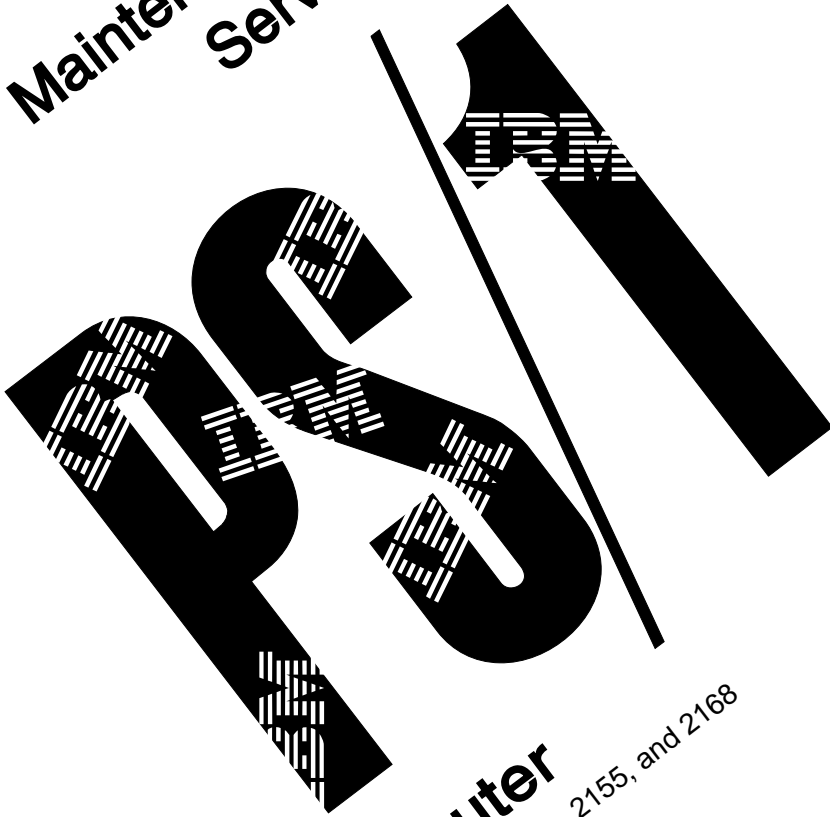
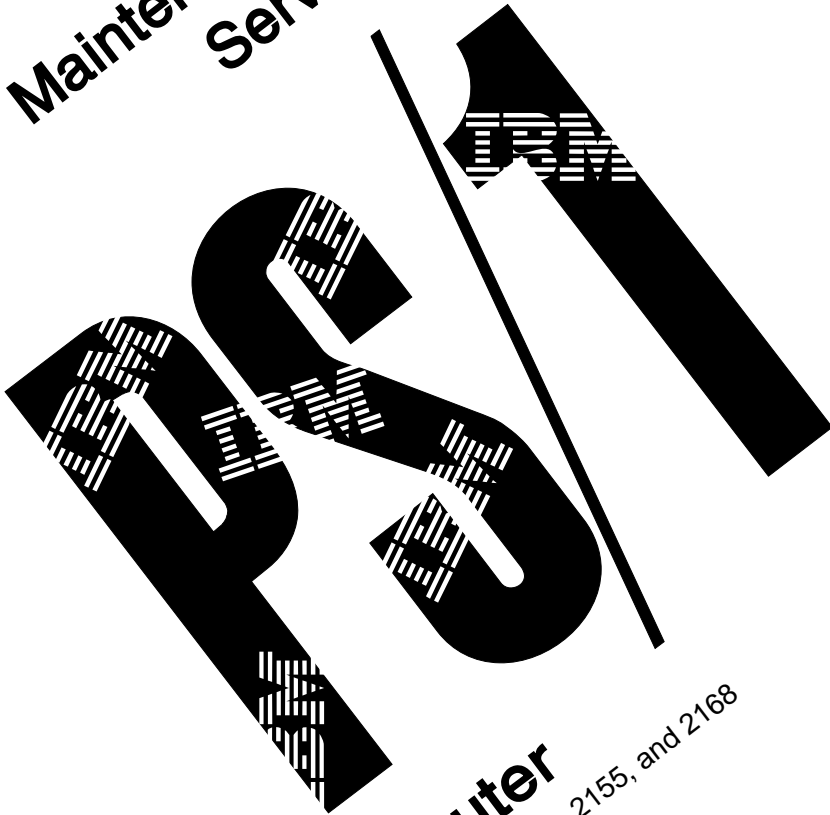


**Hardware
Maintenance
Service for**



Computer
Machine Types 2133, 2155, and 2168

**Hardware
Maintenance
Service for**



Computer
Machine Types 2133, 2155, and 2168

First Edition (March 1993)

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Voltage Supply Switch Settings

Before setting up your computer as described in the *Start Here* publication, follow these instructions to avoid damaging your computer:

Your IBM* Personal System/1* (PS/1*) computer **may** have voltage switches, which must be set correctly for your voltage supply. If your display or system unit has a voltage switch, complete these steps to make sure each switch is set correctly.

1. Determine the correct voltage switch setting for your area:



Voltage Supply Range	Voltage Switch Setting
100–127 V	115 V or 115
200–240 V	230 V or 230

2. Locate the voltage switch on the back of your display or system unit. If the setting shown on the switch is:

Correct, start setting up your PS/1 computer.

Incorrect, change the voltage switch setting. (You may need a small screwdriver.)

Safety Information

The construction of the IBM PS/1 computer provides extra protection against the risk of electrical shock by either grounding of metal parts or using an approved system of double insulation. If your computer has the  symbol (on the voltage rating plate on the back of the display), it does not require grounding. This computer has a power cord with a two-pin plug. If your computer does *not* have the  symbol, it *must* be connected to an electrical outlet that is properly grounded. This computer has a power cord with a three-prong plug. It is the responsibility of the person installing the computer to connect it to a properly grounded electrical outlet. Seek professional assistance before using an adapter or extension cord; these devices could interrupt the grounding circuit.

If the computer is connected to an electrical outlet that is incorrectly connected to the building wiring, serious electrical shock could result.

For continued protection against the risk of electrical shock:

- Connect your computer only to an electrical outlet of the correct voltage.

- If your computer has cables other than the power cords, you must connect them before plugging the power cord into an electrical outlet. Before removing these cables, you must first unplug the power cords from the outlet.

- If your computer has a telephone connection, do not touch the telephone cords when there is lightning in the area.

- Do not use or store the computer in an area where it can become wet.

- Make sure all replacement parts have characteristics identical or equivalent to the original parts. Other parts may not have the same safety features.

- Refer service or repairs to qualified service personnel.

If your computer uses lithium batteries, there may be a risk of fire, explosion, or burns if the batteries are handled incorrectly. To ensure safety:

- Do not recharge, disassemble, heat, or incinerate a lithium battery.
- Replace the battery with an identical or equivalent type lithium battery.
- Discard used lithium batteries according to local country dispositions.

For Denmark:

ADVARSEL!

Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.

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OS/2	PS/2
Personal System/1	

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Windows	Microsoft Corporation
386, 386SX, 486, 486SX, 486DX	Intel Corporation

Preface

This manual is intended to be used as a stand-alone document to service this product. It is divided into the following chapters:

“**General Information**” contains a brief description of this manual.

“**Diagnostic Information**” provides step-by-step instructions that aid in locating the failing Field Replaceable Unit (FRU).

“**Diagnostic Aids**” explains the diagnostic aids that are available for troubleshooting problems on the system unit.

“**Repair Information**” contains the procedures for removing FRUs.

“**Parts/Test Point Locations**” contains illustrations of the locations of the major components and connectors.

“**Safety Inspection Guide**” contains information about inspecting a machine for safety problems before putting the machine under a Maintenance Agreement.

“**Parts Catalog**” contains illustrations and part numbers for individual FRUs.

“**Part Number Index**” contains part numbers listed in numerical order.

Appendix, “Model Configurations and FRU Part Numbers” contains models and FRUs listed by part number for all countries.

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Chapter Description

This chapter contains general information about the contents of this manual, product descriptions, and other information useful when servicing the product.

“Diagnostic Information”

The diagnostic information contains the procedures you use to diagnose and isolate product failures. Diagnostic information consists of the:

- Start MAP
- Maintenance Analysis Procedures (MAPs)
- Diagnostic Aids

Start MAP: This MAP is the starting point for any diagnostic action. Based on high-level symptoms, the information in this MAP directs you to more detailed procedures to help you resolve the machine failure.

Maintenance Analysis Procedures: When Start sends you to a MAP, go to that page and perform the steps as instructed. If there are any notes or instructions at the top of the page, you must read them before you start the procedure.

Carefully read each step of the MAP and perform the appropriate action as instructed. If you do not remember the location of a specific part or test point, or if you do not remember an adjustment or removal procedure, see the chapter that has that information. Always return to the MAP after you do this. In some cases, you are sent to other MAPs to find the failure.

Failing Parts or Assemblies: The MAPs generally help you trace a problem to one part or assembly. The last step of the specific MAP you are using indicates that a part or assembly is failing. You should inspect the part or assembly before you decide to replace it. It may only be loose, dirty, or in need of a small repair. The MAPs may lead you to two, or even three, possible failing parts or assemblies. The parts that may be failing are listed in order of the most probable failure.

Measuring Voltages: Many MAP steps instruct you to measure voltages on cable plugs and electronic board connectors. If you are asked to measure voltage at several places on a plug or connector, a chart next to or near the instruction indicates the number of the plug or connector, the pin numbers you should measure, the signal name, and the correct voltage for the condition you are measuring. Measure the voltage only at the pins listed in the chart. Remember to set your meter on the correct scale and to put the meter leads in the correct position for the voltage you are asked to measure.

Note: Use frame ground for the ground reference. Attach the black meter (ground) lead to frame ground, except where specified otherwise.

“Diagnostic Aids”

This chapter contains information outside the MAPs to help you diagnose a failure of a specific part. Some diagnostic aids are resident in the machine, such as the Power-On Self Test (POST). The machine performs the POST each time it is turned on. Use this information throughout the diagnostic procedures. You should become familiar with the POST and be able to determine if the machine performed all the steps.

Power-On Self Test (POST): The POST is initiated automatically each time the system unit is powered on. The POST is a series of system checks and initializations that verify the correct operation of the base system. Two classifications of malfunctions may be detected during the POST: critical and noncritical.

Critical malfunctions prevent the system from operating at all, or could cause incorrect results that are apparent to the user. Examples of critical errors include processor or interrupt controller malfunctions. If a critical error is detected during the POST, an attempt is made to indicate the error, and all testing halts.

Noncritical malfunctions cause incorrect results that may not be apparent to the user. An example of a noncritical error is a memory module failure. If a noncritical error occurs, an error code is displayed, and the testing is stopped. Testing can be continued on a noncritical error by pressing the **Esc** key.

After a successful POST (one in which no critical errors were detected) a single short beep is generated. The system attempts to load an operating system. The system can be customized to different start methods. The default is to do a "smart" boot.

Remember that the POST does not test all areas, but only those that allow the system to operate well enough to run the Advanced Diagnostics program.

"Repair Information"

This chapter contains removal and replacement instructions and hard disk jumper settings.

"Parts/Test Point Locations"

This chapter contains system board layouts. It is useful when you are asked to measure voltages. Use this information to help you locate parts such as electronic boards, connectors, pin numbers, and test points.

"Safety Inspection Guide"

This chapter contains guidelines to help you identify possible safety concerns. Use this information to inspect a machine for safety problems before putting the machine under a Maintenance Agreement.

"Parts Catalog"

This catalog includes figures, part numbers, and part names.

"Part Number Index"

This chapter contains part numbers listed in numerical order.

Appendix, "Model Configurations and FRU Part Numbers"

This appendix contains tables, listed by country, of models and FRU part numbers. Refer to this when ordering FRUs.

Product Description

This book contains service information for all models of the IBM PS/1 Computer, Machine Types 2133, 2155, and 2168, worldwide. Machine Type 2133 contains bays for three diskette/hard disk drives and slots for three adapter cards. Machine Type 2155 contains bays for five diskette/hard disk drives and slots for five adapter cards. Machine Type 2168 contains bays for six diskette/hard disk drives and slots for eight adapter cards.

For ordering information for all FRU parts, see Appendix, "Model Configurations and FRU Part Numbers" on page A-1.

Security

- Power-on password

System boards

386SX—25MHz processor (72-pin memory SIMM)

Three system boards available (refer to "System Board Layout" on page 5-1):

1. Soldered on board—2MB system memory and 256 kilobytes (K) video memory (DRAM)
2. Soldered on board—2MB system memory and 512K video memory (DRAM)
3. Soldered on board—4MB system memory and 512K video memory (DRAM)

Each system board contains:

- Math coprocessor socket.
- Two 72-pin system memory sockets (accepts 70 to 85 ns). Maximum Memory = 16MB. Refer to "System Memory" on page 1-20.
- 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—20MHz/25MHz processor (30-pin memory SIMMs)

- 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 (MB). 256K, 1MB and 4MB SIMMs are supported in both banks. Refer to “System Board Layouts” on page 5-2. Bank 0 or bank 1 must be filled with the same value SIMMs to work properly. Refer to “System Memory” on page 1-20.
- 512K Video RAM is soldered on the system board and four sockets are provided for an additional 512K Video RAM.
- 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 (socketed) with built-in math coprocessor (30-pin memory SIMMs)

- 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 32MB. 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” on page 1-20.
- 1MB 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.

486SX—25MHz processor (72-pin memory SIMM)

Three system boards available:

1. 2MB SIMM for system memory and no cache sockets
2. 2MB SIMM for system memory and five cache sockets
3. 4MB SIMM for system memory.

Each system board contains:

- Upgrade processor socket.
- Supports 8K internal cache.
- Some models support 0, 128K, or 256K external cache (field upgradeable).
- Shipped with 0 cache.

- Two 72-pin system memory sockets (one is populated with either a 2MB or 4MB SIMM). Memory speed is 70 ns. Maximum memory is 32MB. Refer to “System Memory” on page 1-20 and to “System Board Layouts” on page 5-2.
- 512K video RAM soldered on the system board (not field upgradeable).
- 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), and power LED/hard disk LED (4-pin).
- Lithium battery.

486SX—33MHz processor (72-pin memory SIMM)

Three system boards available:

1. 2MB SIMM for system memory, 128K external cache, upgrade processor socket. Refer to “System Memory” on page 1-20 and to “System Board Layouts” on page 5-2.
2. 4MB SIMM for system memory, 128K external cache, upgrade processor socket.
3. 4MB SIMM for system memory, 0 external cache, upgrade processor socket.

Each system board contains:

- Supports 8K internal cache.
- Supports 0, 128K, or 256K external cache (field upgradeable). Shipped with 0 or 128K standard.
- Two or four 72-pin system memory sockets (one is populated with either a 2MB or 4MB SIMM). Memory speed is 70 ns. Maximum memory is 32MB or 64MB (depending on the number of SIMM sockets). Refer to “System Memory” on page 1-20 and to “System Board Layouts” on page 5-2.
- 1MB video RAM soldered on the system board (not field upgradeable).
- 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/hard disk LED (4-pin), and video feature (26-pin).
- Lithium battery.

486DX—33MHz processor (72-pin memory SIMM)

Two system boards available:

1. 238-pin processor socket

2. 169-pin processor socket.

Each system board contains:

- Supports 8K internal cache.
- Supports 0, 128K, or 256K external cache (field upgradeable). Shipped with 128K standard.
- Four 72-pin system memory sockets (one is populated with a 4MB SIMM). Memory speed is 70 ns. Maximum memory is 64MB. Refer to "System Memory" on page 1-20 and to "System Board Layouts" on page 5-2.
- 1MB video RAM soldered on the system board (not field upgradeable).
- 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/hard disk LED (4-pin), and video feature (26-pin).
- Lithium battery.

