

HP MICRO 3000RX

System/Upgrade Installation Manual



HP Part No. 32543-90001
Printed in USA January 1990

E0190

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New editions are complete revisions of the manual. Update packages, which are issued between editions, contain additional and replacement pages to be merged into the manual by the customer. The dates on the title page change only when a new edition or a new update is published. No information is incorporated into a reprinting unless it appears as a prior update; the edition does not change when an update is incorporated.

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Third Edition. January 1990

List of Effective Pages

The List of Effective Pages gives the date of the current edition and of any pages changed in updates to that edition. Within the manual, any page changed since the last edition is indicated by printing the date the changes were made on the bottom of the page. No information is incorporated into a reprinting unless it appears as a prior update.

All Pages. January 1990

Safety and Regulatory Information

For your protection this product has been tested to various national and international regulations and standards. The scope of this regulatory testing includes electrical/mechanical safety, radio frequency interference, ergonomics, acoustics, and hazardous materials. Where required, approvals obtained from third-party test agencies are shown on the product label. In addition, various regulatory bodies require some of the information under the following headings.

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Warning



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

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Japanese Radio Frequency Notice

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This product complies with the UK "General Approval (NS/G/23/J/100003)" safety requirements for secondary attachments.

Safety Considerations

This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation. The following figure shows some of the safety symbols used on the product to indicate various safety considerations.

SAFETY SYMBOLS



Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the product against damage.



Indicates hazardous voltages.



Indicates earth (ground) terminal (sometimes used in manual to indicate circuit common connected to grounded chassis).

About This Manual

This manual contains chapters that are organized as follows:

1. HP MICRO 3000RX System Description, including specifications.
2. HP MICRO 3000RX System Installation.
3. HP MICRO 3000RX Upgrade Installation.
4. HP MICRO 3000RX System Power-up and Verification.

Additional manuals that may prove useful are:

HP MICRO 3000GX Site Planning and Preparation Guide	P/N 32536-90002
HP MICRO 3000LX/GX User's Manual	P/N 32520-90003
HP MICRO 3000LX/GX Port Upgrade Manual	P/N 32520-90015
HP-IB Diagnostic Manual Set	P/N 30070-60068
HP 3000 HP-IB Version Computer Systems CE Handbook	P/N 30070-90010
HP 3000 Series 37/MICRO 3000 Family Computer Systems CE Handbook	P/N 30457-90039
HP CEO Site Prep Handbook	P/N 5958-2370
MPE System Utilities Reference Manual	P/N 30000-90044
System Operation and Resource Management Reference Manual	P/N 32033-90005

Conventions used in this manual are:

Note A NOTE contains operating procedures, practices, or an activity that should be highlighted.



Caution A CAUTION contains operating procedures, practices, or an activity, which, if not observed, could result in damage or destruction to equipment or data.



Warning A WARNING contains operating procedures, practices, or an activity, which, if not observed, could result in injury to personnel or loss of life.



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System Description

Introduction

The HP MICRO 3000RX is a low-end HP 3000 system. It allows up to 24 point-to-point terminals to access two or four megabytes of main memory. The most important unit in the system is the System Processor Unit (SPU). The SPU contains two types of Printed Circuit Assemblies (PCAs):

- A processor PCA - contains the Central Processor Unit (CPU) and memory. This PCA also performs a comprehensive system self-test that verifies correct installation and operation of the system.
- An Advanced Terminal Processor (ATP/M) - an RS232C serial interface to hook up the peripherals in your office. You may connect terminals, modems, plotters, and printers. Up to three ATP/M PCAs are supported.

If the 24-Port option is not present, two other Input/Output (I/O) PCAs can be included in the SPU:

- A Local Area Network (LAN) - provides an alternate way to connect your system to peripherals or other systems.
- An Intelligent Network Processor (INP) - provides synchronous communication to other systems.

The HP MICRO 3000RX also contains one or two embedded disk drives and a cartridge tape drive. The entire system is housed in a cabinet that fits under a desk.

The MICRO 3000RX uses the MPE Operating System.

System Description

The keyswitch positions and their functions are described below. See Figure 1-1.

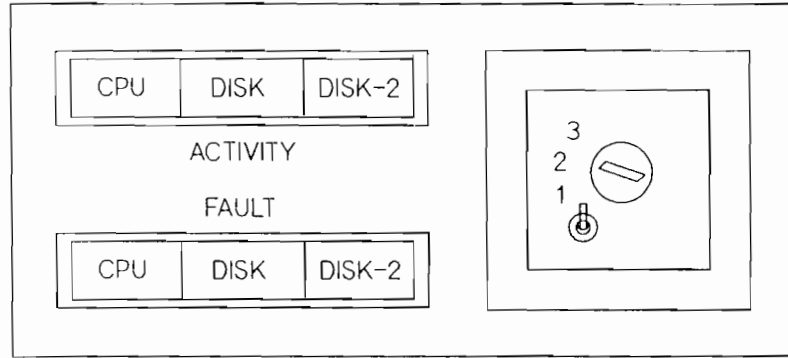


Figure 1-1. System Keyswitch and Indicator Lights

0—Stand By Mode

In this position AC power is still supplied to the computer, but the processor, embedded disks, and embedded cartridge tape drive are not running. DC power is off and battery power is off.

1—Normal Mode

Selecting “1” turns the computer on and initially lights both the green “ACTIVITY” and yellow “FAULT” indicators on the system front panel.

These lights indicate that the computer self-test is executing. Two megabytes of memory will take about 30 seconds. Four megabytes of memory will take one minute.

If the self-test is successful, the green indicator stays on (until MPE comes up), the yellow indicator goes out.

2—Local Service Mode

Selecting this position allows the execution of individual self-test diagnostics when directed by qualified service personnel.

3—Remote Service Mode

This position allows HP service personnel to run diagnostic tests on your HP MICRO 3000RX via a modem (allows all console commands to be executed remotely).

CPU Activity and Fault Indicators

ACTIVITY	The CPU Activity light will be on or flash quickly when the computer is busy.
FAULT	The CPU Fault light will be out during normal operation.
IDLE	The CPU Activity light will flash at a rate of one flash per second when the computer is idle (paused, waiting for instructions).

Disk Activity and Fault Indicators

The DISK-2 Activity and Fault lights will operate only if a second disk is installed in the HP MICRO 3000RX.

ACTIVITY	The DISK and DISK-2 Activity lights will be on or will flash rapidly when the computer is busy.
FAULT	The DISK and DISK-2 Fault lights will be out during normal operation.

Cartridge Tape Drives

The HP MICRO 3000RX can have one of two cartridge tape drives installed in the cabinet. The HP 9144S is a 16-track cartridge tape drive. The HP 9145S is a 32-track cartridge tape drive.

HP 9144S Cartridge Tape Drive Front Panel

The HP 9144S cartridge tape drive front panel has an UNLOAD button, an EJECT button, a Busy lamp, a Protect lamp, and a Fault lamp. See Figure 1-2.

The Busy lamp is lit when the tape drive is active.

The Protect lamp is lit when a write-protected cartridge has been inserted or after a write operation to a marginal tape has been attempted.

The Fault lamp is lit when the drive or cartridge has failed.

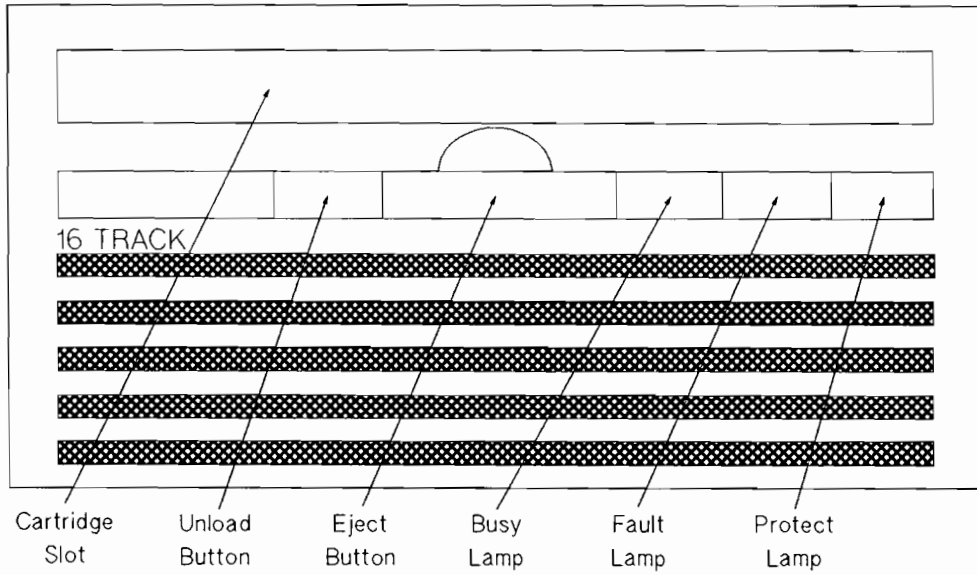


Figure 1-2. HP 9144S Cartridge Tape Drive

HP 9145S Cartridge Tape Drive Front Panel

The HP 9145S cartridge tape drive front panel has an UNLOAD button, an EJECT button, a Busy lamp, a Protect lamp, a Fault lamp, a Clean lamp, and a Loaded lamp. See Figure 1-3.

The **Busy** lamp is lit when the tape drive is active.

The **Protect** lamp is lit when a write-protected cartridge has been inserted or after a write operation to a marginal tape has been attempted.

The **Fault** lamp is lit when the drive or cartridge has failed.

The **Clean** lamp is lit when the tape head needs cleaning. Use the HP 92193E cleaning cartridge to clean the tape heads and reset the **Clean** lamp.

The **Loaded** lamp is lit when a tape cartridge is loading, unloading, or loaded.

