*COVER Book Cover*

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**PS/ValuePoint**

# Hardware Maintenance Service and Reference

September 1992

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+--- **Note** ----------+
¦ Before using this information and the product it supports, be sure to read the general information under "Notices" in topic 3.0. ¦
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**First Edition (September 1992)**

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## *About This Manual*

The IBM (*) PS/ValuePoint* (PS/VP*) Hardware Maintenance Service and Reference manual contains *both* service and reference information for IBM PS/ValuePoint computers.

- The service section of this manual includes procedures for isolating problems to a FRU, a Symptom-to-FRU Index, and a parts listing.
- The reference section of this manual includes safety information, general information, product description, and information about the advanced diagnostic tests.
- The manual should be used with the advanced diagnostics tests (found on the Advanced Diagnostics Diskette) to effectively troubleshoot problems.

**Important**

This manual is intended for trained servicers who are familiar with PS/VP products. Before servicing a PS/VP product, be sure to review the safety information under "Safety Information" in topic 2.1.

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*1.0 Hardware Maintenance Service*

This section contains a general checkout procedure, a Symptom-to-FRU Index, and procedures for isolating problems to a FRU for the PS/VP computer.

The diagnostic tests are intended to test *only* PS/VP products. Non-PS/VP products, prototype cards, or modified options can give false errors and invalid system responses.

Warning: The drives in the system you are servicing might have been rearranged or the drive startup sequence changed. Be extremely careful during write operations such as copying, saving, or formatting. Data or programs can be overwritten if you select an incorrect drive.

Subtopics

1.1 How to Diagnose Combined FRUs
1.2 How to Use Error Messages
1.3 General Checkout
1.4 Undetermined Problem
1.5 Power Supply
1.6 Display
1.7 Installed Devices List
1.8 Keyboard
1.9 Printer
1.10 Memory
1.11 Symptom-to-FRU Index
1.12 Model 6384 Parts

## *1.1 How to Diagnose Combined FRUs*

If an adapter or device consists of more than one FRU, an error code may be caused by any of the FRUs. Before replacing the adapter or device, remove the FRUs, one by one, to see if the symptoms change.

If you are instructed to replace the system board and that does not correct the problem, replace the riser card and reinstall the original system board.

## *1.2 How to Use Error Messages*

Use the error messages displayed on the screen to diagnose failures. If more than one error message is displayed, diagnose the **first** error message first. The cause of the first error message can cause false error messages to be displayed. If you did not receive any error messages, see if the error symptom is listed in the "Symptom-to-FRU Index" in topic 1.11.

The general checkout procedure starts on the next page.

*1.3 General Checkout*

**001**

- Power-off the system and all external devices.
- Check all cables and power cords.
- Make sure there are no diskettes in the drives.
- Power-on all external devices.
- Power-on the system.
- Watch the screen for a POST error message.

**DID YOU RECEIVE A POST ERROR MESSAGE?**

**Yes** → **002**: Go to Step 010.

**No** → **003**

**IS THE ERROR 162?**

**Yes** → **004**: Go to Step 010.

**No** → **005**

- Insert your advanced diagnostics diskette.
- Press **Ctrl+Alt+Del** and check for the following responses:

  1. One or two short beeps.

  2. A 162 Error.

**DID YOU RECEIVE BOTH RESPONSES?**

**Yes** → **006**: Go to "Symptom-to-FRU Index" in topic 1.11.

**No** → **007**

**HAS THE CONFIGURATION BEEN INTENTIONALLY CHANGED?**

**Yes** → **008**: Press **Esc** to load diagnostics, then go to Step 016.

**No** → **009**

Press **Enter** to run the configuration utility and verify that the error is no longer present. If you return to this point again, go to Step 007 and answer No.

---

**010**

- Insert your advanced diagnostics diskette.
- Press **Ctrl+Alt+Del**

**DID THE "SELECT AN OPTION" MENU APPEAR?**

**Yes** → **011**

**DID YOU RECEIVE A POST ERROR?**

**Yes** → **012**

**No**

Go to "Symptom-to-FRU Index" in topic 1.11.

**013**

- Press **Esc**

**DID THE "SELECT AN OPTION" MENU APPEAR?**

**Yes No**

**014**

Go to "Symptom-to-FRU Index" in topic 1.11.

**015**

Go to Step 016.

---

**016**

- Select **System Checkout**.

- If the test stops and you cannot continue, replace the last device tested.
- If the system has incorrect keyboard responses, go to "Keyboard" in topic 1.8.
- If the printer has incorrect responses, go to "Printer" in topic 1.9.
- If the display has problems such as jittering, rolling, shifting, or being out-of-focus, go to "Display" in topic 1.6.

**IS THE LIST OF INSTALLED DEVICES CORRECT?**

**Yes No**

**017**

Go to "Installed Devices List" in topic 1.7. If that does not resolve the problem, continue with Step 019.

**018**

- Run the advanced diagnostic tests.

**DID THE TESTS IDENTIFY A FAILURE?**

**Note: If the test stops and you cannot continue, replace the last device tested.**

**Yes No**

**019**

Check the "Symptom-to-FRU Index" in topic 1.11 for any POST error or other error symptom you might have. If your error symptom is not listed, go to "Undetermined Problem" in topic 1.4. If you cannot find a problem, it may be intermittent:

- Check for damaged cables and connectors.
- Reseat all adapters, drives, and modules.
- Check the system unit fan for proper operation.
- Start an error log and run the tests multiple times. (Use a DOS-formatted diskette.)

**020**

Follow the instructions on the display. If that does not correct the problem, go to "Symptom-to-FRU Index" in topic 1.11.

*1.4 Undetermined Problem*

Check the power supply voltages (see "Power Supply" in topic 1.5). If the voltages are correct, return here and continue with the following steps:

1. Power-off the system.

2. Remove or disconnect the following, one at a time:

    a. Non-IBM devices
    b. External devices (modem, printer, or mouse)
    c. Math coprocessor
    d. Any adapters
    e. Riser card
    f. Memory module kits
    g. Hard disk drive
    h. Diskette drive.

3. Power-on the system.

4. Repeat steps 1 through 3 until you find the failing device or adapter.

If all devices and adapters have been removed, and the problem continues, replace the system board.

*1.5 Power Supply*

If the power-on indicator is not on or if the power-supply fan is not running, check the power cord for proper installation and continuity. Verify that the voltage-selector switch is set for the correct voltage.

If these are correct, check the voltages listed below.

PICTURE 1

If the voltages are not correct, and the power cord is good, replace the power supply.

*1.6 Display*

If the screen is rolling, replace the display assembly. If that does not correct the problem, replace the system board.

If the screen is not rolling, do the following to run the display self-test:

1. Power-off the system unit and display.
2. Disconnect the display signal cable.
3. Power-on the display.
4. Turn the brightness and contrast controls clockwise to their maximum setting.
5. Check for the following conditions:

   - The screen should be white or light gray with a 2 to 20mm (0.08-0.79 in.) wide black margin on one or both sides.

   - The contrast and brightness controls should vary the screen intensity.

   If both of these conditions are not present, refer to the documentation supplied with the display for additional testing information. If additional testing information is not supplied, replace the display.

   If you are unable to correct the problem, go to "Undetermined Problem" in topic 1.4.

*1.7 Installed Devices List*

Warning: A customized setup configuration (other than default settings) may exist on the system you are servicing. Running Configuration may alter those settings. Note the current configuration settings (using the **View Configuration** option) and verify that the settings are in place when service is complete. (For more information about configuration, see "Setup Program" in "Diagnostic Aids" in this manual.

*If the number of diskette drives shown in the installed devices list is not correct*, do the following:

1. Restart the system.

2. Correct the drive information in the Set Configuration menu.

3. Run the diagnostic tests.

If you cannot correct the drive information, replace FRUs, in the following order, until the problem goes away: diskette drive; diskette drive cable; system board.

*If the number of hard disk drives shown in the installed devices list is not correct*, do the following:

1. Check the hard disk drive jumper settings (see "Hard Disk Drive Jumper Settings" in topic 2.11).

2. Check the voltages to the hard disk drives (see "Power Supply" in topic 1.5).

3. Restart the system and check the configuration.

   - If the first drive is missing, replace the primary drive.
   - If all drives are missing, replace the primary drive.
   - If just the second drive is missing, replace that drive.

   If the problem remains, replace the drive cable. If that does not fix the problem, replace the system board.

*If any other adapter or device is missing from the installed devices list, add it to the list and continue with the diagnostic tests.*

**Note:** If you cannot add a missing adapter or device to the list, the diagnostic code for the missing adapter or device is not on the advanced diagnostic diskette. Run the diagnostics provided with that device.

*1.8 Keyboard*

**Note:** If a mouse or other pointing device is attached, remove it and see if the error symptom goes away. If the symptom goes away, the mouse or pointing device is defective.

**001**

- Power-off the system.
- Disconnect the keyboard cable from the system unit.
- Power-on the system and check the keyboard cable connector on the system unit for the voltages shown. All voltages are ± 5%.

PICTURE 2

**ARE THE VOLTAGES CORRECT?**

**Yes** — **No**

**002**

Replace the system board.

**003**

Replace the keyboard. If the problem remains, replace the system board.

---

*1.9 Printer*

1. Make sure the printer is properly connected and powered-on.
2. Run the printer self-test.

If the printer self-test does not run correctly, the problem is in the printer. Refer to the printer service manual.

If the printer self-test runs correctly, install a wrap plug in the parallel port and run the advanced diagnostic tests to determine which FRU failed.

If the advanced diagnostic tests (with the wrap plug installed) do not detect a failure, replace the printer cable. If that does not correct the problem, replace the system board or adapter connected to the printer cable.

*1.10 Memory*

**001**

- Power-off the system.
- Insert the advanced diagnostics diskette into drive A.
- Power-on the system.
- Make a note of any POST errors you receive. Disregard 164 errors (memory size).

**DID YOU RECEIVE A XXXXXX XXXX 2XX POST ERROR?**

**Yes** **No**

**002**

Press **Esc** to continue.

- Run the memory tests. Use the **RUN TESTS ONE TIME** option.

**DID THE MEMORY TESTS COMPLETE RUNNING WITHOUT AN ERROR?**

**Yes** **No**

**003**

Follow the instructions on the display.

**004**

Your system memory is now functioning correctly. If you suspect an intermittent problem, start an error log. (Use a DOS-formatted diskette.)

---

**005**

Press **Esc** to continue.