486DX2—25MHz/50MHz processor (72-pin memory SIMM)

System board contains:

- Upgrade processor socket.
- Supports 8K internal cache.
- Supports 0, 128K, or 256K external cache (field upgradeable). Shipped with 128K standard.
- Four 72-pin system memory sockets (one is populated with a 4MB SIMM). Memory speed is 70 ns. Maximum memory is 64MB. Refer to "System Memory" on page 1-20 and to "System Board Layouts" on page 5-2.
- 1MB video RAM soldered on the system board (not field upgradeable).
- 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/hard disk LED (4-pin), and video feature (26-pin).
- Lithium battery.

486DX2—33MHz/66MHz processor (72-pin memory SIMM)

Two system boards available:

1. 4MB SIMM for system memory.
2. 8MB SIMM for system memory.

Each system board contains:

- Upgrade processor socket.
- Supports 8K internal cache.
- Supports 0, 128K, or 256K external cache (field upgradeable). Shipped with 128K standard.
- Four 72-pin system memory sockets (one is populated with either a 4MB or 8MB SIMM). Memory speed is 70 ns. Maximum memory is 64MB. Refer to “System Memory” on page 1-20 and to “System Board Layouts” on page 5-2.
- 1MB video RAM soldered on the system board (not field upgradeable).
- 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/hard disk LED (4-pin), and video feature (26-pin).
- Lithium battery.

Power supplies with CPU power switch

Machine Type 2133 contains a 65-W low voltage power supply with fan and a connector for a detachable grounded 3-wire power cord. The power cable has three DASD connectors: one 3.5-inch diskette drive mini power connector and two standard 4-pin power connectors.

For countries with high voltage requirements, Machine Type 2133 contains a 65-W high voltage power supply with a switched appliance connector.

Machine Type 2155 contains either an 85-W low voltage power supply or a 145-W switchable power supply with a fan and a connector for a detachable grounded 3-wire power cord. The 85-W low voltage power supply contains a nonswitched appliance connector. Its power cable has four DASD connectors: one 3.5-inch diskette drive mini power connector and three standard 4-pin power connectors. The 145-W switchable power supply contains a switched appliance connector. Its power cable has four DASD connectors: one 3.5-inch diskette drive mini power connector and three standard 4-pin power connectors.

Machine Type 2155 and Machine Type 2168 contain a 145-W switchable high/low voltage power supply with a fan and a connector for a detachable grounded 3-wire power cord. The power supply also has a switched appliance connector. The power cable has four DASD connectors: one 3.5-inch diskette drive mini power connector and three standard 4-pin connectors.

Cables

One cable for hard disk drives and one cable for diskette drives are provided in all models. Some earlier models have a two-connector hard disk drive cable.

Diskette Drives—AT-type

3.5-inch 1.44MB Slimline diskette drive in all models
5.25-inch 1.2MB Half-High diskette drive (not in all models).

Hard Disk Drives

Hard disk drives are 3.5-inch Slimline IDE AT drives.

85MB with 32K of “look-ahead” cache and 17 ms average access time
129MB with 64K of “look-ahead” cache and 17 ms average access time
170MB with 32K of “look-ahead” cache and 16 ms average access time
211MB with 64K of “look-ahead” cache and 15 ms average access time
253MB with 64K of “look-ahead” cache and 13 ms average access time
340MB with 64K of “look-ahead” cache and 13 ms average access time.

Displays

VGA

- 14-inch, 0.39-mm.
- Supports VGA modes.
Note: Does not support high-resolution graphic modes.
- Includes its own power switch.
- Four user controls: horizontal centering, vertical centering, brightness, and contrast.
- Connector for a detachable grounded 3-wire power cord.
- 1.5-m attached signal cable.
- Low-voltage Northern Hemisphere and high-voltage Northern and Southern Hemisphere versions.

SVGA

- 14-inch, 0.28-mm or 0.39-mm dot pitch tri-synch.
- Supports VGA, 800x600, and 1024x768 (i) modes.
- Includes its own power switch.

- Up to seven user controls: horizontal centering, vertical centering, brightness, contrast, horizontal sizing, vertical sizing, and side pin cushion.
- Connector for a detachable grounded 3-wire power cord.
- 1.5-m attached signal cable.
- Low-voltage Northern Hemisphere and high voltage Northern and Southern Hemisphere displays. System units may have a 110 V–220 V switch, auto sensing, or single voltage.

SVGA+

- 14-inch, 0.28-mm dot pitch multi-scanning.
- Supports VGA, 800x600, 1024x768, and 1280x1024 (i) modes.
- Includes its own power switch.
- Six user controls: horizontal centering, vertical centering, brightness, contrast, horizontal sizing, and vertical sizing.
- Connector for a detachable grounded 3-wire power cord.
- 1.5-m attached signal cable.
- Low-voltage Northern Hemisphere and high voltage Northern and Southern Hemisphere displays.

Keyboard

101-key, 102-key, or 104-key enhanced with 1.8-m (6-foot) cable.

Mini mouse with 1.8-m (6-foot) cable.

Hardware Compatibility

IBM PS/1 Computers, Machine Types 2133, 2155, and 2168, are designed to maintain compatibility with adapters, options, and drives that fully support the following interfaces and physically fit into the system unit.

Item	Interface			
Hard Disk Drives	AT IDE Interface (CAM compatible)			
I/O Adapter Cards	Adapters that are IBM AT compatible and operate at 8MHz			
Diskette Drives	AT Interface			
Math Coprocessor	Intel** or equivalent			
Video	Display Type	Resolution	Colors	Video Memory
	VGA	640×480	16	256K
	VGA	640×480	256	512K
	VGA	640×480	65,535	1024K
	VGA	640×480	16,777,216	1024K
	SVGA	800×600	16	256K
	SVGA	800×600	256	512K
	SVGA	800×600	65,535	1024K
	SVGA	1024×768	16	512K
	SVGA	1024×768	256	1024K
	SGA+	1280×1024	16	1024K
	Note:			
1. SVGA supports all resolutions and colors supported by VGA. SVGA+ supports all resolutions and colors supported by SVGA.				
2. Physical interface is compatible with IBM's Personal System/2* (PS/2*) VGA interface.				
Serial	9-pin connector with RS232D electrical interface			
Parallel	Bidirectional			
Pointing Device	IBM PS/2-compatible mouse			
Keyboard Device	IBM PS/2-compatible enhanced keyboard			

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 unit boots up after the proper password is entered.

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

For a 386SX system board:

1. Locate connector J8 on the system board.
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 Level 1 and 486DX (30-pin memory SIMM) system boards:

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

For 486SX Level 2 (30-pin memory SIMM) system boards:

1. Power off the system unit.
2. Locate connector JP8 on the system board.
3. Move the jumper on JP8 so that it connects pins 2 and 3.
4. Locate connector JP59 on the system board.
5. Move the jumper on JP59 so that it connects pins 2 and 3.

6. Move the jumper on JP59 back to pins 1 and 2.
7. Move the jumper on JP8 back to pins 1 and 2.
8. The system detects the change and the password is erased from memory.
9. When you are finished servicing the machine, run the Configuration Utility to restore the configuration settings.

For 486SX, 486DX, and 486DX2 (72-pin memory SIMM) system boards:

1. Power off the system unit.
2. Locate and remove the battery.
3. Locate the two pads next to SP103 (near the battery).
4. Apply a momentary short across the two pads at SP103.
5. Replace the battery and power on the system unit.
6. The system detects the change and the password, time, and date are erased from memory.
7. Run the Configuration Utility to restore the configuration settings. Press ESC to save with the password disabled.
8. When you are finished servicing the machine, run the Configuration Utility to restore the configuration settings. (You must reset the time and date.)

Notes:

1. To reinstall the password, the user must enter a password in the Configuration Utility.
2. Disabling the power-on password reconfigures the system. If you receive a 162 error, make note of any flagged option.

Using the Configuration Utility

The Configuration Utility is a PS/1 function that lets you view and change important information about the 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 need to verify the change.

If you get a POST 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 the computer.

Change the computer's serial and parallel port settings.

Set up or change the password protection on the computer.

Check the display type installed.

Note: If you have a 486SX, 486DX, or 486DX2 (72-pin memory SIMM) system board and a SVGA display, run the Configuration Utility and set the display type to match the display.

Configuration Utility Screen

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

View information about how the computer's hardware is set up (called the *hardware configuration*)

Change information about certain hardware options on the computer.

What the Screen Shows You

If you want to know about the specific capabilities of the 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 the 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.

What You Can Change on the Screen

The PS/1 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 the computer. The BIOS for the computer is stored in *read-only memory* called *ROM*. The **Shadow BIOS in RAM** option (not available on 486SX, 486DX, and 486DX2 72-pin memory SIMM system boards) lets you increase the computer's performance by copying BIOS into *random-access memory* (RAM). Since the computer accesses RAM faster than it accesses ROM, the programs run faster.

Hard Disk Drive (C: or D:)

This option (available on 486SX, 486DX, and 486DX2 72-pin memory SIMM system boards) shows you an entry for each hard disk drive in the system unit. If you add or change a hard disk drive, you must select the correct drive position for this option on the Configuration Utility screen.

Diskette Drive (A: or B:)

This option shows you an entry for each diskette drive on the computer. If you add or change a diskette drive, you must select the correct diskette drive type on the Configuration Utility screen.

Display Type

This option (available on 486SX, 486DX, and 486DX2 72-pin memory SIMM system boards) shows the display type installed. If you add or change a display, you must select the correct display type on the Configuration Utility screen.

Note: If you are not sure which display is installed, run the Setup program, and check the display type. Make sure the display type shown on the Configuration Utility screen matches the display installed.

Power-On Password

You may want to restrict the use of the computer by setting a *power-on password*. This password must then be entered each time you turn on the 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 the password, **be sure to write it down and put it in a secure place**.

Startup Sequence

When the 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.

The PS/1 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

The 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 the computer that have additional serial ports, you 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 the software. For instructions on changing the software, see the user's guide or online information that came with the software.

Parallel Port

The computer has one parallel port with a special *address* (identifying location) assigned to it. If you add adapter cards to the computer that have additional parallel ports, you 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 the software. For instructions on changing the 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 the computer using the **Date** and **Time** options. The changes take effect immediately.

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

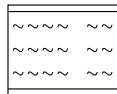
```
12 midnight is    :
12 noon is       12:
 1 p.m. is       13:
```

How to Get the Screen

There are three ways to display the Configuration Utility screen:

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

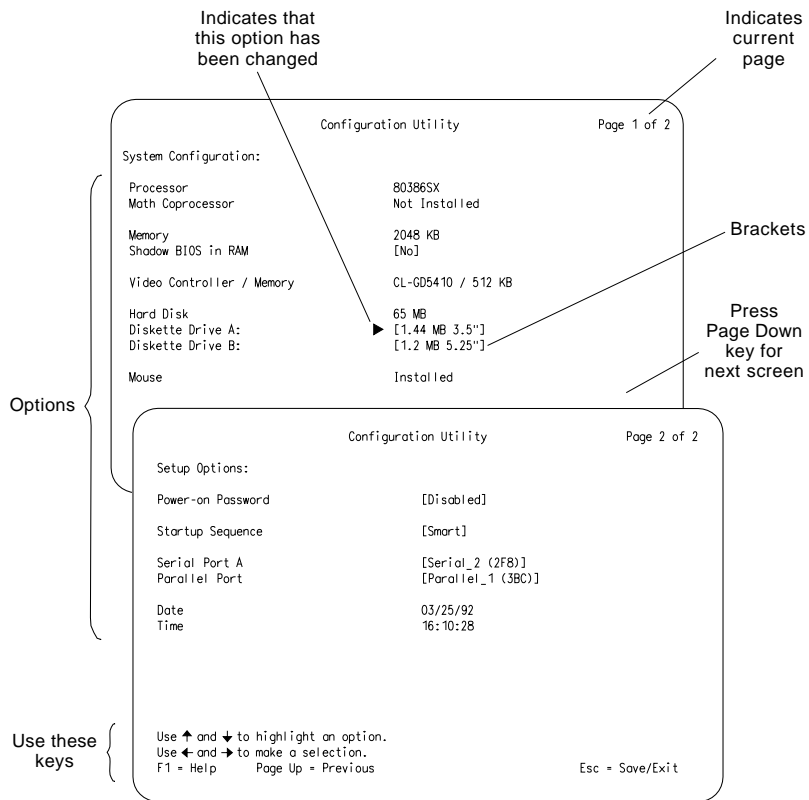
When you turn on the computer, this symbol appears:



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

In the Advanced Diagnostics program, you can select `Setup` from the menu.

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



System Memory

The system memory consists of RAM soldered on the system board and socketed Single In-line Memory Module (SIMM). Machine Types 2133, 2155, and 2168 contain a 386SX, 486SX, 486DX, or 486DX2 system board.

The 386SX system board (72-pin memory SIMM) has either 2MB or 4MB of RAM soldered on. 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" appears on the display when an installed SIMM is the wrong value.

The 486SX and 486DX system boards (30-pin memory SIMMs) have no soldered RAM. 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 or faster. Faster speeds are numbers less than 80 ns. SIMMs must be 9 bits wide. No POST error is displayed when a SIMM of the wrong value is installed.

The 486SX, 486DX, and 486DX2 system boards (72-pin memory SIMM) have no soldered RAM. All system memory is socketed with SIMMs. Unlike 30-pin SIMMs, which must be installed in banks of four, 72-pin memory SIMM can be installed one at a time. SIMMs supported are 70 ns and must be 36 bits wide.

SIMM Identification

30-Pin Memory SIMMs: 30-pin memory 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 are many variations to this. Consult the SIMM manufacturer documentation to identify SIMM values when you are unsure of the SIMM value in the system.

72-Pin Memory SIMMs: The 72-pin memory SIMM for 486SX, 486DX, and 486DX2 system boards are usually marked with a label that shows the size and speed (for example, 1M×36, 7 ns). SIMMs that are not explicitly labeled cannot be identified other than by part number. Consult the SIMM manufacturer documentation to identify SIMM values when you are unsure of the SIMM value in the system.

Specifications

Size:

Machine Type 2133 System Unit

- Width: 360 mm (14.2 in.)
- Depth: 421.5 mm (16.6 in.)
- Height: 122.1 mm (4.8 in.).

Machine Type 2155 System Unit

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

Machine Type 2168 System Unit

- Width: 240 mm (9.5 in.)
- Depth: 416 mm (16.4 in.)
- Height: 427 mm (16.8 in.).

Display (max.)

- Width: 356 mm (14.0 in.)
- Depth: 382 mm (15.0 in.)
- Height: 352 mm (13.9 in.) with tilt/swivel stand.

Weight:

Machine Type 2133 System Unit

- 9 kg (20 lb).

Machine Type 2155 System Unit

- 11 kg (23.5 lb).

Machine Type 2168 System Unit

- 12.7 kg (28 lb).

Display (max.)

- 11.5 kg (25.4 lb).

Environment:

Temperature, System Unit and Display

- Power on: 10° to 32°C (60° to 95°F)
- Power off: 10° to 43°C (50° to 110°F).

Humidity, System Unit and Display

- Power on: 8% to 80%
- Power off: 8% to 80%.

Maximum altitude: 2134 m (7000 ft).

Heat output (maximum):

Machine Type 2133 System Unit

- 184 Btu/Hr.

Machine Type 2155 System Unit

- 409 Btu/Hr.

Machine Type 2168 System Unit

- 409 Btu/Hr.

Electrical:

Input voltage (sinewave input is required)

Low Range System Unit Display

Minimum: 100 V ac 108 V ac

Maximum: 125 V ac 132 V ac

High Range System Unit Display

Minimum: 180 V ac 198 V ac

Maximum: 265 V ac 264 V ac

Operating Requirements

All machines have two power-on switches: one on the system unit and one on the display. High voltage machines (180–265 V ac) have a power cord from the display to the system unit and a switched appliance connector allowing the machine to be turned on with one power switch on the system unit.

High voltage Northern and Southern Hemisphere SVGA displays may come with a voltage selector switch, allowing selection of voltage of either 110 V ac or 220 V ac. This switch must be in the 220 V ac position when the machine is plugged into a 220 V ac electrical outlet.