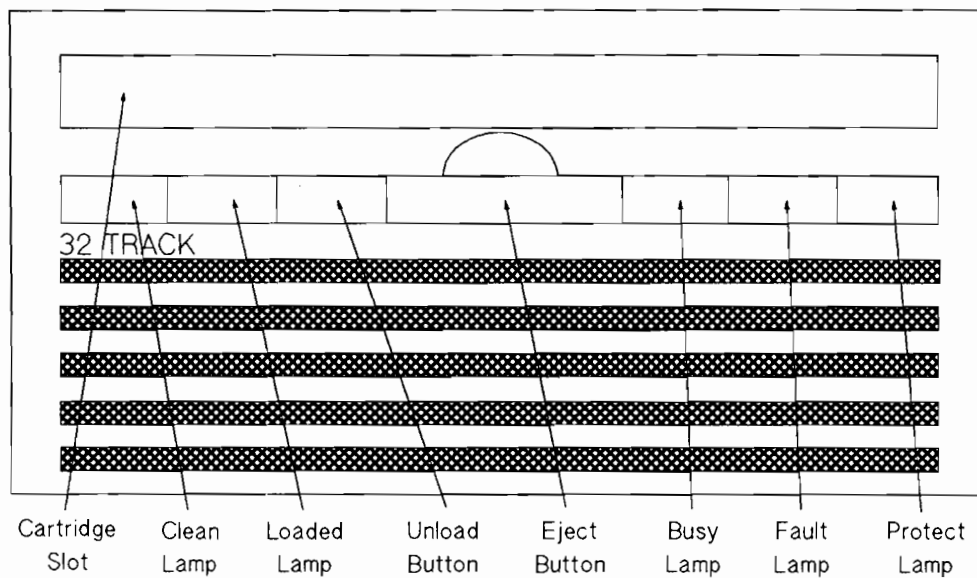


Figure 1-3. HP 9145S Cartridge Tape Drive

System Specifications

The system specifications for the HP MICRO 3000RX are listed below.

Table 1-1. Physical Specifications

Width (top)	212 millimeters/8.4 inches
Width (base)	360 millimeters/14.2 inches
Height	609 millimeters/24 inches
Length	539 millimeters/21.2 inches
Weight	36 kilograms/80 pounds (estimated)

Table 1-2. Environmental Specifications

Operating Temperature	5 to 40 degrees C (41 to 104 degrees F)
Storage Temperature	-40 to 65 degrees C (-40 to 149 degrees F) *
Maximum Rate of Temperature Change	20 degrees C (36 degrees F per hour)
Operating Humidity	20 to 80 % with maximum wet-bulb (non-condensing) not to exceed 26 degrees C (79 degrees F)
Non-operating Humidity	2 to 98 % (non-condensing)
Operating Altitude	0 to 4572 m (0 to 15,000 ft)
Non-operating Altitude	-305 to 15,240 m (-1000 to 50,000 ft)
Heat Dissipation	1450 BTU/hr (estimated)

* assumes no cartridge tape is in the cartridge tape drive.

Table 1-3. Electromagnetic Susceptibility Specifications

Radiated	< \neq 1 V/meter from 14 kHz to 1 GHz
Conducted	3 V RMS 30 Hz to 50 Hz 1 V RMS 50 Hz to 400 Hz
Magnetic	1 gauss 47.5 Hz to 198 Hz
Electrostatic Discharge	15 kV - no effect 25 kV - no hardware failure

Table 1-4. Power Specifications

Voltage - nominal	100 to 120 VAC or 200 to 240 VAC												
Voltage range	90 to 132 VAC or 198 to 264 VAC												
Current	4.5 amperes maximum 100 - 120 VAC 2.5 amperes maximum 200 - 240 VAC												
Power	425 watts at maximum output load capability (line nominal range)												
Frequency	47 to 63 Hz												
Neutral-to-Ground Voltage	1 volt												
Holdup	With full load on the power supply, minimum line frequency, and minimum line voltage, one entire cycle of input AC can be omitted without causing a Power Fail condition (20 msec at 50 Hz, 16 msec at 60 Hz).												
Power Line Disturbance	(normal and common mode) the system should perform with no change in output in the presence of the following: <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Voltage</th> <th>Rise</th> <th>Fall</th> <th>Width</th> </tr> </thead> <tbody> <tr> <td>1000V (peak)</td> <td>1.5 μs</td> <td>1.5 μs</td> <td>10 μs</td> </tr> <tr> <td>1000V (peak)</td> <td>100 μs</td> <td>100 μs</td> <td>100 μs</td> </tr> </tbody> </table>	Voltage	Rise	Fall	Width	1000V (peak)	1.5 μ s	1.5 μ s	10 μ s	1000V (peak)	100 μ s	100 μ s	100 μ s
Voltage	Rise	Fall	Width										
1000V (peak)	1.5 μ s	1.5 μ s	10 μ s										
1000V (peak)	100 μ s	100 μ s	100 μ s										
Battery Backup	No less than 15 minutes.												



System Installation

Introduction

This chapter describes the steps required to install the HP MICRO 3000RX system. The steps are presented in sequence, and the procedure assumes that the system components have been unpacked and are ready for assembly. For upgrades, see the chapter entitled, "Upgrade Installation".

Products Required (32543A or 32543AH)

PRODUCT HP 32543A, includes:

- HP MICRO 3000RX System Processor Unit (SPU).
- 2 Mbytes of memory.
- HP 97962M 152 Mbyte Embedded Disk Drive.
- HP 9144s 16 Track/67 Mbyte Cartridge Tape Drive.
- 16 Port Asynchronous Terminal Distribution Panel (PDP) with Asynchronous Terminal Controllers (ATP/M). (16 ports direct connect—8 with modem capability.)
- HP C1001G #ABA -700/92 Console Terminal.
- HP 40242M Modem Cable.
- DUS on cartridge tape.
- MPE Media Product (51450A must be ordered separately).
- MPE Disk Caching (included in the system price but must be ordered separately).
- HP Easytime User Interface (35303A must be ordered separately).

PRODUCT 32543AH (Box Swap) Upgrade.

This product is the same as the previously described 32543A, but does not include the C1001G #ABA console terminal. It is meant for current customers who are upgrading from one of the following:

- MICRO 3000LX.
- HP 250.
- HP 260.

Available Options

001 Add 8 Ports for a total of 24 ports (8 additional direct connect—4 with modem capability). This option includes an additional 8 port asynchronous terminal controller and an external junction panel and cable.

Panel part number = 40290-60003

Cable part number = 32543-60005

NOTE: You MUST have the 4 Mbyte processor (Opt 510) to have this option installed.

002 Delete 8 Ports. This option removes 1 asynchronous terminal controller (ATP/M) and substitutes the 8 port PDP for the 16 port PDP.

005 Casters. The stationary base of the SPU is replaced by a base with wheels.

009 Substitute 304 Mbyte (97963M) embedded disk drive for 152 Mbyte (97962M) embedded disk drive.

010 Add 304 Mbyte (97963M) embedded disk drive.

011 Substitute 2—304 Mbyte (97963M) embedded disk drives for 152 Mbyte (97962M) embedded disk drive.

015 220 - 240 VAC system.

051 DUS on 1600 bpi 1/2 inch magnetic tape media.

510 Substitute 4 Mbyte Memory/CPU (30534-60010) for 2 Mbyte Memory/CPU (30534-60001).

NOTE: This option is required if Opt 001 is ordered.

544 Delete 9144S cartridge tape.

NOTE: You must have an optional standalone tape or cartridge tape drive.

545 Substitute 9145S 32 track/134 Mbyte cartridge tape drive for 9144S.

S02 Add Standalone 2934A printer Series 200.

Software Required

V delta 1 or later versions of MPE.

Tools and Equipment Required

- 7mm Nut Driver.
- Flat Blade Screwdriver (small to medium).
- Anti-static Wrist Strap.

Third ATP/M Cable/Junction Panel Installation

This section describes the steps necessary to install the external Junction Panel and Cable for the third ATP/M in SLOT 1 of the SPU.

Required Tools: Flat Blade Screwdriver (small to medium).
Anti-static Wrist Strap.

See Figure 2-2.

1. Install one end of the new cable (P/N 32543-60005) on the ATP/M edge connector. This is located on the bustle, left-hand side above P21. Make sure the cable connector screws are moderately tight.
2. The Junction Panel (P/N 40290-60003) may have a metal bracket attached to the back. If present, remove the two screws which hold the bracket to the panel and discard the bracket.
3. Connect the remaining end of the cable to the junction panel.

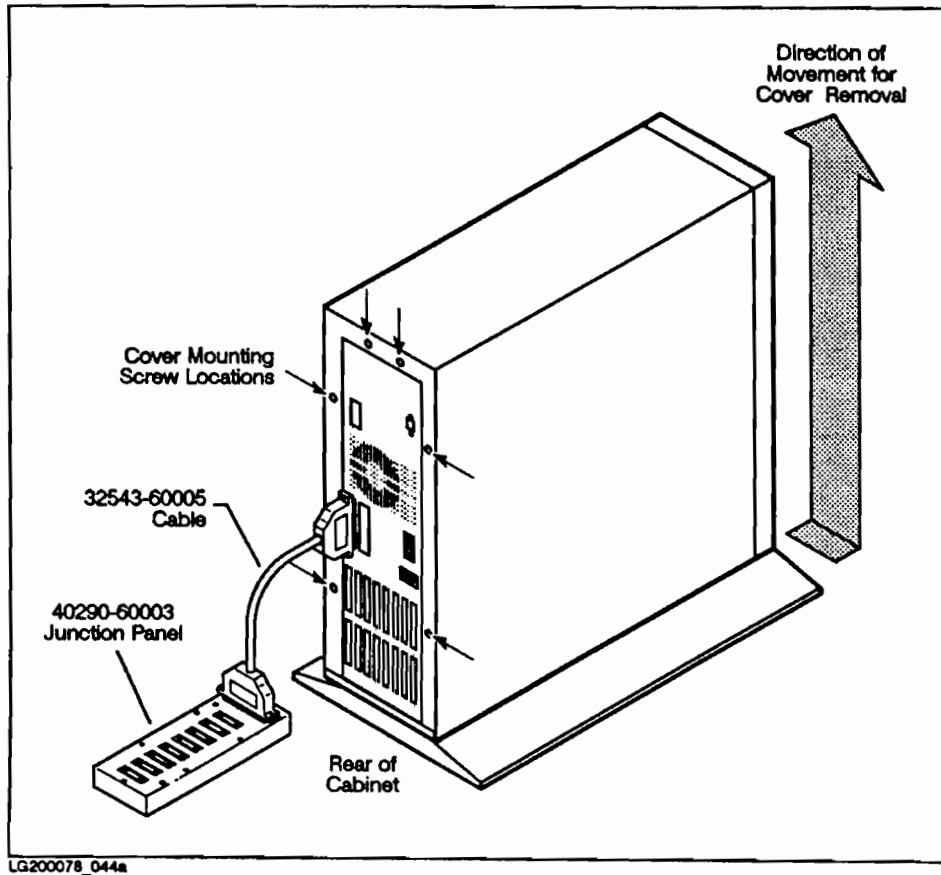


Figure 2-2. Third ATP/M Cable/Junction Panel Installation

Disk Configuration

The hardware configuration of each embedded disk is implemented by the Option/Address switch. This switch is located on the right side of the ESDI interface of the disk. It is set to 00001 at the factory. Do not reset it to any other value.