- Run the memory tests. Use the **RUN TESTS ONE TIME** option. If you cannot run the memory test or the test does not find a problem, replace the memory module kits, one at a time, until the problem goes away. Refer to "System Memory" in topic 2.8. When the problem goes away, replace the last kit removed. If that does not fix the problem, replace the system board.

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*1.11 Symptom-to-FRU Index*

The Symptom-to-FRU Index lists error symptoms and possible causes. The most likely cause is listed first. When servicing a system, always begin with "General Checkout" in topic 1.3. This index can also be used to help you decide which FRUs to have available when servicing a system.

If you are unable to correct the problem using this index, go to "Undetermined Problem" in topic 1.4.

**Notes:**

1. If you have both an error message and an incorrect audio response, diagnose the error message first.

2. If you cannot run the advanced diagnostic tests, but did receive a POST error message, diagnose the POST error message.

3. If you did not receive any error message, look for a description of your error symptoms in the first part of this index.

4. Check all power supply voltages before you replace the system board. (See "Power Supply" in topic 1.5.)

5. Check the hard disk drive jumper settings before you replace a hard disk drive. (See "Hardware Jumper Settings" in topic 2.11.)

In the following index, an "X" in an error message can represent any number.

| **Symptom/Error** | **FRU/Action** |
|---|---|
| No power, or fan not running | **See** "Power Supply" in topic 1.5 |
| No beep during POST but system works correctly | **System Board** |
| No beep during POST | **See** "Undetermined Problem" in topic 1.4<br>System Board<br>Memory Module Kit<br>Any Adapter or Device<br>Riser Card<br>Power Cord<br>Power Supply |
| One long and two short beeps during POST | **System Board** |
| Continuous beep | **System Board** |
| Repeating short beeps | **Keyboard (stuck key?)**<br>System Board |
| Changing colors | **Display** |
| Intensity or coloration varies from left to right of characters and color bars | **Display**<br>System Board |
| Other display problem not listed above (including blank or illegible display) | **See** "Display" in topic 1.6<br>System Board<br>Display |
| Diskette drive in-use light remains on or does not light when drive is active | **Diskette Drive**<br>System Board<br>Diskette Drive Cable |
| Power-on indicator or hard disk drive in-use light not on but system works correctly | **Power Supply**<br>System Board |
| The "Insert a Diskette" icon appears with a known-good diagnostics diskette in the first 3.5-inch diskette drive | **Diskette Drive**<br>System Board<br>Diskette Drive Cable<br>Network Adapter |
| A nonsystem disk or disk error-type message with a known-good | **Diskette Drive**<br>System Board<br>Diskette Drive Cable |

| | |
|---|---|
| diagnostic diskette | |
| Incorrect memory size during POST | **See** "Memory" in topic 1.10<br>System Board |
| 110 | **See Step 005 of** "Memory" in topic 1.10<br>Memory Module Kit<br>System Board |
| Printer problems | **See** "Printer" in topic 1.9 |
| Serial or parallel port device failure (system board port) | **Device Self-Test OK?**<br>Device<br>Cable<br>System Board |
| Serial or parallel port device failure (adapter port) | **Device Self-Test OK?**<br>Device<br>Cable<br>Alternate Adapter<br>System Board<br>Riser Card |
| XXXX ROM Error | **Any Adapter** |
| Some or all keys on the keyboard don't work. | **Keyboard**<br>System Board |
| Clock Battery inaccurate | **Clock Battery**<br>System Board |
| 161 | **Run Auto Configuration**<br>Clock Battery<br>System Board |
| 162<br>(and unable to run advanced diagnostics) | **Diskette Drive**<br>System Board<br>Diskette Drive Cable |
| 162 | **Run Auto Configuration**<br>Clock Battery<br>System Board |
| 163 | **Time and Date Set?**<br>Clock Battery<br>System Board |
| 164 | **Run Auto Configuration**<br>See "Memory" in topic 1.10<br>System Board |
| 199 | **See** "Installed Devices List" in topic 1.7 |
| 1XX<br>(not listed above) | **System Board** |
| 2XX or<br>XXXXXX XXXX 2XX | **See** "Memory" in topic 1.10<br>Memory Module Kit<br>System Board |
| 305<br>(The system-board nonreplaceable fuse can be blown by a defective keyboard or mouse. If you suspect one of these FRUs, replace it when you replace the system board.) | **System Board**<br>Keyboard<br>Mouse |
| 3XX<br>(not listed above) | **Keyboard**<br>System Board |
| 604 or 662 | **Wrong diskette drive type installed** |
| 663 | **Wrong media type** |
| 6XX<br>(not listed above) | **Diskette Drive**<br>System Board<br>Diskette Drive Cable<br>Power Supply |
| 7XX | **Math Coprocessor**<br>System Board |

| | |
|---|---|
| 9XX | **System Board** |
| 10XX | **Alternate Parallel Adapter**<br>Riser Card |
| 11XX | **System Board** |
| 12XX | **Alternate Serial Adapter**<br>Riser Card |
| 13XX<br>(A properly-functioning Joystick or Paddle must be attached.) | **Game Control Adapter**<br>Riser Card |
| 14XX | **See** "Printer" in topic 1.9 |
| 15XX | **SDLC Communications Adapter**<br>Riser Card |
| 17XX | **See** "Power Supply" in topic 1.5<br>**Hard Disk Drive**<br>System Board<br>Hard Disk Cable<br>Power Supply |
| 2401, 2402 | **System Board**<br>Display |
| 2409 | **Display** |
| 2410 | **System Board** |
| 30XX | **PC Network Adapter**<br>LF Translator<br>Cable Problem?<br>Riser Card |
| 31XX | **Alternate PC Network Adapter**<br>LF Translator<br>Cable Problem?<br>Riser Card |
| 86XX | **Mouse**<br>System Board |

**Supplemental Symptom-to-FRU Index:**

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*1.12 Model 6384 Parts*

PICTURE 3

| ***Index*** | ***System Unit*** | |
|---|---|---|
| **1** | Top Cover Assembly | 52G8740 |
| | Logo | 52G8743 |
| | Front Bezel | 52G8742 |
| | Foot (1) | 93F2386 |
| **2** | Riser Card | 93F2396 |
| **3** | System Board, 386SLC, 2MB | 52G8751 |
| | System Board, 486SX, w/o SIMMs | 52G8752 |
| | System Board, 486DX, w/o SIMMs | 93F0008 |
| | Lithium Battery - CR2032 (NS) | 33F8354 |
| | Jumper, 2 position - 4 pack (NS) | 93F0067 |
| | Mounting Screws - 4 pack (NS) | 93F0041 |
| **4** | 145 W Power Supply with CPU switch | 52G8741 |
| **5** | Hard Disk Drive Cable | 52G8749 |
| **5** | Diskette Drive Cable | 52G8748 |
| **7** | Base Frame Assembly (R) | 52G8750 |
| | Cover Lock | 52G8744 |
| | Adapter Card Guides (2) | 52G8746 |
| **8** | LED and Cable, Power | 93F2389 |
| **9** | LED and Cable, Hard Disk Drive | 93F2388 |
| **10** | 30-Pin SIMM, 1MB (486SX and 486DX) | 93F0058 |
| | 30-Pin SIMM, 4MB (486SX and 486DX) | 96F9289 |
| | 72-Pin SIMM, 1MB (386SLC) | 90X8624 |
| | 72-Pin SIMM, 2MB (386SLC) | 92F0103 |
| | 72-Pin SIMM, 4MB (386SLC) | 92F3337 |
| | 72-Pin SIMM, 8MB (386SLC) | 64F3607 |
| **12** | 5.25-in. Blank Bezel | 52G8745 |

| ***Index*** | ***DASD*** | | |
|---|---|---|---|
| **6** | 5.25-in. 1.2MB Diskette Drive (optional) | | 93F2362 |
| | DASD Tray | 52G8762 | |
| **11** | 3.5-in. 1.44MB Diskette Drive | 93F2361 | |
| | 80MB Hard Disk Drive | 95F4721 | |
| | 120MB Hard Disk Drive | 93F0076 | |
| | 170MB Hard Disk Drive | 95F4728 | |
| | 212MB Hard Disk Drive | 93F0118 | |
| | DASD Tray and Riser Support Bracket | 93F2387 | |
| | Mounting Screws (4) | 93F0041 | |

Subtopics
1.12.1 Keyboard and Mouse
1.12.2 Power Cords
1.12.3 Displays

*1.12.1 Keyboard and Mouse*

***Keyboards***

| | |
|---|---|
| Arabic | 1391490 |
| Belgian | 1391414 |
| Belgian/French | 1391526 |
| Bulgarian | 1399583 |
| Canadian French | 1392022 |
| Czechoslovakia | 1399570 |
| Cyrillic | 1393866 |
| Danish | 1391407 |
| Dutch | 1391511 |
| French | 1391402 |
| German | 1391403 |
| Greek | 1399046 |
| Hebrew | 1391408 |
| Hungary | 1399581 |
| Italian | 1393395 |
| Latin-American Spanish | 1392025 |
| Norwegian | 1391409 |
| Polish | 1399580 |
| Portuguese | 1391410 |
| Romanian | 1399582 |
| Russian/Cyrillic | 1399579 |
| Serbian/Cyrillic | 1399578 |
| Slovakian | 1399571 |
| Spanish | 1391405 |
| Swedish/Finnish | 1391411 |
| Swiss | 1391412 |
| Swiss/French | 1395881 |
| Swiss/German | 1395882 |
| Turkish | 1393286 |
| U.K. English | 1391406 |
| U.K. English (E/ME/A only) | 1396790 |
| U.S. English | 1392090 |
| U.S. English (E/ME/A only) | 1396790 |
| Yugoslavian | 1393669 |

***Keyboard Cable and Mouse***

| | |
|---|---|
| Keyboard Cable Assembly 0.9 m (3ft.) | 61X8898 |
| Keyboard Parts Kit | 33F8174 |
| Mouse | 1383640 |

| | |
|---|---|
| -- Mouse Ball and Pop-Off Retainer | 33F8461 |
| -- Mouse Ball and Twist-Off Retainer | 33F8462 |

