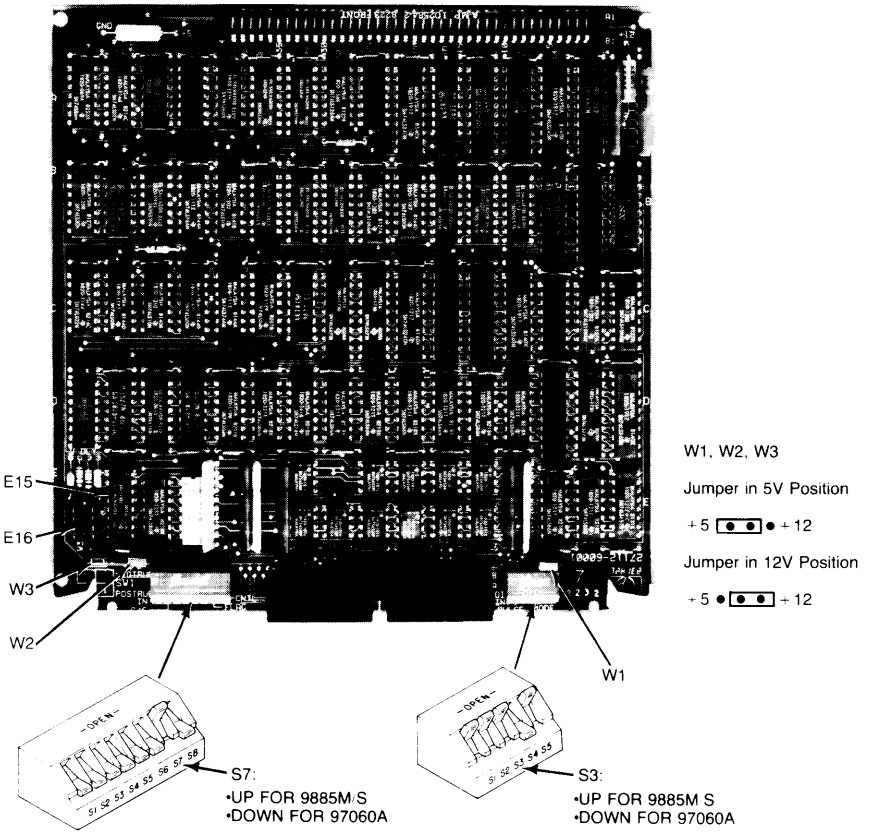
SW2

S1: Bidirectional Bus Enable;
Up – Disabled.
Down – Enabled.

S2: Internal Handshake Enable;
Up – Disabled.
Down – Enabled.

S3: Full/Pulse Handshake Enable;
Up – Disabled.
Down – Enabled (HP 97060A).

S4 and S5: Data Input Clock Select;
Both Down – backplane sync cycle completion.
Both Up – Backplane sync cycle completion.
S4 Up and S5 Down – Busy to ready edge of PFLAG (trail edge).
S4 Down and S5 Up – Ready to busy edge of the PFLAG (lead edge).



HP 27112A General Purpose I/O (GPIO) Interface Card

To configure the GPIO card:

1. Install jumpers in W1, W2, and W3, according to whether 5-volt or 12-volt logic levels are to be used.
2. Set the card's switches for proper operation.
3. If necessary, increase the delays on the card as follows:

   Two one-shots (E15) on the GPIO card generate the write delay and the internal handshake delay. The write delay one-shot provides approximately 100 nsec for the output data to settle. When extra-long cables are used, or when the peripheral device requires additional settling time for the data, the delay can be increased by adding a capacitor between pins 1 and 4 of the socket at E16.

   The formula for selecting the capacitor value is:

   $C = (T-100)/1.5$

   where

   C = additional capacitance (in pf)
   T = total time delay required in nsec

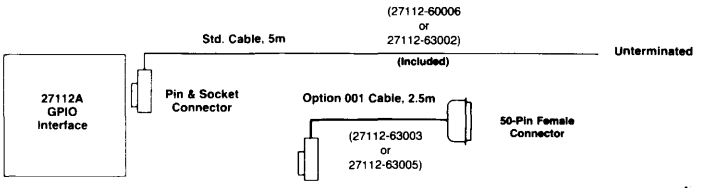
   The internal delay one-shot provides a delay of approximately 3 usec between the assertion of PCNTL and the assertion of FLAG. The delay can be increased by adding a capacitor between pins 5 and 8 of the socket at E16.

   The formula for the value of the capacitor is:

   $C = (T-3000)/3$

   where

   C = additional capacitance (in pf)
   T = total time delay required (in nsec)

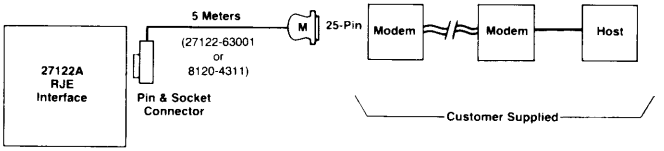


HP 27112A GPIO Interface Cabling

HP 27122A Remote Job Entry (RJE)

Features

- 1,200 to 19,200 baud rates.
- Compatible with EIA RS-232C and CCITT V.24 specifications.
- Supports Bell type 208B, 2096, and 212 data sets or equivalent.
- Supports Siemens MSV2 protocol.
- Works with full or half duplex modems, and supports AUTO ANSWER and ORIGINATE.
- Provides link control functions: line bid, normal and transparent data modes, all responses, and link termination.
- Assures data integrity with CRC error checking.
- EBCDIC character recognition.
- Space compression/truncation.



HP 27122A Remote Job Entry (RJE) Cabling

Shared Resource Management Interface (SRM) - HP 27123A

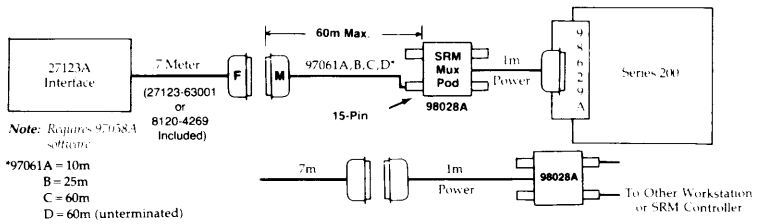
Features

- Data transmission rate is 700 Kbits per second.
- Access to the network through rotary polling on an HP 98028A Multiplexer (part of the SRM product).
- All transmissions are broadcast to all connections on the HP 98028A Multiplexer.
- Packets can contain up to 512 data bytes.
- Reception of packets is acknowledged.
- Remote file access to create/open/purge a file or directory, read or write bytes, set protection, and catalog.

Configuration

Ensure that the eight switches are set to the binary equivalent of the assigned decimal node address. S1 is the MSB, and S8 is the LSB.

Cable Information



HP 27123A SRM Interface Cabling

HP 27128A Asynchronous Serial Interface (ASI)

Features

- Switch selectable and software programmable baud rate; up to 19,200 bits per second.
- EIA RS-232C, CCITT V.24, and CCITT V.28 compatibility.
- Asynchronous transmission in simplex, full duplex, and echoplex mode.
- Programmable format control and built-in framing error, overrun error, and parity checking.
- Break detection, support for X-ON/X-OFF and terminal emulation mode.

Configuration

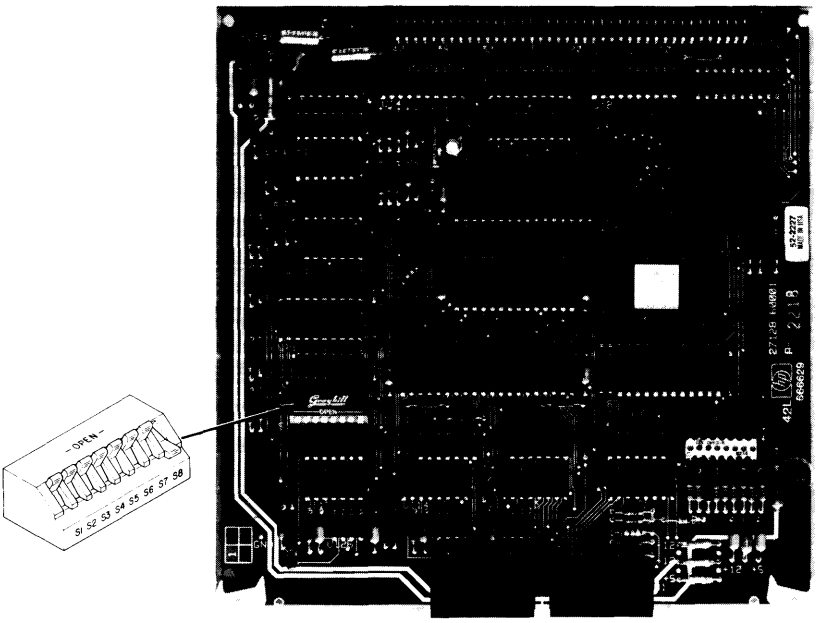
The normal switch settings are:

S1: Single Text Termination;	UP – Single Text Termination. (Typical) Down – Not Single Text Termination.
S2: Hard wired;	Up – Device Directly Connected. Down – Device Not Directly Connected. (Modem use)
S3: No Parity;	Up – No Parity. (Typical) Down – Odd Parity.
S4: Bits Per Character;	Up – 8 Bits Per Character. (Typical) Down – 7 Bits Per Character.
S5 to S8: Baud Rate;	(See table)

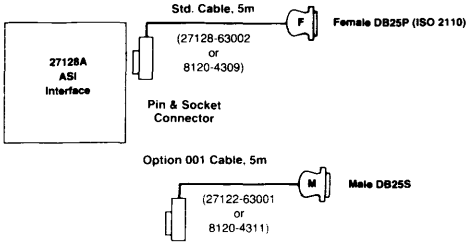
ASI Baud Rate Switches

Switches				
S5	**S6**	**S7**	**S8**	**BAUD Rate**
Down	Down	Down	Down	50
Down	Down	Down	Up	75
Down	Down	Up	Down	110
Down	Down	Up	Up	134.5
Down	Up	Down	Down	150
Down	Up	Down	Up	300
Down	Up	Up	Down	600
Down	Up	Up	Up	900
Up	Down	Down	Down	*1200
Up	Down	Down	Up	1800
Up	Down	Up	Down	2400
Up	Down	Up	Up	3600
Up	Up	Down	Down	4800
Up	Up	Down	Up	7200
Up	Up	Up	Down	**9600
Up	Up	Up	Up	19200

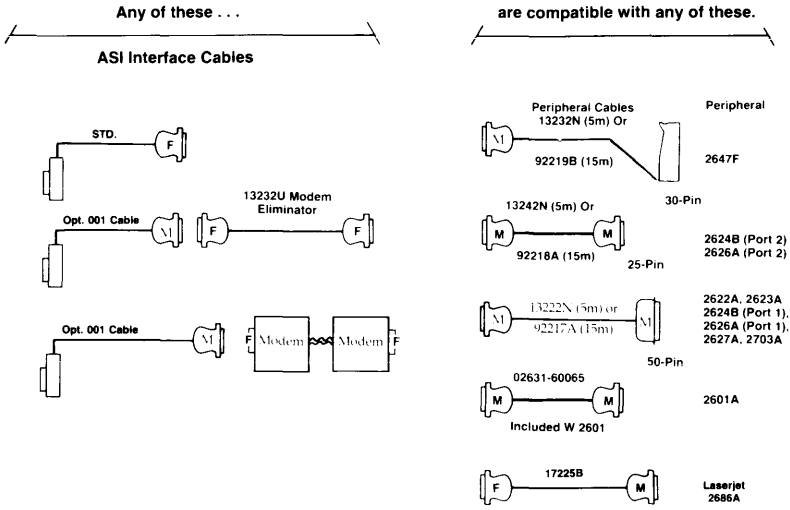
* Typical modem
**Typical direct connection application