Tape Configuration

The address switch of the Tape Controller PCA is set to 3 at the factory. Do not alter this switch setting. If the embedded cartridge tape drive is not installed, an external tape drive can be assigned the HP-IB address 3. This address is reserved for tape devices.

System Console Installation

Only an HP terminal supported on the HP MICRO 3000RX may be used as the system console. Refer to the *HP MICRO 3000GX Site Planning and Preparation Guide*, P/N 32536-90002, for a list of supported terminals. Install the console as follows:

1. Place the terminal on an appropriate surface that will allow adequate air flow under and around the terminal.
2. Turn the system off by turning the Front Panel key switch to the 0 position.
3. Set the terminal power switch to OFF.
4. Connect the terminal keyboard cable to the connector on the rear of the terminal and the connector on the rear of the keyboard.
5. Connect the terminal connector cable to the terminal and to port 0 of the Passive Distribution Panel (PDP) at the back of the system cabinet.
6. Connect the AC power cord from the terminal to an appropriate 120 or 240 VAC outlet.
7. Turn the terminal power on.
8. Turn the system power on.

HP-IB Peripheral Installation

Before installing an HP-IB peripheral with other than the supplied cable, you must calculate the maximum length of cable permitted. The HP-IB device loads and the internal cable lengths of the support HP-IB peripherals are listed in the most current edition of the *HP CEO Site Prep Handbook*, P/N 5958-2370.

Use the following calculation to determine the maximum cable length (meters) that may be used to attach HP-IB devices to the HP-IB connector on the rear of the system.

- 1) $7 + A = B$
Where 7 = Internal device load of the HP-IB interface
A = Loads of peripheral devices
++B must be 15 or less++

- 2) Subtract internal device cable lengths from "B" (found in 1 above) to yield the maximum cable length in meters that may be used to attach the devices to the HP-IB interface.

Note



A maximum of six HP-IB devices are supported. The INP must be counted as one device in this calculation.

Do not connect two HP-IB cables together. If you need a two-meter cable, use a two-meter cable, not two one-meter cables.

External Disk Drive Installation

Disk drives listed in Table 2-1 can be installed as peripherals on the HP MICRO 3000RX system up to the maximums shown.

Note



No more than four disk drives can be installed on each HP MICRO 3000RX system. This includes the embedded disk drives. If the system includes two embedded disk drives, only two disk drives can be installed as external peripherals.

Table 2-1. Number of Disk Drives Permitted

Type	Maximum
7936H/XP	3
7937H/XP	3
7957A/B	3
7958A/B	3
7959B	3
97962B (embedded)	1
97963B (embedded)	2

Refer to the appropriate manual for detailed installation and verification procedures.

1. Turn system off (keyswitch to standby position, O).
2. Set disk drive power switch to 0/OFF.
3. Set HP-IB switch to appropriate address.
4. Connect HP-IB cable to connector in rear of drive.
5. Connect free end of HP-IB cable to HP-IB connector on next device.
6. Connect the external disk drive AC power cord to a grounded outlet.

External Tape Drive Installation

Tape drive units listed in Table 2-2 may be installed as peripherals on an HP MICRO 3000RX system up to the maximums shown.

Note

No more than a total of two tape drive units may be installed on an HP MICRO 3000RX system.



Table 2-2. Number of Tape Drive Units Permitted

Type	Maximum
7974A	2
7978A/B	2
7979A	2
7980A	2
9144A	2
9144S (embedded cartridge tape drive)	1
9145S (embedded cartridge tape drive)	1
35401A	2



Refer to the appropriate manual for detailed installation and verification procedures.

1. Turn system off (keyswitch to standby position, O).
2. Set tape drive power switch to 0/OFF.
3. Set the HP-IB address to 3.
4. Connect HP-IB cable to connector in rear of drive.
5. Connect free end of HP-IB cable to other HP-IB cables (if there is another HP-IB device).
6. Connect external tape drive AC power cord to a grounded outlet.

Printer Installation

The installation of system and serial printers is described below.

System Printer (HP-IB) Installation

Printers listed in Table 2-3 can be installed on an HP 3000RX system up to the maximum indicated.

Note

No more than a total of two HP-IB printers may be installed on an HP MICRO 3000RX system.

Table 2-3. Number of System Printers Permitted

Type	Maximum
2563A/B	2
2564B	2
2566A/B	2
2567A/B	2
2680A	2

Note

System printers are connected to the HP-IB connector on the Passive Distribution Panel (PDP).

1. Turn system off (keyswitch to standby position, O).
2. Set printer power switch to 0/OFF (rear of printer).
3. Connect HP-IB cable to printer and next HP-IB device. If you have an interface other than HP-IB, configure the interface according to the interface manual provided with the printer.
4. Set HP-IB address.
5. Connect AC power cord to the designated grounded outlet.
6. Load ribbon (except for laser printer) and paper as described in the appropriate Operator's Manual.
7. Turn printer power to 1/ON.
8. Refer to printer installation manual for self-test procedure.

Note

The self-test printout will vary with the installed character set option.



The printer is ready for operation if no error numbers flash on the self-test display, and if the characters on the self-test printout are clear, well-formed and unbroken.

Serial Printer Installation

Any of the printers listed in Table 2-4 can be installed as a serial printer on an HP MICRO 3000RX system.

Table 2-4. Number of Serial Printers Permitted

Type	Maximum
2235A	3
2563A/B	3
2564B	3
2603A	3
2684A	2
2686A/D	2
2932A	3
2934A	3

Note

Serial printers are connected to ports on the Passive Distribution Panel (PDP) or Junction Panel connected to the third ATP/M, if present.



1. Turn system off (keyswitch to standby position, O).
2. Set printer power switch to 0/OFF (rear of printer).
3. Configure the interface according to the interface manual provided with the printer.
4. Connect AC power cord to the designated grounded outlet.

5. Load ribbon (except for laser printer) and paper as described in the appropriate Operator's Manual.
6. Turn printer power to 1/ON.
7. Refer to printer installation manual for self-test procedure.

Note

The self-test printout will vary with the installed character set option.



The printer is ready for operation if no error numbers flash on the self-test display, and if the characters on the self-test printout are clear, well-formed and unbroken.

Additional Peripheral Installation

Refer to the installation manuals that accompany the peripherals.

Modem Connection

A modem can be connected to the HP MICRO 3000RX by way of the Passive Distribution Panel (PDP) or the Junction Panel connected to the third ATP/M, if present. The connecting cable can be no longer than 5 meters.

The following cables are recommended: **HP 40242M** or **HP 40242Y**.

Modems are supported on Ports P4 through P7 and P24 through P27 on the PDP; also, on Ports 4M through 7M of the Junction Panel if the third ATP/M is present.

Upgrade Installation

Introduction

This chapter describes the steps required to install upgrades to the MICRO 3000RX. The steps are presented in sequence and assumes that the system is logically SHUTDOWN and the upgrade equipment is unpacked and ready for assembly.

Upgrade Product Description

PRODUCT HP 30543A, MICRO 3000GX to MICRO 3000RX Upgrade, includes:

- 4 Mbyte Memory/CPU.
- 16 Port Asynchronous Terminal Distribution Panel (16-port PDP).
- 2 Asynchronous Terminal Controllers (ATP/M), including 1 external Junction Panel and Cable, allowing a configuration of 24 ports total (24 ports direct connect—12 with modem capability).

Panel part number = 40290-60003

Cable part number = 32543-60005

Available Options

- 100** Delete 16-port PDP and one asynchronous terminal controller.
- 110** Delete 4 Mbyte Memory/CPU. Add replacement Self-Test Firmware.
Firmware part numbers: 32543-81016 (U106) and 32543-81017 (U108).

PRODUCT HP 30528A, MICRO 3000RX Port Upgrade (16 ports to 24 ports), includes:

- 4 Mbyte Memory/CPU.
- Additional 8 Ports for a total of 24 ports (8 additional direct connect—4 with modem capability). Includes an additional 8 Port Asynchronous Terminal Controller and an external Junction Panel and Cable.

Panel part number = 40290-60003

Cable part number = 32543-60005

Note



If the original MICRO 3000RX was ordered with only 8 ports, Product HP 30522A must also have been ordered (HP 30522A - 16 Port MICRO 3000GX Upgrade).

Available Options

110 Delete 4 Mbyte Memory/CPU.

Software Required

V delta 1 or later versions of MPE.

Tools and Equipment Required

- 7mm Nut Driver.
- 2.5mm Hex Driver.
- Flat Blade Screwdriver (small to medium).
- Posi-drive Screwdriver (small to medium).
- Exacto Knife.
- Anti-static Wrist Strap.
- Anti-static Work Surface.

Caution



Proper ESD grounding procedures **MUST** be followed to prevent serious damage to the system electronic components.

Before beginning disassembly, ensure that AC power has been **DISCONNECTED**.

Before beginning disassembly, ensure that the anti-static workstation is grounded.

Disassembly Instructions

Disassemble the HP MICRO 3000GX/RX by performing the following steps in sequence.

Before Beginning Disassembly

1. Ensure that the customer has archived all data by performing a full system backup.
2. Perform an orderly system SHUTDOWN.
3. Verify system integrity by executing system Self-Test from the maintenance mode (see the section entitled, "System Power-Up and Verification").
4. Ensure DC power is off (key switch to position 0).
5. Unplug the AC power cord from the AC receptacle and remove the power cord from the system.
6. Label all of the cables at the rear of the cabinet and disconnect them.
7. Move the system to a location which allows easy access to all sides.