When the system unit 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.

Special Tools

The following special tools are required to service this system:

- A meter similar to the Triplet** Model 310 (IBM P/N 9900167)
- Wrap Plug, IBM P/N 72X8546
- Video Memory Removal Tool, IBM P/N 9900764.

Diagnostic Information

MAP 0010:	Start	2-3
MAP 0020:	Power	2-20
MAP 0100:	System Board	2-30
MAP 0200:	Memory	2-36
MAP 0300:	Keyboard	2-54
MAP 0600:	3.5-Inch Diskette Drive	2-58
MAP 0625:	5.25-Inch Diskette Drive	2-66
MAP 0700:	Math Coprocessor	2-70
MAP 0900:	Parallel Port	2-72
MAP 1100:	System Board Serial Port	2-73
MAP 1200:	Serial Port Adapter	2-75
MAP 1700:	Hard Disk Drive	2-79
MAP 2000:	Riser Card	2-93
MAP 2400:	Video Graphics Array	2-97
MAP 8600:	Mouse	2-119

MAP 0010: Start

This is the entry point for all MAPs.

In these MAPs, the descriptive terms “30-pin memory SIMM” and “72-pin memory SIMM” are given for *board identification* only. The amount of SIMM memory installed has no effect on the diagnostic steps described in the MAPs.

The Advanced Diagnostics program comes in two versions on two diskettes (packaged together with this book). One diskette, labeled “For Machine Types 2133, 2155, and 2168,” is for all 486 system boards with 72-pin memory SIMM sockets. The other, labeled “For Machine Types 2133 and 2155,” is for all other system boards. If in doubt about which kind of board you are testing, try one diskette in the machine. Only the correct diskette for the machine will run the Advanced Diagnostics program.

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

All voltages in the MAPs are positive unless otherwise shown.

Use frame ground for all voltage checks unless otherwise specified.

If the Advanced Diagnostics program instructs you to replace a FRU, do not do so until all applicable MAP steps have been completed.

A POST error code can appear on the display in two ways:

1. Under the System Memory count at the upper-left corner of the screen.

Note: A memory error can appear without the memory count as:
XXXXXX XXXX 201 (X can be a number or letter).

2. After two beeps, a window appears with the error code followed by an explanation.

If you have a 162 error with no other error codes, run the Configuration Utility and note any flagged options. Refer to the POST Error table in Step 065 on page 2-15.

If more than one POST error code is displayed, diagnose the first one. Many times the other error codes are a result of the first error code.

Note: If you have any of the following POST error messages displayed, go to the appropriate MAP; otherwise, continue with this MAP. (You may have to wait up to 2 minutes for the error to be displayed.)

Error Code	Component	MAP
1XX	System Board	0100

MAP 0010 (continued)

Error Code	Component	MAP
2XX	Memory	0200
3XX	Keyboard	0300
6XX	Diskette Drive	0600
11XX	System Board Serial Port	1100
17XX	Hard Disk Drive	1700
24XX	Video Graphics Array	2400
86XX	Mouse	8600
XXXXXX XXXX 201		0200

001

(From MAP 0100 step 009 on page 2-32)

(From step 055)

- Verify the power-on password is inactive. See “Power-On Password” on page 1-13.
- Power off the system unit and display and wait 10 seconds.
- 386SX (72-pin memory SIMM) system boards:
Refer to “386SX 25MHz (72-Pin Memory SIMM) System Board Layout” on page 5-3 and verify the beeper jumper on connector J12 is on pins 1 and 2.
- 486SX and 486DX (30-pin memory SIMM) system boards:
Verify the jumpers are in the correct positions, as shown in “486SX 20MHz/486SX 25MHz Level 1 (30-Pin Memory SIMM) System Board Layout” on page 5-9 and “486DX 33MHz (30-Pin Memory SIMM) System Board Layout” on page 5-13.
- 486SX, 486DX, and 486DX2 (72-pin memory SIMM) system boards:
Refer to “486SX 33MHz (72-Pin Memory SIMM) System Board Layout” on page 5-15 and “486DX 25MHz/486DX2 50MHz or 486DX 33MHz/486DX2 66MHz (72-Pin Memory SIMM) System Board Layout” on page 5-17 for the correct jumper positions. To reset the power-on password, see “Power-On Password” on page 1-13.
- Disconnect all external cables and devices from the system unit, except for the keyboard, mouse, and display.
- Remove all adapter cards from the riser card.
- Disconnect any drives except for the following:

Machine Type 2133

- One 3.5-in. diskette drive

(Step 001 continues)

001 (continued)

- One 5.25-in. diskette drive
- One hard disk drive.

Machine Type 2155 or Machine Type 2168

- One 3.5-in. diskette drive
- One 5.25-in. diskette drive
- Two hard disk drives. (Some machines have one hard disk drive installed.)

- Check all cables and power cords.
- Ensure the display brightness and contrast controls are not turned down.

Note: Some displays have detachable system I/O cable between the display and the system unit. In either case, check the power cord or cable before replacing the unit.

- Make sure there are no diskettes in the drives.
- Insert the Advanced Diagnostics diskette in drive A.

Note: High voltage Northern and Southern Hemisphere displays may come with a voltage selector (110 V–220 V) switch. The 145 W power supply has a voltage selector (110 V–220 V) switch. Match the switch to the line voltage.

- Power on the system unit and display.

IS THE POWER SUPPLY FAN RUNNING?

Yes No

002

Go to "MAP 0020: Power" on page 2-20.

003

IS THE SYSTEM UNIT POWER ON INDICATOR LAMP LIT?

Yes No

004

- Power off the system unit.
 - Ensure the power on indicator lamp is plugged in correctly. A lamp that is plugged into the connector in reverse does not light.
- (Step **004** continues)

MAP 0010 (continued)

004 (continued)

- Disconnect the power on indicator lamp.
- 386SX machines: Check the voltage between J13 pin 1 on the system board and frame ground.
- 486SX and 486DX (30-pin memory SIMM) machines: Check the voltage between J11 pin 1 on the system board and frame ground.
- 486SX and 486DX (72-pin memory SIMM) machines: Check the voltage at J26 pin 1 on the system board and frame ground.
- Power on the system unit.

IS THE VOLTAGE +5 V dc?

Yes No

005

The system board is failing.

006

The indicator lamp is failing.

007

- Listen carefully for any beeps during POST.

Note: Under certain failing conditions, POST may take up to 1 minute.

DID YOU HEAR A SINGLE SHORT BEEP AT THE END OF THE POST?

Yes No

008

DID YOU HEAR ANY BEEPS?

Yes No

009

Go to Step 016 on page 2-7.

010

(Step 010 continues)

010 (continued)

DID YOU HEAR TWO SHORT BEEPS?

Yes No

011

Go to Step 065 on page 2-15.

012

Go to Step 025 on page 2-9.

013

DO YOU HAVE A DISPLAY PROBLEM?

Yes No

014

Go to Step 037 on page 2-10.

015

Go to Step 066 on page 2-16.

016

(From step 009)

DOES THE MACHINE FUNCTION NORMALLY EXCEPT FOR THE BEEP?

Yes No

017

Go to Step 025 on page 2-9.

018

(Step **018** continues)

MAP 0010 (continued)

018 (continued)

IS THE MACHINE A MACHINE TYPE 2168 WITH A VOLUME CONTROL AND SPEAKER?

Yes No

019

Replace the system board.

020

Note: The volume control and speaker are used only in World Trade Machine Type 2168 machines. Refer to "486DX 25MHz/486DX2 50MHz or 486DX 33MHz/486DX2 66MHz (72-Pin Memory SIMM) System Board Layout" on page 5-17.

- Make sure the volume control is not turned to low.
- Power off the system unit.
- Unplug connector J27 and jumper pins 1 and 2.
- Power on the system unit.

DID YOU HEAR A BEEP AT THE END OF POST?

Yes No

021

Replace the system board.

022

- Power off the system unit.
 - Reconnect connector J27 to the system board.
 - Power on the system unit.
 - Measure the voltage, with the meter set at +6 V dc, between the bottom connector on the speaker and frame ground.
 - Turn up the volume control.
- (Step **022** continues)

022 (continued)

DOES THE VOLTAGE VARY FROM 0 TO +5 V dc?

Yes No

023

– Replace the volume control assembly.

024

– Replace the speaker.

025

(From steps 012 and 017)

DID YOU RECEIVE A 16X ERROR?

Yes No

026

Go to Step 032 on page 2-10.

027

DID YOU RECEIVE A 161 OR 163 ERROR?

Yes No

028

DID YOU RECEIVE A 164 ERROR?

Yes No

029

Go to Step 032 on page 2-10.

030

Go to "MAP 0200: Memory" on page 2-36.

031

(Step **031** continues)

MAP 0010 (continued)

031 (continued)

Go to "MAP 0100: System Board" on page 2-30.

032

(From steps 026 and 029)

DO YOU HAVE A DISPLAY PROBLEM?

Yes No

033

Go to Step 035.

034

Go to "MAP 2400: Video Graphics Array" on page 2-97.

035

(From step 033)

Make a note of any error messages, then press **Esc**.

Note: If no error code is present, answer the following question "Yes."

DID THE ERROR MESSAGE GO AWAY?

Yes No

036

Go to "MAP 0300: Keyboard" on page 2-54.

037

(From step 014)

DID THE ADVANCED DIAGNOSTIC MENU APPEAR?

Yes No

038

Go to "MAP 0600: 3.5-Inch Diskette Drive" on page 2-58.

039

(Step 039 continues)

039 (continued)
(From step 043)

Press **3 (SETUP)**, then press **Enter**.

- 386SX system board:
Make a note of the “Shadow BIOS in RAM.” It is either Yes or No.
- 486SX, 486DX, and 486DX2 (72-pin memory SIMM) system boards:
Make a note of the size of the internal and external cache memory installed.
- After the Configuration Utility menu is displayed, press **Esc** then **Enter** to save the changes.
- Power off the system unit when the configuration is completed.
- Wait 10 seconds and power on the system unit.
- Make a note of any error messages and press **Esc**.

DID THE ADVANCED DIAGNOSTICS MENU APPEAR, AND IS IT SHARP, CLEAR, AND STABLE?

Yes No

040

Go to Step 066 on page 2-16.

041

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

DID THE INSTALLED DEVICES MENU APPEAR?

Yes No

042

Go to Step 065 on page 2-15.

043

- Use the “System Board Layout” charts on pages 5-2 through 5-13 and “SIMM Identification” on page 1-20 to determine the amount of system memory (RAM) installed on the system board. 1MB = 1024KB.
- Refer to Appendix, “Model Configurations and FRU Part Numbers” on page A-1 for model and part number information. Then go to “Parts Catalog” on page 7-1, and refer to the cache memory descriptions. (This is only accurate if no memory has been added since installation.)

MAP 0010 (continued)

- 386SX system board:

If the “Shadow BIOS in RAM” was yes from Step 039 on page 2-11, the memory size shown will be less than the physical size of the installed memory (soldered and SIMMs) by 128K.

- 486SX and 486DX (30-pin memory SIMM) system boards:

The memory size shown will be less than the system memory (SIMMs) by 384K.

IS THE MEMORY SIZE SHOWN LESS THAN THAT INSTALLED IN THE SYSTEM?

Yes No

044

Go to Step 046.

045

Go to “MAP 0200: Memory” on page 2-36.

046

(From step 044)

- Compare the list to the options installed inside the system.

Note: The Installed Devices list displays only those devices supported by this manual. If a device is missing from the list and is *not* supported by this manual, go to Step 051 on page 2-13.

DOES THE INSTALLED DEVICES LIST CORRECTLY IDENTIFY THE DEVICES INSTALLED INSIDE THE SYSTEM?

Yes No

047

Go to Step 049 on page 2-13.

048

- Press **Y**, then press **Enter**.

Go to Step 057 on page 2-14.

049

(From step 047)

- Press **N**, then press **Enter**. Follow the screen instructions and attempt to correct the Installed Devices list.

Note: A 199 error indicates you answered “No” to the question about the Installed Devices list. Disregard the error.

COULD YOU CORRECT THE INSTALLED DEVICES LIST?

Yes No

050

Go to Step 052.

051

(From step 046)

- Press **Y**, then press **Enter**.

Go to Step 057 on page 2-14.

052

(From step 050)

IS THE OPTION MISSING FROM THE INSTALLED DEVICES LIST?

Yes No

053

- Press **Y**, then press **Enter**.

Go to Step 057 on page 2-14.

054

- Ensure all switches and jumpers (if present) are correctly set for the option that is missing on the list.

ARE THE SWITCHES AND JUMPERS SET CORRECTLY?

Yes No

055

- Reset any incorrect jumper or switch settings.
(Step **055** continues)

MAP 0010 (continued)

055 (continued)

Go to Step 001 on page 2-4 to verify system operation.

056

Go to the appropriate MAP for the missing device.

057

(From steps 048, 051, and 053)

- Follow the instructions on the screen.
- Select the options you want to test, or press **Enter** to run all tests.

Note: If you received a 199 error, or if you have an undetermined problem, run all tests.

IS THERE AN ERROR CODE DISPLAYED ON THE SCREEN?

Yes No

058

Go to Step 060.

059

Go to Step 071 on page 2-18.

060

(From step 058)

DID THE SYSTEM CHECKOUT MENU APPEAR AT THE END OF TESTING?

Yes No

061

Go to "MAP 0020: Power" on page 2-20.

062

(Step **062** continues)

062 (continued)

DID YOU NOTICE ANY FAILURE SYMPTOMS OR WERE ANY FAILURES REPORTED TO YOU?

Yes No

063

Go to Step 067 on page 2-17.

064

Go to Step 066 on page 2-16.

065

(From steps 011 and 042)

Find the POST error in the following figure and take the action indicated. If an error message and incorrect audio response occur, take the action indicated for the error message.

MAP 0010 (continued)

POST Error	Action
No beep and: Blank or unreadable display Blinking cursor Machine functioning properly 1XX error	MAP 0020: Power MAP 0020: Power MAP 0020: Power MAP 0100: System Board
One long and one short beep	MAP 0200: Memory
One long and two short beeps	MAP 2400: Video Graphics Array
One long and three short beeps	MAP 2400: Video Graphics Array
Two short beeps and: Blank or unreadable display Distorted display image 30X error 6XX error 11XX error 17XX error 24XX error 2408 error 2410 error 86XX error XXXXXX XXXX 201 error 111, 129 error 162 without a device error 2XX error	MAP 2400: Video Graphics Array MAP 2400: Video Graphics Array MAP 0300: Keyboard MAP 0600: Diskette Drive MAP 1100: System Board Serial Port MAP 1700: Hard Disk Drive MAP 2400: Video Graphics Array Replace the system board. Replace the system board. MAP 8600: Mouse MAP 0200: Memory MAP 0200: Memory Check the Configuration Utility for any flagged option(s) and add or delete the missing device(s). Refer to "Using the Configuration Utility" on page 1-14. If you cannot add or delete a device, go to the MAP for that device and test. MAP 0200: Memory
Continuous beep	MAP 0020: Power
Repeating short beeps	MAP 0020: Power
Any other errors	Go to Step 071 on page 2-18.

Figure 2-1. POST Errors

066

(From steps 015, 040, and 064)
(Step **066** continues)

066 (continued)

Find the symptom in the following figure and take the action indicated.