HP 27128A Asynchronous Serial Interface (ASI) Card



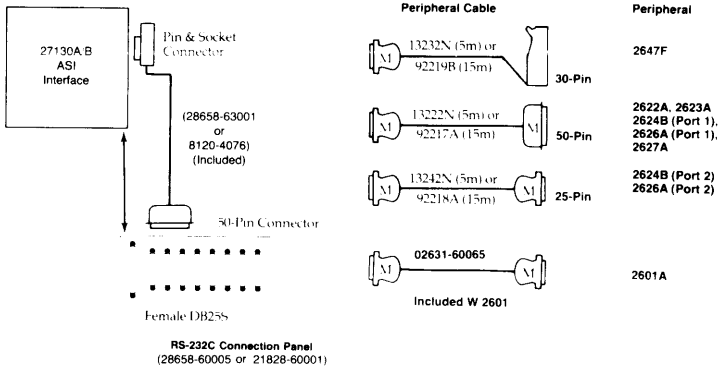
Terminal Cabling



HP 27130A/B Asynchronous 8-Channel Multiplex

Features

- CCITT V.28 and EIA RS-232C compatible.
- Supports simplex, echoplex, or full-duplex mode (asynchronous transmission only).
- Selection of data transmission attributes can be performed independently on each channel.
- Local intelligence reduces time consumed by the CPU during I/O transactions by offering edit functions, special character recognition, and handshake protocol control.
- Parity, overrun, and framing errors are sensed locally to detect transmission errors.
- X-ON/X-OFF (both directions) and ENQ/ACK (one direction, host sending ENQ) handshaking

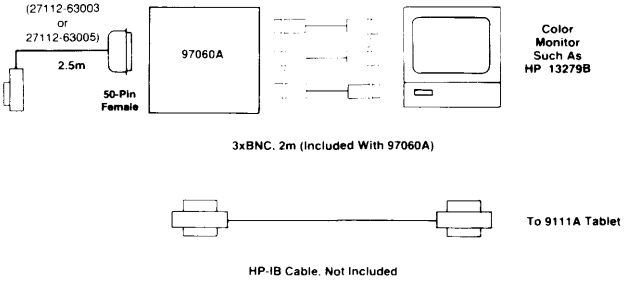


HP 27130A/B Asynchronous 8-Channel Multiplex Cabling

HP 97060A Graphics Processor

Features

- GPIO interface to the host computer. (See GPIO for cabling information.)
- High performance graphics processor; 8 planes of 1024 X 1024 pixels.
- RGB output to color graphics monitor.
- Built in self-test capabilities. Results displayed by the Ready light.
- Compatible with the HP 9111A Data Tablet.

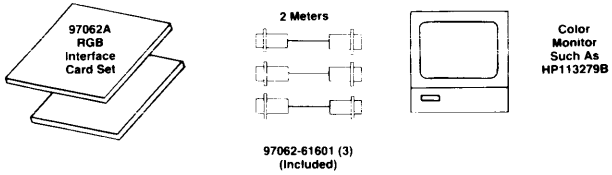


Interconnecting the HP 97060A Graphics Processor

HP 97062A Color Video

Features

- Medium-resolution interface to 19-inch color monitor.
- Produces RS-343-compatible signals across three coaxial cables.
- Uses four memory planes to display 16 colors from 4096 available.
- Supports all Graphics/9000 plotter commands including area shading.



HP 97062A Color Video Interface Cabling

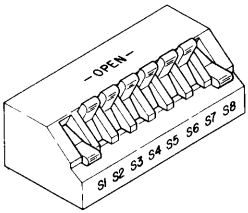
HP 2885A LAN 9000 Local Area Network

Features

- HP-IB interface to host CPU.
- Coax cable with baseboard signaling.
- 10 Mbps data signaling rate.
- Minimum separation between nodes is 2.5 metres.
- Nodes can be up to 40 metres from the coax cable.
- Masterless protocol, Carrier-Sense Multiple Access with Collision Detection (CSMA/CD).
- Up to 500-metre segment coax length and up to 100 nodes per segment.
- Supports broadcast and multicast addressing.
- User-executable diagnostics which can be run simultaneously with other network services.

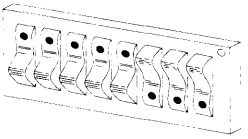
Configuration

Before you install the HP-IB card, ensure that the resistor pack is installed in socket U74 (normal speed) and that the switches are set in these positions:

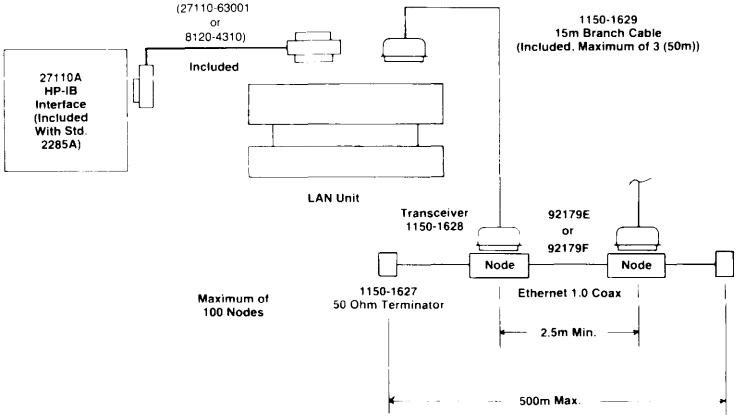


HP-IB Switch Setting

Set the bus address of the LAN unit to 0 by setting the switches on the back of the unit to these positions:



LAN Unit Switch Settings



HP 2885A LAN 9000 Local Area Network Cabling

Chapter 8
9030/40 Replaceable Parts

Exchange Parts

New Part Number	Rebuilt Part Number	Description
09855-67980	09855-69980	Power Supply Assembly
5061-6803	97043-69803	Floating Point CPU
5061-6805	97047-69805	512K RAM Board
5061-7704	97046-69704	1M RAM Board
09955-66510	09955-69510	System Control Module

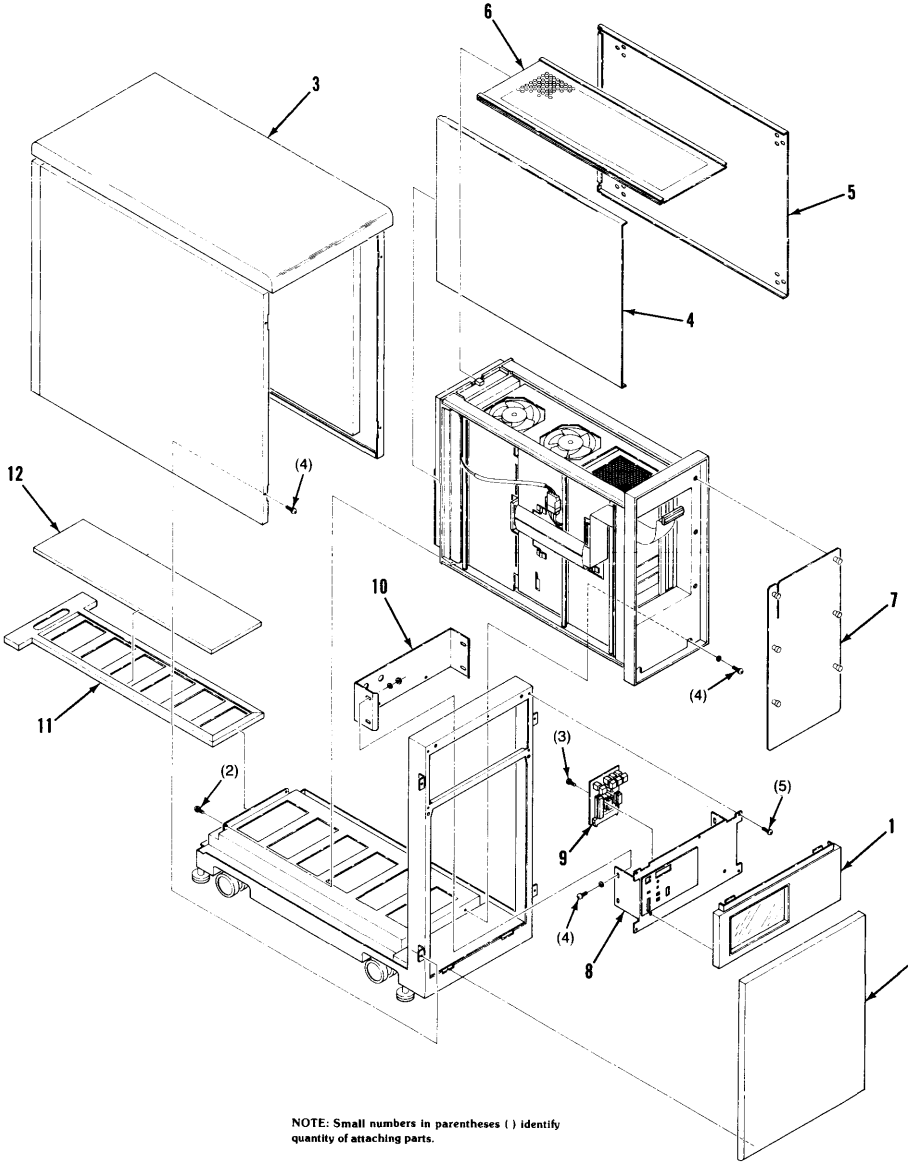
Non-Exchange Parts

Part Number	Description
09955-66500	Motherboard
09955-66511	Service Panel Board
09955-66501	I/O Backplane
5061-4224	Processor Stack Clock Board
5061-4225	IOP Finstrate
5061-4228	IOP Buffer Assembly
97043-69235	CPU Finstrate
5061-4232	256K RAM Board
3103-0377	Fan

Replaceable Parts, Exploded View #1

Index Number	Part Number	Item Description	Total Qty
1		Front Panel, HP 9040	1
	1600-1318	• Window Clamp	1
	4114-0991	• Window	1
	5041-3470	• Window Frame	1
	0701-0715	• Upper Front Panel	1
	1600-1315	• Beltline Strip	1
2	07908-00002	Lower Front Panel, HP 9040	1
3	09955-67902	Flip-Top Cover, HP 9040	1
*4	5061-9436	Top Cover (System II)	1
*5	5061-9448	Bottom Cover (System II)	1
*6	5061-9523	Side Cover, Perforated (System II)	2
7	1600-1314	RFI Shield, HP 9040	1
8	1600-1300	Service Panel Bracket, HP 9040	1
9	09955-66511	Service Panel Board	1
	3101-2524	• Switch Assembly (4 switches)	1
	5041-0368	• Keycap	4
10	1600-1301	Support Bracket, HP 9040	1
11	1600-1299	Air Filter Frame, HP 9040	1
12	7121-3730	Air Filter, HP 9040	1

* These parts have been changed from "inch" to "metric". You may need to obtain metric hardware when replacing these parts.



NOTE: Small numbers in parentheses ( ) identify quantity of attaching parts.