*1.12.2 Power Cords*

| | |
|---|---|
| Arabic | 14F0033 |
| Australia | 93F2365 |
| Belgian | 13F9979 |
| Belgian/French | 13F9979 |
| Bulgarian | 13F9979 |
| Canada English | 93F2364 |
| Canada French | 93F2364 |
| Czechoslovakia | 13F9979 |
| Denmark | 13F9997 |
| Finland | 13F9979 |
| French | 13F9979 |
| German | 13F9979 |
| Hungary | 13F9979 |
| Israel | 14F0087 |
| Italian | 14F0069 |
| Latin-America Spanish | 93F2366 |
| Netherlands | 13F9979 |
| New Zealand | 93F2365 |
| Norway | 13F9979 |
| Poland | 13F9979 |
| Portuguese | 13F9979 |
| Serbia | 13F9979 |
| Slovak | 13F9979 |
| South Africa | 14F0015 |
| Spanish | 13F9979 |
| Swiss | 13F9979 |
| Swiss/French | 14F0051 |
| Swiss/German | 14F0051 |
| U.S. | 93F2364 |
| UK Ireland | 14F0033 |
| Yugoslavia Latin | 13F9979 |

*1.12.3 Displays*

***6312 Color Display***

| | |
|---|---|
| 90/137 V ac (N. Hemisphere) | 39G3321 |
| 180/264 V ac (N. Hemisphere) | 39G3322 |
| 180/264 V ac (Equatorial) | 39G3323 |
| 180/264 V ac (S. Hemisphere) | 39G3494 |
| Tilt/Swivel | 39G3496 |

***6314 Color Display***

| | |
|---|---|
| 98/264 V ac, Universal (N. Hemisphere) | 39G3352 |
| 98/264 V ac, Universal (N. Hemisphere) | 39G3353 |
| 98/264 V ac, Universal (Equatorial) | 39G3454 |
| 98/264 V ac, Universal (S. Hemisphere) | 39G3498 |
| Tilt Swivel | 39G3502 |
| Signal Cable | 39G3331 |

***6319 Color Display***

| | |
|---|---|
| 98/264 V ac, Universal (N. Hemisphere) | 39G3385 |
| 98/264 V ac, Universal (N. Hemisphere) | 39G3386 |
| 98/264 V ac, Universal (Equatorial) | 39G3387 |
| 98/264 V ac, Universal (S. Hemisphere) | 39G3500 |
| Tilt Swivel | 39G3503 |
| Signal Cable | 39G3331 |

*2.0 Hardware Maintenance Reference*

This section contains general product and diagnostic information and covers the following:

- Safety Information
- Product Description
- Specifications
- Compatibility
- Passwords
- Configuration Utility
- Memory
- Jumper Settings
- Exploded View
- Test Point Locations
- Miscellaneous related information

Subtopics

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*2.1 Safety Information*

The following section contains the safety information required to service a PS/VP computer. Familiarize yourself with this information before servicing a PS/VP computer.

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2.1.4 Changing the Battery
2.1.5 Handling Electrostatic Discharge (ESD) Sensitive Devices
2.1.6 Electrical Safety

*2.1.1 General Safety*

Use these rules to ensure general safety:

- Observe good housekeeping in the area of the machines during maintenance and after completing it.
- When lifting any heavy object:
  1. Ensure you can stand safely without slipping.
  2. Distribute the weight of the object equally between your feet.
  3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
  4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. *Do not attempt to lift any objects that weigh more than 16 kg (35 lb) or objects that you think are too heavy for you.*
- Do not perform any action that causes hazards to the customer or that makes the equipment unsafe.
- Before you start the machine, ensure that other service representatives and the customer's personnel are not in a hazardous position.
- Put removed covers and other parts in a safe place, away from all personnel, while you are servicing the machine.
- Keep your tool case away from walk areas so that other people will not trip over it; for example, put it under a desk or table.
- Do not wear loose clothing that can be trapped in the moving parts of a machine. Ensure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.
- Insert the ends of your necktie or scarf inside other clothing or fasten the necktie with a clip, preferably nonconductive, approximately 8 centimeters (3 inches) from the end.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing.

  **Remember:** A metal object lets more current flow if you touch a live conductor.
- Wear safety glasses when you are:
  - Using a hammer to drive pins or similar parts
  - Drilling with a power hand-drill
  - Using spring hooks or attaching springs
  - Soldering parts
  - Cutting wire or removing steel bands
  - Cleaning parts with solvents, chemicals, or cleaning fluids
  - Working in any other conditions that might be hazardous to your eyes.
- After maintenance, reinstall all safety devices such as shields, guards, labels, and ground wires. Exchange any safety device that is worn or defective for a new one.

  **Remember:** Safety devices protect personnel from hazards. You destroy the purpose of the devices if you do not reinstall them before completing your service call.
- Reinstall all covers correctly before returning the machine to the customer.

### *2.1.2 Moving the Computer*

The PS/VP computer top-cover assembly slides onto the base frame and is held in place by the cover-release latch and cover lock. Before moving the computer, make sure that the cover is latched and the cover lock is in the locked position.

*2.1.3 Safety Inspection Guide*

The intent of this inspection guide is to assist you in identifying potentially unsafe conditions on these products. Each machine, as it was designed and built, had required safety items installed to protect users and service personnel from injury. This guide addresses only those items. However, good judgment should be used to identify potential safety hazards due to attachment of non-IBM features or options not covered by this inspection guide.

If any unsafe conditions are present, you must determine how serious the apparent hazard could be and whether you can continue without first correcting the problem.

Consider these conditions and the safety hazards they present:

- Electrical hazards, especially primary power: primary voltage on the frame can cause serious or fatal electrical shock.
- Explosive hazards, such as a damaged CRT face or bulging capacitor, can cause serious injury.
- Mechanical hazards, such as loose or missing hardware, can cause serious injury.

The guide consists of a series of steps presented in a checklist. Begin the checks with the power off and the power cord removed from the power receptacle.

Checklist:

1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Power off the system. Disconnect the power cord from the electrical outlet.
3. Check the power cord for:
   a. A third-wire ground connector in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and frame ground.
   b. Insulation must not be frayed or worn.
4. Remove the cover.
5. Check for any obvious non-IBM alterations. Use good judgment as to the safety of any non-IBM alterations.
6. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Check that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

*2.1.4 Changing the Battery*

Follow any special handling and installation instructions supplied with the replacement battery.
CAUTION:
Danger of explosion if battery is incorrectly replaced.

Replace with only the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

*2.1.5 Handling Electrostatic Discharge (ESD) Sensitive Devices*

Any computer part containing transistors or integrated circuits (ICs) should be considered sensitive to electrostatic discharge (ESD). ESD damage can occur when there is a difference in charge between objects. Protect against ESD damage by equalizing the charge so that the machine, the part, the work mat, and the person handling the part are all at the same charge.

**Notes:**

1. Use product-specific ESD procedures when they exceed the requirements noted here.

2. Make sure that the ESD protective devices you use have been certified (ISO 9000) as fully effective.

When handling ESD-sensitive parts:

- Keep the parts in protective packages until they are inserted into the product.
- Avoid contact with other people.
- Wear a grounded wrist strap against your skin to eliminate static on your body.
- Prevent the part from touching your clothing. Most clothing is insulative and retains a charge even when you are wearing a wrist strap.
- Use the black side of a grounded work mat to provide a static-free work surface. The mat is especially useful when handling ESD-sensitive devices.
- Select a grounding system, such as those listed below, to provide protection that meets the specific service requirement.

  **Note:** The use of a grounding system is desirable but not required to protect against ESD damage.

  - Attach the ESD ground clip to any frame ground, ground braid, or green-wire ground.
  - Use an ESD common ground or reference point when working on a double-insulated or battery-operated system. You can use coax or connector-outside shells on these systems.
  - Use the round ground-prong of the AC plug on AC-operated systems.

*2.1.6 Electrical Safety*

Observe the following rules when working on electrical equipment:

- Find the room emergency power-off (EPO) switch or disconnecting switch. If an electrical accident occurs, you can then operate the switch quickly.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Disconnect all power:
  - Before doing a mechanical inspection
  - Before working near power supplies
  - Before removing or installing main units
- Before you start to work on the machine, unplug its power cable. If you cannot unplug the cable, ask the customer to switch off the wall box that supplies power to the machine and to lock the wall box in the off position.
- If you need to work on a machine that has *exposed* electrical circuits, observe the following precautions:
  - Ensure that another person, familiar with the power-off controls, is near you.

    **Remember:** Another person must be there to switch off the power, if necessary.

    CAUTION:
    Some hand tools have handles covered with a soft material that does not insulate you when working with live electrical currents. Use only approved tools and testers.

  - Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.

    **Remember:** There must be a complete circuit to cause electrical shock. By observing the above rule, you may prevent a current from passing through your body.
  - When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.

    CAUTION:
    Many customers have, near their equipment, rubber floor mats that contain small conductive fibers to decrease electrostatic discharges. Do not use this type of mat to protect yourself from electrical shock.

  - Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

  Observe the special safety precautions when you work with very high voltages; these instructions are in the safety sections of maintenance information. Use extreme care when measuring high voltages.
- Regularly inspect and maintain your electrical hand tools for safe operational condition.
- Do not use worn or broken tools and testers.
- *Never assume* that power has been disconnected from a circuit. First, *check* that it has been switched off.
- Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, nongrounded power extension cables, power surges, and missing safety grounds.
- Do not touch live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.
- Do not service the following parts *with the power on* when they are removed from their normal operating places in a machine:
  - Power supply units
  - Pumps
  - Blowers and fans
  - Motor generators

  and similar units. (This practice ensures correct grounding of the units.)
- If an electrical accident occurs:
  - **Use caution; do not become a victim yourself.**
  - **Switch off power.**
  - **Send another person to get medical aid.**

*2.2 Product Description*

All PS/VP Model 6384 computers contain five diskette/hard disk bays and five I/O adapter card slots.

- Security

  - Power-on password

- System boards

  386SLC (25MHz Processor)

  - Soldered on board--2MB system memory and 1MB video memory (DRAM)
  - Math coprocessor socket.
  - Two 72-pin system memory sockets (accepts 70 to 85 ns). Maximum Memory = 16MB. Refer to "System Memory" in topic 2.8.
  - Ports include: serial, parallel, keyboard, mouse, and video.
  - Connectors for AT (*) riser card (120-pin), input power (12-pin), AT diskette drives (34-pin), IDE AT hard disk drives (40-pin), power LED (2-pin), hard disk LED (2-pin), and video feature (26-pin).
  - Lithium battery.