Symptom	Action
Display problem: Incorrect colors No high intensity Missing, broken, or incorrect characters Blank display (dark) Blank display (bright) Distorted image Unreadable display Other display problems	MAP 2400: Video Graphics Array MAP 2400: Video Graphics Array MAP 2400: Video Graphics Array MAP 2400: Video Graphics Array MAP 2400: Video Graphics Array MAP 2400: Video Graphics Array MAP 2400: Video Graphics Array MAP 2400: Video Graphics Array MAP 2400: Video Graphics Array
Blinking cursor only	MAP 0600: Diskette Drive
C: prompt	MAP 0600: Diskette Drive
Keyboard problem	MAP 0300: Keyboard
Cannot finish diagnostic test	MAP 0020: Power
Mouse doesn't work	MAP 8600: Mouse
3.5-in. diskette drive doesn't work	MAP 0600: 3.5-in. Diskette Drive
5.25-in. diskette drive doesn't work	MAP 0625: 5.25-in. Diskette Drive
Hard disk LED doesn't come on but machine functions normally otherwise	MAP 1700: Hard Disk Drive—go to Step 049 on page 2-88.
Printer problems	Refer to the service manual for the printer.
Processor speed seems slower	MAP 0200: Memory
Any other problem	Go to Step 071 on page 2-18.

Figure 2-2. Failure Symptoms

067

(From step 063)

- Power off the system unit.
- Install the riser card, if it was part of the failing system.

(Step **067** continues)

MAP 0010 (continued)

067 (continued)

- Power on the system unit.

Note: If you know of a failure that has occurred because of an adapter card, answer the following question “Yes.”

DO YOU HAVE ANY ERROR CODES OR FAILURE SYMPTOMS?

Yes No

068

Go to Step 070.

069

Go to “MAP 2000: Riser Card” on page 2-93.

070

(From step 068)

The Advanced Diagnostics tests finished without detecting a failure.

If you are still experiencing a failure:

- Check all adapter jumper positions.
- Check all adapter switch settings.
- Check all cables and connectors for proper installation.
- Run the Advanced Diagnostics tests on all devices. Use the **RUN TESTS ONE TIME** option. If you receive an error, go to the MAP indicated by the error code. For example, if you receive the error code 6XX, go to “MAP 0600: 3.5-Inch Diskette Drive” on page 2-58.

If you are experiencing a problem with a device not supported by this manual, refer to that device’s service manual for special testing instructions.

If you suspect an intermittent problem, start an error log. If you need instructions, refer to “Error Log” on page 3-9.

071

(From steps 059, 065, and 066)

(Step **071** continues)

071 (continued)

Go to the MAP indicated by the error code. For example, if you receive the error code 6XX, go to "MAP 0600: 3.5-Inch Diskette Drive" on page 2-58. If no error code is indicated, go to the MAP relating to the reported symptom.

Note: If you are unable to find a MAP that corresponds to your error code, you have either an IBM device with its own service manual or a device not supported by IBM diagnostic tests.

MAP 0020: Power

Symptom Explanation	Conditions That Could Cause This Symptom
You have entered this MAP because you were unable to complete POST, another MAP directed you here, or you suspect a power problem.	<ul style="list-style-type: none">A diskette drive is failing.A hard disk drive is failing.A memory card (SIMM) is failing.A video RAM is failing (486SX 30-pin memory SIMM) on system board only.The riser card is failing.The power supply is failing.The system board is failing.The math coprocessor is failing (386SX or 486SX).

001

- Power off the system unit.
- Unplug the system unit power cord, the display power cord, and any external devices from the electrical outlets.
- Disconnect all external cables and devices from the system unit, except for the keyboard, mouse, and display.
- Remove all adapter cards from the riser card.
- Disconnect any drives except for the following:
 - Machine Type 2133
 - One 3.5-in. diskette drive
 - One 5.25-in. diskette drive
 - One hard disk drive.
 - Machine Type 2155 or Machine Type 2168
 - One 3.5-in. diskette drive
 - One 5.25-in. diskette drive
 - Two hard disk drives. (Some machines have one hard disk drive installed.)

(Step **001** continues)

001 (continued)

- Plug the system unit power cord and display power cord into the electrical outlet.
- Power on the system unit.

DID THE SYMPTOM REMAIN?

Yes No

002

CAUTION:

Power off the system unit before connecting any device.

Connect the adapter cards, external devices, or drives disconnected in Step 001 on page 2-20 to the system unit one at a time until the symptom returns. Repair or replace the device causing the failure.

003

DOES YOUR SYSTEM HAVE A POWER CORD BETWEEN THE SYSTEM UNIT AND THE DISPLAY?

Yes No

004

- Power off the system unit and display.
 - Disconnect the power cord from the back of the system unit and display.
- Note:** Some displays have an attached power cord.
- Measure the line voltage at the system unit end and display end of the power cords.

DO YOU HAVE THE CORRECT LINE VOLTAGE?

Yes No

005

- Check the power at the electrical outlet.
- Check the continuity of the power cords.
- Replace the failing power cord or plug the machine into a functioning electrical outlet.

MAP 0020 (continued)

006

Go to Step 011.

007

- Power off the system unit.
- Disconnect the power cord from the back of the display.
- Power on the system unit.
- Measure the line voltage at the display end of the power cord.

DO YOU HAVE THE CORRECT LINE VOLTAGE?

Yes No

008

- Power off the system unit.
- Disconnect the power cord from the back of the system unit.
- Measure the line voltage at the system unit end of the power cord.

DO YOU HAVE THE CORRECT LINE VOLTAGE?

Yes No

009

- Check the power at the electrical outlet.
- Check the continuity of the power cord.
- Replace the power cord or plug the machine into a functioning electrical outlet.

010

- Check the continuity of the power cord between the system unit and the display.
 - Replace the power cord or the power supply.
-

011

(From step 006)

(Step 011 continues)

011 (continued)

- Reconnect the power cord(s).
- Disconnect all power cables to all the drives.
- Disconnect the power cables to the system board.
- Power on the system unit.
- Check the voltages at the power supply connectors to the system board as indicated.

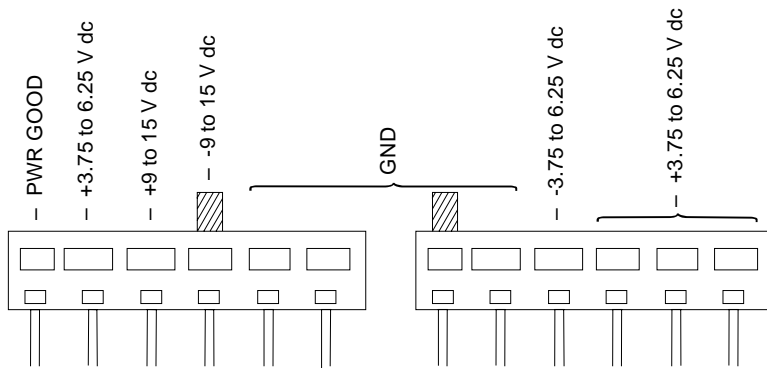


Figure 2-3. System Board Power Supply Connectors

ARE THE VOLTAGES CORRECT?

Yes No

012

Replace the power supply.

013

You may have a failing diskette drive or hard disk drive. Perform the following:

- Power off the system unit and wait 10 seconds.
- Reinstall all internal cables.
- Remove the power and signal cable from one of the drives.
- Power on the system unit.

(Step **013** continues)

MAP 0020 (continued)

013 (continued)

DID THE SYMPTOM REMAIN?

Yes No

014

Replace the failing drive. If this does not correct the problem, replace the signal cable.

015

- Power off the system unit and wait 10 seconds.
- Reinstall the signal cable you removed from the drive.
- Perform the same procedure for any remaining drives.

DID THE SYMPTOM REMAIN?

Yes No

016

Replace the failing drive. If this does not correct the problem, replace the signal cable.

017

You may have a failing riser card.

- Power off the system unit.
- Remove the riser card.
- Power on the system unit.

DID THE SYMPTOM REMAIN?

Yes No

018

Replace the failing riser card.

019

(Step 019 continues)

019 (continued)

DO YOU HAVE A 486SX (30-PIN MEMORY SIMM) SYSTEM BOARD INSTALLED, AND DOES IT HAVE SOCKETED VIDEO RAM INSTALLED?

Yes No

020

Go to Step 025.

021

You may have a failing video RAM chip.

- Power off the system unit.
- Remove one of the video RAM chips. Use the Video Memory Removal Tool to remove the chip. Observe electrostatic discharge (ESD) precautions.
- Power on the system unit.

DID THE SYMPTOM REMAIN?

Yes No

022

Replace the failing video RAM chip.

023

- Power off the system unit.
- Perform the same procedure for any remaining video RAM chips.

DID THE SYMPTOM REMAIN?

Yes No

024

Replace the failing video RAM chip.

025

(From step 020)

(Step 025 continues)

MAP 0020 (continued)

025 (continued)

ARE THERE ANY MEMORY SIMMS INSTALLED IN YOUR MACHINE?

Note: All 486SX, 486DX, and 486DX2 system boards that have 72-pin memory SIMMs sockets must have at least one memory SIMM card installed to operate. There is no memory on the system board alone. Install a memory SIMM if there is none.

Yes No

026

Replace the system board. After replacing parts, run automatic configuration and set the time and date to remove 16X errors.

027

You may have a failing SIMM memory card.

- Power off the system unit.
- Remove one of the SIMM memory cards from the system board.

Note: If you have only one memory SIMM card installed, you must substitute another SIMM for the system to operate.

- Power on the system unit.

DID THE SYMPTOM REMAIN?

Yes No

028

Replace the failing SIMM memory card.

029

- Power off the system unit.
- Perform the same procedure for any remaining SIMM memory cards.

DID THE SYMPTOM REMAIN?

Yes No

030

(Step 030 continues)

030 (continued)

Replace the failing SIMM memory card.

031

DO YOU HAVE A 386SX OR A 486SX SYSTEM BOARD?

Yes No

032

Go to Step 035.

033

You may have a failing math coprocessor.

- Power off the system unit.
- Remove the math coprocessor. Use a Processor Removal Tool to remove the math coprocessor. Observe ESD precautions.
- Power on the system unit.

DID THE SYMPTOM REMAIN?

Yes No

034

Replace the failing math coprocessor.

035

(From step 032)

You may have a failing indicator lamp.

- Power off the system unit.
- Unplug one indicator lamp at a time.
- Power on the system unit.

DID THE SYMPTOM REMAIN?

Yes No

036

(Step **036** continues)

MAP 0020 (continued)

036 (continued)

Replace the failing indicator lamp.

037

Replace the system board. After replacing parts, run the Configuration Utility and set the time and date to remove 16X errors.

MAP 0100: System Board

Symptom Explanation	Conditions That Could Cause This Symptom
You have entered this MAP because you were unable to complete the POST or you received a 1XX error message.	The battery is failing. The keyboard is failing. The system board is failing. The configuration has changed.

001

(From step 026)

- Verify the power-on password is inactive.
- Power off the system unit.
- 386 system board: Refer to “386SX 25MHz (72-Pin Memory SIMM) System Board Layout” on page 5-3 and verify the beeper jumper on connector J12 is on pins 1 and 2.
- 486SX and 486DX (30-pin memory SIMM) system boards:
Verify the jumpers are in the correct positions as shown in “486SX 20MHz/486SX 25MHz Level 1 (30-Pin Memory SIMM) System Board Layout” on page 5-9, “486SX 25MHz Level 2 (30-Pin Memory SIMM) System Board Layout” on page 5-11, and “486DX 33MHz (30-Pin Memory SIMM) System Board Layout” on page 5-13.
- 486SX, 486DX, and 486DX2 (72-pin memory SIMM) system boards:
Verify the jumpers are in the correct positions as shown in the “System Board Layout” charts on pages 5-2 through 5-13 and “SIMM Identification” on page 1-20.
- Insert the Advanced Diagnostics diskette into drive A.
- Power on the system unit.

DID YOU RECEIVE A 1XX ERROR MESSAGE DURING THE POST?

Yes No

002

Go to Step 004 on page 2-31.

003

Go to Step 009.

004

(From step 002)

Make a note of any error messages, then press **Esc**.

DID THE ADVANCED DIAGNOSTICS MENU APPEAR?

Yes No

005

Go to "MAP 0010: Start" on page 2-3.

006

- Press **0 (SYSTEM CHECKOUT)**, then press **Enter**.
- Follow the screen instructions to run the System Unit tests.

DID YOU RECEIVE A 1XX ERROR?

Yes No

007

Go to Step 018 on page 2-33.

008

Go to Step 028 on page 2-35.

009

(From step 003)

Find your error in the following figure and take the action indicated.

MAP 0100 (continued)

Error Code	Action
161	Go to Step 010 on page 2-32.
163	Go to Step 019 on page 2-33.
162, 164	Go to MAP 0010 step 001 on page 2-4.
101, 107	Go to "MAP 0020: Power" on page 2-20.
1XX (not listed)	Replace the system board.
129	Go to "MAP 0200: Memory" on page 2-36.

Figure 2-4. POST Errors

010

(From step 009)

This error indicates a problem with the nonvolatile memory.

- Make a note of any error messages and press **Esc**.

DID THE ERROR MESSAGE GO AWAY WHEN ESC WAS PRESSED?

Yes No

011

Go to "MAP 0300: Keyboard" on page 2-54.

012

DID THE ADVANCED DIAGNOSTICS MENU APPEAR?

Yes No

013

Go to "MAP 0600: 3.5-Inch Diskette Drive" on page 2-58.

014

- Press **3 (SETUP)**, then press **Enter**. When the Configuration Utility screen appears, press **Esc**.

- Power off the system unit and wait 10 seconds.

- Power on the system unit.

(Step **014** continues)

014 (continued)

DID RUNNING THE SETUP PROGRAM CORRECT THE PROBLEM?

Yes No

015

Replace the battery.

Note: Run the Configuration Utility by selecting **3 (SETUP)** and set the date and time to remove any 16X errors.

If the symptom remains, replace the system board.

016

Check the battery for at least 2.8 V dc.

DOES THE BATTERY HAVE AT LEAST 2.8 V DC?

Yes No

017

Replace the battery.

018

(From step 007)

You have successfully completed the Advanced Diagnostics tests. If you suspect an intermittent problem, start an error log. If you need instructions, refer to "Error Log" on page 3-9.

019

(From step 009)

This error message indicates the system date and time are not set.

– Make a note of any error messages and press **Esc**.

DID THE ERROR MESSAGE GO AWAY WHEN ESC WAS PRESSED?

Yes No

020

Go to "MAP 0300: Keyboard" on page 2-54.

MAP 0100 (continued)

021

DID THE ADVANCED DIAGNOSTICS MENU APPEAR?

Yes No

022

Go to "MAP 0600: 3.5-Inch Diskette Drive" on page 2-58.

023

- Set the date and time.
- Power off the system unit and wait 10 seconds.
- Power on the system unit.

DID YOU RECEIVE A 163 POST ERROR?

Yes No

024

Check the battery for at least 2.8 V dc.

DOES THE BATTERY HAVE AT LEAST 2.8 V DC?

Yes No

025

Replace the battery.

026

Go to Step 001 on page 2-30.

027

Replace the battery.

Note: After replacing the battery, run the Configuration Utility by selecting **3 (SETUP)** and set the date and time to remove any 16X errors.

If the symptom remains, replace the system board.

028

(From step 008)

DID YOU RECEIVE A 104 ERROR?

Yes No

029

Replace the system board.

Note: After replacing the system board, run the Configuration Utility by selecting **3 (SETUP)** and set the date and time to remove any 16X errors.

030

Replace the battery.

Note: After replacing the battery, run the Configuration Utility by selecting **3 (SETUP)** and set the date and time to remove any 16X errors.

MAP 0200: Memory

Symptom Explanation	Conditions That Could Cause This Symptom
You have entered this MAP because you were unable to complete the POST, the memory or cache size displayed was incorrect, you have an error message indicating a memory failure, the processor speed has slowed, or you were directed here from another MAP.	A SIMM card is failing. The system board is failing. A channel memory card is failing. Memory was removed. Cache memory jumper is positioned incorrectly. Cache memory is failing.