Rear Panel/Bustle Removal

Required tool: 2.5mm hex driver

See Figure 3-1.

1. Remove the twelve captive screws which secure the bustle to the rear of the system cabinet.
2. Remove the bustle and set aside.
3. If a cover plate over P20 to P27 is present on the bustle, remove the four screws securing the cover plate to the bustle and discard the cover plate.

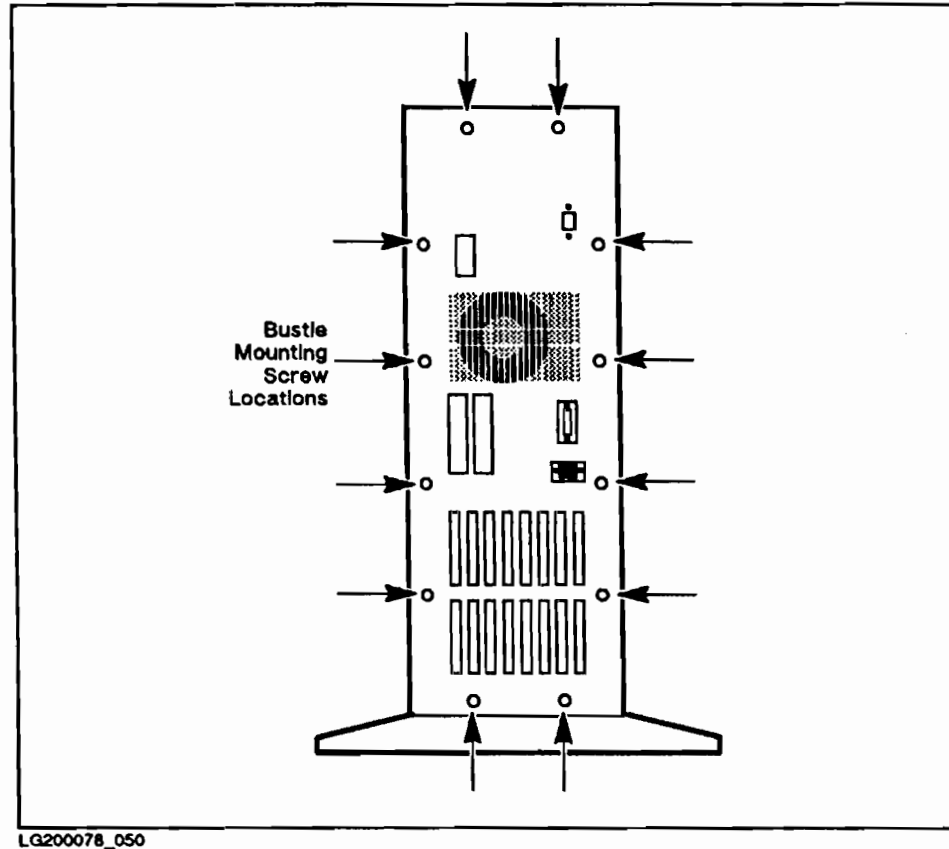


Figure 3-1. Rear Panel/Bustle Removal

PDP Removal

Required tool: 2.5mm hex driver

See Figure 3-2.

1. Remove the four screws securing the Passive Distribution Panel (PDP) to the system cabinet.
2. Move the PDP toward the rear of the system cabinet.
3. Carefully remove all flat cables connected to the PDP and set the PDP aside.

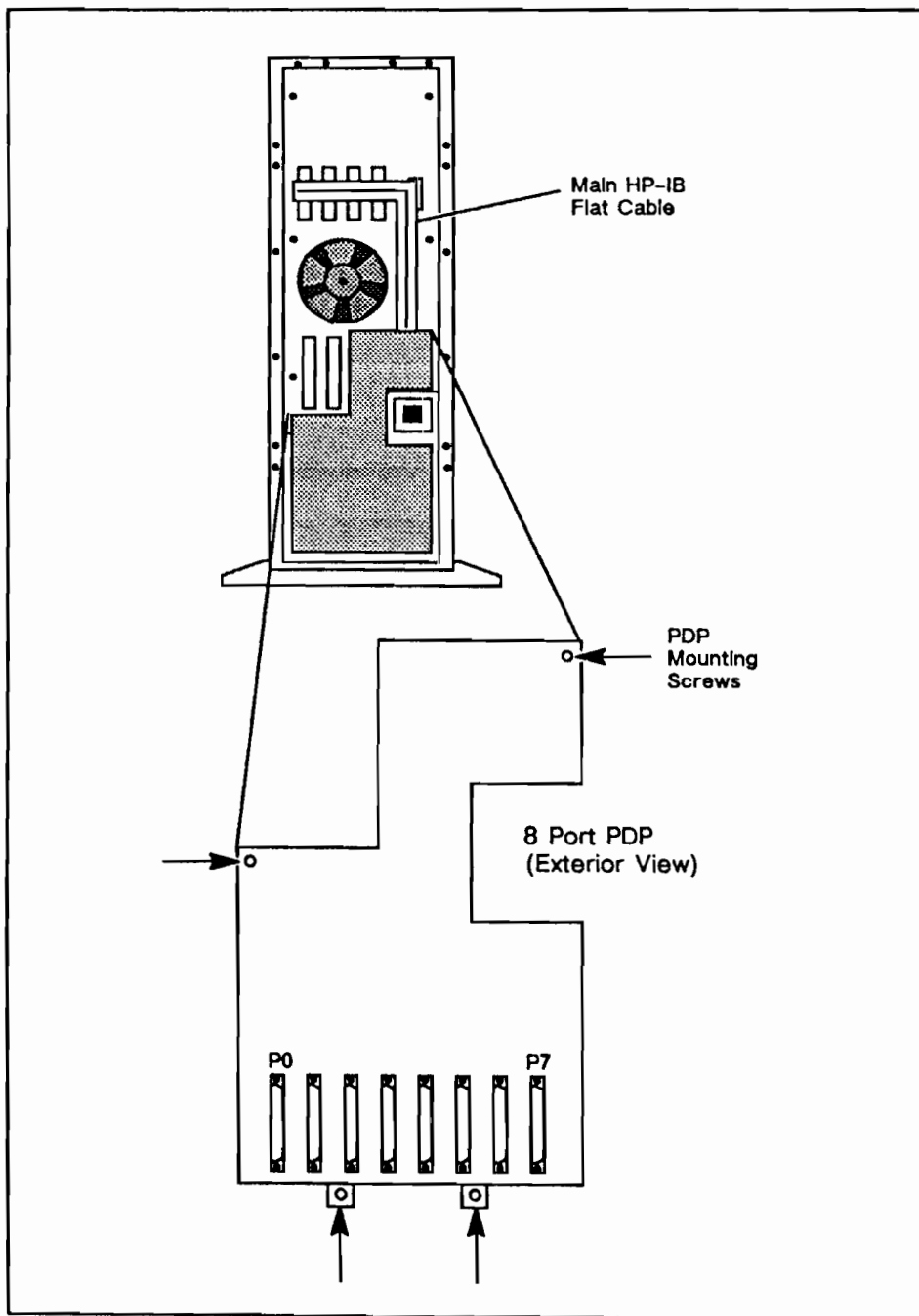


Figure 3-2. Passive Distribution Panel (PDP) Removal

Rear Inner Cover/Fan Assembly Removal

Required tools: 7mm nut driver
2.5mm hex driver
Posi-drive screwdriver (small to medium)

See **Figure 3-2**.

1. Remove posi-drive screws (2 per connector) holding the HP-IB flat cable to the PC board connectors.
2. Remove the HP-IB flat cable and set aside.

See **Figure 3-3**.

3. Remove the two 7mm hex nuts securing the Cartridge Tape HP-IB connector to the inner rear cover.
4. Remove the six captive screws securing the rear inner cover to the system cabinet.

See **Figure 3-4**.

5. Move the inner rear panel toward the rear of the cabinet.
6. Unplug the fan cable connector located at the corner of the fan assembly.
7. Set the rear inner cover/fan assembly aside.