  486SX (25MHz processor)

  - Math coprocessor socket
  - Supports 8K internal cache. (External cache is not supported.)
  - RAM is installed directly onto the system board using industry standard 30-pin 80 ns SIMMs. There are two banks of four sockets to allow a maximum of 32 Megabytes. 256K, 1MB and 4MB SIMMs are supported in both banks. Refer to "System Board Layouts" in topic 2.13. Bank 0 or bank 1 must be filled with the same value SIMMs to work properly. Refer to "System Memory" in topic 2.8.
  - 1MB Video RAM is soldered on the system board.
  - Ports include: two serial, parallel, keyboard, mouse and video.
  - Connectors for AT riser card (120-pin), input power (12-pin), AT diskette drives (34-pin), IDE AT hard disk drives (40-pin), power LED (2-pin), hard disk LED (2-pin), and video feature (26-pin).
  - Lithium battery

  486DX (33MHz processor with built-in math coprocessor)

  - Supports 8K internal cache and 128K external cache. (Not field upgradeable)
  - RAM is installed directly onto the system board using industry standard 30-pin 80 ns SIMMs. There are two banks of four sockets to allow a maximum of 32 Megabytes. 256K, 1MB and 4MB SIMMs are supported in both banks. One or both banks must be filled with the same value SIMMs to work properly. Refer to "System Memory" in topic 2.8.
  - 1 Megabyte of Video RAM is soldered on the system board.
  - Ports include: two serial, parallel, keyboard, mouse, and video
  - Connectors for AT riser card (120-pin), input power (12-pin), AT diskette drives (34-pin), IDE AT hard disk drives (40-pin), power LED (2-pin), hard disk LED (2-pin), and video feature (26-pin).
  - Lithium battery

- Power supplies with CPU power switch

  - A 145-W universal voltage power supply with fan and a connector for a detachable grounded 3-wire power cord. The power cable has five DASD connectors. One 3.5-inch diskette drive minipower connector and four standard 4-pin power connectors.

    When the system is powered off for 10 seconds or more and then powered on, the power supply generates a "power good" signal that resets the system logic.

- Cables

  One signal cable for hard disk drives and one cable for diskette drives are provided with all models.

- Diskette Drives--"AT"

  3.5-inch 1.44MB Slimline diskette drive in all models

- Hard Disk Drives

  Hard disks are 3.5-inch Slimline IDE AT drives with 18 ms average access time.

  - 80MB with 32K of "look-ahead" cache

- 170MB with a minimum of 32K of "look-ahead" cache
- 213MB with 64K of "look-ahead" cache.

- Keyboard

  101- or 102-key enhanced with 6-foot (1.8-m) cable.

- Mouse with 6-foot (1.8-m) cable.

(*) Trademark of the IBM Corporation.

*2.3 System Unit Specifications*

System Unit Size:

- Width: 405 mm (15.9 in.)
- Depth: 421.5 mm (16.6 in.)
- Height: 148.3 mm (5.8 in.).

System Unit Weight:

- 11 kg (23.5 lb).

Environment:

- Temperature, System Unit and Display
  - Power on: 16 to 32 degrees C (60 to 95 degrees F)
  - Power off: 10 to 43 degrees C (50 to 110 degrees F).
- Humidity, System Unit and Display
  - Power on: 8% to 80%
  - Power off: 8% to 80%.
- Maximum altitude: 2134 m (7000 ft).

Heat output:

- 242 Btu/Hr.

Electrical:

- Input voltage (sinewave input is required)
  - Low Range
    - Minimum: 100 V ac
    - Maximum: 125 V ac
  - High Range
    - Minimum: 180 V ac
    - Maximum: 265 V ac

*2.4 Hard Disk Drive Specifications*

| Formatted Capacity | 80MB | 170MB | 212MB |
|---|---|---|---|
| Bytes/Sector | 512 | 512 | 512 |
| Sectors/Track | 17 | 34 | 38 |
| Cylinders | 984 | 984 | 682 |
| Heads | 10 | 10 | 16 |
| Rotational Speed (RPM) | 3600 | 3600/3551 | 3551 |
| Transfer Rate (M bits/sec) | 13.3 | 13.3/9.0 | 9.0 |
| Access Time: | | | |
| Track to Track (ms) | 5.0 | 5.0/4.0 | 4.0 |
| Average (ms) | 18.5 | 18.5/17.0 | 17.0 |
| Maximum (ms) | 32.5 | 32.5/30.0 | 30.0 |
| Interleave Factor | 1:1 | 1:1 | 1:1 |
| Recording Method | 1, 7 RLL | 1, 7 RLL | 1, 7 RLL |
| dc Power: | | | |
| +5 V Tolerance | ±5% | ±5% | ±5% |
| +12 V Tolerance | ±8% | ±8% | ±8% |
| Power (W): | | | |
| Idle, R/W (typical) | 2.9 | 3.2/3.7 | 3.7 |
| Seeking (typical) | 3.2 | 3.5/3.9 | 3.9 |
| Startup (typical) | 6.0 | 8.3/10.0 | 10.0 |

*2.5 Hardware Compatibility*

PS/VP computers are designed to maintain compatibility with adapters, devices and drives which fully support the following interfaces and physically fit into the system.

| **Item** | **Interface** |
|---|---|
| Hard Disk Drives | AT IDE Interface |
| I/O Adapter Cards | Adapters that are IBM AT compatible and operate at 8MHz |
| Diskette Drives | AT Interface |
| Math Coprocessor | Intel** or equivalent |
| Video | Displays:<br><br>□ VGA or SVGA (operations at VGA or higher frequencies)<br><br>□ Physical interface compatible with IBM's PS/2* VGA interface.<br><br>Modes (dependent on system Video RAM):<br><br>□ 256K RAM VGA Mode<br><br>- 800x600 (16 colors) medium-high resolution<br><br>□ 512K RAM VGA Modes<br><br>- 640x480 (256 colors) standard resolution<br>- 800x600 (256 colors) medium-high resolution<br>- 1024x768 (16 colors) high resolution.<br><br>□ 1MB RAM VGA Modes<br><br>- 640x480 (256 colors) standard resolution<br>- 800x600 (256 colors) medium-high resolution<br>- 1024x768 (256 colors) high resolution. |
| Serial | 9-pin connector with RS232D electrical interface |
| Parallel | Bi-directional |
| Pointing Device | IBM PS/2-compatible mouse |
| Keyboard Device | IBM PS/2-compatible enhanced keyboard |

( ) ( )

( ) ** Trademark of the Intel Corporation.

( ) * Trademark of the IBM Corporation.

*2.6 Power-On Password*

A power-on password denies access to the system by an unauthorized user when the system is powered on. When a power-on password is active, the password prompt appears on the screen each time the system is powered on. The system starts after the proper password is entered.

To service a system with an active and unknown power-on password, power off the system and do the following:

- For a 386SLC (*) system board:

  1. Locate system board connector J8.
  2. Move the jumper on J8 so that it connects the center pin and the pin on the opposite end of the connector.
  3. Power on the system unit.

The system detects the change and the password is erased from memory. Leave the jumper in that position until the next time you need to reset the password.

- For 486SX and 486DX system boards:

  1. Locate system board connector JP8.
  2. Move the jumper on JP8 so that it connects pins 2 and 3.
  3. Apply a momentary short across the two ends of capacitor C17. C17 is located near the power connector P1.
  4. Move the jumper on JP8 back to pins 1 and 2.
  5. The system detects the change and the password is erased from memory.
  6. While holding down both mouse buttons, power on the system unit. Release the mouse buttons when the cursor appears.
  7. When you are finished servicing the machine, run the Configuration Utility to restore the configuration settings.

**Note:** To reinstall the password, the user must enter a password in the Configuration Utility.

(*) Trademark of the IBM Corporation.

## *2.7 Using the Configuration Utility*

The Configuration Utility is a function that lets you view and change important information about your computer's hardware. You may need to use the Configuration Utility in these situations:

- If you add a *hardware option* (such as a diskette drive, memory module, or math coprocessor), and you want to verify the change or make a change.
- If you remove a hardware option, you will need to verify the change.
- If you get an error code and description.

You can also use the Configuration Utility to:

- Check the computer's hardware features. For example, you can use this program to check the amount of memory in your computer.
- Change the computer's serial and parallel port settings.
- Set up or change the password protection on your computer.

Subtopics

2.7.1 The Configuration Utility Screen
2.7.2 What the Screen Shows You
2.7.3 What You Can Change on the Screen
2.7.4 How to Get the Configuration Utility Screen
2.7.5 Restoring the Default Configuration

### *2.7.1 The Configuration Utility Screen*

The Configuration Utility shows you a screen that has two functions. You can use the screen to:

- ***View*** information about how your computer's hardware is set up (called the *hardware configuration*)
- ***Change*** information about certain hardware options on your computer.

### *2.7.2 What the Screen Shows You*

If you want to know about the specific capabilities of your computer, you can find this information on the Configuration Utility screen. For example, you can see:

- Whether you have a math coprocessor
- Amount of memory installed
- Size of the hard disk.

If you get an error message while using your computer, you can also use the screen to determine what caused the error. For example, if the mouse is not functioning properly or is installed incorrectly, the screen may show that it is disabled or not installed.

*2.7.3 What You Can Change on the Screen*

Your PS/VP computer displays hardware information automatically, and you can only change certain information that appears on the screen. The information you can change is always enclosed in brackets, like this: [ ].

Here's what you can change on the screen:

**Shadow BIOS in RAM**
The Basic Input/Output System *(BIOS)* is the machine language that runs your computer. The BIOS for your computer is stored in *read-only memory* called *ROM*. The **Shadow BIOS in RAM** option lets you increase your computer's performance by copying BIOS into *random-access memory* (RAM). Since your computer accesses RAM faster than it accesses ROM, your programs will run faster.

**Diskette Drive (A: or B:)**
This option shows you an entry for each diskette drive on your computer. If you add or change a diskette drive, you must select the correct diskette drive type on the Configuration Utility screen.

**Power-On Password**
You may want to restrict the use of your computer by setting a *power-on password*. This password must then be entered each time you turn on your computer ***before*** you can begin using the computer.

A password can be up to seven characters long (letters, numbers, or a combination of the two). Once you create your password, ***be sure to write it down and put it in a secure place***.

**Startup Sequence**
When your computer starts, it looks for the operating system files either on diskette or hard disk. If there is a diskette in the diskette drive that does not contain the operating system files, most computers send an error message and stop operating. This process is known as the *conventional* startup sequence.

Your PS/VP computer has a *smart* startup sequence that automatically looks for the operating system files on the hard disk if the files are not found on diskette.

**Serial Port**
Your computer has either one or two serial ports. Each serial port has a special *address* (identifying location) assigned to it. If you add adapter cards to your computer that have additional serial ports, you will need to make sure that each serial port has a different address.

The **Serial Port** option lets you change the serial port addresses when needed. If you change serial port addresses on the Configuration Utility screen, you may also need to make changes to your software. For instructions on changing your software, see the user's guide or online information that came with the software.