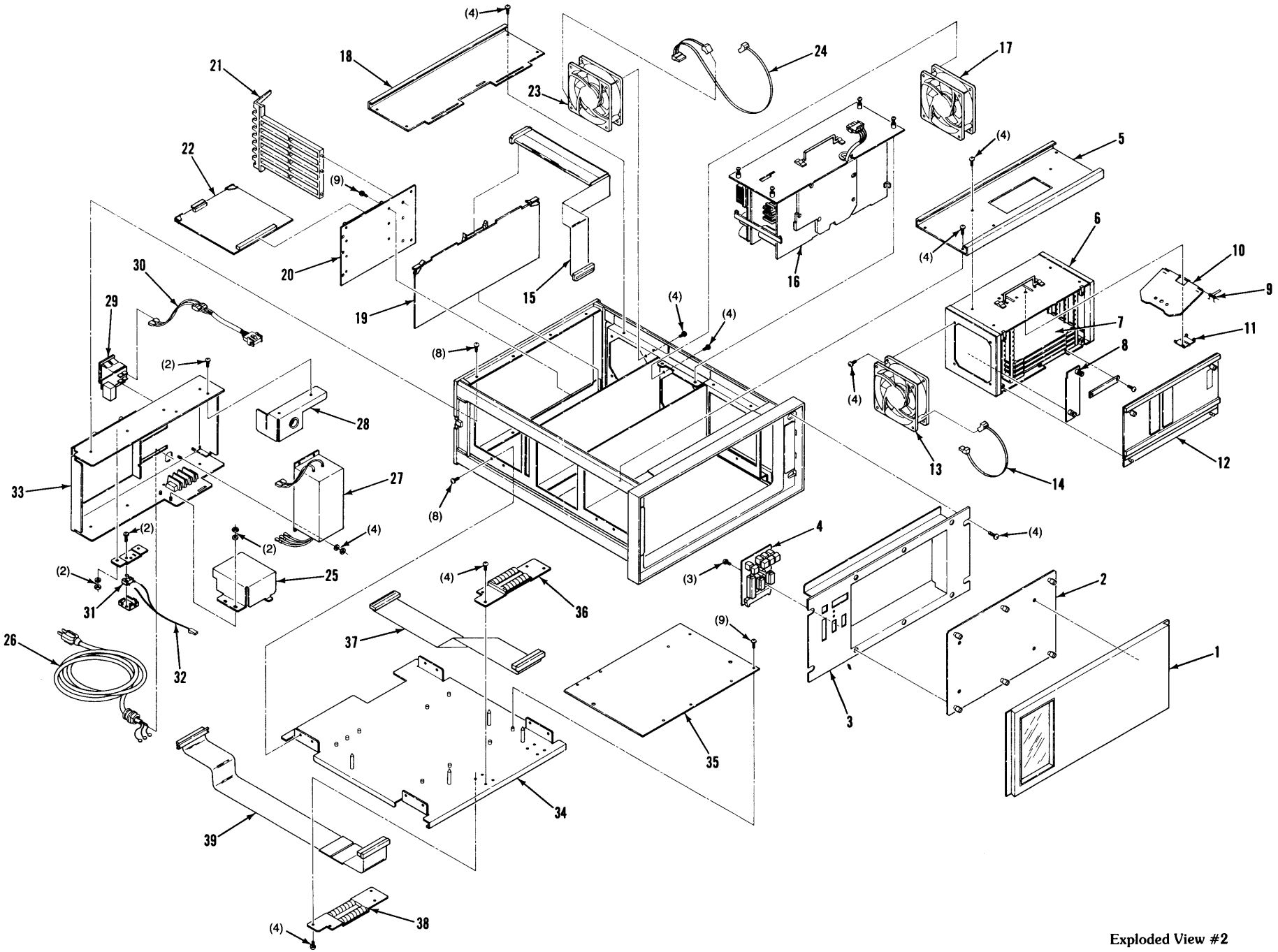
Exploded View #1

Replaceable Parts, Exploded View #2

Index Number	Part Number	Item Description	Total Qty
1		Front Panel, HP 9030	1
	1600-1318	• Window Clamp	1
	4114-0991	• Window	1
	5041-3470	• Window Frame	1
	7101-0702	• Cosmetic Panel	1
2	1600-1298	RFI Shield, HP 9030	1
3	7101-0701	Appearance Panel	1
4	09955-66511	Service Panel Board	1
	3101-2524	• Switch Assembly (4 switches)	1
	5041-0368	• Keycap	4
5	1600-1287	Processor Stack Lid	1
6		Processor Stack	1
7	97043-69235	• CPU Board	A/R
	5061-6803	• Floating Point CPU Board (New)	A/R
	97043-69803	• Floating Point CPU Board (Exchange)	A/R
	5061-6806	• IOP Board (Rev.3.1)	A/R
	5061-4228	• IOP Buffer Assembly	1
	09855-69232	• 256K RAM Board	1
	5061-6805	• 512K RAM Board (New)	1
	97047-69805	• 512K RAM Board (Exchange)	1
	5061-7704	• 1M RAM Board(New)	1
	97046-69704	• 1M RAM Board(Exchange)	1
8	5061-4224	• Processor Stack Clock Board	1
9	1460-1981	• Spring	2
10	4040-2114	• Air Controller	1
11	4040-2115	• Controller Pivot	1
12	5061-4264	• Processor Stack Door	1
13	3160-0377	• Processor Stack Fan	1
14	8120-3790	• Processor Stack Fan Cable	1
15	8120-4016	Service Panel Cable	1
16	09855-69980	Power Supply Assembly	1
17	3160-0377	Power Supply Fan	1
18	1600-1286	I/O Lid	1
19	09955-69510	System Control Module	1
	1420-0302	• Battery Assembly, 4.8V	1
20	09955-66501	I/O Backplane	1
21	0403-0466	I/O Card Guide	2
22	Cd Specific	I/O Card	A/R
23	3160-0377	I/O Fan	1
24	8120-3787	Power Supply and I/O Fans Cable	1
25	1600-1331	Terminal Block Cover	1

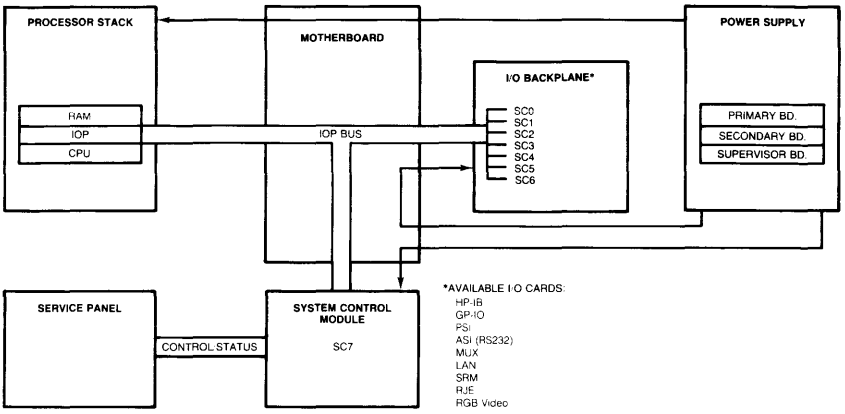
Replaceable Parts, Exploded View #2, Continued

Index Number	Part Number	Item Description	Total Qty
26		Power Cord	1
	09855-61600	• U.S.A., 110V	
	09855-61605	• Great Britain	
	09855-61601	• Australia	
	09855-61602	• Europe	
	09855-61603	• U.S.A., 220V	
	09855-61604	• Switzerland	
	09855-61606	• Denmark	
27	9135-0177	Line Filter	1
28	1600-1312	Power Switch Assembly Cover	1
29		Power Switch Assembly	1
	09955-61901	• 110V	
	09955-61902	• 220V	
30		Power Supply Cable	1
	8120-3764	• 110V	
	8120-3763	• 220V	
31	3101-2565	I/O Door Interlock Switch	1
32	8120-4043	I/O Door Interlock Cable	1
33	7101-0704	Rear Panel	1
34	7101-0703	Base Plate	1
35	09955-66500	Motherboard	1
36	1600-1316	IOP #1 Cable Strain Relief Clamp	1
37	8120-4015	IOP #1 Cable	1
38	1600-1316	IOP #2 or #3 Cable Strain Relief Clamp	1
39	8120-4058	IOP #2 or #3 Cable	1