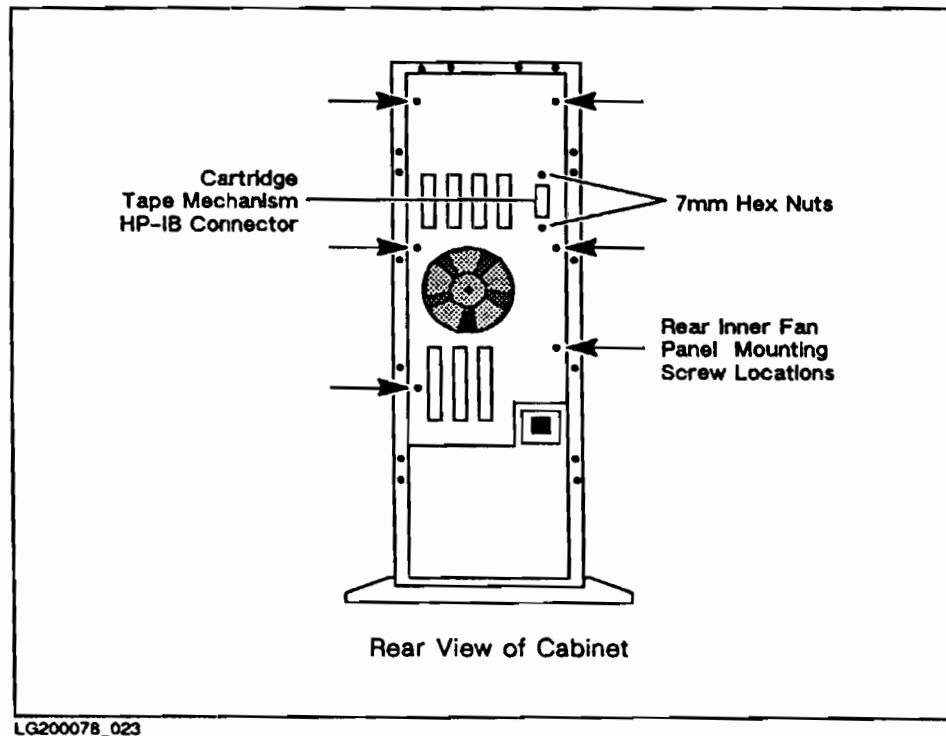


Figure 3-3. Rear Inner Cover/Fan Assembly Removal

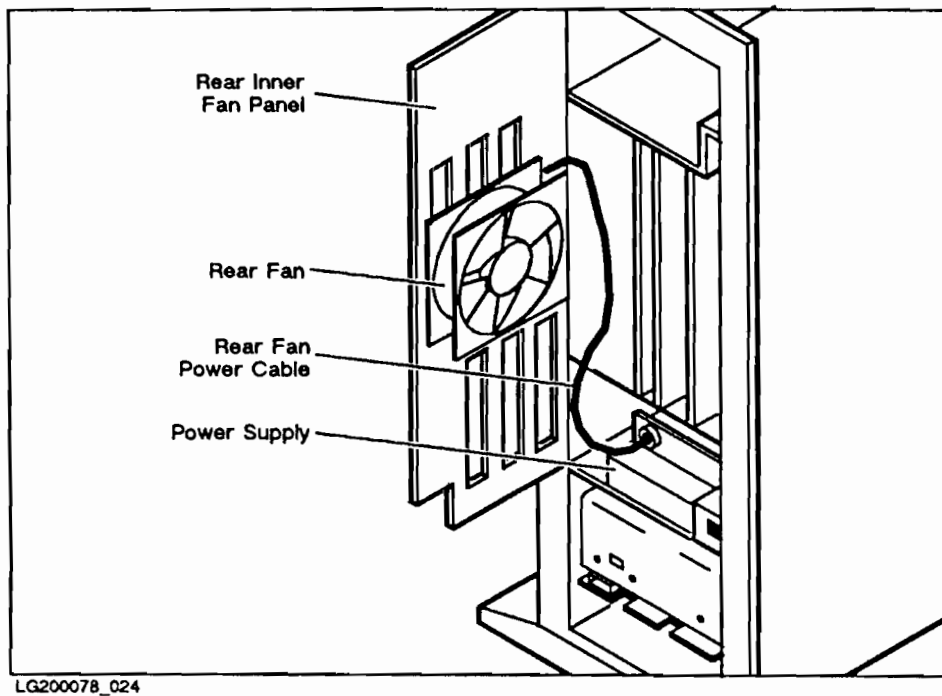


Figure 3-4. Rear Inner Cover Cabling Removal

ATP/M PCA Installation

Required tools: None

See Figure 3-5.

1. Install the second ATP/M PCA in SLOT 2 of the SPU card cage.

Note This product may already be present in some configurations.



-
2. Install the third ATP/M PCA in SLOT 1 of the SPU card cage.

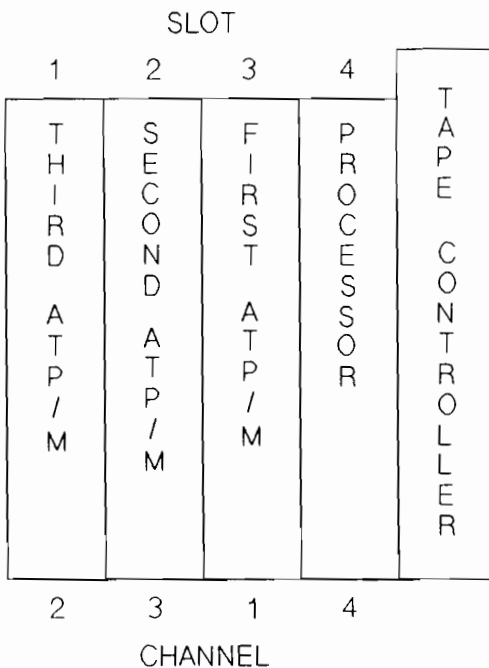


Figure 3-5. HP MICRO 3000RX Card Cage Configuration

4 Mbyte Memory/CPU Upgrade and/or Update

This section provides the sequence of steps necessary to update a HP MICRO 3000GX or a HP MICRO 3000RX from a 2 Mbyte Memory/CPU to a 4 Mbyte Memory/CPU. It also provides the necessary information to update a HP MICRO 3000GX 4 Mbyte Memory/CPU with the new HP MICRO 3000RX self-test firmware.

Required tools: Anti-static Wrist Strap
 Anti-static Workstation
 Flat blade screwdriver (small to medium)

See Figure 3-5.

1. If the existing system is a HP MICRO 3000RX with a 4 Mbyte Memory/CPU, skip this section.
2. Remove the processor from SLOT 4 and place it on the anti-static workstation. If this is a MICRO 3000GX to MICRO 3000RX 4 Mbyte Memory/CPU upgrade, complete steps 3 through 5. Otherwise, skip to step 6.

Self-Test Firmware Update

See Figure 3-6.

Caution



Before proceeding, make sure that the Processor PCA you are about to work on is one of the following two part numbers and has corresponding EPROM part numbers as listed in Step 3.

New 4 Mbyte Memory/CPU P/N 30534-60010, Rebuilt P/N 30534-69010.

3. Remove U106 and U108 on the 4 Mbyte Memory/CPU. Use a small flat blade screwdriver and carefully pry up on each end of the EPROMS in a rocking motion until they are free of their socket. The part numbers of the removed EPROMS are:

U106 = 30534-81016

U108 = 30534-81017

4. Install the two new EPROMS that are supplied with the upgrade. The part numbers are:

U106 = 32543-81016

U108 = 32543-81017

5. Place the old EPROMS in the container supplied with the new ones and set them aside.
6. Install the new or firmware-updated 4 Mbyte Memory/CPU (P/N 30534-60010) in processor SLOT 4.
7. If a 2 Mbyte Memory/CPU (P/N 30534-60001) was removed, place it in the protective container provided with the replacement.

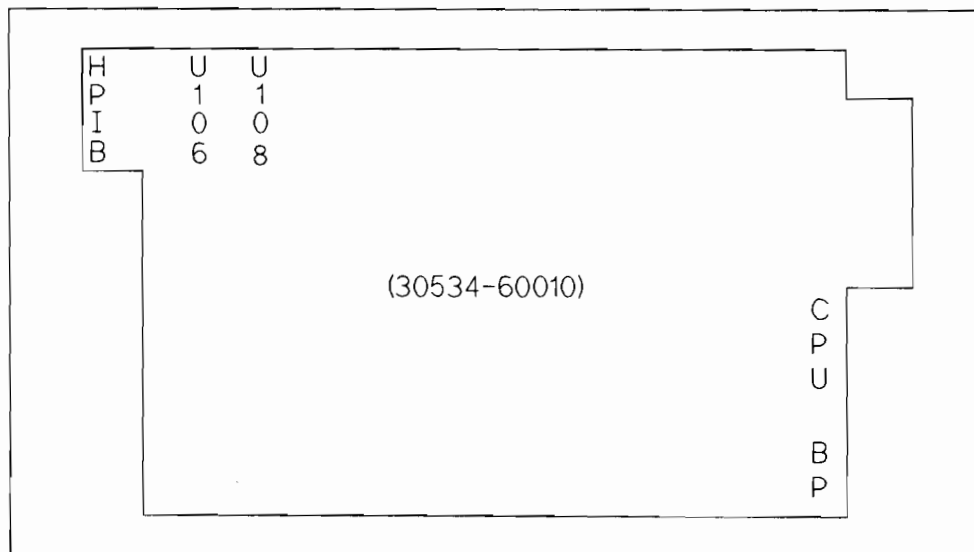


Figure 3-6. 4 Mbyte Memory/CPU PCA Firmware Location

MICRO 3000GX Label Replacement

This section describes the label replacements necessary to complete the MICRO 3000GX to MICRO 3000RX upgrade.

Required tools: Exacto Knife

Front Logo

See Figure 3-7.

1. Remove the HP Logo label from the front of the system. Carefully lift one end of the label using the Exacto knife, then peel the label off the cabinet.
2. Apply the new HP Logo label in place of the old.

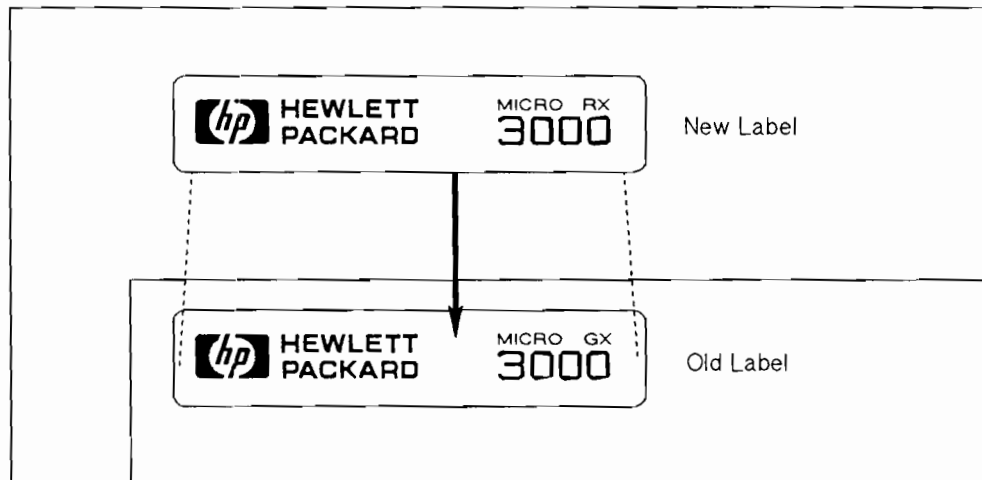


Figure 3-7. Front Logo Label Replacement

Rear Card Cage Label

See Figure 3-8.