001

(From steps 012 and 015)

- Power off the system unit.
- An expansion box memory failure indicates a failing channel memory card.
- A 230 POST error indicates a channel memory overlapping problem. Remove the channel memory card from the riser card and continue.
- A 225 error indicates a SIMM is not supported by the system board (386SX system boards only).
- 486SX and 486DX (30-pin memory SIMM) system boards:
Verify the SIMMs in each bank are the same value SIMMs. If there are eight SIMMs installed, remove the four cards from bank 1. If you have four SIMMs installed, they should be in bank 0.
- 486SX, 486DX, and 486DX2 (72-pin memory SIMM) system boards:
Any SIMM can be positioned in any location. The SIMM sockets (banks) are numbered 0, 1, 2, and 3 starting from the outer edge of the system board.
- Insert the Advanced Diagnostics diskette into drive A.
- Power on the system unit.

(Step **001** continues)

001 (continued)

- Make a note of any error messages.

DID YOU RECEIVE AN XXXXXX XXXX 201, 203, OR 221 POST ERROR?

Yes No

002

Go to Step 004.

003

Go to Step 024 on page 2-40.

004

(From step 002)

DID YOU RECEIVE ONE LONG BEEP AND ONE SHORT BEEP?

Yes No

005

Go to Step 016 on page 2-39.

006

- Power off the system unit.
- Ensure the memory SIMMs are seated correctly.
- Power on the system unit.

DID THE SYMPTOM CHANGE?

Yes No

007

Go to Step 009 on page 2-38.

008

Go to Step 016 on page 2-39.

009

(Step **009** continues)

MAP 0200 (continued)

009 (continued)
(From step 007)

DOES THE MACHINE HAVE ONLY ONE SIMM INSTALLED?

Yes No

010

- Power off the system unit.
- Swap SIMMs one at a time with a known good SIMM card.
- Power on the system unit.

DID THE SYMPTOM CHANGE?

Yes No

011

Replace the system board.

012

Replace the failing SIMM and return to Step 001 on page 2-36.

013

- Power off the system unit.
- Replace the memory SIMM.
- Power on the system unit.

DID THE SYMPTOM CHANGE?

Yes No

014

Replace the system board.

015

Go to Step 001 on page 2-36.

016

(Step **016** continues)

016 (continued)
(From steps 005 and 008)

DID YOU RECEIVE A 129 ERROR?

Yes **No**

017

Go to Step 019.

018

- Check the cache jumper.
 - Replace one bank of external cache at a time until the symptom goes away. Refer to “486DX 25MHz/486DX2 50MHz or 486DX 33MHz/486DX2 66MHz (72-Pin Memory SIMM) System Board Layout” on page 5-17 for cache locations. If the problem remains, replace the system board.
-

019

(From step 017)

DID YOU RECEIVE A 164 ERROR?

Yes **No**

020

Go to Step 065 on page 2-47.

021

- Press **Enter**.
- Use the “System Board Layout” charts on pages 5-2 through 5-13 and “SIMM Identification” on page 1-20 to determine the amount of system memory (RAM) installed on the system board. 1MB = 1024KB.
- 386SX system board:
If the “Shadow BIOS in RAM” is Yes, the memory size shown will be less than the physical size of the installed memory (soldered and SIMMs) by 128K.
- 486SX and 486DX system boards:
The memory size shown will be less than the system memory (SIMMs) by 384K.

(Step **021** continues)

MAP 0200 (continued)

021 (continued)

- If no memory has been added, refer to Appendix, “Model Configurations and FRU Part Numbers” on page A-1 to determine the factory installed memory. Then turn to “Parts Catalog” on page 7-1 to see details about the size of installed memory.

DOES THE SIZE OF THE MEMORY INSTALLED IN THE MACHINE AT THIS TIME MATCH THE INSTALLED MEMORY IN THE CONFIGURATION UTILITY?

Yes No

022

Go to Step 024.

Note: To determine if the symptom changed, enter **3 (SETUP)** after each action.

023

- Press **Esc**, then press **Enter**.

Go to Step 065 on page 2-47.

024

(From steps 003 and 022)

IS YOUR SYSTEM BOARD A 486SX OR A 486DX (WITH 30-PIN MEMORY SIMMS)?

Yes No

025

IS YOUR SYSTEM BOARD A 486SX, 486DX, OR 486DX2 (WITH 72-PIN MEMORY SIMMS)?

Yes No

026

Go to Step 042 on page 2-43.

027

(Step 027 continues)

027 (continued)

Go to Step 034 on page 2-42.

028

- Power off the system unit.
- Reseat the SIMMs.
- Power on the system unit.

DID YOU RECEIVE AN XXXXXX XXXX 201, 203, OR 221 POST ERROR?

Yes No

029

Go to Step 035 on page 2-42.

030

- Power off the system unit.
- Remove the four SIMMs from bank 0 and install them in bank 1.
- Power on the system unit.

DID YOU RECEIVE AN XXXXXX XXXX 201, 203, OR 221 POST ERROR?

Yes No

031

- Power off the system unit.
- Return the four SIMMs to bank 0.
- Power on the system unit.

DID YOU RECEIVE AN XXXXXX XXXX 201, 203, OR 221 POST ERROR?

Yes No

032

Run the system memory test several times to verify the failure symptom no longer exists.

033

(Step **033** continues)

MAP 0200 (continued)

033 (continued)

Replace the system board and go to Step 035.

034

(From step 027)

- Run the memory test.
 - Replace the SIMMs in the bank (sockets) displayed.
 - If the symptom remains, swap SIMMs one at a time with a known good SIMM card until the symptom goes away. Replace the failing SIMM and return to Step 035.
-

035

(From steps 029, 033, and 034)

DOES YOUR SYSTEM BOARD CONTAIN EIGHT SIMMS?

Yes No

036

Run the system memory test several times to verify the failure symptom no longer exists.

037

(From steps 038 and 041)

- Power off the system unit.
- Remove the four SIMMs from bank 1 and install the four SIMMs you removed at the beginning of this MAP in bank 0.
- Power on the system unit.

DID YOU RECEIVE AN XXXXXX XXXX 201, 203, OR 221 POST ERROR?

Yes No

038

- Power off the system unit.
 - Install the four SIMMs removed in Step 037 in bank 1.
 - Power on the system unit.
- (Step 038 continues)

038 (continued)

- Run the system memory test several times to verify the failure symptom no longer exists.

039

- Power off the system unit.
- Reseat the SIMMs.
- Power on the system unit.

DID YOU RECEIVE AN XXXXXX XXXX 201, 203, OR 221 POST ERROR?

Yes No

040

Run the system memory test several times to verify the failure symptom no longer exists.

041

- Swap SIMMs one at a time with a known good SIMM until the symptom goes away. Replace the failing SIMM and return to this step.
 - Install the four SIMMs removed in Step 037 on page 2-42 in bank 1 and run the system memory test several times to verify the failure symptom no longer exists.
-

042

(From step 026)

DO YOU HAVE SIMMS INSTALLED?

Yes No

043

Replace the system board.

044

- Power off the system unit.
 - Reseat the SIMMs.
- (Step **044** continues)

MAP 0200 (continued)

044 (continued)

- Power on the system unit.

DID YOU RECEIVE AN XXXXXX XXXX 201, 203, OR 221 POST ERROR?

Yes No

045

Run the system memory test several times to verify the failure symptom no longer exists.

046

ARE TWO SIMMS INSTALLED?

Yes No

047

- Power off the system unit.
- Move the SIMM to the other socket.
- Power on the system unit.

DID THE SYMPTOM REMAIN?

Yes No

048

Replace the system board.

049

Replace the failing SIMM. If the symptom remains, replace the system board.

050

(From steps 051, 059, and 062)

- Power off the system unit.
- Remove the SIMM from bank 1.
- Power on the system unit.

(Step 050 continues)

050 (continued)

DID YOU RECEIVE AN XXXXXX XXXX 201, 203, OR 221 POST ERROR?

Yes No

051

- Power off the system unit.
- Remove the SIMM from bank 0 and install the SIMM removed in Step 050 on page 2-44 in bank 0.
- Power on the system unit.

DID YOU RECEIVE AN XXXXXX XXXX 201, 203, OR 221 POST ERROR?

Yes No

052

Run the system memory test several times to verify the failure symptom no longer exists.

053

- Power off the system unit.
- Remove the SIMM from bank 0 and install it in bank 1.
- Power on the system unit.

DID YOU RECEIVE AN XXXXXX XXXX 201, 203, OR 221 POST ERROR?

Yes No

054

- Power off the system unit.
 - Install a known good SIMM in bank 0.
 - Power on the system unit.
- (Step **054** continues)

MAP 0200 (continued)

054 (continued)

DID YOU RECEIVE AN XXXXXX XXXX 201, 203, OR 221 POST ERROR?

Yes No

055

Run the system memory test several times to verify the failure symptom no longer exists.

056

Replace the failing SIMM.

057

Replace the failing SIMM.

058

- Power off the system unit.
- Remove the SIMM from bank 0 and install it in bank 1.
- Power on the system unit.

DID YOU RECEIVE AN XXXXXX XXXX 201, 203, OR 221 POST ERROR?

Yes No

059

- Power off the system unit.
- Remove the SIMM from bank 1 and install the SIMM removed in Step 050 on page 2-44 in bank 0.
- Power on the system unit.

DID YOU RECEIVE AN XXXXXX XXXX 201, 203, OR 221 POST ERROR?

Yes No

060

(Step **060** continues)

060 (continued)

Your system memory is now functioning correctly. If you suspect an intermittent problem, start an error log. If you need instructions, refer to "Error Log" on page 3-9.

061

- Replace the system board.
-

062

Replace the failing SIMM and return to this step.

- Power off the system unit.
- Remove the SIMM from bank 1 and install the SIMM removed in Step 050 on page 2-44 in bank 0.
- Power on the system unit.

DID YOU RECEIVE AN XXXXXX XXXX 201, 203, OR 221 POST ERROR?

Yes No

063

Install both SIMMs and run the system memory test several times to verify the failure symptom no longer exists.

064

Replace the failing SIMM.

065

(From steps 020 and 023)

DID THE ADVANCED DIAGNOSTICS MENU APPEAR?

Yes No

066

Go to "MAP 0020: Power" on page 2-20.

067

(Step **067** continues)

MAP 0200 (continued)

067 (continued)

- Press **0** (**SYSTEM CHECKOUT**), then press **Enter**.
- Press **Y** when the Installed Devices menu appears.
- Use the **RUN TESTS ONE TIME** option.
- Follow the screen instructions to run the Memory tests.

DID YOU RECEIVE AN ERROR?

Yes No

068

IS YOUR SYSTEM BOARD A 486SX OR A 486DX (WITH 30-PIN MEMORY SIMMS)?

Yes No

069

Your system memory is now functioning correctly. If you suspect an intermittent problem, start an error log. If you need instructions, refer to "Error Log" on page 3-9.

070

DID YOUR SYSTEM BOARD CONTAIN EIGHT SIMMS?

Yes No

071

Your system memory is now functioning correctly. If you suspect an intermittent problem, start an error log. If you need instructions, refer to "Error Log" on page 3-9.

072

- Power off the system unit.
 - Remove the four SIMMs installed in bank 0 and install the four SIMMs you removed at the beginning of this map in bank 0.
 - Power on the system unit.
- (Step **072** continues)

072 (continued)

DID YOU RECEIVE AN XXXXXX XXXX 201, 203, OR 221 POST ERROR?

Yes No

073

Your system memory is now functioning correctly. If you suspect an intermittent problem, start an error log. If you need instructions, refer to "Error Log" on page 3-9.

074

Swap SIMMs one at a time with a known good SIMM until the symptom goes away. Replace the failing SIMM.

075

DID YOU RECEIVE A 209 ERROR?

Yes No

076

– Go to Step 078.

077

- Remove and replace system board cache by bank until the error goes away. Refer to "486SX 33MHz (72-Pin Memory SIMM) System Board Layout" on page 5-15 through "486DX 25MHz/486DX2 50MHz or 486DX 33MHz/486DX2 66MHz (72-Pin Memory SIMM) System Board Layout" on page 5-17.
 - If the error remains, replace the system board.
-

078

(From step 076)
(Step **078** continues)

MAP 0200 (continued)

078 (continued)

IS YOUR SYSTEM BOARD A 486SX OR A 486DX (WITH 30-PIN MEMORY SIMMS)?

Yes No

079

IS YOUR SYSTEM BOARD A 486SX, 486DX, OR 486DX2 (WITH 72-PIN MEMORY SIMMS)?

Yes No

080

You should have a 386SX 25MHz.

The error message displayed indicates the failing SIMM by position. Refer to "386SX 25MHz (72-Pin Memory SIMM) System Board Layout" on page 5-3 and "386SX 25MHz (72-Pin Memory SIMM) System Board Layout" on page 5-5.

- Make a note of the error.
- Power off the system unit.
- If there are two SIMMs installed, swap the SIMMs. If there is one SIMM installed, move it to the other socket.
- Power on the system unit.
- If you get a POST error, press **Esc**.
- Run the memory test.

DID YOU RECEIVE AN ERROR?

Yes No

081

Run the system memory test several times to verify the failure symptom no longer exists.

Note: You may have a failing system board SIMM socket. Test this by returning the SIMMs to the original sockets and running the memory test. If the symptom returns, you have a failing system board.

082

Replace the SIMM indicated by the error.

Note: SIMM bank 0 is connector J2 and SIMM bank 1 is connector J1.

If the symptom remains, replace the system board.

083

– Go to Step 095 on page 2-53.

084

The error message displayed indicates the failing SIMM by position. Refer to the “System Board Layout” charts on pages 5-2 through 5-13 and “SIMM Identification” on page 1-20.

- Make a note of the error.
- Power off the system unit.
- Move the four SIMMs to bank 1.
- Power on the system unit.
- If you get a POST error, press **Esc**.
- Run the memory test.

DID YOU RECEIVE AN ERROR?

Yes No

085

DID YOUR SYSTEM BOARD CONTAIN EIGHT SIMMS?

Yes No

086

Run the system memory test several times to verify the failure symptom no longer exists.

Note: You may have a failing system board SIMM socket. Test this by returning the SIMMs to the original sockets and running the memory test. If the symptom returns,

MAP 0200 (continued)

you have a failing system board.

087

Go to Step 090.

088

Replace the failing SIMM and return to this step.

DID YOUR SYSTEM BOARD CONTAIN EIGHT SIMMS?

Yes No

089

Run the system memory test several times to verify the failure symptom no longer exists.

Note: You may have a failing system board SIMM socket. Test this by returning the SIMMs to the original sockets and running the memory test. If the symptom returns, you have a failing system board.

090

(From step 087)

- Power off the system unit.
- Remove the four SIMMs installed in bank 1 and install the four SIMM cards you removed at the beginning of this MAP in bank 0.
- Power on the system unit.
- Run the memory test.

DID YOU RECEIVE AN ERROR?

Yes No

091

Your system memory is now functioning correctly. If you suspect an intermittent problem, start an error log. If you need instructions, refer to "Error Log" on page 3-9.

092

(Step 092 continues)

092 (continued)

- The error message displayed indicates the failing SIMM by position. Refer to “486SX 20MHz/486SX 25MHz Level 1 (30-Pin Memory SIMM) System Board Layout” on page 5-9.
- Make a note of the error.
- Power off the system unit.
- Move the four SIMMs to bank 1.
- Power on the system unit.
- If you get a POST error, press **Esc**.
- Run the memory test.

DID YOU RECEIVE AN ERROR?

Yes No

093

Replace the failing system board.

094

Replace the failing SIMM.

095

(From step 083)

- Power off the system unit.
- Replace each memory SIMM one at a time with a known good memory SIMM of equivalent value.
- Power on the system unit.
- If the symptom goes away, the last memory SIMM replaced is defective. If all memory SIMMs have been replaced and the problem remains, replace the system board.

Note: Since the 486SX, 486DX, and 486DX2 (72-pin memory SIMM) system boards have no soldered memory, you must have at least one memory SIMM installed for the system to operate.

MAP 0300: Keyboard

Symptom Explanation	Conditions That Could Cause This Symptom
You have entered this MAP because you received a 3XX error code, you have been directed here from another MAP, or you suspect a keyboard problem.	The keyboard is failing. The system board is failing. The mouse is failing.