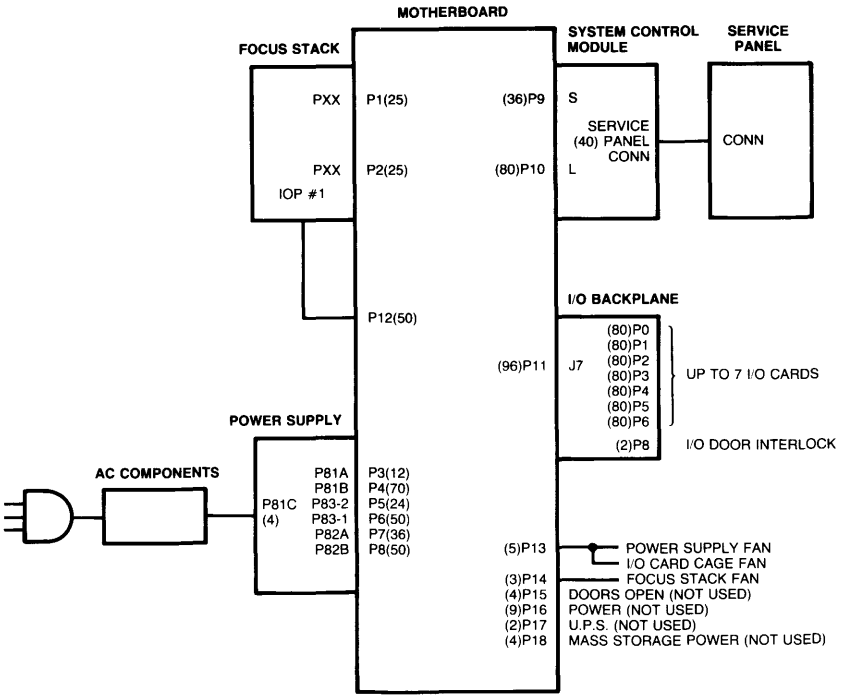


Exploded View #2

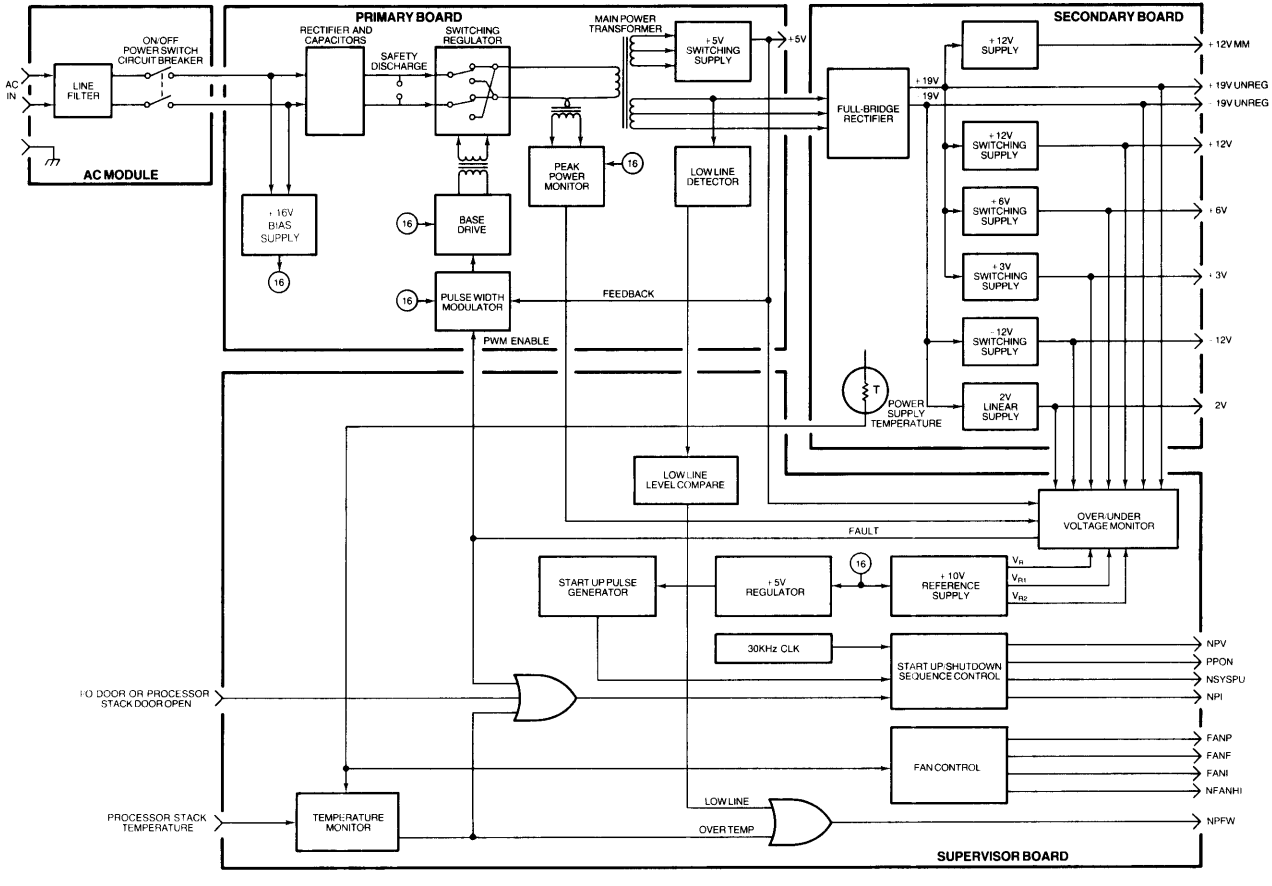
Chapter 9
9030/40 Diagrams



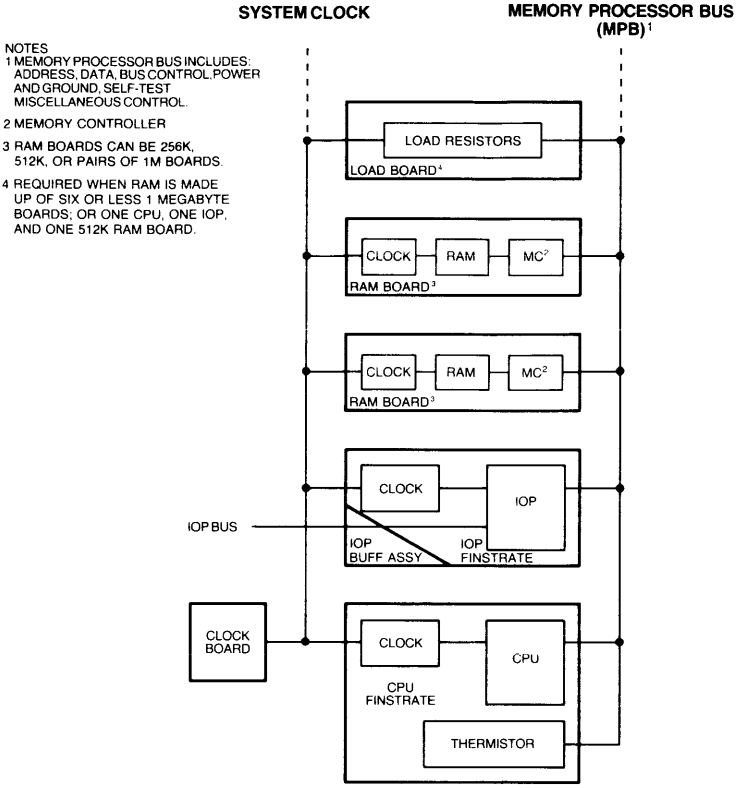
Computer Block Diagram



Computer Interconnection Diagram



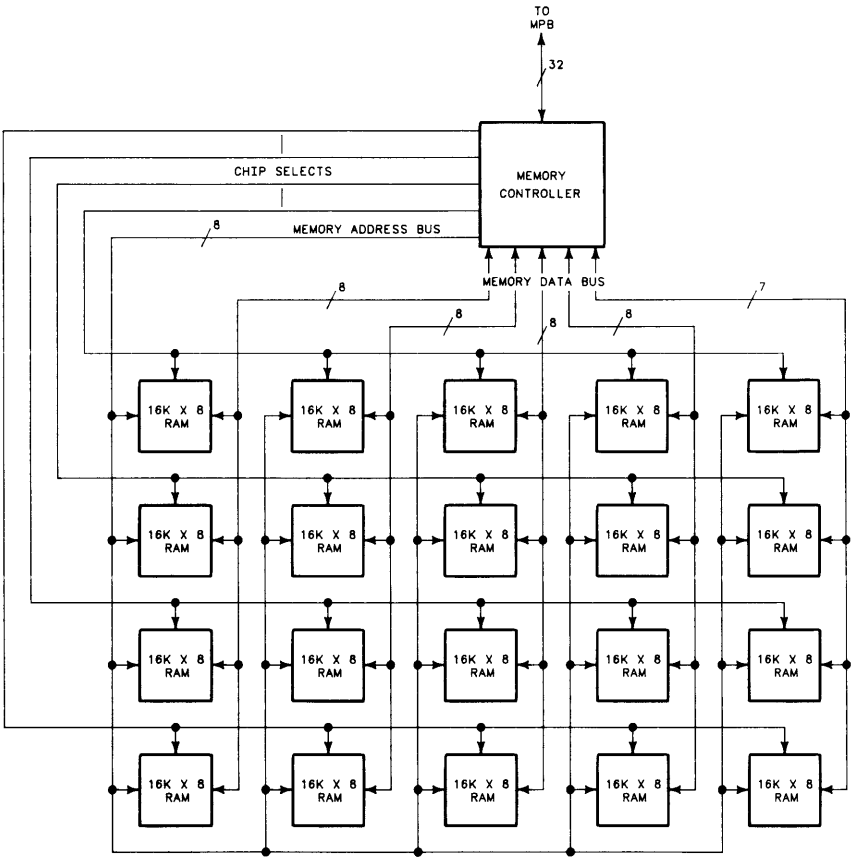
Power Supply Assembly Block Diagram



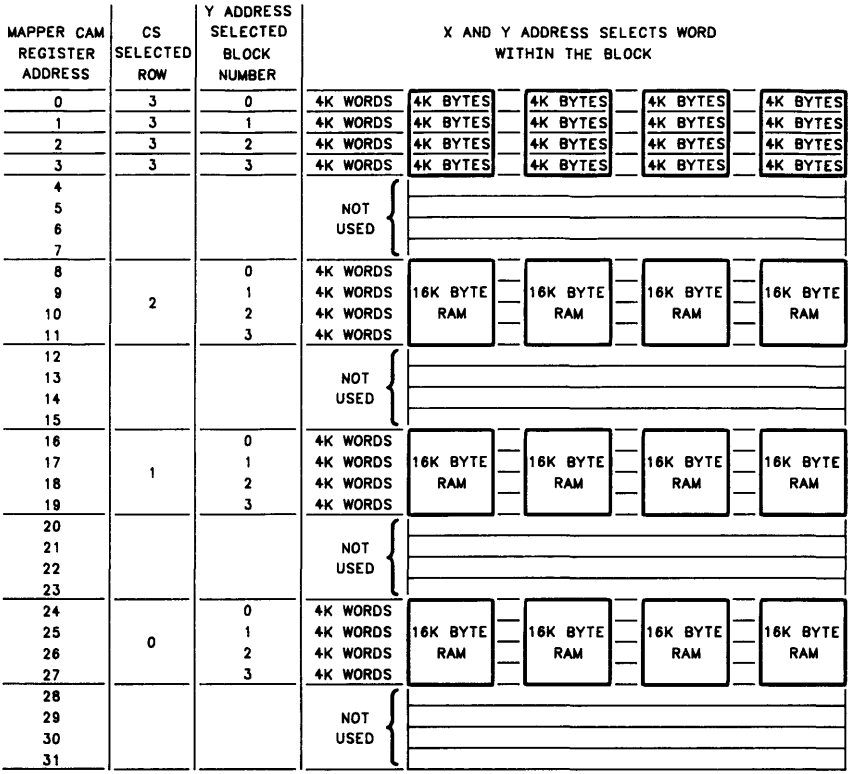
Boards	Minimum	Maximum*
CPU	1	3
IOP	1	3
RAM	1	10

* Maximum of 12 boards per stack.