1. Remove Rear Card Cage Slot Identification label.
2. Apply new label in place of old.

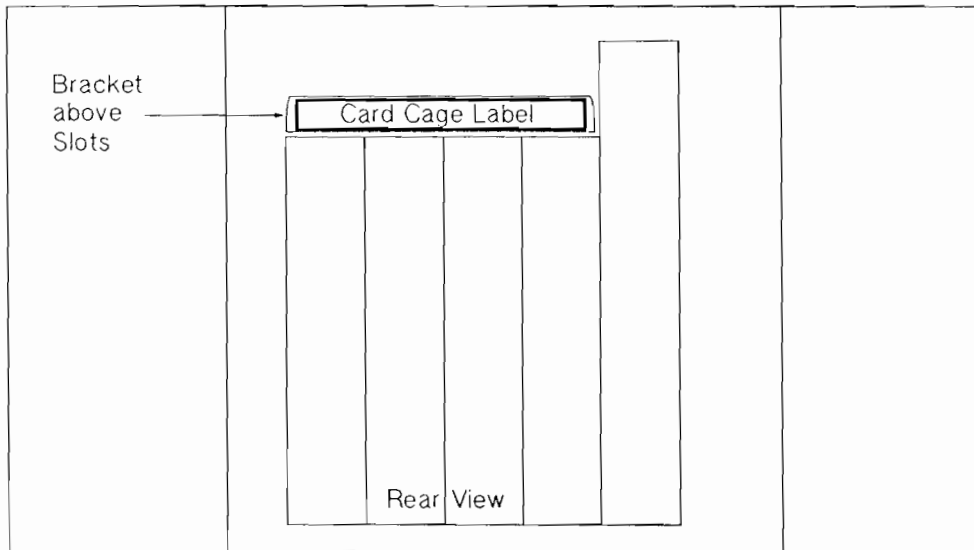


Figure 3-8. Rear Card Cage Label Replacement

Model Number Label

See Figure 3-9.

1. On the rear panel/bustle of the system, place the new System Model number label over the old.

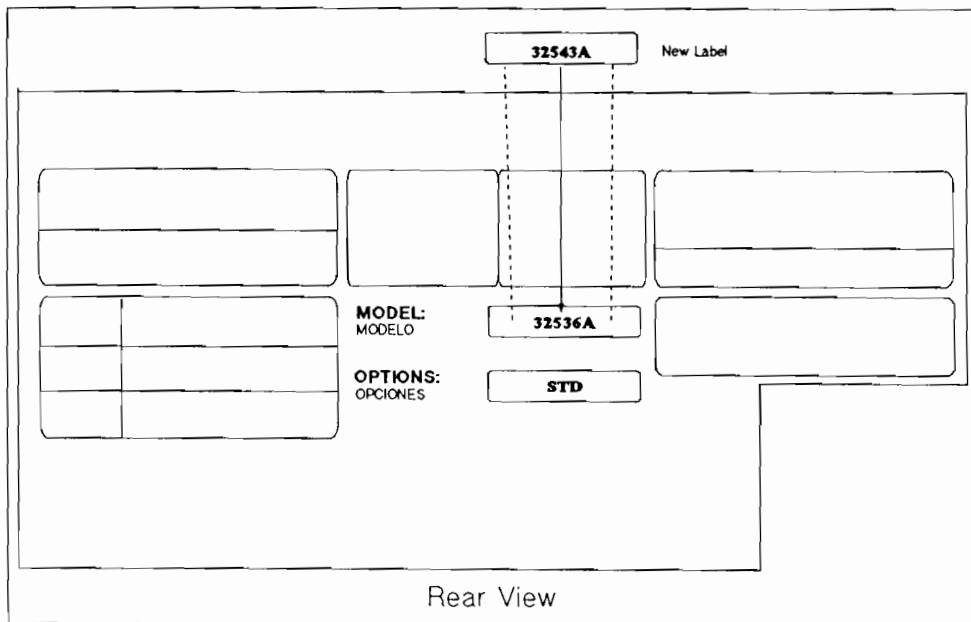


Figure 3-9. Model Number Label Placement

Reassembly Instructions

Reassemble the system by performing the following steps.

Note

Remember the previously described disassembly procedures contain all the necessary tool information and illustrations required to complete the reassembly process.

-
1. Install the rear inner cover/fan assembly cabling.
 2. Install the rear inner cover/fan assembly.
 3. Install the HP-IB flat cable.
 4. Reconnect the flat cables to the 16-Port PDP.

Note

A 16-Port PDP may have been supplied with the upgrade (original system was 8 ports).

-
5. Install the 16-Port PDP.

Caution

Be sure not to damage the flat cables connected in step 4.

-
6. Install the bustle (rear panel).
 7. Go to the section for "Third ATP/M Junction Panel and Cable Installation".
 8. Reposition the system in its operational location.
 9. Reconnect the labeled cables to the PDP.

Note

New or additional cabling should be added after verifying the system operation.

-
10. Reconnect AC power.
 11. Go to the chapter entitled, "System Power Up and Verification".

Third ATP/M Junction Panel and Cable Installation

This section describes the steps necessary to install the external junction panel and cable for the third ATP/M in SLOT 1 of the SPU.

Required Tools: Flat blade screwdriver (small to medium)
Anti-static Wrist Strap

See Figure 2-2.

1. Remove the cover plate which blocks access to the ATP/M edge connector. This is located on the bustle, left hand side, above P21.
2. Install one end of the new cable (P/N 32543-60005) on the ATP/M edge connector which is now accessible. Make sure the cable connector screws are moderately tight.
3. The Junction Panel (P/N 40290-60003) may have a metal bracket attached to the back. If present, remove the two screws which hold the bracket to the panel and discard the bracket.
4. Connect the remaining end of the cable to the junction panel.
5. Return to step 8 of the Reassembly Instructions.

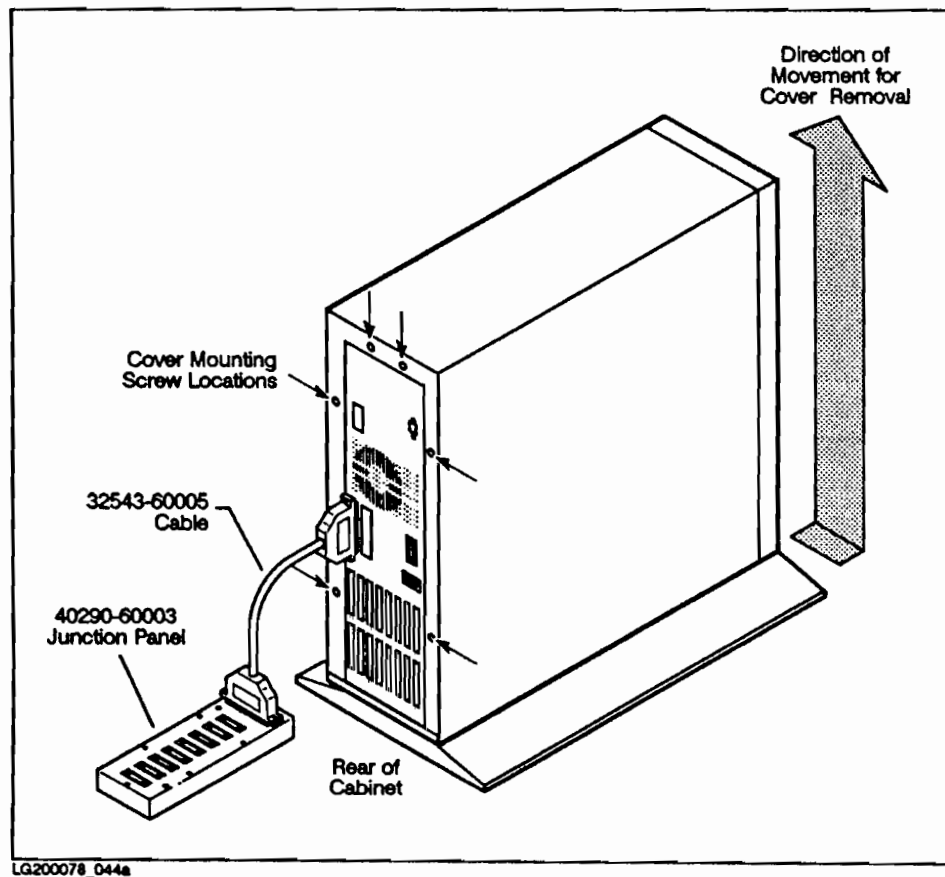


Figure 3-10. Third ATP/M Junction Panel and Cable Installation

System Power-up and Verification

Introduction

This chapter describes the procedure required to power up and verify the correct operation of the HP MICRO 3000RX system. Procedural steps are presented in sequence and assume that the installation chapter has been completed.

Manuals Required:

HP 3000 Series 37/MICRO 3000/MICRO 3000XE Computer Systems CE Handbook (P/N 30457-90039)

HP 3000 HP-IB Computer Systems Diagnostic Manual Set (P/N 30070-60068)

HP 3000 Software Installation Manual (P/N 32033-90039)

System Self-test

The CPU, embedded disks, and embedded cartridge tape drive are tested by Self-test when the following steps are performed.

Caution



Allow two hours for the system to come up to room temperature before you turn it on. If the system was unpacked and sitting for at least 2 hours in the room where it will be used, this 2-hour waiting period is not necessary.

1. Check that the system power cord and any external peripheral power cords are connected to the AC power outlets. Check that the console power switch is ON.
2. Ensure that the console and peripherals are ON LINE. Move the keyswitch on the system from position 0 to position 1. This turns on system power and starts the system self-test. Self-test takes about 30 seconds for a 2 Mbyte system and about one minute for a 4 Mbyte system.

Check the following:

- a. The CPU Activity and Fault lights are lit;
- b. The DISK Activity and Fault lights are flashing;
- c. The DISK-2 Activity and Fault lights are flashing if a second disk is installed;
- d. The cartridge tape Busy light is lit if a cartridge tape is installed. A cartridge tape should not be installed when self-test is initiated.

When self-test has completed, the CPU Activity light, the DISK Activity light, the DISK-2 Activity light (if installed) are lit. All cartridge tape drive indicators should be off.

The following screen is then displayed on the console:

```
Power on Self Test
Memory Test passed
Memory Size (MEGABYTES) = nn *
Channel 1 - Terminal Interface Controller
Channel 4 - Peripheral Interface Controller
**
1 - NORMAL
H for help ->
```

Figure 4-1. Self-Test Passed Display

* nn = 2 or 4.

** Channel 2 and 3 will be displayed if installed.

At this point you can start the system from either a disk or tape. You will know that the start was successful when you receive the appropriate option response, for example "COOLSTART/WARMSTART".