**Parallel Port**
Your computer has one parallel port with a special *address* (identifying location) assigned to it. If you add adapter cards to your computer that have additional parallel ports, you will need to make sure that each parallel port has a different address.

The **Parallel Port** option lets you change the parallel port addresses when needed. If you change parallel port addresses on the Configuration Utility screen, you may also need to make changes to your software. For instructions on changing your software, see the user's guide or online information that came with the software.

**Date** and **Time**
You can change the date and time on your computer using the **Date** and **Time** options. Your changes take effect immediately.

Type the date in the format shown on the screen. Type the time in 24-hour format. For example:

| | |
|---|---|
| 12 midnight is | **00:00** |
| 12 noon is | **12:00** |
| 1 p.m. is | **13:00** |

*2.7.4 How to Get the Configuration Utility Screen*

There are two ways to display the Configuration Utility screen:

- If you have an error, your computer shows a *popup window* with an error code and description. At this point, press **Enter** to get the Configuration Utility screen.

- When you turn on your computer, this symbol appears:

PICTURE 4

  Press **F1** while this symbol is displayed to get the Configuration Utility screen.

The following picture is an example of the type of information that appears on the Configuration Utility screen. The actual screen on your computer may look slightly different, but it operates the same way.

PICTURE 5

### *2.7.5 Restoring the Default Configuration*

Pressing and holding down both mouse buttons during power-on will set the computer's configuration to the default (original) settings. To restore a customized configuration, see "Using the Configuration Utility" in topic 2.7.

**Note:** If a mouse is not available, the default configuration must be set manually. To manually set the configuration, see "Using the Configuration Utility" in topic 2.7.

## *2.8 System Memory*

System memory consists of RAM soldered on the system board and socketed Single In-line Memory Module (SIMM). The PS/VP Model 6384 contains either a 386SLC, 486SX, or a 486DX system board.

The 386SLC has 2MB of RAM soldered on the board. Two 72-pin sockets are available to add SIMMs. SIMMs supported are 1MB, 2MB, 4MB, and 8MB. SIMM speed is from 70 ns to 85 ns. Sockets can accept either size and speed. When two SIMMs of the same size and speed are installed, interleaving can occur. A POST error code 225, "Unsupported SIMM" will appear on the display when an installed SIMM is the wrong value.

The 486SX and 486DX do not have RAM soldered on the system board. All system memory is socketed with SIMMs. 30-pin SIMMs are installed in banks of four each. One or both banks must be occupied. Each bank must contain SIMMs of the same size and speed. Interleaving of memory occurs on these system boards. SIMMs supported are 80 ns. SIMMS must be 9 bits wide. No POST error will be displayed when a SIMM of the wrong value is installed.

Subtopics
2.8.1 SIMM Identification

*2.8.1 SIMM Identification*

30-pin SIMM size and speed can be difficult to identify. By looking at the numbers on the SIMM chips, you can attempt to identify the size and speed of the SIMM. The size of the SIMM is generally imbedded in the chip part number and the speed generally follows the number. For example: XXX256XX - 8 (X can be any number or letter) would be a 256K SIMM and have a speed of 80 ns. XXXX1000X - 7 would be a 1MB SIMM and have a speed of 70 ns. XXXX256X - 15 would be an unsupported SIMM since it has a speed of 150 ns. There will be many variations to this. Consult the SIMM manufacturer documentation to identify SIMM values when you are unsure of the SIMM value in the system.

*2.9 Special Tools*

The following special tools are required to service this system:

- A meter similar to the Triplett Model 310 (IBM P/N 9900167) (1)
- Wrap Plug, IBM P/N 72X8546

(1) Manufactured by Triplett Corporation, Bluffton, Ohio 45817, U.S.A.

*2.10 Diagnostic Aids*

Subtopics
2.10.1 Power-On Self Test
2.10.2 Advanced Diagnostics Diskette
2.10.3 Diagnostic Menus
2.10.4 Error Log
2.10.5 Setup Program
2.10.6 Display Self Test

*2.10.1 Power-On Self Test*

Each time you power on the system, the power-on self test (POST) is initiated. The POST takes up to 90 seconds to complete, depending on the options installed.

The POST checks the following:

- System board
- Memory
- VGA
- Hard disk drive(s)
- Diskette drive(s)
- Keyboard
- Mouse
- Parallel port
- Serial port(s).

To start the POST, turn on the display and the system unit. The following will happen:

1. The system attempts to load the operating system. If an operating system is not found, a graphic message (icon) is displayed requesting the user to insert a diskette into drive A and press the F1 key to resume operation.

2. An icon,

   PICTURE 6

   will appear at the upper-right corner of the display. Pressing F1 at this time will cause the Configuration Utility menu to appear after the POST has completed.

3. A count of the system memory will appear at the upper-left corner of the screen.

4. If an error is detected, and error code will appear under the system memory count.

   **Note:** Memory errors will appear as XXXXXX XXXX 201 in the upper-left corner of the screen (X can be a number or letter).

5. Successful completion of POST is attained when there are no errors detected in the system.

6. If a critical error is encountered, the POST is halted.

*2.10.2 Advanced Diagnostics Diskette*

The Advanced Diagnostics diskette contains diagnostic and utility programs.

*The Advanced Diagnostics program is intended to test only PS/VP products. Non-PS/VP products, prototype cards, or modified options can give false errors and invalid system responses.*

Subtopics
2.10.2.1 To load the diagnostics diskette:
2.10.2.2 To access diagnostic tests from the SELECT AN OPTION Menu:

*2.10.2.1 To load the diagnostics diskette:*

1. Power off the system unit.

2. Install the Advanced Diagnostics diskette in Drive A.

3. Power on the system unit.

4. Do not press **F1** when the icon appears.

5. If any POST error(s) appear after POST, make a note of the error(s) and press the **Esc** key.

*2.10.2.2 To access diagnostic tests from the SELECT AN OPTION Menu:*

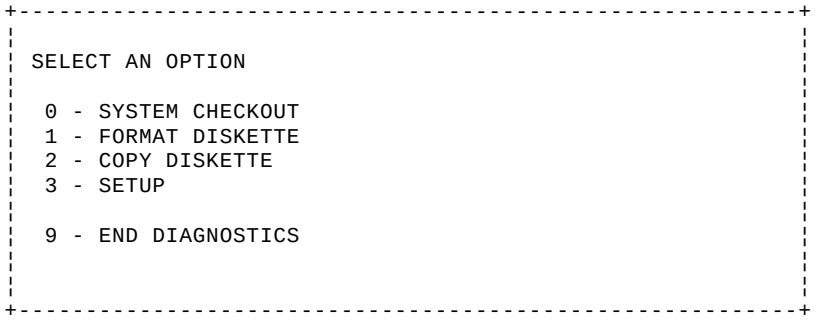
1. Select **0 (SYSTEM CHECKOUT)** option.
2. At the Installed Devices menu, press (**Y**), then **Enter**.
3. The **SYSTEM CHECKOUT** menu is displayed.
4. Select **0** or **1** from the **SYSTEM CHECKOUT** menu.
5. Select the device to be tested.

*2.10.3 Diagnostic Menus*

Subtopics
2.10.3.1 Select an Option Menu
2.10.3.2 Diskette Drive Menu
2.10.3.3 Hard Disk Drive Menu
2.10.3.4 Formatting a Hard Disk Drive
2.10.3.5 Formatting Procedure
2.10.3.6 Video Graphics Array Menu

*2.10.3.1 Select an Option Menu*

This menu appears first if the system options are correctly set.




0 - SYSTEM CHECKOUT: Starts the system checkout procedure.

1 - FORMAT DISKETTE: Formats a scratch diskette for diagnostic use only.

2 - COPY DISKETTE: Copies the Advanced Diagnostics diskette to another diskette.

3 - SETUP: Allows you to check or change the system configuration.

9 - END DIAGNOSTICS: Gives the option to restart the system.

*2.10.3.2 Diskette Drive Menu*

This menu allows you to test the diskette drives and the control logic on the system board.

```
+------------------------------------------------------------+
¦                                                            ¦
¦ TESTING -                                                  ¦
¦ X DISKETTE DRIVE(S)                                        ¦
¦ DISKETTE DIAGNOSTIC MENU                                   ¦
¦ -----------------------------                              ¦
¦ OPTION                                                     ¦
¦  1 - SEEK TEST                                             ¦
¦  2 - WRITE, READ, COMPARE TEST                             ¦
¦  3 - VERIFY DISKETTE TEST                                  ¦
¦  4 - SPEED TEST                                            ¦
¦  5 - DISKETTE CHANGE TEST                                  ¦
¦  9 - RETURN TO CONTROL PROGRAM                             ¦
¦                                                            ¦
¦                                                            ¦
¦ For option 9, type (9) and press Enter.                    ¦
¦ For options 1 - 5,                                         ¦
¦ type the option number, drive ID (1, A), and press Enter.  ¦
¦                                                            ¦
+------------------------------------------------------------+
```

1 - SEEK TEST:  Tests the basic diskette seek operations, including sequential and random diskette drive head positioning.

2 - WRITE, READ, COMPARE TEST:  Tests the basic diskette operations, including a series of random seeks.  Each seek is followed by a write, read, and comparison of data.

3 - VERIFY DISKETTE TEST:  Verifies data accessing and each sector.

4 - SPEED TEST:  Measures the time required for one revolution of the diskette.

5 - DISKETTE CHANGE TEST:  Tests the diskette change signal and write-protect feature as you remove and insert a diskette.

9 - RETURN TO CONTROL PROGRAM:  Returns to the System Checkout menu or continues with the next device test.

*2.10.3.3 Hard Disk Drive Menu*

This menu allows you to test the hard disk drive and the integrated controller.

```
+-----------------------------------------------------------+
¦                                                           ¦
¦ HARD DISK DIAGNOSTIC MENU                                 ¦
¦ -------------------------                                 ¦
¦  1 - WRITE, READ, COMPARE (ON TEST CYLINDER)              ¦
¦  2 - SEEK TEST                                           ¦
¦  3 - HEAD SELECT                                          ¦
¦  4 - ERROR DETECTION AND CORRECTION                       ¦
¦  5 - RUN ALL TESTS                                        ¦
¦  6 - READ VERIFY                                          ¦
¦  7 - FORMAT MENU                                          ¦
¦  9 - RETURN TO CONTROL PROGRAM                            ¦
¦                                                           ¦
¦ For option 9, type 9 and press Enter.                     ¦
¦ For other options                                         ¦
¦ type the option number, drive ID (1, C), and press Enter. ¦
¦                                                           ¦
+-----------------------------------------------------------+
```

1 - WRITE, READ, COMPARE (ON TEST CYLINDER): Tests the hard disk drive read and write operations.