001

A failing mouse can show up as a keyboard failure.

- Power off the system unit.
- Disconnect the mouse from the system unit.
- Power on the system unit.

DID THE SYMPTOM REMAIN?

Yes No

002

Replace the failing mouse.

003

- Power off the system unit and wait 10 seconds.
 - Reinstall the mouse.
 - Ensure the keyboard cable is fully inserted into the system unit.
 - Remove any foreign objects that may interfere with the mechanical operation of the keybuttons.
 - Power on the system unit.
- (Step **003** continues)

003 (continued)

DID YOU RECEIVE A 3XX POST ERROR?

Yes No

004

Go to Step 008 on page 2-56.

005

(From steps 008, 010, and 013)

- Power off the system unit and wait 10 seconds.
- Disconnect the keyboard cable from the system unit.
- Power on the system unit.
- Check the voltage at the keyboard cable connector on the system board, shown in Figure 2-5, after the POST.

Note: Measure voltages with respect to Ground (Pin 3).

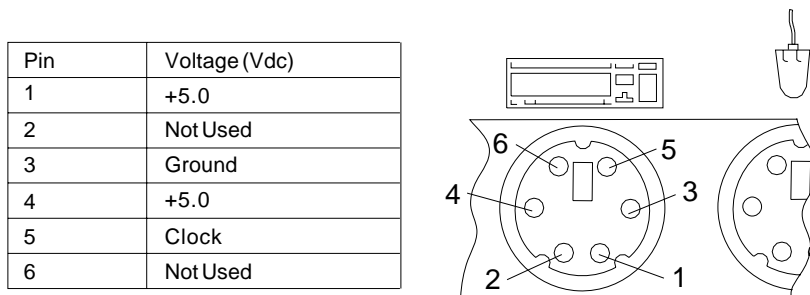


Figure 2-5. Keyboard Connector Voltage Check

ARE THE VOLTAGES CORRECT?

Yes No

006

Replace the system board.

007

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

MAP 0300 (continued)

008

(From step 004)

- Make a note of any error messages, then press **Esc**.
- Follow the screen instructions to run the keyboard tests. Use the **RUN TESTS ONE TIME** option.

Note: If you are unable to follow the instructions on the screen because of incorrect keyboard responses, go to Step 005 on page 2-55.

DID YOU RECEIVE A 3XX ERROR?

Yes No

009

Go to Step 011.

010

Go to Step 005 on page 2-55.

011

(From step 009)

DID YOU NOTICE ANY FAILURE SYMPTOMS?

Yes No

012

The Advanced Diagnostics tests have finished without detecting a failure. If you suspect an intermittent problem, start an error log. If you need instructions, refer to "Error Log" on page 3-9.

013

Go to Step 005 on page 2-55.

MAP 0600: 3.5-Inch Diskette Drive

Symptom Explanation	Conditions That Could Cause This Symptom
You have entered this MAP because you received a 6XX error code, or you have been directed here from another MAP.	The diskette drive is failing. The diskette drive signal cable is failing. The power supply is failing. The system board is failing.

Within this MAP, the term *scratch diskette* refers to a blank, formatted diskette that is not write-protected.

Note: If you have an 5.25-inch diskette drive option, disconnect it by disconnecting both power and signal cables. If the symptom goes away, go to "MAP 0625: 5.25-Inch Diskette Drive" on page 2-66.

001

(From step 030)

- Power off the system unit and wait 10 seconds.
- Insert the Advanced Diagnostics diskette into drive A.
- Power on the system unit.

DID YOU RECEIVE A 601 ERROR DURING THE POST?

Yes No

002

Go to Step 008 on page 2-59.

003

- Press **Esc**.
- (Step **003** continues)

003 (continued)

IS THE ADVANCED DIAGNOSTIC MENU DISPLAYED?

Yes No

004

Go to Step 008.

005

- Press **3 (SETUP)**, then press **Enter**.
- After the Configuration Utility menu is displayed, press **Esc**, then **Enter** to save the changes.
- Power off the system unit and wait 10 seconds.
- Power on the system unit.

DID YOU RECEIVE A 6XX ERROR DURING THE POST?

Yes No

006

Go to Step 020 on page 2-61.

007

Go to Step 024 on page 2-62.

008

(From steps 002 and 004)

DID THE LED ON THE 3.5-INCH DISKETTE DRIVE LIGHT BEFORE THE BEEP AT THE END OF THE POST?

Yes No

009

Replace the 3.5-inch diskette drive.

010

(Step 010 continues)

MAP 0600 (continued)

010 (continued)

IS THE LED ON THE 3.5-INCH DISKETTE DRIVE CONSTANTLY LIT?

Yes No

011

Go to Step 013.

012

Replace the 3.5-inch diskette drive. If the symptom remains, replace the system board.

013

(From step 011)

Make a note of any error messages, then press **Esc**.

IS THE ADVANCED DIAGNOSTICS MENU DISPLAYED?

Yes No

014

Go to Step 016.

015

Go to Step 020 on page 2-61.

016

(From step 014)

Try using your backup copy of the Advanced Diagnostics diskette.

IS THE ADVANCED DIAGNOSTICS MENU DISPLAYED?

Yes No

017

(Step 017 continues)

017 (continued)

DOES THE SYSTEM FUNCTION NORMALLY EXCEPT FOR THE 3.5-IN DISKETTE?

Yes No

018

Go to Step 038 on page 2-64.

019

Go to Step 034 on page 2-63.

020

(From steps 006 and 015)

- Press **0 (SYSTEM CHECKOUT)**, then press **Enter**.
- When the Installed Devices list appears, press **Y**, then press **Enter**. Regardless of the number of diskette drives shown, you must answer **Yes** to the Installed Devices list to continue testing.
- Press **0 (RUN TESTS ONE TIME)**, then press **Enter**.
- Press **6 (DISKETTE DRIVE)**, then press **Enter**.

Note: Do not run the individual tests until instructed to do so by this MAP.

DID THE DISKETTE DIAGNOSTIC MENU APPEAR WITHOUT AN ERROR?

Yes No

021

Go to Step 024 on page 2-62.

022

- Run all tests.
(Step **022** continues)

MAP 0600 (continued)

022 (continued)

DID YOU RECEIVE A 6XX ERROR?

Yes No

023

You have successfully completed the Advanced Diagnostics tests. If you suspect a problem with the 5.25-inch diskette drive, go to "MAP 0625: 5.25-Inch Diskette Drive" on page 2-66.

024

(From steps 007 and 021)

IS THE ERROR CODE 613 OR 630?

Yes No

025

Go to Step 027.

026

Replace the system board.

027

(From step 025)

IS THE ERROR CODE 608 or 614?

Yes No

028

Go to Step 031 on page 2-63.

029

A 608 or 614 error code indicates that your scratch diskette may be defective.

– Repeat the Advanced Diagnostics tests using a different scratch diskette.
(Step 029 continues)

029 (continued)

DID YOU RECEIVE A 6XX ERROR?

Yes No

030

Your first diskette was defective. Return to Step 001 on page 2-58 to verify system operation.

031

(From step 028)

IS THE ERROR CODE 603?

Yes No

032

Go to Step 034.

033

Replace the system board. If the symptom remains, replace the 3.5-inch diskette drive.

034

(From steps 019 and 032)

- Power off the system unit.
- Disconnect the power cable from the 3.5-inch diskette drive.
- Power on the system unit.
- Check the voltages at the diskette drive end of the power cable.
- Pin 1 to frame ground +5 V dc.
- Pin 4 to frame ground +12 V dc.

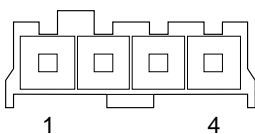


Figure 2-6. Diskette Drive End of Power Cable

MAP 0600 (continued)

ARE THE VOLTAGES CORRECT?

Yes No

035

Replace the power supply.

036

- Power off the system unit.
- Check all lines of the diskette drive signal cable for continuity.

DO ALL LINES HAVE CONTINUITY?

Yes No

037

Replace the diskette drive signal cable.

038

(From step 018)

IS YOUR SYSTEM BOARD A 486SX OR 486DX (30-PIN MEMORY SIMMS)?

Yes No

039

Go to Step 042 on page 2-65.

040

You may have a failing SIMM.

Perform the following steps to check each of the SIMMs. You may have to perform these steps several times.

- Power off the system unit.
- Replace one of the SIMMs with a known good SIMM.
- Power on the system unit.

(Step 040 continues)

040 (continued)

DID THE SYMPTOM REMAIN?

Yes **No**

041

Replace the failing SIMM.

042

(From step 039)

Replace the 3.5-inch diskette drive. If the symptom remains, replace the system board.

MAP 0625: 5.25-Inch Diskette Drive

Symptom Explanation	Conditions That Could Cause This Symptom
You have entered this MAP because you received a 6XX error code, or you have been directed here from another MAP.	The 5.25-inch diskette drive is failing. The diskette drive signal cable is failing. The system board is failing. The power supply is failing.

Ensure the 5.25-inch power and signal cables are connected to the 5.25-inch drive.

001

IS THE 5.25-INCH DISKETTE DRIVE THE ONLY DRIVE FAILING?

Yes No

002

Go to "MAP 0600: 3.5-Inch Diskette Drive" on page 2-58.

003

- Power off the system unit.
- Install the Advanced Diagnostics diskette in drive A.
- Power on the system unit.

DID THE LED ON THE 5.25-INCH DISKETTE DRIVE COME ON BEFORE THE BEEP AT THE END OF POST?

Yes No

004

Go to Step 012 on page 2-68.

005

(Step **005** continues)

005 (continued)

Make a note of any error messages, then press **Esc**.

DID THE ADVANCED DIAGNOSTICS MENU APPEAR?

Yes No

006

Go to "MAP 0600: 3.5-Inch Diskette Drive" on page 2-58.

007

- Press **0 (SYSTEM CHECKOUT)**, then press **Enter**.
- When the Installed Devices list appears, press **Y**; then press **Enter**.
Regardless of the number of diskette drives shown, you must answer **Yes** to the Installed Devices list to continue testing.
- Press **0 (RUN TESTS ONE TIME)**, then press **Enter**.
- Press **6 (X DISKETTE DRIVE(S))**, then press **Enter**.

Note: Do not run the individual tests until instructed to do so by this MAP.

DID THE DISKETTE DIAGNOSTIC MENU APPEAR WITHOUT AN ERROR?

Yes No

008

Go to "MAP 0600: 3.5-Inch Diskette Drive" on page 2-58.

009

Run the individual tests on the 5.25-inch diskette drive.

Note: You need a scratch diskette to run these tests.

DID THE TESTS RUN WITHOUT AN ERROR?

Yes No

010

Go to Step 012 on page 2-68.

011

(Step 011 continues)

MAP 0625 (continued)

011 (continued)

You have successfully completed the Advanced Diagnostics test.

- If you suspect an intermittent problem, you may start an error log.
 - If you need instructions to start an error log, refer to “Error Log” on page 3-9.
-

012

(From steps 004 and 010)

- Power off the system unit and wait 10 seconds.
- Disconnect the power cable from the 5.25-inch diskette drive.
- Power on the system unit.
- Check the voltages at the diskette-drive end of the power cable.
- Pin 1 to frame ground +12 V dc.
- Pin 4 to frame ground +5 V dc.

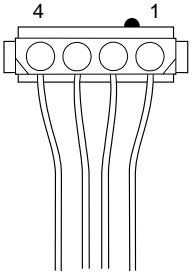


Figure 2-7. 5.25-Inch Diskette Power Cable

ARE THE VOLTAGES CORRECT?

Yes No

013

Replace the power supply.

014

(Step 014 continues)

014 (continued)

Check the continuity of the 5.25-inch diskette signal cable.

IS THERE CONTINUITY?

Yes No

015

Replace the cable.

016

Replace the 5.25-inch diskette drive. If the symptom remains, replace the system board.

MAP 0700: Math Coprocessor

Symptom Explanation	Conditions That Could Cause This Symptom
You have entered this MAP because you received a 7XX error code, you suspect a math coprocessor problem, or you have been directed here from another MAP.	The math coprocessor is failing. The system board is failing.

001

IS THERE A MATH COPROCESSOR INSTALLED?

Note: If you have a 486DX or 486DX2 system board installed, answer this question **Yes**.

Yes **No**

002

You have successfully completed the Advanced Diagnostic tests. If you suspect an intermittent problem, start an error log. If you need instructions, refer to "Error Log" on page 3-9.

003

- Power off the system unit.
- Install the Advanced Diagnostics diskette in drive A.
- Power on the system unit.
- Go to the Installed Devices menu.

IS MATH COPROCESSOR LISTED ON THE INSTALLED DEVICES MENU?

Yes **No**

004

(Step **004** continues)

004 (continued)

Go to Step 007.

005

- Run the Math Coprocessor test. Use the **RUN TESTS ONE TIME** option.
- Follow the instructions on the screen.

DID YOU RECEIVE A 7XX ERROR?

Yes No

006

You have successfully completed the Advanced Diagnostic tests. If you suspect an intermittent problem, start an error log. If you need instructions, refer to “Error Log” on page 3-9.

007

(From step 004)

- 386 SX and 486SX system boards:
Replace the math coprocessor.
 - 486DX or 486DX2 system board:
Replace the system board.
-

MAP 0900: Parallel Port

Symptom Explanation	Conditions That Could Cause This Symptom
You have entered this MAP because you received a 9XX error code, you suspect a parallel port problem, or you have been directed here from another MAP.	The system board is failing. The communications cable is failing. The setup is incorrect.

001

- Power off the system unit.
- Remove all adapter cards from the riser card.
- Insert the Advanced Diagnostics diskette into drive A.
- While holding down both mouse buttons, power on the system unit. This automatically sets the parallel port configuration correctly.
- Run the Parallel Port tests. Use the **RUN TESTS ONE TIME** option.
- Follow the instructions on the screen.

Note: When instructed to install the wrap plug, use IBM P/N 72X8546.

DID YOU RECEIVE AN ERROR MESSAGE?

Yes No

002

You have successfully completed the Advanced Diagnostics tests. If you suspect an intermittent problem, start an error log. If you need instructions, refer to "Error Log" on page 3-9.

003

Replace the system board.

MAP 1100: System Board Serial Port

Symptom Explanation	Conditions That Could Cause This Symptom
You have entered this MAP because you received an 11XX error code or you have been directed here from another MAP.	The system board is failing. The communications cable is failing. The setup is incorrect.

001

- Power off the system unit.
- Remove all adapter cards from the riser card.
- Disconnect all external cables and devices from the system unit, except for the keyboard, mouse, and display.
- Insert the Advanced Diagnostics diskette in drive A.
- While holding down both mouse buttons, power on the system unit. This automatically sets the serial port configuration correctly.
- Run the System Board Serial Port tests. Use the **RUN TESTS ONE TIME** option.
- Follow the instructions on the screen.
- 486SX, 486DX, and 486DX2 system boards: test each serial port one at a time.

DID YOU RECEIVE AN ERROR MESSAGE?

Yes No

002

You have successfully completed the Advanced Diagnostic tests. If you suspect an intermittent problem, start an error log. If you need instructions, refer to "Error Log" on page 3-9.

003

(Step **003** continues)

MAP 1100 (continued)

003 (continued)

Replace the system board.

MAP 1200: Serial Port Adapter

Symptom Explanation	Conditions That Could Cause This Symptom
You have entered this MAP because you received a 12XX error code or you have been directed here from another MAP.	The serial port adapter card is failing. The riser card is failing. The system board is failing. The setup is incorrect.

001

(From step 002)

- Power off the system unit.
- Remove all adapter cards from the riser card except for one serial port adapter card.
- Disconnect all external cables and devices from the system unit, except for the keyboard, mouse, and display.
- Insert the Advanced Diagnostics diskette in drive A.
- While holding down both mouse buttons, power on the system unit. This automatically sets the serial port configuration correctly.
- Run the Serial Port Adapter tests. Use the **RUN TESTS ONE TIME** option.
- Follow the instructions on the screen.