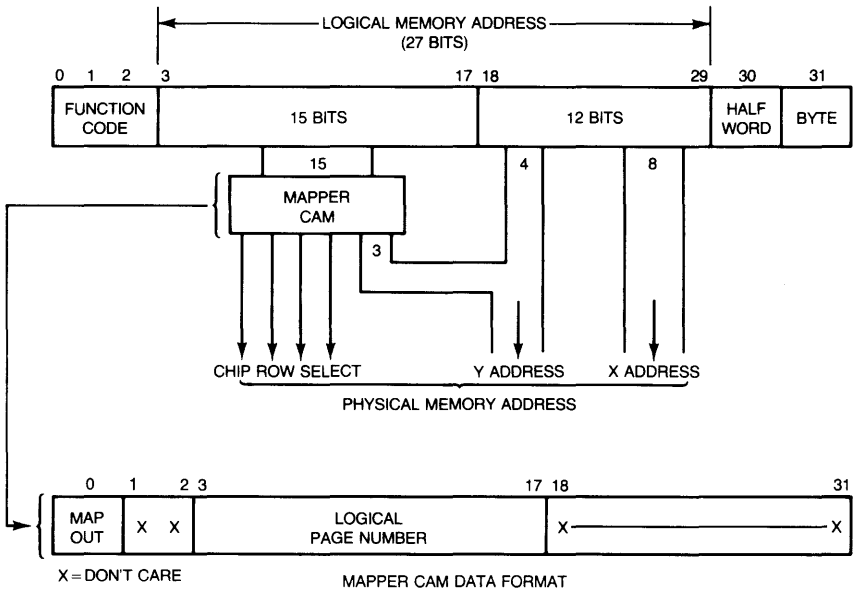
Processor Stack Block Diagram



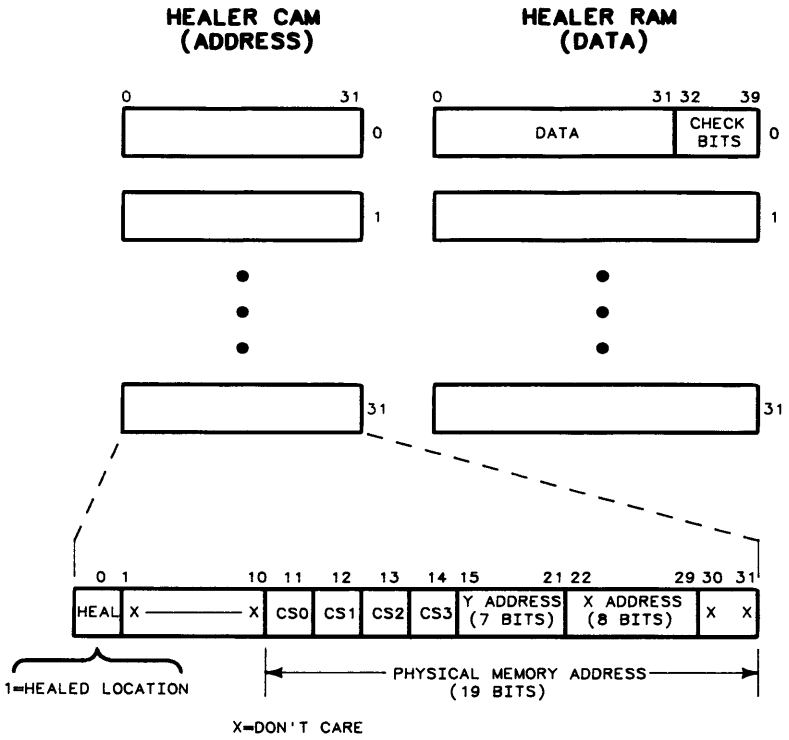
256K RAM Finstrate Block Diagram



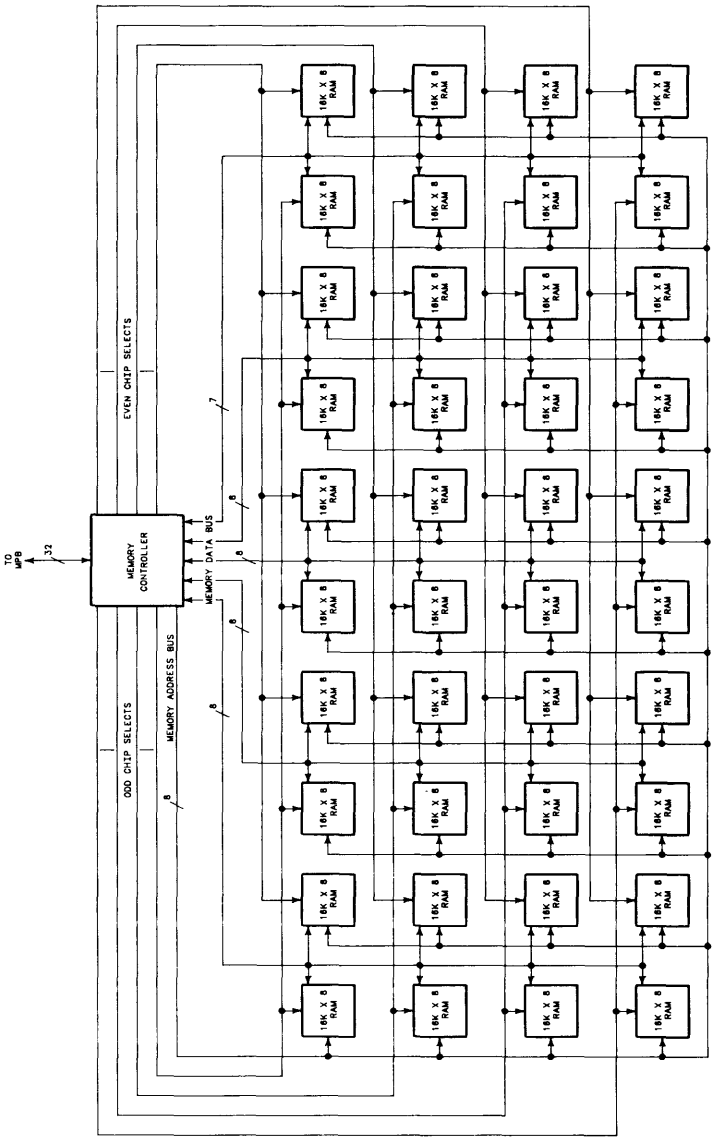
256K Memory Mapping Organization



256K Memory Mapping Operation



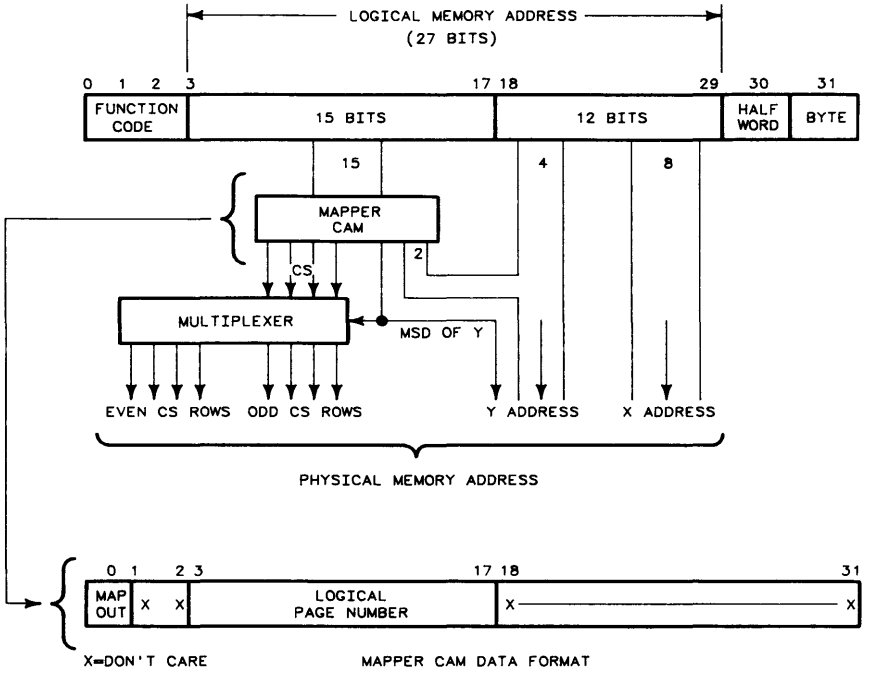
256K Memory Healing



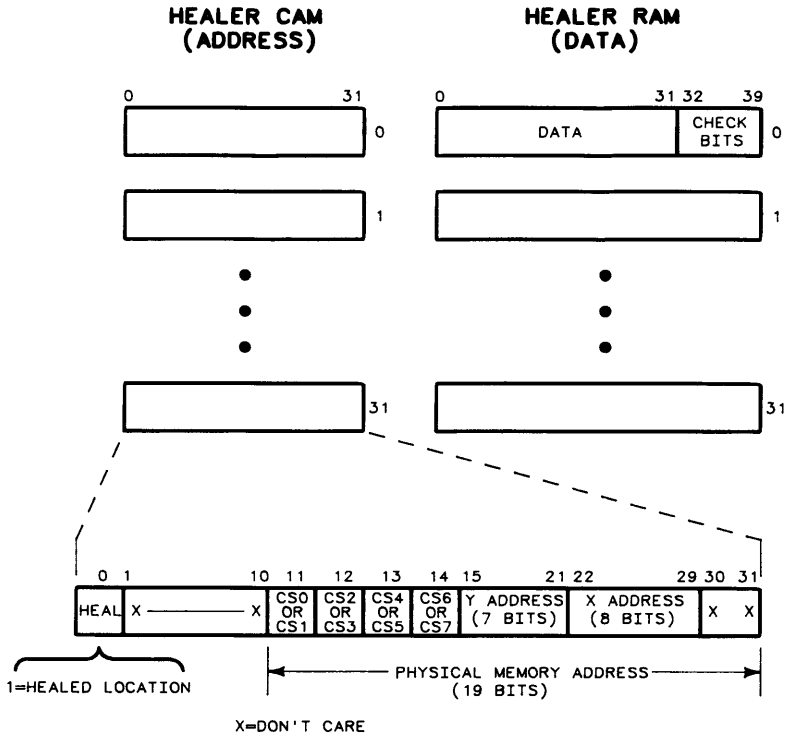
512K RAM Board Block Diagram

MAPPER CAM REGISTER ADDRESS	CS SELECTED ROW	Y ADDRESS SELECTED BLOCK NUMBER	X AND Y ADDRESS SELECTS WORD WITHIN THE BLOCK							
0	7	0	4K WORDS	4K BYTES		4K BYTES		4K BYTES		4K BYTES
1	7	1	4K WORDS	4K BYTES		4K BYTES		4K BYTES		4K BYTES
2	7	2	4K WORDS	4K BYTES		4K BYTES		4K BYTES		4K BYTES
3	7	3	4K WORDS	4K BYTES		4K BYTES		4K BYTES		4K BYTES
4	6	0	4K WORDS	16K BYTE RAM		16K BYTE RAM		16K BYTE RAM		16K BYTE RAM
5		1	4K WORDS							
6		2	4K WORDS							
7		3	4K WORDS							
8	5	0	4K WORDS	16K BYTE RAM		16K BYTE RAM		16K BYTE RAM		16K BYTE RAM
9		1	4K WORDS							
10		2	4K WORDS							
11		3	4K WORDS							
12	4	0	4K WORDS	16K BYTE RAM		16K BYTE RAM		16K BYTE RAM		16K BYTE RAM
13		1	4K WORDS							
14		2	4K WORDS							
15		3	4K WORDS							
16	3	0	4K WORDS	16K BYTE RAM		16K BYTE RAM		16K BYTE RAM		16K BYTE RAM
17		1	4K WORDS							
18		2	4K WORDS							
19		3	4K WORDS							
20	2	0	4K WORDS	16K BYTE RAM		16K BYTE RAM		16K BYTE RAM		16K BYTE RAM
21		1	4K WORDS							
22		2	4K WORDS							
23		3	4K WORDS							
24	1	0	4K WORDS	16K BYTE RAM		16K BYTE RAM		16K BYTE RAM		16K BYTE RAM
25		1	4K WORDS							
26		2	4K WORDS							
27		3	4K WORDS							
28	0	0	4K WORDS	16K BYTE RAM		16K BYTE RAM		16K BYTE RAM		16K BYTE RAM
29		1	4K WORDS							
30		2	4K WORDS							
31		3	4K WORDS							