2 - SEEK TEST: Sequentially moves the hard disk heads inward one cylinder at a time until the last cylinder is reached. The heads then reset to the first cylinder and a random seek test is performed.

3 - HEAD SELECT: Data is written to the test cylinder by each hard disk head; the data is then read and checked for any errors.

4 - ERROR DETECTION AND CORRECTION: Tests the hard disk error checking and correction circuits by reading data, altering the data, and writing the data at the test cylinder. A comparison test is made to detect any errors.

5 - RUN ALL TESTS: Runs tests 1, 2, 3, and 4; also reads track 0.

6 - READ VERIFY: A read operation is performed on the entire hard disk drive; any tracks that cannot be read are reported with existing defects.

7 - FORMAT MENU: Selects the Format Selection menu for the hard disk drives.

9 - RETURN TO CONTROL PROGRAM: Returns to the System Checkout menu or continues with the next device test.

*2.10.3.4 Formatting a Hard Disk Drive*

Hard disk drives normally contain tracks in excess of their stated capacity to allow for defective tracks. The user is notified by a diagnostic message when the defect limit has been reached and service is recommended.

The Advanced Diagnostics Format program is different from the operating system format program. Before the customer can transfer information from the backup diskettes to the hard disk drive, the hard disk drive must be formatted using the operating system format program. Have the customer refer to the operating system manual for a description of the hard disk preparation commands.

Warning: All data on the selected hard disk drive will be destroyed during a format operation or surface analysis.

Format Menu

```
+-----------------------------------------------------------+
¦                                                           ¦
¦ FORMAT SELECTION MENU                                     ¦
¦ ----------------------                                    ¦
¦  1 - CONDITIONAL FORMAT                                   ¦
¦  2 - UNCONDITIONAL FORMAT                                 ¦
¦  3 - SURFACE ANALYSIS                                     ¦
¦  9 - RETURN TO HARD DISK MENU                             ¦
¦                                                           ¦
¦                                                           ¦
¦                                                           ¦
+-----------------------------------------------------------+
```

1 - CONDITIONAL FORMAT: The hard disk drive is scanned for any defective tracks, then formatted (except for any known defective tracks).

2 - UNCONDITIONAL FORMAT: The hard disk drive is formatted, except for any defective tracks that you specify.

3 - SURFACE ANALYSIS: Scans the hard disk drive by writing, reading, and comparing a unique data pattern to detect any defective tracks.

9 - RETURN TO HARD DISK MENU: Returns to the Hard Disk Diagnostic menu.

Warning: Formatting results in a complete loss of data on the hard disk drive, including system programs. If you are directed to or elect to format the hard disk drive, you must do the following:

1. Prior to formatting, have the customer back up all information, if possible.

2. Prior to returning the system to the customer, you must reinstall the system programs on the hard disk.

*2.10.3.5 Formatting Procedure*

Before replacing a failing hard disk drive, try to format it as follows:

1. Power off the system unit. Check that the hard disk drive cable is tightly connected.

2. Insert the Advanced Diagnostics diskette into drive A.

3. Power on the system unit.

4. Press **0 (SYSTEM CHECKOUT),** then press **Enter**.

5. Depending on the options installed in the system, questions about attached devices will appear on the screen. Answer as required, then press **Enter**.

6. Press **Y (IS THE LIST CORRECT (Y/N)?)**, then press **Enter**. If the list is incorrect, follow the instructions on the screen to correct the list before answering "Yes."

7. Press **0 (RUN TESTS ONE TIME)**, then press **Enter**.

8. Select **17 (HARD DISK DRIVE)**, then press **Enter**.

9. Press **7 (FORMAT MENU)**, then press **Enter**.

10. Press **1, C**, then press **Enter**.

11. Press **Y (DO YOU WANT TO CONTINUE (Y/N)?)**, then press **Enter**.

12. Press **Y** or **N (ALL DEFECTS WILL BE SHOWN ON THE DISPLAY, THEY CAN ALSO BE PRINTED ON LPT1. IS A HARD COPY NEEDED?)**, then press **Enter**.

13. If you were instructed to perform an **UNCONDITIONAL FORMAT**, follow the instructions on the screen.

*2.10.3.6 Video Graphics Array Menu*

This menu allows you to test the VGA and SVGA displays and control logic on the system board.

```
+-----------------------------------------------------------+
¦                                                           ¦
¦ VIDEO GRAPHICS DISPLAY                                    ¦
¦                                                           ¦
¦   1 - VGA TEST                                            ¦
¦   2 - DISPLAY ATTRIBUTES                                  ¦
¦   3 - CHARACTER TESTS                                     ¦
¦   4 - GRAPHICS TESTS                                      ¦
¦   5 - SCREEN PAGING                                       ¦
¦   6 - RUN TESTS 1 THROUGH 5                               ¦
¦   7 - SYNC TEST                                           ¦
¦                                                           ¦
¦   9 - RETURN TO CONTROL PROGRAM                           ¦
¦                                                           ¦
¦                                                           ¦
¦                                                           ¦
+-----------------------------------------------------------+
```

1 - VGA TEST:  Verifies the video portion of the system board.

2 - DISPLAY ATTRIBUTES:  Shows the following character attributes: normal and high intensity, reverse video, blinking, non-display, and 16 colors.

3 - CHARACTER TESTS:  Shows the following character modes: 40X25, 80X25, 80X30, and 256 ASCII characters.

4 - GRAPHICS TESTS:  Displays various patterns to test the display graphics modes.

5 - SCREEN PAGING:  Tests the video-addressing circuitry.

6 - RUN TESTS 1 THROUGH 5:  Performs tests 1 through 5 on a VGA display.

7 - SYNC TEST:  Provides a test signal to allow voltage measurement at the video connector.

9 - RETURN TO CONTROL PROGRAM:  Returns to the System Checkout menu or continues with the next device test.

*2.10.4 Error Log*

Use the following steps to create an error log, run the diagnostic tests, and automatically record any error messages in an error log. This procedure is normally used to diagnose an intermittent problem.

**Note:** The errors must be logged to a diskette drive or to a printer. If recording errors on a diskette, use a copy of the Advanced Diagnostics diskette that is not write-protected. **Do not run any diskette test when logging to a diskette drive.**

Subtopics
2.10.4.1 Creating the Error Log
2.10.4.2 Starting the Test
2.10.4.3 Display the Error Log

*2.10.4.1 Creating the Error Log*

1. Load the Advanced Diagnostics diskette from drive A.

2. Press **0 (SYSTEM CHECKOUT)**, then **Enter**.

3. Depending on the options installed in the system, questions about attached devices may appear on the screen. Answer as required; then press **Enter**.

4. Press **Y** or **N (IS THE LIST CORRECT (Y/N)?)**, then **Enter**.

5. Press **2 (LOG UTILITIES)**, then **Enter**.

6. Press **0 (START ERROR LOG)**, then **Enter**.

7. Press **0 (LOG TO DISKETTE, OR PRINTER (0/1)?)**, then **Enter**.

8. If you are logging to diskette, press **A** or **B (ENTER THE DRIVE ID FOR ERROR LOG?)**, then **Enter**.

9. Press **9 (END LOG UTILITIES)**, then **Enter**.

*2.10.4.2 Starting the Test*

1. Press **1 (RUN TESTS MULTIPLE TIMES)**, then **Enter**.

2. Select the device you suspect has a failure, then press **Enter**.

3. Select the number of times the test is to be run; then press **Enter**.

4. Press **N (WAIT EACH TIME AN ERROR OCCURS (Y/N)?)**, then **Enter**.

5. Follow any instructions on the screen and select all available tests.

   **Note:** Do not press any keys during the keyboard test.

6. To end **(RUN TEST CONTINUOUSLY)**, press and hold the **Ctrl** key; then press the **Break** key. The system will complete testing and return to the Installed Devices menu.

*2.10.4.3 Display the Error Log*

1. Depending on the options installed in the system, questions about attached devices will appear on the screen. Answer as required; then press **Enter**.

2. Press **Y** or **N (IS THE LIST CORRECT (Y/N)?)**, then **Enter**.

3. Press **2 (LOG UTILITIES)**, then **Enter**.

4. Press **2 (DISPLAY LOG)**, then **Enter**.

5. Press **A** or **B (ENTER THE DRIVE ID FOR ERROR LOG?)**, then **Enter**.

6. If no errors occurred, the Log Utilities menu appears. If errors are displayed, go to "Hardware Maintenance Service" in topic 1.0.

*2.10.5 Setup Program*

The Setup program allows the user to view or change the current system configuration. The system configuration can be set through manual selections or done automatically. In automatic configuration, the system changes the configuration to what it determines is installed.

Subtopics
2.10.5.1 Set Configuration Menu

*2.10.5.1 Set Configuration Menu*

This menu allows you to change the current systems configuration:

1. From the **SELECT AN OPTION** menu, select **3 (SETUP).**
2. Use the cursor up/down keys to select the configuration option.
3. Use the cursor right/left keys to change the configuration options.
4. Press **Esc** to save the change to the configuration.

*2.10.6 Display Self Test*

Be sure the display has been turned on for approximately 5 minutes before you start the display self test. Run the test as follows:

1. Power off the system unit and display.

2. Disconnect the display signal cable from the system unit.

3. Power on the display.

4. Turn the brightness and contrast controls to their maximum positions.

5. The image on the screen should be white in the center with a black strip, 2-20 mm (0.08-0.79 in.), on one or both sides. There should be no borders on the top or bottom. Some shading may occur near the edges.

   **Note:** Not all displays have a self test. Refer to the documentation supplied with the display for additional testing information.

*2.11 Hard Disk Drive Jumper Settings*

Hard disk drives for PS/VP computers use jumpers or tabs to set the drives as primary or secondary. Match your hard disk drive to one of the following figures. Set the first drive as the primary (master) drive 1 . If a second drive is installed, set it as the secondary (slave) drive 2 .