DID YOU RECEIVE AN ERROR MESSAGE?

Yes No

002

You have successfully completed the Advanced Diagnostic tests. If you suspect an intermittent problem, start an error log. If you need instructions, refer to “Error Log” on page 3-9.

If you have a second serial port adapter card in the system unit, return to Step 001 and test the second card.

003

MAP 1200 (continued)

- Power off the system unit.
- Move the card to a different slot in the riser card.
- Power on the system unit.
- Run the Serial Port Adapter tests.

DID THE SYMPTOM REMAIN?

Yes No

004

Replace the riser card.

005

- Power off the system unit.
- Disconnect the riser card from the system unit.
- Power on the system unit.

DOES THE SYSTEM UNIT WORK ALL RIGHT BY ITSELF?

Yes No

006

Go to “MAP 0010: Start” on page 2-3.

007

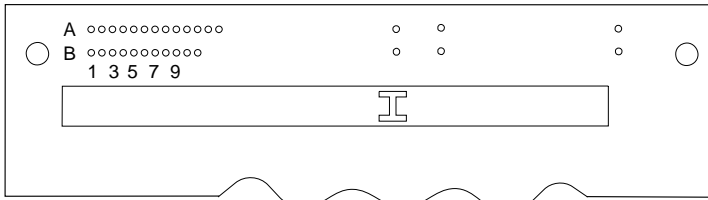
- Power off the system unit.
- Reconnect the riser card.
- Remove the serial port adapter card from the riser card.
- Power on the system unit.
- Check the voltages at pins B3, B5, B7, and B9 on the top of the of the riser card.

B3 = +5 V dc

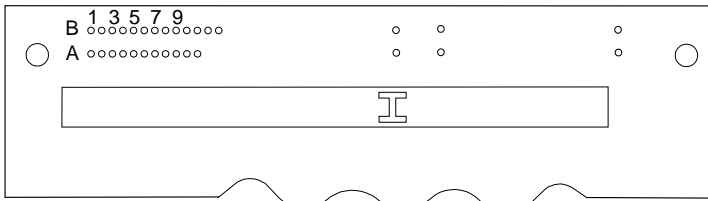
B5 = -5 V dc

B7 = -12 V dc

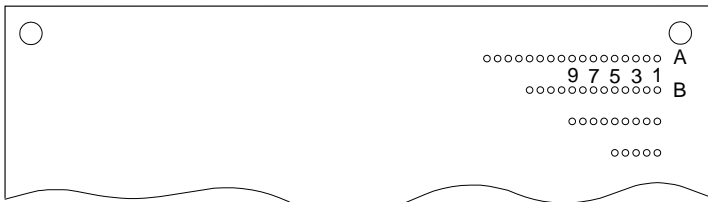
B9 = +12 V dc



(Left View)
8 Slot Riser Card



(Left View)
5 Slot Riser Card



(Right View)
3 Slot Riser Card

Figure 2-8. Riser Cards

ARE THE VOLTAGES CORRECT?

Yes No

008

Replace the riser card. If the symptom remains, replace the system board.

MAP 1200 (continued)

009

Replace the serial port adapter card.

MAP 1700: Hard Disk Drive

Symptom Explanation	Conditions That Could Cause This Symptom
You have entered this MAP because you received a 17XX error message, or you suspect a problem with the hard disk drive.	<ul style="list-style-type: none">The hard disk drive is failing.The hard disk drive signal cable is failing.The hard disk drive jumper is in the wrong position.The system board is failing.The power supply is failing.The hard disk drive LED is failing.

Warning: Shipping and handling can result in permanent loss of all data and formatting of the hard disk. In the event system software is not present or has been removed from the hard disk, you must reinstall it. Refer to “Software Installation Procedure” on page 4-48.

Hard Disk Drive Jumpers

The hard disk drives have jumper(s) that determine if the drive is the primary (master) or secondary (slave) drive. If one hard disk drive is installed, it must be set as the primary. If two hard disk drives are installed, one must be set as the primary and one as the secondary drive. See “Hard Disk Drive Jumper Settings” on page 4-2 and ensure the jumpers are in the correct positions.

001

- Power off the system unit and wait 10 seconds.
 - Ensure that all hard disk drive cables are properly connected.
 - Remove any external devices except for the keyboard and mouse.
 - Remove any adapter cards.
 - Insert the Advanced Diagnostics diskette into drive A.
 - Power on the system unit.
- (Step **001** continues)

MAP 1700 (continued)

001 (continued)

– Make a note of any error messages, if present, then press **Esc**.

DID THE ADVANCED DIAGNOSTICS MENU APPEAR?

Yes No

002

Go to Step 004.

003

Go to Step 009.

004

(From step 002)

DID YOU RECEIVE A 17XX POST ERROR CODE?

Yes No

005

Go to Step 016 on page 2-82.

006

DID YOU RECEIVE A 1790 OR 1791 POST ERROR CODE?

Yes No

007

Go to Step 018 on page 2-82.

008

Press the **Esc** key and continue with Step 009.

009

(From steps 003 and 008)

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

(Step **009** continues)

009 (continued)

DOES THE INSTALLED DEVICES MENU SHOW ANY HARD DISK DRIVES INSTALLED?

Yes No

010

Go to Step 012.

011

– Press **Y**, then press **Enter**.

Go to Step 014.

012

(From step 010)

– Press **N**, then press **Enter**.

Follow the screen instructions and attempt to correct the Installed Devices list.

Note: A 199 error indicates you answered **No** to the question about the Installed Devices list. Disregard the error.

COULD YOU CORRECT THE INSTALLED DEVICES LIST?

Yes No

013

– Press **Y**, then press **Enter**.

Go to Step 014.

014

(From steps 011 and 013)

Follow the instructions on the screen and run the Hard Disk Drive tests. Use the **RUN TESTS ONE TIME** option.

(Step **014** continues)

MAP 1700 (continued)

014 (continued)

DID THE HARD DISK DIAGNOSTIC MENU APPEAR?

Yes No

015

Go to Step 018.

016

(From step 005)

- Run all hard disk drive tests.
- Make a note of any error message displayed.

DID YOU RECEIVE A 17XX ERROR CODE?

Yes No

017

Go to Step 019.

018

(From steps 007, 015, and 021)

Find the error code in Figure 2-9 and go to the step indicated.

Error Code	Go to
1701, 1702, 1704, 1710, 1714, 1720, 1780, 1781, 1782	Step 022 on page 2-83
1703, 1705, 1706, 1707, 1708, 1709, 1711, 1712, 1713	Step 037 on page 2-86

Figure 2-9. Error Code Information

019

(From step 017)

- The Hard Disk Drive tests have finished without an error.
- Run the Hard Disk Drive tests again. Use the **RUN TEST ONE TIME** option.

(Step 019 continues)

019 (continued)

- Select test **5**.

DID YOU RECEIVE A 17XX ERROR CODE?

Yes **No**

020

Go to Step 049 on page 2-88.

021

Go to Step 018 on page 2-82.

022

(From step 018)

Error codes: 1701, 1702, 1704, 1710, 1714, 1720, 1780, 1781, or 1782.

- Check that all electrical connections are secure by disconnecting and then reconnecting them.
- Repeat the operation or diagnostic test that failed.

DID THE SYMPTOM REMAIN?

Yes **No**

023

Go to Step 054 on page 2-89.

024

(From MAP 2400 step 050 on page 2-106)

(From MAP 2400 step 103 on page 2-116)

IS THERE A SECOND HARD DISK DRIVE INSTALLED?

Yes **No**

025

Go to Step 063 on page 2-91.

026

(Step **026** continues)

MAP 1700 (continued)

026 (continued)

- Power off the system unit.
- Disconnect the power and signal cable at the second hard disk drive.
- Power on the system unit.
- Run the Hard Disk Drive tests.

DID THE SYMPTOM REMAIN?

Yes No

027

- Power off the system unit.
- Check all lines of the hard disk drive signal cable for continuity.

DO ALL LINES HAVE CONTINUITY?

Yes No

028

Replace the failing cable.

029

Check the jumper position on the secondary hard disk drive. If correct, replace the secondary hard disk drive. If the symptom remains, replace the system board.

030

- Power off the system unit.
- Disconnect the power cable from the primary hard disk drive.
- Power on the system unit.
- Check the voltages on the power cable at the connector to the primary hard disk drive.
- Pin 1 to frame ground +12 V dc.
- Pin 4 to frame ground +5 V dc.

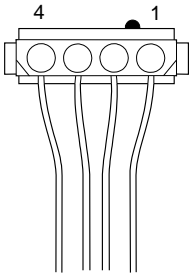


Figure 2-10. Hard Disk Drive Power Cable

ARE THE VOLTAGES CORRECT?

Yes No

031

Replace the power supply.

032

- Power off the system unit.
- Check all lines of the hard disk drive signal cable for continuity.

DO ALL LINES HAVE CONTINUITY?

Yes No

033

Replace the failing cable. If the symptom remains, replace the system board.

034

Swap hard disk drives using the following procedures:

- Refer to "Hard Disk Drive Jumper Settings" on page 4-2 to change the secondary drive to the primary drive.
 - Reconnect the hard disk drives to the system unit.
 - Power on the system unit.
- (Step 034 continues)

MAP 1700 (continued)

034 (continued)

DOES THE SYMPTOM REMAIN?

Yes No

035

Replace the original hard disk drive.

036

Replace the system board.

037

(From step 018)

Error Codes: 1703, 1705, 1706, 1707, 1708, 1709, 1711, 1712, or 1713.

- Check that all electrical connections are secure by disconnecting and then reconnecting them.
- Repeat the operation or diagnostic test that failed.

DID THE SYMPTOM REMAIN?

Yes No

038

Go to Step 054 on page 2-89.

039

- Power off the system unit.
- Check all lines of the hard disk drive signal cable for continuity.

DO ALL LINES HAVE CONTINUITY?

Yes No

040

Replace the failing cable.

041

(Step 041 continues)

041 (continued)

- Power off the system unit and wait 10 seconds.
- Insert the Advanced Diagnostics diskette into drive A.
- Power on the system unit.

Warning: Formatting results in a complete loss of data on the hard disk, including system software. If you are directed to (or choose to) format the hard disk, you should:

1. Prior to formatting, have the customer back up all information, if possible.
 2. Prior to returning the system to the customer, reinstall the system software on the hard disk. Refer to “Software Installation Procedure” on page 4-48.
- Format the failing hard disk drive. Use the **CONDITIONAL FORMAT** option. Formatting may take up to 60 minutes.

DID THE DRIVE FORMAT SUCCESSFULLY?

Yes No

042

- Replace the hard disk drive, then go to Step 046 on page 2-88.

043

- Run the hard disk drive tests on the drive you just formatted. Use the **RUN TESTS MULTIPLE TIMES** option.

DID THE DIAGNOSTIC TESTS RUN WITHOUT AN ERROR?

Yes No

044

- Replace the hard disk drive, then go to Step 046 on page 2-88.

045

The hard disk can now be prepared to accept data.

Note: The Advanced Diagnostics Format program is different from the operating system format program. Before the customer can transfer information from the backup diskettes, the hard disk must be formatted using the operating system diskette.

MAP 1700 (continued)

Refer to "Software Installation Procedure" on page 4-48 and install the correct software on the hard disk.

046

(From steps 042 and 044)

– Repeat the operation or diagnostic test that failed.

DID THE SYMPTOM REMAIN?

Yes No

047

You have successfully completed the Advanced Diagnostics tests. If you suspect an intermittent problem, start an error log. If you need instructions, refer to "Error Log" on page 3-9.

Note: The hard disk can now be prepared to accept data. The Advanced Diagnostics Format program is different from the operating system format program. Before the customer can transfer information from the backup diskettes, the hard disk must be formatted using the operating system diskette.

048

Replace the system board.

Note: The hard disk can now be prepared to accept data. The Advanced Diagnostics Format program is different from the operating system format program. Before the customer can transfer information from the backup diskettes, the hard disk must be formatted using the operating system diskette.

049

(From step 020)

IS THE PROBLEM THAT THE REMOTE LED FOR THE HARD DISK DRIVE DOES NOT LIGHT?

Yes No

050

(Step **050** continues)

050 (continued)

Go to Step 054.

051

- Power off the system unit and wait 10 seconds.
- Unplug the remote LED connector from the system board.
- Power on the system unit with the Advanced Diagnostics diskette in drive A.
- Select the Hard Disk Drive test.
- 386SX (72-pin memory SIMM) system boards:
While running the Seek test, check for +5 V dc between J13 pin 4 on the system board and frame ground.
- 486SX and 486DX (30-pin memory SIMM) system boards:
While running the Seek test, check for + 5 V dc between J11 pin 5 on the system board and frame ground.
- 486SX, 486DX, or 486DX2 (72-pin memory SIMM) system boards:
While running the Seek test, check for 0 V dc when the drive is running and +5 V dc when it is idle (not running).

IS THE VOLTAGE READING CORRECT?

Yes No

052

Replace the system board.

053

Replace the LED cable.

054

(From steps 023, 038, and 050)

(Step **054** continues)

MAP 1700 (continued)

054 (continued)

IS THERE A SECOND HARD DISK DRIVE INSTALLED?

Yes No

055

Go to Step 062 on page 2-91.

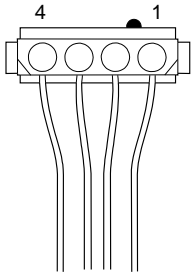
056

WERE YOU ABLE TO RUN THE ADVANCED DIAGNOSTIC TESTS ON BOTH OF THE HARD DISK DRIVES?

Yes No

057

- Power off the system unit.
- Disconnect the power cable from the second hard disk drive.
- Power on the system unit.
- Check the voltages at the hard disk drive end of the power cable.
- Pin 1 to frame ground +12 V dc.
- Pin 4 to frame ground +5 V dc.



Hard Disk Power Cable

(Step 057 continues)

057 (continued)

ARE THE VOLTAGES CORRECT?

Yes **No**

058

Replace the power supply.

059

- Power off the system unit.
- Check all lines of the hard disk drive signal cable for continuity.

DO ALL LINES HAVE CONTINUITY?

Yes **No**

060

Replace the failing signal cable.

061

Check the jumper position on the secondary hard disk drive. If correct, replace the failing secondary hard disk drive.

062

(From step 055)

The Advanced Diagnostic tests have finished without detecting a failure. If you suspect an intermittent problem, start an error log. If you need instructions, refer to "Error Log" on page 3-9.

063

(From step 025)

- Power off the system unit and wait 10 seconds.
- Disconnect the power cable from the hard disk drive.
- Power on the system unit.
- Check the voltages at the hard disk drive end of the power cable.

(Step **063** continues)

MAP 1700 (continued)

063 (continued)

- Pin 1 to frame ground +12 V dc.
- Pin 4 to frame ground +5 V dc.

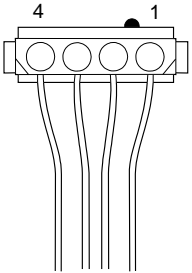


Figure 2-11. Hard Disk Drive Power Cable

ARE THE VOLTAGES CORRECT?

Yes No

064

Replace the power supply.

065

- Power off the system unit.
- Check all lines of the hard disk drive signal cable for continuity.

DO ALL LINES HAVE CONTINUITY?

Yes No

066

Replace the failing signal cable.

067

Replace the hard disk drive. If the symptom remains, replace the system board.

MAP 2000: Riser Card

Symptom Explanation	Conditions That Could Cause This Symptom
You have entered this MAP because you were directed here from another MAP, or you suspect a problem in the riser card.	The riser card is failing. The system board is failing. An adapter card is failing.

001

- Power off the system unit.
- Disconnect the riser card from the system unit.
- Power on the system unit.

DOES THE SYSTEM UNIT WORK ALRIGHT BY ITSELF?

Yes No

002

Go to "MAP 0010: Start" on page 2-3.