Self-test from Console

The following specific tests allow you to run the individual portions of self-test.

You can start self-test in two ways.

1. You can run self-test as described in the paragraphs above,

OR

2. If the MPE operating system is running, you can perform an orderly system shutdown by simultaneously pressing the **CTRL** and **A** keys and after the "=" prompt appears, type SHUTDOWN.
3. Turn the keyswitch to position 2.
4. Type TE(st) on the console keyboard. You will see this menu displayed:

```
ROM Versions:

AL [l][count]
CH [an][count [,chan]]
CP [u][count]
E [xit]
I [omap][count]
PON [count]

2 - LOCAL (from NORMAL)
Test ->
```

Figure 4-2. Diagnostic Display

5. The prompt **Test->** is displayed at the bottom of the menu.

At this point, you can execute any or all of the tests.

Note



The information in the examples below will vary, depending on the configuration of the system.

CPU Test

Type CP

The following information should be displayed:

```
TOC RAM
Addr Data
000E 00C2
000F 00F5
0010 000F
0011 0021
0012 0023
0013 0054
0014 00FF
0015 00FF
CPU test passed
```

If the system does not pass the CPU test, call your HP service representative.

I/O Map

Type I

A listing of the system I/O configuration will be displayed. This is not a system test.

System I/O Configuration

```
-----  
Memory Size (MEGABYTES) = 4  
Load:  
Channel 4 Device 3  
Start/Dump:  
Channel 4 Device 1  
-----  
Channel 1 ID=4 - Terminal Interface Controller  
-----  
Channel 4 ID=2 - Peripheral Interface Channel  
Device 1 ID=022E - HPIB peripheral device  
Device 2 ID=022E - HPIB peripheral device  
Device 3 ID=0260 - 9144 Cartridge Tape Unit *  
Device 3 ID=0268 - HPIB peripheral device (9145 Cartridge Tape Unit) *  
-----
```

* Only one of these devices will be configured in the system at one time.

Note



System I/O configurations may vary from the sample above. Save a sample of the system I/O configuration for future reference.

Memory Test

Type M

The following message is displayed if the system passes the test.

```
Memory Test passed
```

If this message is not displayed, call your HP service representative.

Channel Test

Type CH 1

The following message should be displayed:

```
Channel 1 -Terminal Interface Controller  
*Channel 2 -Terminal Interface Controller  
*Channel 3 -Terminal Interface Controller  
Channel 4 -Peripheral Interface Controller  
Test Passed
```

* These two channels may not be present on some configurations, but if installed, should report. In some configurations, Channel 3 may be a LAN.

If the system does not pass the test, call your HP service representative.

4-4 System Power-up and Verification

Test All of System

Type AL(L)

The following information should be displayed:

```
TOC RAM
Addr Data
000E 00C2
000F 00F5
0010 000F
0011 0021
0012 0023
0013 0054
0014 00FF
0015 00FF
CPU test passed
Memory Test passed
```

```
Channel 1 -Terminal Interface Controller
Channel 4 -Peripheral Interface Channel
Test Passed
```

System I/O Configuration

```
-----
Memory Size (MEGABYTES) = 4
```

```
Load:
```

```
Channel 4 Device 3
```

```
Start/Dump:
```

```
Channel 4 Device 1
-----
```

```
Channel 1 ID=4 - Terminal Interface Controller
-----
```

```
Channel 4 ID=2 - Peripheral Interface Channel
```

```
Device 1 ID=022E - HP-IB peripheral device
```

```
Device 2 ID=022E - HP-IB peripheral device
```

```
Device 3 ID=0260 - 9144 Cartridge Tape Unit *
```

```
Device 3 ID=0268 - HP-IB peripheral device (9145 Cartridge Tape Unit) *
-----
```

* Only one of these devices will be configured in the system at one time.

Notice that there is a CPU test passed message, a Memory Test passed message, and a Test Passed message following the I/O Channel messages. If the system does not display all of these "Pass" messages and the "System I/O Configuration", call your HP service representative.

PON Power-on Self-test

Type PON

Entering the PON command starts the Power-on Self-test as if you had turned the keyswitch to position 1.

The following information should be displayed:

```
Power on Self Test
Memory Test passed
Memory Size (MEGABYTES) = **
Channel 1 - Terminal Interface Controller
Channel 4 - Peripheral Interface Channel
***
1 NORMAL
H for help ->
```

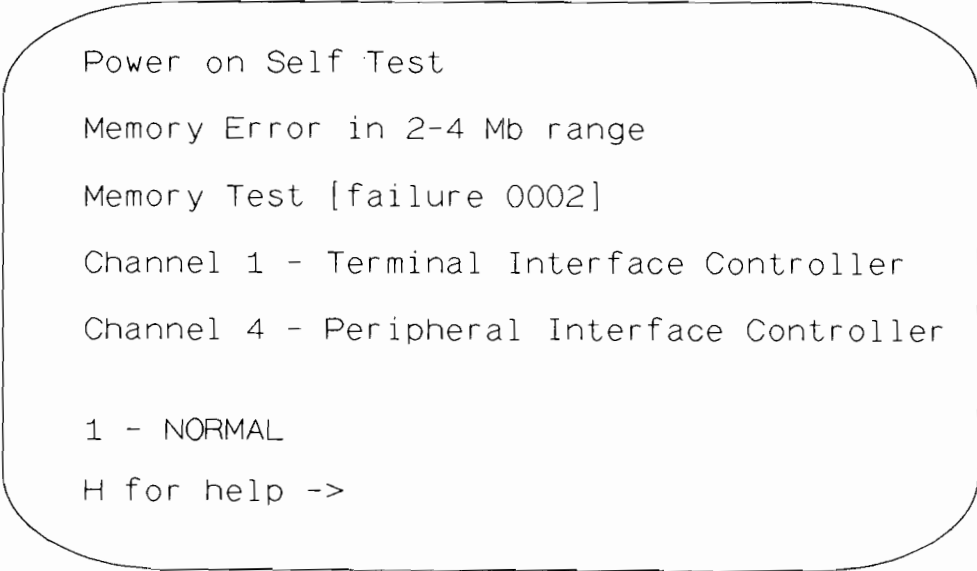
** Will either be 2 or 4.

*** Channels 2 and 3 will respond if present.

Self-test Fault Analysis

SELFTEST FAILURE—If the Fault indicator stays on or continually blinks while self-test is running, it means there is a problem that needs to be fixed (refer to Table 4-1).

MEMORY FAILURE—If you get the message in Figure 4-3, reconfigure the system for two megabytes and call your HP service representative.



```
Power on Self Test
Memory Error in 2-4 Mb range
Memory Test [failure 0002]
Channel 1 - Terminal Interface Controller
Channel 4 - Peripheral Interface Controller
1 - NORMAL
H for help ->
```

Figure 4-3. Self-Test Failed Display

Table 4-1 shows the states of the **CPU** Activity and Fault indicators. It also shows the associated interpretation and corrective action for the fault conditions.

Table 4-1. CPU Activity and Fault Self-Test Indicators

Activity	Fault	Meaning	Action
OFF	OFF	No AC input power. No DC voltage. CPU chip defective.	Check that system is plugged in. Call HP service representative. Call HP service representative.
OFF	ON Continuously	CPU or MEMORY failed.	Call HP service representative.
OFF	Flashing	Illegal hardware configuration.	Call HP service representative.
OFF	Flashing Double Flash	ATP slot 3 failed. SIMB slow-to-fast interface failed.	Call HP service representative. Call HP service representative.
OFF	Triple Flash	Console did not speed sense.	Console cable disconnected. Console not in remote mode. Console misconfigured. Console cable defective or wrong cable. Console inoperative. Call HP service representative.
ON	ON	System in battery back-up mode.	Restore AC power.
ON	OFF	Normal completion state.	None.

Note



If a power failure occurs during normal operation, both the Activity and Fault indicators will light. This action indicates that battery power is retaining memory.

Table 4-2 shows the states of the **DISK** and **DISK-2** Activity and Fault indicators. It also shows the associated interpretation and corrective action for the fault indicators.

Table 4-2. DISK and DISK-2 Activity and Fault Self-Test Indicators

Activity	Fault	Meaning	Action
ON	ON	On for 5 seconds at power-on while disk controller runs self-test and disk spins up. Both LEDs remain on if disk fails self-test.	None. Call HP service representative.
Flashing	OFF	Disk being accessed by CPU.	None.
OFF	ON	Disk drive failed mechanism self-test.	Call HP service representative.
ON	OFF	Disk drive is in a ready state.	None.

Fundamental Operating System

The MPE Fundamental Operating System (FOS) is installed on the embedded disks at the factory and Autowarmstart is enabled.

Sample MPE Starting Sequence

This is an example of the display you see when the system is started.

```
Warmstart? (Y/N) y
*** Auto Warmstart ***
HP32033.02.04
** PERFORMING A WARMSTART **

**WARNING** AFTER THIS POINT DO NOT INTERRUPT THE STARTUP
PROCESS UNTIL AFTER THE MESSAGE " *WELCOME* " APPEARS

DIRECTORY MAINTENANCE COMPLETED
PART 1 OF 6 COMPLETED - MEMORY RESIDENT TABLES SET UP
PART 2 OF 6 COMPLETED - SL BINDING
PART 3 OF 6 COMPLETED - SYSTEM I/O PROCESS CREATION
PART 4 OF 6 COMPLETED - DRIVER LOADING
PART 5 OF 6 COMPLETED - DISC RESIDENT TABLES SET UP
PART 6 OF 6 COMPLETED - SYSTEM PROCESS CREATION
FRI, JAN 05, 1990, 8:47AM? (Y/N)
LOG FILE NUMBER 23 ON
*WELCOME*
8:49/14/SP#6/SPOOLED OUT
:HELLO OPERATOR.SYS;HIPRI
8:49/#S1/16/LOGON FOR: OPERATOR.SYS,PUB ON LDEV #20
HP 3000 / MPE V G.02.04 (BASE G.02.04). FRI, JAN 05, 1990, 8:49 AM
file l;dev=lp
file t;dev=ctape
:
```

System Table Default Values

The default MPE system table sizes configured at the factory are listed in Table 4-3.