PICTURE 7

PICTURE 8

Figure 1. 80MB and 170MB Drives

PICTURE 9

Figure 2. 80MB Drive

PICTURE 10

Figure 3. 120MB Drive

PICTURE 11

Figure 4. 170MB and 212MB Drives

*2.12 System Unit Exploded View*

PICTURE 12

*2.13 System Board Layouts*

Subtopics
2.13.1 386SLC 25MHz System Board
2.13.2 486SX 25MHz System Board
2.13.3 486DX 33MHz System Board

*2.13.1 386SLC 25MHz System Board*

PICTURE 13

Figure 5. 386SLC 25MHz

Subtopics
2.13.1.1 386SLC 25MHz System Board

*2.13.1.1 386SLC 25MHz System Board*

| | |
|---|---|
| B1 | Battery |
| J1 | SIMM Socket 1 |
| J2 | SIMM Socket 0 |
| J3 | Video Feature Connector |
| J4 | Video Port |
| J5 | Parallel Port |
| J6 | Riser Connector |
| J7 | Serial Port |
| J8 | Password Bypass |
| J9 | Mouse Port |
| J10 | Keyboard Port |
| J11 | Hard Disk Connector |
| J12 | Beeper Bypass |
| J13 | Pins 1 and 2--Power On LED<br>Pins 3 and 4--Hard Disk LED |
| J14 | Diskette Connector |
| J15 | Power Connector |
| | |
| U5 | 512K X 9 System Memory |
| U6 | 512K X 9 System Memory |
| U8 | 512K X 9 System Memory |
| U9 | 512K X 9 System Memory |
| U20 | BIOS |
| U23 | Math Coprocessor |
| U24 | 386SLC Processor |
| U32 | 256K X 16 Video Memory |
| U33 | 256K X 16 Video Memory |

*2.13.2 486SX 25MHz System Board*

PICTURE 14

Figure 6. 486SX 25MHz

Subtopics
2.13.2.1 486SX 25MHz System Board

*2.13.2.1 486SX 25MHz System Board*

| | |
|---|---|
| BT1 | Battery |
| J2 | External Battery |
| J3 | Power Connector |
| J4 | Serial Port (Comm A) |
| J5 | Serial Port (Comm B) |
| J6 | Diskette Connector |
| J7 | Parallel Port |
| J8 | Hard Disk Connector |
| JP21 | Keyboard Port |
| JP22 | Mouse Port |
| J11 | Hard Disk LED (pin 4 and 5)<br>Power On LED (pin 1 and 2) |
| J12 | Riser Connector |
| J15 | Video Feature Connector |
| J16 | Video Port |
| J45 | SIMM Socket Bank 0, 0 |
| J46 | SIMM Socket Bank 0, 1 |
| J47 | SIMM Socket Bank 0, 2 |
| J48 | SIMM Socket Bank 0, 3 |
| J49 | SIMM Socket Bank 1, 0 |
| J50 | SIMM Socket Bank 1, 1 |
| J51 | SIMM Socket Bank 1, 2 |
| J52 | SIMM Socket Bank 1, 3 |
| JP8 | Battery Select |
| JP10 | VGA Enable |
| JP24 | Mouse Enable |
| JP26 | Beeper Enable |
| U214 | 487SX or 486DX2 |
| U215 | 486SX Processor |

*2.13.3 486DX 33MHz System Board*

PICTURE 15

Figure 7. 486DX 33MHz

Subtopics
2.13.3.1 486DX 33MHz System Board

*2.13.3.1 486DX 33MHz System Board*

| | |
|---|---|
| BT1 | Battery |
| J2 | External Battery |
| J3 | Power Connector |
| J4 | Serial Port (Comm A) |
| J5 | Serial Port (Comm B) |
| J6 | Diskette Connector |
| J7 | Parallel Port |
| J8 | Hard Disk Connector |
| J9 | Keyboard Connector |
| J10 | Mouse Port |
| J11 | Hard Disk LED (pin 4 and 5)<br>Power On LED (pin 1 and 2) |
| J12 | Riser Connector |
| J15 | Video Feature Connector |
| J16 | Video Port |
| J45 | SIMM Socket Bank 0, 0 |
| J46 | SIMM Socket Bank 0, 1 |
| J47 | SIMM Socket Bank 0, 2 |
| J48 | SIMM Socket Bank 0, 3 |
| J49 | SIMM Socket Bank 1, 0 |
| J50 | SIMM Socket Bank 1, 1 |
| J51 | SIMM Socket Bank 1, 2 |
| J52 | SIMM Socket Bank 1, 3 |
| JP4 | BIOS Select |
| JP8 | Battery Select |
| JP10 | VGA Enable |
| JP20 | Beeper Enable |
| JP200 | Cache Configuration |
| JP201 | Cache Configuration |
| JP206 | Cache Configuration |
| JP207 | Cache Configuration |
| JP209 | Mouse Enable |
| U300 | 486DX Processor |

**Note:** Jumpers are marked in black and should be in positions as shown.

*2.14 System Board Connector Assignments*

Subtopics
2.14.1 Display/Signal
2.14.2 Parallel Port
2.14.3 Serial Port
2.14.4 Mouse
2.14.5 Keyboard
2.14.6 Power
2.14.7 Diskette
2.14.8 Hard Disk
2.14.9 AT Expansion Bus (Riser)
2.14.10 Video Feature
2.14.11 SIMM--30 Pin
2.14.12 SIMM--72 Pin

*2.14.1 Display/Signal*

| **Pin** | **Signal Name** | **I/O** |
|---|---|---|
| 1 | Red Video | O |
| 2 | Green Video | O |
| 3 | Blue Video | O |
| 4 | Monitor ID Bit 2 | I |
| 5 | Sync Ground | |
| 6 | Red Ground | |
| 7 | Green Ground | |
| 8 | Blue Ground | |
| 9 | No Connection | |
| 10 | Sync Ground | |
| 11 | Monitor ID Bit 0 | I |
| 12 | Monitor ID Bit 1 | I |
| 13 | Horizontal Sync | O |
| 14 | Vertical Sync | O |
| 15 | Monitor ID Bit 3 | I |

*2.14.2 Parallel Port*

| **Pin** | **Signal Name** | **I/O** |
|---|---|---|
| 1 | Strobe | O |
| 2 | Data Bit 0 | I/O |
| 3 | Data Bit 1 | I/O |
| 4 | Data Bit 2 | I/O |
| 5 | Data Bit 3 | I/O |
| 6 | Data Bit 4 | I/O |
| 7 | Data Bit 5 | I/O |
| 8 | Data Bit 6 | I/O |
| 9 | Data Bit 7 | I/O |
| 10 | Acknowledge | I |
| 11 | Busy | I |
| 12 | Paper Empty | I |
| 13 | Select | O |
| 14 | Auto Feed | NA |
| 15 | Error | I |
| 16 | Initialize | O |
| 17 | Select (In) | O |
| 18 | Ground | Power |
| 19 | Ground | Power |
| 20 | Ground | Power |
| 21 | Ground | Power |
| 22 | Ground | Power |
| 23 | Ground | Power |
| 24 | Ground | Power |
| 25 | Ground | Power |

*2.14.3 Serial Port*

| **Pin** | **Signal Name** | **I/O** |
|---|---|---|
| 1 | Data Carrier Detect | I |
| 2 | Receive Data | I |
| 3 | Transmit Data | O |
| 4 | Data Terminal Ready | O |
| 5 | Signal Ground | |
| 6 | Data Set Ready | I |
| 7 | Request To Send | O |
| 8 | Clear To Send | I |
| 9 | Ring Indicator | I |

*2.14.4 Mouse*

| **Pin** | **Signal Name** | **I/O** |
|---|---|---|
| 1 | Data | I/O |
| 2 | No Connection | |
| 3 | Ground | Power |
| 4 | +5 V dc | Power |
| 5 | Clock | I/O |
| 6 | No Connection | |

*2.14.5 Keyboard*

| **Pin** | **Signal Name** | **I/O** |
|---|---|---|
| 1 | Data | I/O |
| 2 | No Connection | |
| 3 | Ground | Power |
| 4 | +5 V dc | Power |
| 5 | Clock | I/O |
| 6 | No Connection | |

*2.14.6 Power*

| **Pin** | **Signal Name** |
|---|---|
| 1 | Power Good (+5 V dc) |
| 2 | +5 V dc |
| 3 | +12 V dc |
| 4 | -12 V dc |
| 5 | Ground |
| 6 | Ground |
| 7 | Ground |
| 8 | Ground |
| 9 | -5 V dc |
| 10 | +5 V dc |
| 11 | +5 V dc |
| 12 | +5 V dc |

*2.14.7 Diskette*

| Pin | Signal Name | I/O |
|---|---|---|
| 1 | Drive 2 | |
| 2 | Density Select | O |
| 3 | No Connection | |
| 4 | No Connection | |
| 5 | Ground | |
| 6 | No Connection | |
| 7 | Ground | |
| 8 | Index | I |
| 9 | Ground | |
| 10 | Motor Enable 0 | O |
| 11 | Ground | |
| 12 | Drive Select 1 | O |
| 13 | Ground | |
| 14 | Drive Select 0 | O |
| 15 | Ground | |
| 16 | Motor Enable 1 | O |
| 17 | Ground | |
| 18 | Direction | O |
| 19 | Ground | |
| 20 | Step | O |
| 21 | Ground | |
| 22 | Write Data | I |
| 23 | Ground | |
| 24 | Write Enable | O |
| 25 | Ground | |
| 26 | Track 0 | I |
| 27 | Ground | |
| 28 | Write Protect | I |
| 29 | Ground | |
| 30 | Read Data | I |
| 31 | Ground | |
| 32 | Select Head 1 | O |
| 33 | Ground | |
| 34 | Diskette Change | I |

**Note:** The diskette drive signal cable for drive A has a twist for the Drive Select and Motor Enable signals.

*2.14.8 Hard Disk*

| **Pin** | **Signal Name** | **I/O** |
|---|---|---|
| 1 | Host Reset | O |
| 2 | Ground | |
| 3 | Host Data 7 | I/O |
| 4 | Host Data 8 | I/O |
| 5 | Host Data 6 | I/O |
| 6 | Host Data 9 | I/O |
| 7 | Host Data 5 | I/O |
| 8 | Host Data 10 | I/O |
| 9 | Host Data 4 | I/O |
| 10 | Host Data 11 | I/O |
| 11 | Host Data 3 | I/O |
| 12 | Host Data 12 | I/O |
| 13 | Host Data 2 | I/O |
| 14 | Host Data 13 | I/O |
| 15 | Host Data 1 | I/O |
| 16 | Host Data 14 | I/O |
| 17 | Host Data 0 | I/O |
| 18 | Host Data 15 | I/O |
| 19 | Ground | Power |
| 20 | No Connection | |