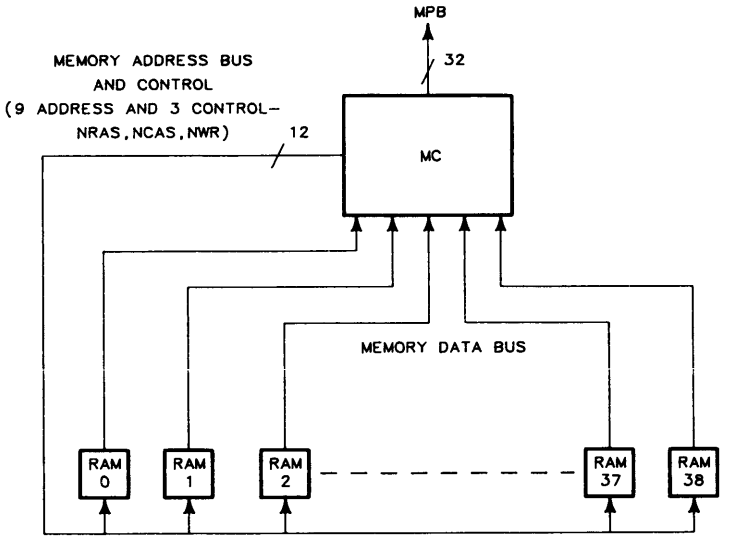
512K Memory Mapping Organization



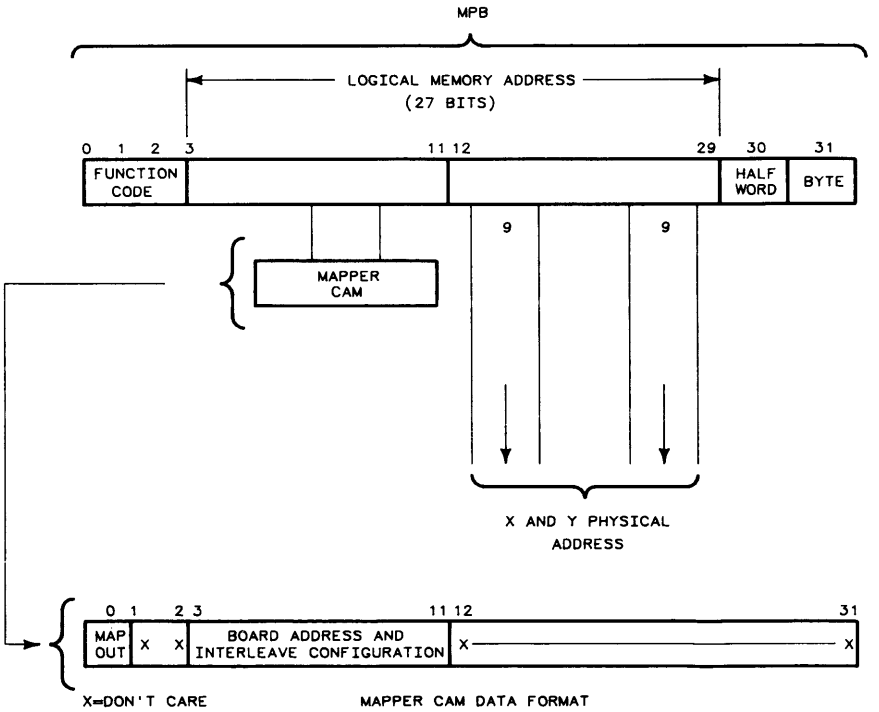
512K Memory Mapping Operation



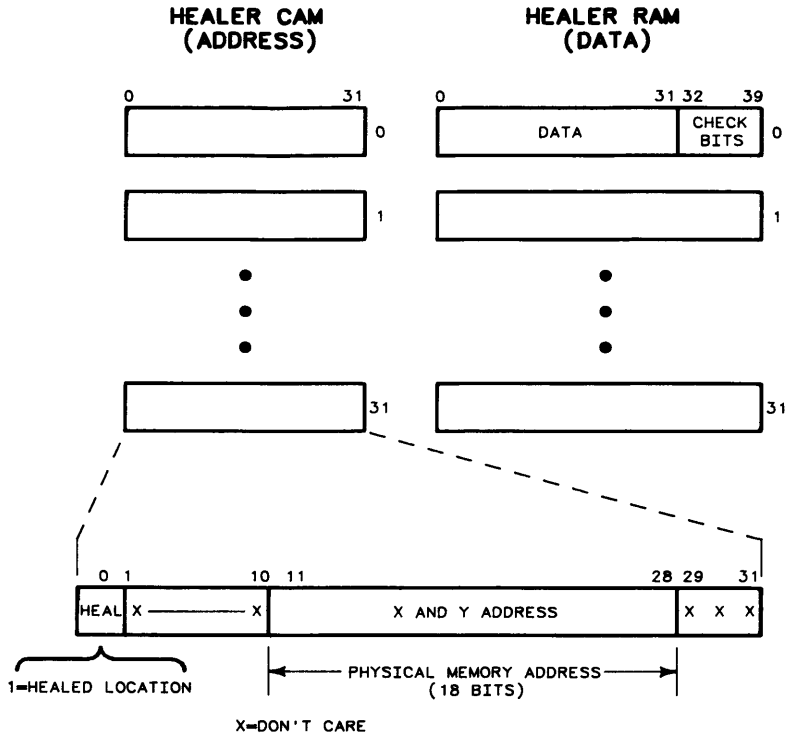
512K Memory Healing



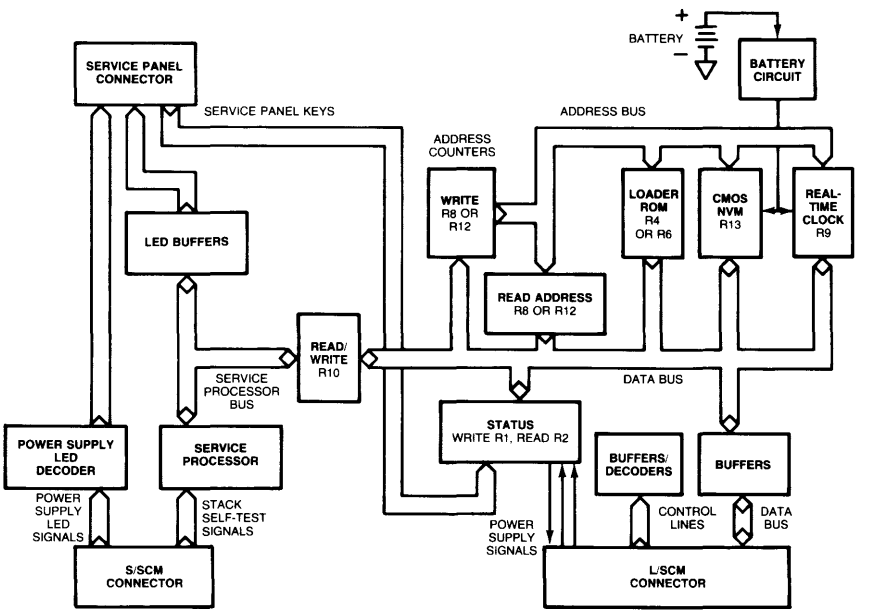
1 Megabyte Memory Organization



1 Megabyte Memory Mapping Operation



1 Megabyte Memory Healing

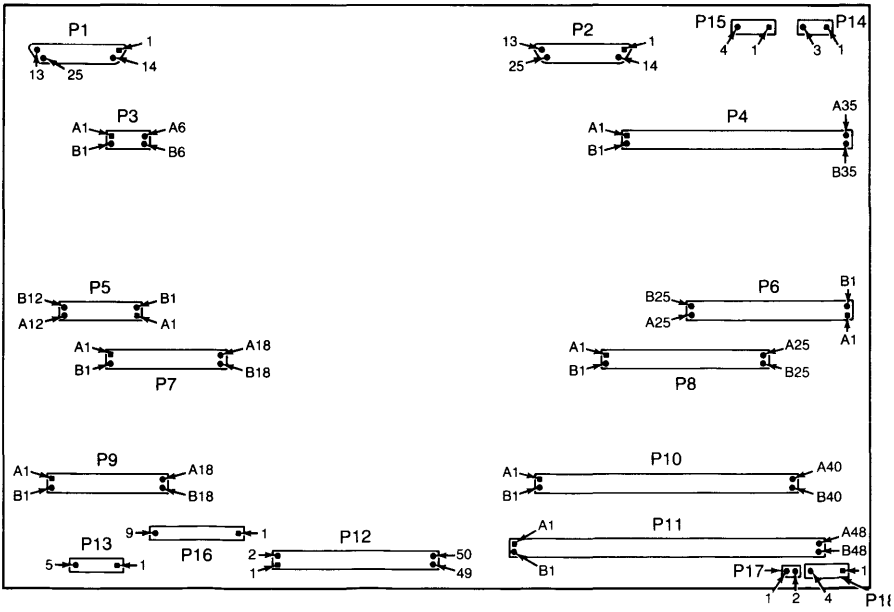


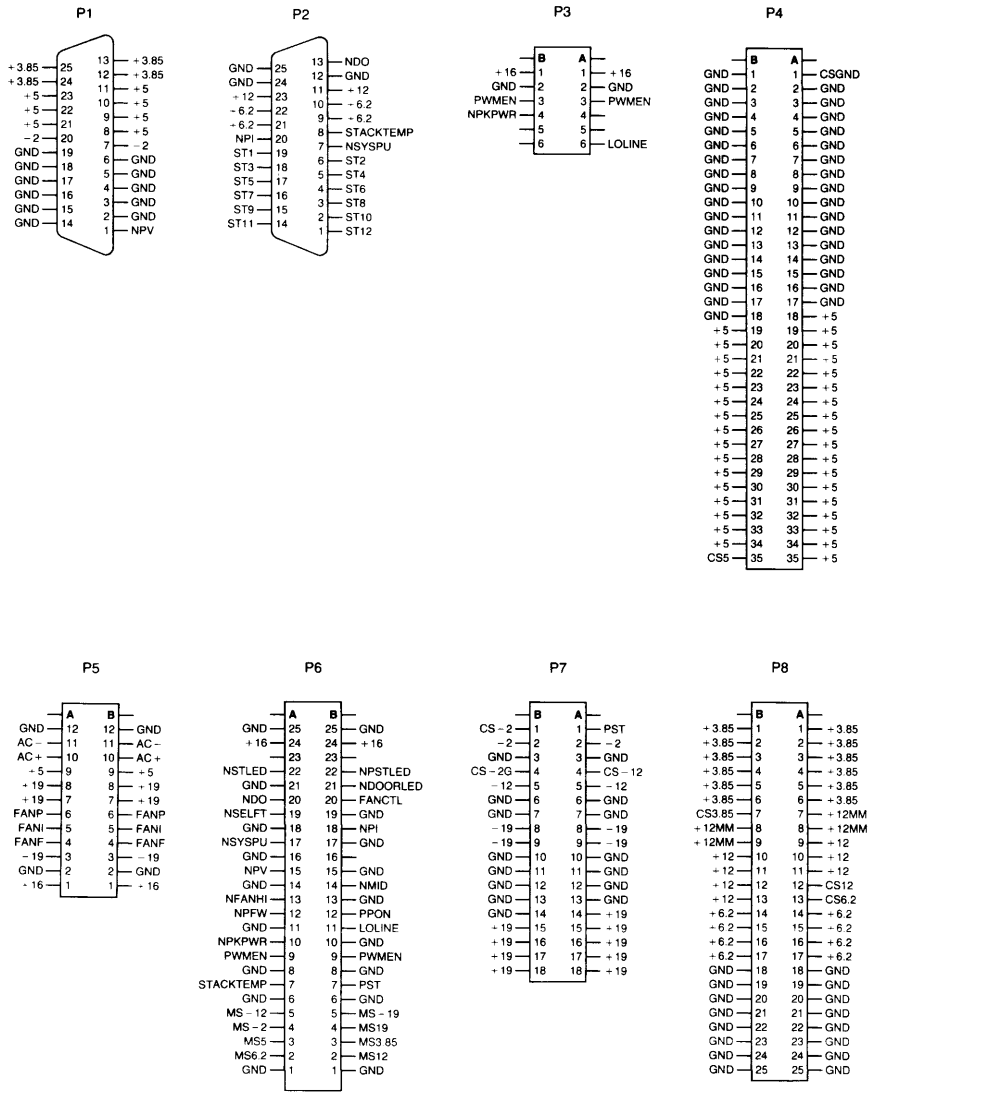
System Control Module Block Diagram

Motherboard Connectors

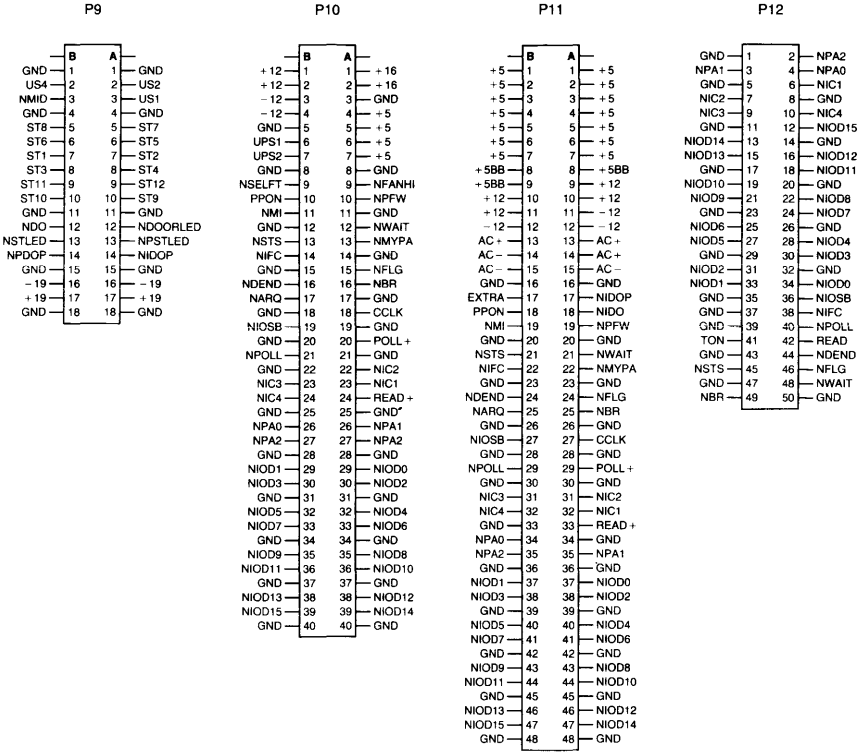
Designator	Connecting Assembly
P1	Processor Stack
P2	Processor Stack
P3	Power Supply
P4	Power Supply
P5	Power Supply
P6	Power Supply
P7	Power Supply
P8	Power Supply
P9	System Control Module
P10	System Control Module
P11	I/O Backplane
P12	IOP Finstrate
P13	Power Supply Fan, I/O Fan
P14	Processor Stack Fan
P15	Processor Stack Door, I/O Door
P16	(Not Used)
P17	Uninterruptible Power Supply
P18	Mass Storage Device