Table 4-3. System Table Default Values

Item	Configured Values
MAX # OF OPEN SPOOLFILES	32
CODE SEGMENT TABLE	192
EXTENDED CST	512
DATA SEGMENT TABLE	384
PROCESS CONTROL BLOCK	96
INPUT/OUTPUT QUEUE	96
DISC REQUEST QUEUE	256
TERMINAL BUFFERS PER PORT	7
SYSTEM BUFFERS	16
SWAP TABLE	768
PRIMARY MESSAGE TABLE	96
SECONDARY MESSAGE TABLE	96
SPECIAL REQUEST TABLE	96
INTERRUPT CONTROL STACK	1024
LOADER SEGMENT TABLE	8192
UCOP REQUEST QUEUE	96
TIMER REQUEST LIST	96
BREAKPOINT TABLE	96
# OF USER LOGGING PROCESSES	6
USERS PER LOGGING PROCESS	32
# OF RINS	1024
# OF GLOBAL RINS	96
SECONDS TO LOGON	120
MAX # OF SESSIONS	32
MAX # OF JOBS	32
DEFAULT JOB CPU LIMIT	0
LOGGING EVENTS	all ON
LOG RECORD SIZE	2
LOG FILE SIZE	1023
DIRECTORY	1536
VIRTUAL MEMORY	32K / disk
SPOOLFILE K-SECTORS	128 default
SECTORS PER SPOOLFILE EXTENT	512
MAX # RUNNING PROGRAMS	256
MAX CODE SEGMENT SIZE	16384
MAX CODE SEGMENTS/PROCESS	128
MAX STACK SIZE	31232
MAX EXTRA DATA SEGMENT SIZE	32764
MAX EXTRA DATA SEGMENTS/PROCESS	255
STANDARD STACK SIZE	1200

MPE I/O Device Configuration Parameters

The MPE I/O device configuration parameters are listed in the following table. This is only a partial list of the supported device configurations.

MPE I/O Configuration Parameters

DEVICE NAME	CHAN	TYPE	SUB TYPE	TERMINAL TYPE	SPEED	REC WIDTH	DRIVER NAME	DEVICE CLASSES
HP7961*	0	3	13			128	HIO MDSC2	DISK
HP7962*	0	3	14			128	HIO MDSC2	DISK
HP7963*	0	3	15			128	HIO MDSC2	DISK
HP9144**	0	3	3			128	HIOCTAP1	CTAPE SDISK DDUMP
HP 9145**	0	4	0			128	HIOCTAP3	CTAPE SDISK DDUMP
HPPCLATP***	0	32	14	****	240	66	HIOASLP0	LP
HPTERMATP	0	16	0	10	960	40	HIO TERM1	TERM

* The HP 7961/2/3 device names are also used for the HP 97961/2/3B internal disk drives in the HP MICRO 3000RX.

** Only one of these devices will be configured in the system at one time.

*** This configuration supports the following printers:

HP 2932A
 HP 2934A
 HP 2563A
 HP 2564B
 HP 2684A
 HP 2686A/D

**** Type TTPCL22.PUB.SYS for this entry.

Sample MPE I/O Device Configuration

An example of a typical MPE I/O device configuration is shown below.

Typical MPE I/O Device Configuration Parameters

LOG DEV #	DRT #	U N I T	C H A N N E	T Y P E	SUB TYPE	TERMINAL TYPE	SPEED	REC WIDTH	OUTPUT DEV	MODE	DRIVER NAME	DEVICE CLASS	
1	33	0	0	3	15			128	0		HIOMDSC2	DISC SPOOL	
7 **	35	0	0	3	3			128	0		HIOCTAP1	CTAPE SDISC DDUMP	
7 **	35	0	0	4	0			128	0		HIOCTAP3	CTAPE SDISC DDUMP	
10	36	0	0	24	0			128	LP	JA	HIOTAPE0	JOBTAPE	
20	8	0	0	16	0	10	960	40	20	JAID	HIOTERM1	TERM	
21	8	1	0	16	0	10	960	40	21	JAID	HIOTERM1	TERM	
22	8	2	0	16	0	10	960	40	22	JAID	HIOTERM1	TERM	
23	8	3	0	16	0	10	960	40	23	JAID	HIOTERM1	TERM	
24	8	4	0	32	14	??*	120	66	0	S	HIOASLPO	LP	
25	8	5	0	16	1	10	240	40	25	JAID	HIOTERM1	TERM	
26	84	6	0	16	1	10	240	40	26	JAID	HIOTERM1	TERM	
27	8	7	0	16	1	10	120	40	27	JAID	HIOTERM1	TERM	
----->	30	24	0	0	16	0	10	960	40	30	JAID	HIOTERM1	TERM
If 2nd	31	24	1	0	16	0	10	960	40	31	JAID	HIOTERM1	TERM
ATP/M	32	24	2	0	16	0	10	960	40	32	JAID	HIOTERM1	TERM
	33	24	3	0	16	0	10	960	40	33	JAID	HIOTERM1	TERM
	34	24	4	0	16	1	10	240	40	34	JAID	HIOTERM1	TERM
	35	24	5	0	16	1	10	240	40	35	JAID	HIOTERM1	TERM
	36	24	6	0	16	1	10	240	40	36	JAID	HIOTERM1	TERM
	37	24	7	0	16	1	10	120	40	37	JAID	HIOTERM1	TERM
----->	40	16	0	0	16	0	10	960	40	40	JAID	HIOTERM1	TERM
If 3rd	41	16	1	0	16	0	10	960	40	41	JAID	HIOTERM1	TERM
ATP/M	42	16	2	0	16	0	10	960	40	42	JAID	HIOTERM1	TERM
	43	16	3	0	16	0	10	960	40	43	JAID	HIOTERM1	TERM
	44	16	4	0	16	1	10	240	40	44	JAID	HIOTERM1	TERM
	45	16	5	0	16	1	10	240	40	45	JAID	HIOTERM1	TERM
	46	16	6	0	16	1	10	240	40	46	JAID	HIOTERM1	TERM
	47	16	7	0	16	1	10	120	40	47	JAID	HIOTERM1	TERM

** Only one of these devices will be configured in the system.

PDP Port/MPE Unit Cross Reference

The information below is contained in the I/O Configuration Display. Other essential information is included in the display.

The relation between the recommended Logical Device number (LOG DEV), the DRT number, UNIT number, and the associated PDP port for the eight-port PDP is shown below.

Eight-Port PDP/MPE UNIT Cross Reference

LOG DEV #	DRT #	UNIT	PDP PORT
20	8	0	P0
21	8	1	P1
22	8	2	P2
23	8	3	P3
24	8	4	P4 *
25	8	5	P5 *
26	8	6	P6 *
27	8	7	P7 *

* Modems are supported on these ports.

The relation between the recommended Logical Device number (LOG DEV), the DRT number, UNIT number, and the associated PDP port for the 16-port PDP is shown below.

16-Port PDP/MPE UNIT Cross Reference

LOG DEV #	DRT #	UNIT	PDP PORT
20	8	0	P0
21	8	1	P1
22	8	2	P2
23	8	3	P3
24	8	4	P4 *
25	8	5	P5 *
26	8	6	P6 *
27	8	7	P7 *
30	24	0	P20
31	24	1	P21
32	24	2	P22
33	24	3	P23
34	24	4	P24 *
35	24	5	P25 *
36	24	6	P26 *
37	24	7	P27 *

* Modems are supported on these ports.

The relation between the recommended Logical Device numbers (LOG DEV), the DRT number, UNIT number, and the associated PDP port for the 16-port PDP with the third ATP/M Junction Panel and Cable installed is shown below.

16-Port PDP/8-Port Junction Panel/MPE UNIT Cross Reference

LOG DEV #	DRT #	UNIT	PDP/JPNL PORT
20	8	0	P0
21	8	1	P1
22	8	2	P2
23	8	3	P3
24	8	4	P4*
25	8	5	P5*
26	8	6	P6*
27	8	7	P7*
30	24	0	P20
31	24	1	P21
32	24	2	P22
33	24	3	P23
34	24	4	P24*
35	24	5	P25*
36	24	6	P26*
37	24	7	P27*
40	16	0	ODC
41	16	1	1DC
42	16	2	2DC
43	16	3	3DC
44	16	4	4M *
45	16	5	5M *
46	16	6	6M *
47	16	7	7M *

* Modems are supported on these ports.

DUS Diagnostics

If DUS crashes, an explanation of the halt code will be found in the *Diagnostic/Utility System Reference Manual* (in Vol 1 of *HP 3000 HP-IB Computer Systems Diagnostic Manual Set*).

An easily isolated failure can be indicated by any of the self-tests, however, an intermittent problem probably will not be indicated by the self-tests. Use DUS to help isolate intermittent problems.

Note



DUS may not load if the hardware is faulty. If it does load you will be able to perform more comprehensive tests of the hardware.

If DUS indicates that the system is OK, but it still won't boot, you may have a problem with the I/O configuration or you may have a faulty software tape. If, after changing the I/O configuration or replacing the software tape, the problem remains, you should contact your CE or the Response Center.

Corrective Action

If you receive a failure code that indicates that part of the circuitry has failed on the processor PCA, call your HP service representative.

READER COMMENT SHEET

Systems Technology Division

HP MICRO 3000RX
System/Upgrade Installation Manual

Manual Part Number 32453-90001 January 1990

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SERIOUS ERRORS, such as technical inaccuracies that may render a program or a hardware device inoperative should be reported to your HP Response Center or directly to a Support Engineer. An engineer will enter the problem on HP's STARS (Software Tracking and Reporting System). This will ensure that critical and serious problems receive appropriate attention as soon as possible.

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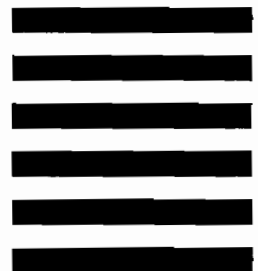
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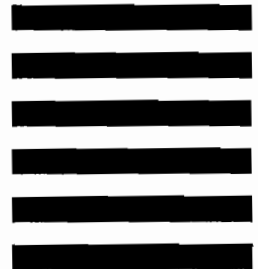
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