***Hard Disk***

| **Pin** | **Signal Name** | **I/O** |
|---|---|---|
| 21 | No Connection | |
| 22 | Ground | |
| 23 | Host IOW | O |
| 24 | Ground | Power |
| 25 | Host IOR | O |
| 26 | Ground | Power |
| 27 | No Connection | |
| 28 | Host ALE | O |
| 29 | No Connection | |
| 30 | Ground | Power |
| 31 | Host IRQ | I |
| 32 | Host IOCS16 | O |
| 33 | Host A1 | O |
| 34 | No Connection | |
| 35 | Host A0 | O |
| 36 | Host A2 | O |

| 37 | Host CS0 | O |
|---|---|---|
| 38 | Host CS1 | O |
| 39 | Host Active | O |
| 40 | Ground | Power |

Figure 8. Hard Disk

*2.14.9 AT Expansion Bus (Riser)*

| Pin | Signal Name | I/O |
|---|---|---|
| 1 | +12 V dc | |
| 2 | +5 V dc | |
| 3 | Ground | |
| 4 | Ground | |
| 5 | Reset Drv | O |
| 6 | +5 V dc | |
| 7 | IRQ9 | I |
| 8 | -5 V dc | |
| 9 | DRQ2 | I |
| 10 | -12 V dc | |
| 11 | OWS | |
| 12 | +12 V dc | |
| 13 | Ground | |
| 14 | SMEMW | O |
| 15 | SMEMR | O |
| 16 | IOW | I/O |
| 17 | IOR | I/O |
| 18 | DACK3 | O |
| 19 | DRQ3 | I |
| 20 | DACK1 | O |
| 21 | DRQ1 | I |
| 22 | Refresh | I/O |
| 23 | System Clock | O |
| 24 | IRQ7 | I |
| 25 | IRQ6 | I |
| 26 | IRQ5 | I |
| 27 | IRQ4 | I |
| 28 | IRQ3 | I |
| 29 | DACK2 | O |
| 30 | T/C | O |

***AT Expansion Bus (Riser)***

| Pin | Signal Name | I/O |
|---|---|---|
| 31 | BALE | O |
| 32 | +5 V dc | |
| 33 | OSC | I |
| 34 | Ground | |
| 35 | Ground | |
| 36 | +5 V dc | |

| 37 | +5 V dc | |
|---|---|---|
| 38 | MEMCS16 | I |
| 39 | IOCS16 | I |
| 40 | IRQ10 | I |
| 41 | IRQ11 | I |
| 42 | Power Good | I |
| 43 | IRQ15 | I |
| 44 | IRQ14 | I |
| 45 | DACK0 | O |
| 46 | DRQ0 | I |
| 47 | DACK5 | O |
| 48 | DRQ5 | I |
| 49 | DACK6 | O |
| 50 | DRQ6 | I |
| 51 | DACK7 | O |
| 52 | DRQ7 | I |
| 53 | +5 V dc | |
| 54 | MASTER | I |
| 55 | Ground | |
| 56 | Ground | |
| 57 | Ground | |
| 58 | +5 V dc | |
| 59 | +5 V dc | |
| 60 | +5 V dc | |

***AT Expansion Bus (Riser)***

| **Pin** | **Signal Name** | **I/O** |
|---|---|---|
| 61 | +12 V dc | |
| 62 | Ground | |
| 63 | Ground | |
| 64 | I/O Check | I |
| 65 | SD7 | I/O |
| 66 | SD6 | I/O |
| 67 | SD5 | I/O |
| 68 | SD4 | I/O |
| 69 | SD3 | I/O |
| 70 | SD2 | I/O |
| 71 | SD1 | I/O |
| 72 | SD0 | I/O |
| 73 | I/O CH Ready | I |
| 74 | AEN | O |
| 75 | SA19 | O |

| 76 | SA18 | O |
|---|---|---|
| 77 | SA17 | O |
| 78 | SA16 | O |
| 79 | SA15 | O |
| 80 | SA14 | O |
| 81 | SA13 | O |
| 82 | SA12 | O |
| 83 | SA11 | O |
| 84 | SA10 | O |
| 85 | SA9 | O |
| 86 | SA8 | O |
| 87 | SA7 | O |
| 88 | SA6 | O |
| 89 | SA5 | O |
| 90 | SA4 | O |

***AT Expansion Bus (Riser)***

| **Pin** | **Signal Name** | **I/O** |
|---|---|---|
| 91 | SA3 | O |
| 92 | SA2 | O |
| 93 | SA1 | O |
| 94 | SA0 | O |
| 95 | Ground | |
| 96 | Ground | |
| 97 | +5 V dc | |
| 98 | SBHE | I/O |
| 99 | LA23 | I/O |
| 100 | LA22 | I/O |
| 101 | LA21 | I/O |
| 102 | LA20 | I/O |
| 103 | LA19 | I/O |
| 104 | LA18 | I/O |
| 105 | LA17 | I/O |
| 106 | MEMR | I/O |
| 107 | MEMW | I/O |
| 108 | SD8 | I/O |
| 109 | SD9 | I/O |
| 110 | SD10 | I/O |
| 111 | SD11 | I/O |
| 112 | SD12 | I/O |
| 113 | SD13 | I/O |
| 114 | SD14 | I/O |

| | | |
|---|---|---|
| 115 | SD15 | I/O |
| 116 | Ground | |
| 117 | Ground | |
| 118 | Ground | |
| 119 | +5 V dc | |
| 120 | +5 V dc | |

Figure 9. AT Expansion Bus

*2.14.10 Video Feature*

| **Pin** | **Signal Name** | **I/O** |
|---|---|---|
| 1 | Pixel Data 0 | I |
| 2 | Ground | |
| 3 | Pixel Data 1 | I |
| 4 | Ground | |
| 5 | Pixel Data 2 | I |
| 6 | Ground | |
| 7 | Pixel Data 3 | I |
| 8 | Enable Ext Pixel Data | O |
| 9 | Pixel Data 4 | I |
| 10 | Enable Ext Sync | O |
| 11 | Pixel Data 5 | I |
| 12 | Enable Ext Pixel Clock | O |
| 13 | Pixel Data 6 | I |
| 14 | No Connection | |
| 15 | Pixel Data 7 | I |
| 16 | Ground | |
| 17 | Pixel Clock | I/O |
| 18 | Ground | |
| 19 | Blanking | |
| 20 | Ground | |
| 21 | Horizontal Sync | |
| 22 | Ground | |
| 23 | Vertical Sync | |
| 24 | No Connection | |
| 25 | Ground | |
| 26 | No Connection | |

*2.14.11 SIMM--30 Pin*

| Pin | Signal Name | I/O |
|---|---|---|
| 1 | +5 V dc | I |
| 2 | CAS | O |
| 3 | D0 | I/O |
| 4 | A0 | O |
| 5 | A1 | O |
| 6 | D1 | I/O |
| 7 | A2 | O |
| 8 | A3 | O |
| 9 | Ground | |
| 10 | D2 | I/O |
| 11 | A4 | O |
| 12 | A5 | O |
| 13 | D3 | I/O |
| 14 | A6 | O |
| 15 | A7 | O |
| 16 | D4 | I/O |
| 17 | A8 | O |
| 18 | A9 | O |
| 19 | A10 | O |
| 20 | D5 | I/O |
| 21 | WE | O |
| 22 | Ground | |
| 23 | D6 | I/O |
| 24 | No Connection | |
| 25 | D7 | I/O |
| 26 | DP Out | I |
| 27 | RAS | O |
| 28 | CASP | O |
| 29 | DP In | O |
| 30 | +5 V dc | I |

*2.14.12 SIMM--72 Pin*

| **Pin** | **Signal Name** | **I/O** |
|---|---|---|
| 1 | Ground | |
| 2 | SIMMD0 | I/O |
| 3 | SIMMD0 | I/O |
| 4 | SIMMD1 | I/O |
| 5 | SIMMD1 | I/O |
| 6 | SIMMD2 | I/O |
| 7 | SIMMD2 | I/O |
| 8 | SIMMD3 | I/O |
| 9 | SIMMD3 | I/O |
| 10 | +5 V dc | I |
| 11 | CASP | I |
| 12 | MA0 | I |
| 13 | MA1 | I |
| 14 | MA2 | I |
| 15 | MA3 | I |
| 16 | MA4 | I |
| 17 | MA5 | I |
| 18 | MA6 | I |
| 19 | Open | |
| 20 | SIMMD4 | I/O |
| 21 | SIMMD4 | I/O |
| 22 | SIMMD5 | I/O |
| 23 | SIMMD5 | I/O |
| 24 | SIMMD6 | I/O |
| 25 | SIMMD6 | I/O |
| 26 | SIMMD7 | I/O |
| 27 | SIMMD7 | I/O |
| 28 | MA7 | I |
| 29 | BS0 | I |
| 30 | +5 V dc | I |
| 31 | MA8 | I |
| 32 | MA9 | I |
| 33 | RAS5 | I |
| 34 | RAS4 | I |
| 35 | DP0 | I |
| 36 | DP0 | I |

***SIMM--72 Pin***

| **Pin** | **Signal Name** | **I/O** |
|---|---|---|

| | | |
|---|---|---|
| 37 | DP1 | I |
| 38 | DP1 | I |
| 39 | Ground | I |
| 40 | BCAS0 | I |
| 41 | BCAS2 | I |
| 42 | BCAS3 | I |
| 43 | BCAS1 | I |
| 44 | RAS4 | I |
| 45 | RAS5 | I |
| 46 | BS1 | I |
| 47 | AWE | I |
| 48 | Open | |
| 49 | SIMMD8 | I/O |
| 50 | SIMMD8 | I/O |
| 51 | SIMMD9 | I/O |
| 52 | SIMMD9 | I/O |
| 53 | SIMMD10 | I/O |
| 54 | SIMMD10 | I/O |
| 55 | SIMMD11 | I/O |
| 56 | SIMMD11 | I/O |
| 57 | SIMMD12 | I/O |
| 58 | SIMMD12 | I/O |
| 59 | +5 V dc | I |
| 60 | SIMMD13 | I/O |
| 61 | SIMMD13 | I/O |
| 62 | SIMMD14 | I/O |
| 63 | SIMMD14 | I/O |
| 64 | SIMMD15 | I/O |
| 65 | SIMMD15 | I/O |
| 66 | BS2 | I |
| 67 | PD1 | O |
| 68 | PD2 | O |
| 69 | PD3 | O |
| 70 | PD4 | I |
| 71 | BS3 | I |
| 72 | Ground | |

Figure 10. SIMM--72 Pin

*3.0 Notices*

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