Motherboard





Motherboard Connectors (Sheet 1 of 2)



Motherboard Connectors (Sheet 2 of 2)

Motherboard Signal Definitions

Signal	Definition
– KEY –	Keyed hole in connector.
– 12	– 12 volt supply.
– 19	– 19 volt supply.
– 2	– 2 volt supply.
12	12 volt supply.
12MM	12 volt supply to mass storage devices only.
16	16 volt bias supply voltage.
19	19 volt supply.
3.85	3.85 volt supply.
5	5 volt supply.
5BB	5 volt battery backup.
6.7	6.7 volt supply.
AC +	25 KHz ac sine wave from power supply.
AC –	25 KHz ac sine wave from power supply.
CCLK	Baud rate generator on SCM board for I/O backplane.
CS – 12	Control sense for – 12 volt supply.
CS – 2	Control sense for – 2 volt supply.
CS – 2G	Control sense for – 2 volt supply ground.
CS12	Control sense for 12 volt supply.
CS3.85	Control sense for 3.85 volt supply.
CS5	Control sense for 5 volt supply.
CS6.7	Control sense for 6.7 volt supply.
CSGND	Control sense for 5 volt supply ground.
DGND	Dirty ground return.
FANCTL	Fan control. Connected to PST.
FANF	Power to processor stack fan (negative voltage).
FANGND	Fan ground return.
FANI	Power to I/O card cage fan (negative voltage).
FANP	Power to power supply fan (negative voltage).
GND	Ground plane of motherboard.
LOLINE	Low line indication.
MS – 12	Monitor sense for – 12 volt under/over voltage.
MS – 19	Monitor sense for – 19 volt under/over voltage.
MS – 2	Monitor sense for – 2 volt under/over voltage.
MS12	Monitor sense for 12 volt under/over voltage.
MS19	Monitor sense for 19 volt under/over voltage.
MS3.85	Monitor sense for 3.85 volt under/over voltage.
MS5	Monitor sense for 5 volt under/over voltage.
MS6.7	Monitor sense for 6.7 volt under/over voltage.
NARQ	HP-CIO card requests attention (negative true).
NBR	I/O bus burst mode DMA request (negative true).
NDEND	I/O bus device end (negative true).
NDO	Door open (negative true). Wired OR of NPDO and NIDO.
NDOORLED	Doop open (negative true).
NFANHI	Power supply fan at highest speed (negative true).
NFLG	I/O bus ready for data (negative true).
NIC1	I/O bus interface control bit 1 (negative true).
NIC2	I/O bus interface control bit 2 (negative true).
NIC3	I/O bus interface control bit 3 (negative true).
NIC4	I/O bus interface control bit 4 (negative true).

Motherboard Signal Definitions (Continued)

Signal	Definition
NIDO	I/O cage door open (negative true). OR'd with NPDO.
NIDO0	I/O bus input/output data bit 0 (negative true).
NIDO1	I/O bus input/output data bit 1 (negative true).
NIDO2	I/O bus input/output data bit 2 (negative true).
NIDO3	I/O bus input/output data bit 3 (negative true).
NIDO4	I/O bus input/output data bit 4 (negative true).
NIDO5	I/O bus input/output data bit 5 (negative true).
NIDO6	I/O bus input/output data bit 6 (negative true).
NIDO7	I/O bus input/output data bit 7 (negative true).
NIDO8	I/O bus input/output data bit 8 (negative true).
NIDO9	I/O bus input/output data bit 9 (negative true).
NIDO10	I/O bus input/output data bit 10 (negative true).
NIDO11	I/O bus input/output data bit 11 (negative true).
NIDO12	I/O bus input/output data bit 12 (negative true).
NIDO13	I/O bus input/output data bit 13 (negative true).
NIDO14	I/O bus input/output data bit 14 (negative true).
NIDO15	I/O bus input/output data bit 15 (negative true).
NIDOP	I/O cage door open (negative true.
NIFC	I/O bus interface clear (negative true).
NIOSB	I/O bus data transfer strobe (negative true).
NMI	Non-maskable interrupt.
NMID	Non-maskable interrupt.
NMYPA	HP-CIO card recognized its address has been asserted (negative true).
NPA0	I/O bus peripheral address bit 0 (negative true).
NPA1	I/O bus peripheral address bit 1 (negative true).
NPA2	I/O bus peripheral address bit 2 (negative true).
NPDO	Panel door open (negative true). OR'd with NIDO.
NPDOP	Panel door open (negative true). Signals SCM board.
NPFW	Power fail warning (negative true).
NPI	Not pop in (negative true). Resets the stack.
NPKPWR	Shut down command indicator due to peak power (negative true).
NPOLL	I/O bus interface poll (negative true).
NPSTLED	Power supply overtemperature (negative true).
NPV	Not power valid; all outputs in spec (negative true).
NSELFT	Leading edge causes power supply to send stack into self-test via NSYSPU and NPI (negative true). Originates on SCM board.
NSTLED	Stack overtemperature (negative true).
NSTS	I/O bus status (negative true).
NSYSPU	Not system pop unsynchronized (negative true). Used with NPI to cause stack to perform a self-test.
NWAIT	I/O bus lengthen IOSB (negative true).
POLL	I/O bus interface poll.
PPON	Primary power on; all outputs in spec.
PST	Power supply temperature indicator; connected to FANCTL.
PWMEN	Pulse width modulator enable.
READ	I/O bus data direction (positive true; high indicates data to IOP).

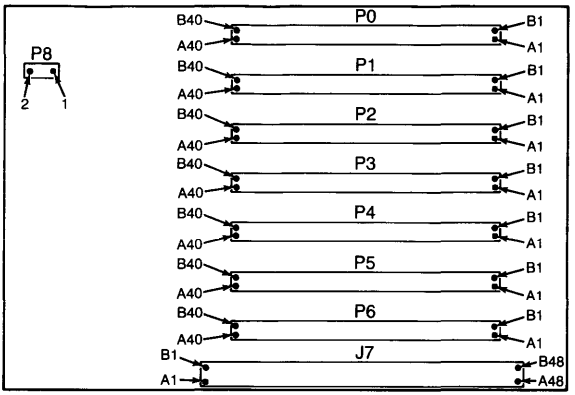
Motherboard Signal Definitions (Continued)

Signal	Description
ST1	Stack self-test from slot 1.
ST2	Stack self-test from slot 2.
ST3	Stack self-test from slot 3.
ST4	Stack self-test from slot 4.
ST5	Stack self-test from slot 5.
ST6	Stack self-test from slot 6.
ST7	Stack self-test from slot 7.
ST8	Stack self-test from slot 8.
ST9	Stack self-test from slot 9.
ST10	Stack self-test from slot 10.
ST11	Stack self-test from slot 11.
ST12	Stack self-test from slot 12.
STACKTEMP	Stack temperature indicator.
TON	(Not used)
US1	Open trace.
US2	Open trace.
US4	POLL ANDed with NSELFT.
UPS1	Uninterruptible power supply.
UPS2	Uninterruptible power supply.

I/O Backplane Connectors

Designator	Connecting Assembly
P0	I/O Card (Slot/Select Code 0)
P1	I/O Card (Slot/Select Code 1)
P2	I/O Card (Slot/Select Code 2)
P3	I/O Card (Slot/Select Code 3)
P4	I/O Card (Slot/Select Code 4)
P5	I/O Card (Slot/Select Code 5)
P6	I/O Card (Slot/Select Code 6)
J7	Motherboard (Connector P11)
P8	I/O Door Interlock Switch

I/O Backplane



P0-P6

A		B	
5P	40	40	5P
5S	39	39	5S
12	38	38	12
−12	37	37	−12
AC+	36	36	AC+
AC−	35	35	AC−
GND	34	34	GND
PPON	33	33	SPON
NPFW	32	32	NNMI
NOT USED	31	31	NOT USED
NSW0	30	30	NOT USED
NSW2	29	29	NSW1
NDPA	28	28	NSTS
GND	27	27	GND
NMYPA	26	26	NIFC
NFLG	25	25	NDEND
NBR	24	24	NARQ
GND	23	23	GND
CCLK	22	22	NIOSB
GND	21	21	GND
NSYNC	20	20	NPOLL
NIC2	19	19	NIC3
NIC1	18	18	NIC4
READ	17	17	NUAD
GND	16	16	GND
NPA0	15	15	NPA1
NPA2	14	14	NPA3
GND	13	13	GND
NIOD0	12	12	NIOD1
NIOD2	11	11	NIOD3
GND	10	10	GND
NIOD4	9	9	NIOD5
NIOD6	8	8	NIOD7
GND	7	7	GND
NIOD8	6	6	NIOD9
NIOD10	5	5	NIOD11
GND	4	4	GND
NIOD12	3	3	NIOD13
NIOD14	2	2	NIOD15
SGND	1	1	SGND

P8

GND	2	1	IDO

J7

A		B	
5	1	1	5
5	2	2	5
5	3	3	5
5	4	4	5
5	5	5	5
5	6	6	5
5	7	7	5
5BB	8	8	5BB
2	9	9	5BB
12	10	10	12
−12	11	11	−12
−12	12	12	−12
AC+	13	13	AC+
AC+	14	14	AC−
AC−	15	15	AC−
GND	16	16	GND
IDOP	17	17	NOT USED
NIDO	18	18	PPON
NPFN	19	19	NNMI
GND	20	20	GND
NWAIT	21	21	NSTS
NMYPA	22	22	NIFC
GND	23	23	GND
NFLG	24	24	NDEND
NBR	25	25	NARQ
GND	26	26	GND
CCLK	27	27	NIOSB
GND	28	28	GND
NSYNC	29	29	NPOLL
GND	30	30	GND
NIC2	31	31	NIC3
NIC1	32	32	NIC4
READ	33	33	GND
GND	34	34	NPA0
NPA1	35	35	NPA2
GND	36	36	GND
NIOD0	37	37	NIOD1
NIOD2	38	38	NIOD3
GND	39	39	GND
NIOD4	40	40	NIOD5
NIOD6	41	41	NIOD7
GND	42	42	GND
NIOD8	43	43	NIOD9
NIOD10	44	44	NIOD11
GND	45	45	GND
NIOD12	46	46	NIOD13
NIOD14	47	47	NIOD15
GND	48	48	GND

I/O Backplane Connectors

I/O Backplane Signal Definitions

Signal	Definition
−12	−12 volt supply.
12	12 volt supply.
5	5 volt supply.
5BB	5 volt supply, battery backup.
5P	Primary 5 volt supply.
5S	Secondary 5 volt supply.
AC−	25 KHz ac sine wave from power supply.
AC+	25 KHz ac sine wave from power supply.
CCLK	Common clock.
GND	Ground plane of I/O backplane.
IDO	I/O door open.
IDOP	I/O door open (not used).
NARQ	HP-CIO card requests attention (negative true).
NBR	I/O bus burst mode DMA request (negative true).
NDEND	I/O bus device end (negative true).
NDPA	Internal select code available (negative true).
NFLG	I/O bus ready for data (negative true).
NIC1	I/O bus interface control bit 1 (negative true).
NIC2	I/O bus interface control bit 2 (negative true).
NIC3	I/O bus interface control bit 3 (negative true).
NIC4	I/O bus interface control bit 4 (negative true).
NIDO	I/O door open (negative true).
NIFC	I/O bus interface clear (negative true).
NIOD0	I/O bus input/output data bit 0 (negative true).
NIOD1	I/O bus input/output data bit 1 (negative true).
NIOD2	I/O bus input/output data bit 2 (negative true).
NIOD3	I/O bus input/output data bit 3 (negative true).
NIOD4	I/O bus input/output data bit 4 (negative true).
NIOD5	I/O bus input/output data bit 5 (negative true).
NIOD6	I/O bus input/output data bit 6 (negative true).
NIOD7	I/O bus input/output data bit 7 (negative true).
NIOD8	I/O bus input/output data bit 8 (negative true).
NIOD9	I/O bus input/output data bit 9 (negative true).
NIOD10	I/O bus input/output data bit 10 (negative true).
NIOD11	I/O bus input/output data bit 11 (negative true).
NIOD12	I/O bus input/output data bit 12 (negative true).
NIOD13	I/O bus input/output data bit 13 (negative true).
NIOD14	I/O bus input/output data bit 14 (negative true).
NIOD15	I/O bus input/output data bit 15 (negative true).
NIOSB	I/O bus data transfer strobe (negative true).
NMYPA	HP-CIO card recognized its address has been asserted (negative true).
NNMI	Non-maskable interrupt (negative true).
NPA0	I/O bus peripheral address bit 0 (negative true).
NPA1	I/O bus peripheral address bit 1 (negative true).
NPA2	I/O bus peripheral address bit 2 (negative true).
NPA3	I/O bus peripheral address bit 3 (negative true).
NPFW	Power fail warning (negative true).
NPOLL	I/O bus interface poll (negative true).

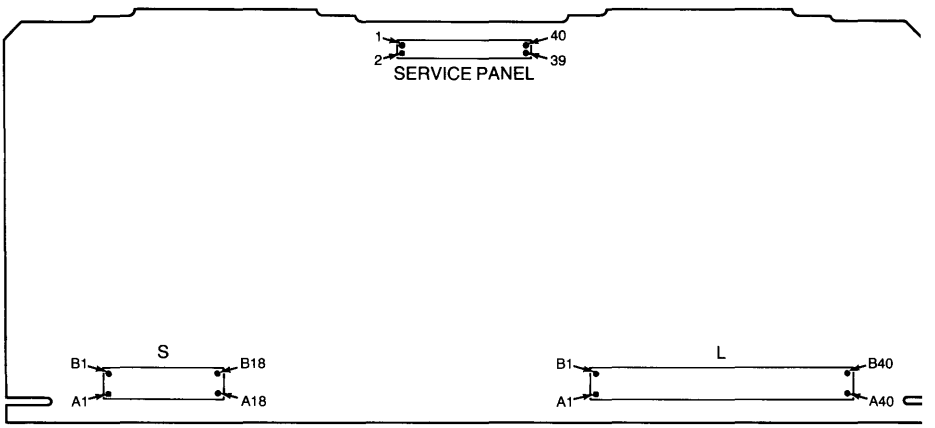
I/O Backplane Signal Definitions (Continued)

Signal	Definition
NSTS	I/O bus status (negative true).
NSW0	Select code switch 0 (negative true).
NSW1	Select code switch 1 (negative true).
NSW2	Select code switch 2 (negative true).
NSYNC	Synchronize (negative true).
NUAD	Your address; slot/select code select (negative true).
NWAIT	(Not used)
PPON	Primary power on; all outputs in spec.
READ	I/O bus data direction (positive true; high indicates data to IOP).
SGND	Safety ground.
SPON	Same as PPON.

SCM Connectors

Designator	Connecting Assembly
L	Motherboard (Connector P10)
S	Motherboard (Connector P9)
Service Panel Conn.	Service Panel

SCM



S

A		B
GND	1	GND
NOTE USED	2	US4
NOT USED	3	NOT USED
GND	4	GND
ST7	5	ST8
ST5	6	ST6
ST2	7	ST1
ST4	8	ST3
ST12	9	ST11
ST9	10	ST10
GND	11	GND
NDOORLED	12	NOT USED
NPSTLED	13	NSTLED
NOT USED	14	NPDOP
GND	15	GND
−19	16	−19
19	17	19
GND	18	GND

Service Panel Connector

5F	1 2	5F
NRESET	3 4	NSTART
GND	5 6	NMEMDUMP
NSELFTEST	7 8	GND
GND	9 10	NDOORLED
NOT USED	11 12	NTEMPLED
NPSLED	13 14	NLOADLED
NSCMLED	15 16	NSELFTESTLED
NRUNLED	17 18	NIO6LED
NIO5LED	19 20	NIO4LED
NIO3LED	21 22	NIO2LED
NIO1LED	23 24	NIO0LED
GND	25 26	GND
NST12LED	27 28	NST11LED
NST10LED	29 30	NST9LED
NST8LED	31 32	NST7LED
NST6LED	33 34	NST5LED
NST4LED	35 36	NST3LED
NST2LED	37 38	NST1LED
16	39 40	16

L

A		B
16	1	12
16	2	12
GND	3	−12
5	4	−12
5	5	GND
5	6	UPS1
5	7	UPS2
GND	8	GND
NFANHI	9	NSELFT
NPFW	10	PPON
GND	11	NMI
NWAIT	12	GND
NMYPA	13	NSTS
GND	14	NIFL
NFLG	15	GND
NOT USED	16	NOT USED
GND	17	NARQ
CCLK	18	GND
GND	19	NIOSB
NSYNC	20	GND
GND	21	NPOLL
NIC2	22	GND
NIC1	23	NIC3
READ	24	NIC4
GND	25	GND
NPA1	26	NPA0
NPA2	27	NPA2
GND	28	GND
NIOD0	29	NIOD1
NIOD2	30	NOID3
GND	31	GND
NIOD4	32	NIOD5
NIOD6	33	NIOD7
GND	34	GND
NIOD8	35	NIOD9
NIOD10	36	NIOD11
GND	37	GND
NIOD12	38	NIOD13
NIOD14	39	NIOD15
GND	40	GND

SCM Connectors

SCM Signal Definitions

Signal	Definition
−12	−12 volt supply.
−19	−19 volt supply.
5	5 volt supply
5F	5 volt fused supply.
12	12 volt supply.
16	16 volt bias supply.
19	19 volt supply.
CCLK	Baud rate generator for I/O backplane.
GND	Ground plane of SCM.
NDOORLED	Door open (negative true).
NFANHI	Power supply fan at highest speed (negative true).
NFLG	I/O bus ready for data (negative true).
NIC1	I/O bus interface control bit 1 (negative true).
NIC2	I/O bus interface control bit 2 (negative true).
NIC3	I/O bus interface control bit 3 (negative true).
NIC4	I/O bus interface control bit 4 (negative true).
NIDO0	I/O bus input/output data bit 0 (negative true).
NIDO1	I/O bus input/output data bit 1 (negative true).
NIDO2	I/O bus input/output data bit 2 (negative true).
NIDO3	I/O bus input/output data bit 3 (negative true).
NIDO4	I/O bus input/output data bit 4 (negative true).
NIDO5	I/O bus input/output data bit 5 (negative true).
NIDO6	I/O bus input/output data bit 6 (negative true).
NIDO7	I/O bus input/output data bit 7 (negative true).
NIDO8	I/O bus input/output data bit 8 (negative true).
NIDO9	I/O bus input/output data bit 9 (negative true).
NIDO10	I/O bus input/output data bit 10 (negative true).
NIDO11	I/O bus input/output data bit 11 (negative true).
NIDO12	I/O bus input/output data bit 12 (negative true).
NIDO13	I/O bus input/output data bit 13 (negative true).
NIDO14	I/O bus input/output data bit 14 (negative true).
NIDO15	I/O bus input/output data bit 15 (negative true).
NIFC	I/O bus interface clear (negative true).
NIO0LED	I/O slot **0** LED on service panel (negative true).
NIO1LED	I/O slot **1** LED on service panel (negative true).
NIO2LED	I/O slot **2** LED on service panel (negative true).
NIO3LED	I/O slot **3** LED on service panel (negative true).
NIO4LED	I/O slot **4** LED on service panel (negative true).
NIO5LED	I/O slot **5** LED on service panel (negative true).
NIO6LED	I/O slot **6** LED on service panel (negative true).
NIOSB	I/O bus data transfer strobe (negative true).
NLOADLED	**LOAD** LED on service panel (negative true).
NMEMDUMP	**MEM DUMP** switch on service panel (negative true).
NMI	Non-maskable interrupt.
NMYPA	HP-CIO card recognized its address has been asserted (negative true).
NPA0	I/O bus peripheral address bit 0 (negative true).
NPA1	I/O bus peripheral address bit 1 (negative true).
NPA2	I/O bus peripheral address bit 2 (negative true).
NPDOP	Panel door open (negative true).

SCM Signal Definitions (Continued)

Signal	Definition
NPFW	Power fail warning (negative true).
NPOLL	I/O bus interface poll (negative true).
NPSLED	**PS** LED on service panel (negative true).
NPSTLED	Power supply overtemperature (negative true).
NRESET	**RESET** switch on service panel (negative true).
NRUNLED	**RUN** LED on service panel (negative true).
NSCMLED	**SCM** LED on service panel (negative true).
NSELFT	Leading edge causes power supply to send stack into self-test (negative true).
NSELFTEST	**SELF TEST** switch on service panel (negative true).
NSELFTESTLED	**SELF TEST** LED on service panel (negative true).
NST1LED	Stack **1** LED on service panel (negative true).
NST2LED	Stack **2** LED on service panel (negative true).
NST3LED	Stack **3** LED on service panel (negative true).
NST4LED	Stack **4** LED on service panel (negative true).
NST5LED	Stack **5** LED on service panel (negative true).
NST6LED	Stack **6** LED on service panel (negative true).
NST7LED	Stack **7** LED on service panel (negative true).
NST8LED	Stack **8** LED on service panel (negative true).
NST9LED	Stack **9** LED on service panel (negative true).
NST10LED	Stack **10** LED on service panel (negative true).
NST11LED	Stack **11** LED on service panel (negative true).
NST12LED	Stack **12** LED on service panel (negative true).
NSTART	**START** switch on service panel (negative true).
NSTLED	Stack overtemperature (negative true).
NSTS	I/O bus status (negative true).
NSYNC	I/O bus interface poll (negative true).
NTEMPLED	**TEMP** LED on service panel (negative true).
NWAIT	I/O bus lengthen IOSB (negative true).
PPON	Primary power on; all outputs in spec.
READ	I/O bus data direction (high indicates data to IOP).
ST1	Stack self-test from slot 1.
ST2	Stack self-test from slot 2.
ST3	Stack self-test from slot 3.
ST4	Stack self-test from slot 4.
ST5	Stack self-test from slot 5.
ST6	Stack self-test from slot 6.
ST7	Stack self-test from slot 7.
ST8	Stack self-test from slot 8.
ST9	Stack self-test from slot 9.
ST10	Stack self-test from slot 10.
ST11	Stack self-test from slot 11.
ST12	Stack self-test from slot 12.
US4	POLL ANDed with NSELFT.
UPS1	Uninterruptible power supply.
UPS2	Uninterruptible power supply.

Chapter 10
9030/40 Reference

Real-Time Clock/Non-Volatile Memory Contents

Byte 0 –	Second
Byte 1 –	Clock Check Byte
Byte 2 –	Minute
Byte 3 –	Stack Size (two times number of finstrates)
Byte 4 –	Hour
Byte 5 –	Century
Byte 6 –	Day of Week
Byte 7 –	Day of Month
Byte 8 –	Month
Byte 9 –	Year
Bytes 10-13 –	Control Registers
Byte 14 –	Timer Resolution
Byte 15 –	Timeout Scan Resolution
Byte 16 –	Keyboard Initialization Data
Bytes 17-24 –	Default System Startup Subsystem
Bytes 25-44 –	Default Mass Storage Unit Specifier
Byte 45 –	Size of System I/O Buffer
Bytes 46-47 –	NVM Checksum
Bytes 48-53 –	Healer CAM Overflow Counter
Bytes 54-57 –	Last Double Bit Memory Failure Data
Bytes 58-60 –	Number of 10-Minute Periods Computer is On
Byte 61 –	Number of Overheat Cycles
Bytes 62-63 –	Number of Power-On Cycles

Chapter 11
9030/40 Service Notes