003

- Power off the system unit.
- Reconnect the riser card.
- Remove all adapter cards from the riser card.
- Power on the system unit.
- Check the voltages at pins B3, B5, B7, and B9 on the top of the of the riser card.

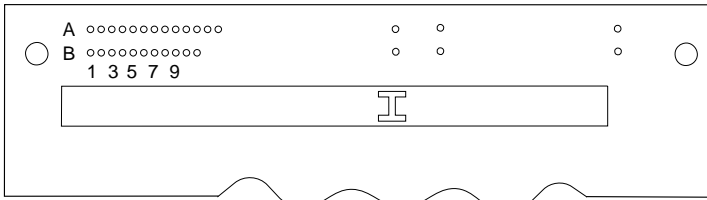
B3 = +5 V dc

B5 = -5 V dc

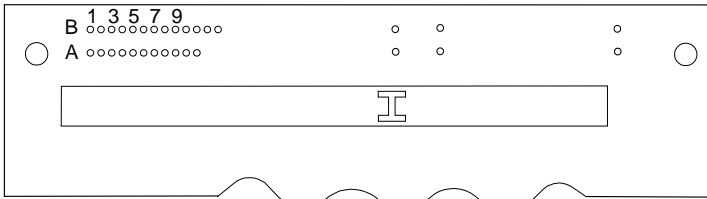
B7 = -12 V dc

B9 = +12 V dc

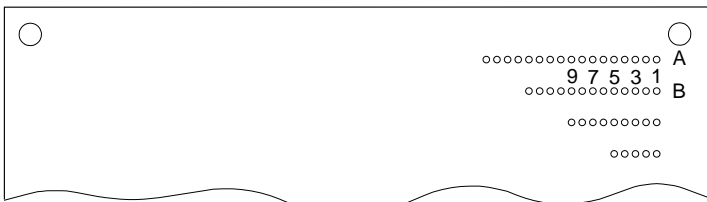
MAP 2000 (continued)



(Left View)
8 Slot Riser Card



(Left View)
5 Slot Riser Card



(Right View)
3 Slot Riser Card

Figure 2-12. Riser Cards

ARE THE VOLTAGES CORRECT?

Yes No

004

Replace the riser card.

005

(Step **005** continues)

005 (continued)

WAS THERE MORE THAN ONE ADAPTER CARD INSTALLED IN THE RISER CARD?

Yes No

006

Replace the adapter card. If the symptom remains, replace the riser card. If the symptom is still present, replace the system board.

007

- Power off the system unit.
- Check one adapter card at a time. To do this, install one adapter card in the riser card and power on the system unit.
- Repeat this with each adapter card.

DOES THE SYSTEM MENU APPEAR WITH EACH ADAPTER CARD INSTALLED BY ITSELF?

Yes No

008

- Replace the riser card. If the symptom remains, replace the system board.

009

Replace the adapter card that did not allow the system menu to appear.

Note: Ensure the adapter card closest to the system board does not touch the SIMM.

MAP 2400: Video Graphics Array

Symptom Explanation	Conditions That Could Cause This Symptom
You have entered this MAP because you were unable to complete the POST, you suspect a display problem, or you received a display error message.	The display is failing. The display power cord is failing. The hard disk drive signal cable is failing. A SIMM card is failing. The system board is failing.

Notes:

1. If you have a 486SX, 486DX, or 486DX2 (72-pin memory SIMM) system board, run the Configuration Utility and make sure the display type shown matches the display installed.
2. Machines equipped with a high voltage power supply have a power cord between the system unit and the display. Some displays have a detachable system I/O signal cable between the display and the system unit. In either case, check the power cord or system I/O signal cable before replacing the unit. See "Detachable Display System I/O Signal Cable Connector Test Points" on page 5-19 for pin identification.

001

- Power off the system unit.
- Remove all adapter cards from the riser card.
- Power on the system unit.

DID THE SYMPTOM REMAIN?

Yes No

002

Go to "MAP 2000: Riser Card" on page 2-93.

003

(Step **003** continues)

MAP 2400 (continued)

003 (continued)

- Power off the system unit and display.
- Ensure the display system I/O signal cable is properly connected to the system unit and display, if applicable.
- Ensure the power cords are properly connected to the system unit and display.
- Ensure the display contrast and brightness controls are not turned down.
- 486SX and 486DX (30-pin memory SIMM) system boards:
Verify the jumpers are in the correct positions as shown in “486SX 20MHz/486SX 25MHz Level 1 (30-Pin Memory SIMM) System Board Layout” on page 5-9 and “486DX 33MHz (30-Pin Memory SIMM) System Board Layout” on page 5-13.
- 486SX, 486DX, or 486DX2 (72-pin memory SIMM) system boards:
Verify the jumpers are in the correct positions as shown in “486SX 33MHz (72-Pin Memory SIMM) System Board Layout” on page 5-15 and “486DX 25MHz/486DX2 50MHz or 486DX 33MHz/486DX2 66MHz (72-Pin Memory SIMM) System Board Layout” on page 5-17.
- Power on the system unit and display, and wait 20 seconds.

Note: Because display models may differ, review the Display Self Test before attempting to answer the following questions. The test has changed from previous levels.

- Refer to steps 5 and 6 of “Display Self Test” on page 3-11 for a description of the self test pattern. *Do not* run the Display Self Test. Do not unplug the display system I/O signal cable from the system unit.

DOES THE DISPLAY SELF TEST PATTERN APPEAR ON THE SCREEN?

Yes No

004

Go to Step 029 on page 2-102.

005

IS YOUR SYSTEM BOARD A 386SX?

Yes No

006

(Step 006 continues)

006 (continued)

Go to Step 018 on page 2-100.

007

ARE THERE SIMM CARDS INSTALLED IN THE SYSTEM BOARD?

Yes No

008

Go to Step 026 on page 2-101.

009

ARE TWO SIMM CARDS INSTALLED?

Yes No

010

- Power off the system unit.
- Remove the SIMM card.
- Power on the system unit.

DID THE DISPLAY SELF TEST PATTERN APPEAR?

Yes No

011

Replace the failing SIMM card.

012

Go to Step 026 on page 2-101.

013

- Power off the system unit.
 - Remove one SIMM card.
 - Power on the system unit.
- (Step **013** continues)

MAP 2400 (continued)

013 (continued)

DID THE DISPLAY SELF TEST PATTERN APPEAR?

Yes No

014

Replace the failing SIMM card.

015

- Power off the system unit.
- Remove the other SIMM card.
- Power on the system unit.

DID THE DISPLAY SELF TEST PATTERN APPEAR?

Yes No

016

Replace the failing SIMM card.

017

Go to Step 026 on page 2-101.

018

(From step 006)

- You should have a 486SX, 486DX, or 486DX2 system board.

DOES THE SYSTEM BOARD HAVE EIGHT 30-PIN MEMORY SIMMS INSTALLED?

Yes No

019

Go to Step 022 on page 2-101.

020

- Power off the system unit.
- (Step 020 continues)

020 (continued)

- Remove one bank of four SIMM cards.
- Power on the system unit.

DOES THE DISPLAY SELF TEST PATTERN APPEAR?

Yes No

021

Replace the SIMM cards.

022

(From step 019)

IS YOUR SYSTEM BOARD A 486SX WITH 30-PIN MEMORY SIMMS, AND DOES IT HAVE A VIDEO RAM IN SOCKET LOCATIONS U31, U35, U36, AND U37 (FOR LEVEL 1) OR U29, U30, U31, AND U32 (FOR LEVEL 2)?

See the “System Board Layouts” on pages 5-2 through 5-13.

Yes No

023

Go to Step 026.

024

- Power off the system unit.
- Remove the socketed video RAM from the system board.
- Power on the system unit.

DOES THE DISPLAY SELF TEST PATTERN APPEAR?

Yes No

025

Replace the video RAM.

026

(From steps 008, 012, 017, and 023)

Unplug the display system I/O signal cable from the system unit.
(Step **026** continues)

MAP 2400 (continued)

026 (continued)

DID THE DISPLAY SELF TEST PATTERN REMAIN WITH A LIGHT SCREEN (NOT TOTALLY BLACK)?

Note: You may need to be in a dimly lit or dark room.

Yes No

027

Replace the display.

028

Replace the system board.

029

(From step 004)

- Power off the system unit and display.
- Unplug the display system I/O signal cable from the system unit.
- Power on the system unit and display.
- Observe whether the screen lights up and does not remain black. You may have to turn the brightness control all the way up and be in a dark or dimly lit room.

DOES THE SCREEN CHANGE FROM BLACK WITH POWER OFF TO A LIGHTER SHADE WHEN POWER IS TURNED ON?

Yes No

030

Go to Step 032.

031

Go to Step 043 on page 2-104.

032

(From step 030)
(Step 032 continues)

032 (continued)

IS THE DISPLAY POWER-ON INDICATOR LIT?

Yes No

033

Go to Step 035.

034

Replace the display.

035

(From step 033)

DOES YOUR SYSTEM HAVE A POWER CORD BETWEEN THE SYSTEM UNIT AND THE DISPLAY?

Yes No

036

- Power off the display.
- Disconnect the power cord from the back of the display.
- Measure line voltage at the display end of the power cord.

DO YOU HAVE THE CORRECT LINE VOLTAGE?

Yes No

037

- Check the power at the electrical outlet.
- Also check the continuity of the power cord.
- Replace the power cord or plug the machine into a functioning electrical outlet.

038

Go to Step 043 on page 2-104.

039

(Step **039** continues)

MAP 2400 (continued)

039 (continued)

- Power off the system unit.
- Disconnect the power cord from the back of the display.
- Power on the system unit.
- Measure the line voltage at the display end of the power cord.

DO YOU HAVE THE CORRECT LINE VOLTAGE?

Yes No

040

- Power off the system unit.
- Disconnect the power cord from the back of the system unit.
- Measure line voltage at the system unit end of the power cord.

DO YOU HAVE THE CORRECT LINE VOLTAGE?

Yes No

041

- Check the power at the electrical outlet.
- Also check the continuity of the power cord.
- Replace the power cord or plug the machine into a functioning electrical outlet.

042

- Check the continuity of the line cord between the system unit and the display.
 - Replace the power cord or the power supply.
-

043

(From steps 031 and 038)

- Power off the system unit.
- Reconnect any disconnected cables.
- Ensure the Advanced Diagnostics Diskette is in drive A.

(Step 043 continues)

043 (continued)

- Power on the system unit.
- Make a note of any error messages, if present, and press the **Esc** key.

IS THE SCREEN BLANK (DARK)?

Yes No

044

Go to Step 065 on page 2-109.

045

(From step 105)

- Power off the system unit.
- Disconnect the power cables to the system board and drives.
- Power on the system unit.
- Check the voltages at the power supply connectors to the system board as indicated.

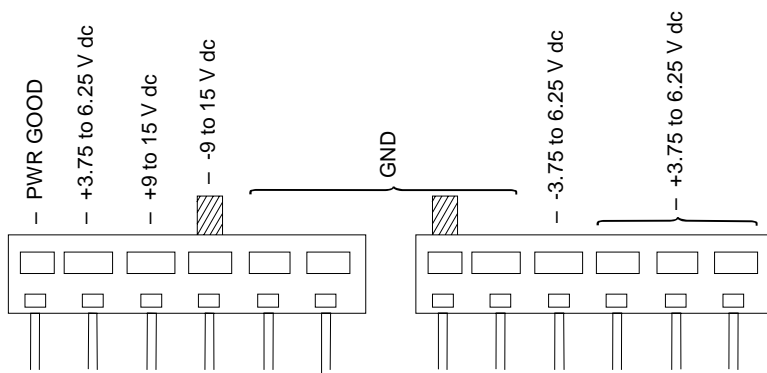


Figure 2-13. System Board Power Supply Connectors

ARE THE VOLTAGES CORRECT?

Yes No

046

(Step **046** continues)

MAP 2400 (continued)

046 (continued)

Replace the power supply.

047

IS YOUR SYSTEM BOARD A 386SX?

Yes No

048

Go to Step 052.

049

You may have a failing hard disk drive signal cable, hard disk drive, or system board.

- Power off the system unit.
- Reconnect all power cables.
- Disconnect the hard disk drive signal cable from the system board.
- Power on the system unit.

DID THE SYMPTOM REMAIN?

Yes No

050

Go to MAP 1700 step 024 on page 2-83.

051

Replace the display.

052

(From step 048)

- You should have a 486SX, 486DX, or 486DX2 system board.
- (Step **052** continues)

052 (continued)

DOES THE SYSTEM BOARD HAVE EIGHT 30-PIN MEMORY SIMMS INSTALLED?

Yes No

053

Go to Step 056.

054

- Power off the system unit.
- Remove one bank of four SIMM cards.
- Power on the system unit.

IS THE SCREEN DARK?

Yes No

055

Swap SIMM cards one at a time with a known good SIMM card until the symptom goes away. Replace the failing SIMM card.

Note: You could have an unsupported SIMM card installed.

056

(From step 053)

IS YOUR SYSTEM BOARD A 486SX WITH 30-PIN MEMORY SIMMS, AND DOES IT HAVE VIDEO RAM INSTALLED IN SOCKET LOCATIONS U31, U36, AND U37 (FOR LEVEL 1) OR U29, U30, U31, AND U32 (FOR LEVEL 2)?

See the “System Board Layouts” on pages 5-2 through 5-13.

Yes No

057

(Step 057 continues)

MAP 2400 (continued)

057 (continued)

IS THE BOARD A 486SX, 486DX, OR 486DX2 (72-PIN SIMM) SYSTEM BOARD?

Yes No

058

Go to Step 062.

059

- Replace the display.
 - If the symptom remains, replace the system board.
-

060

- Power off the system unit.
- Remove the socketed video RAM from the system board.
- Power on the system unit.

IS THE SCREEN DARK?

Yes No

061

Replace the video RAM.

062

(From step 058)

- Power off the system unit.
- Remove the remaining bank of SIMM cards.
- Power on the system unit.

DID THE SYMPTOM REMAIN?

Yes No

063

Replace the SIMM cards.
(Step 063 continues)

063 (continued)

Note: You could have an unsupported SIMM card installed.

064

Replace the display. If the symptom remains, replace the system board.

065

(From step 044)

IS THE SCREEN READABLE?

Yes No

066

Go to Step 102 on page 2-115.

067

- Press **3 (SETUP)**, then press **Enter**.
- Refer to “Product Description” on page 1-5 and the “System Board Layouts” on pages 5-2 through 5-13 and “SIMM Identification” on page 1-20. to determine the size of the video memory on the system board.
- Look at the Configuration Utility screen for Video Controller/Memory. The video memory size detected by the system is indicated to the right.
- Match the video memory size indicated to one of the system boards listed below. 1MB = 1024KB.
- 386SX system boards:
 - U32 and U35 = 256KB
 - U32, U33, U35, and U36 = 512KB
- 486SX (30-pin memory SIMM) system boards:
 - Level 1:
 - U30, U34, U32, and U33 = 512KB
 - U30, U34, U32, U33, U37, U31, U35, and U36 = 1MB
 - Level 2:

(Step **067** continues)

MAP 2400 (continued)

067 (continued)

U27, U28, U33, and U34 = 512KB

U27, U28, U33, U34, U29, U30, U31, and U32 = 1MB

- The 486DX (30-pin memory SIMM) system board has 1MB soldered on board video memory.
- The 486SX (72-pin memory SIMM) system board has 512MB soldered on board video memory.
- The 486DX and 486DX2 (72-pin memory SIMM) system boards have 1MB soldered on board video memory.

DOES THE SIZE OF THE VIDEO MEMORY INSTALLED ON THE SYSTEM BOARD MATCH THE VIDEO MEMORY IN THE CONFIGURATION UTILITY?

Yes No

068

IS YOUR SYSTEM BOARD A 486SX AND DOES IT HAVE VIDEO MEMORY INSTALLED IN SOCKET LOCATIONS U31, U35, U36, AND U37 (FOR LEVEL 1) OR U29, U30, U31, AND U32 (FOR LEVEL 2)?

See the "System Board Layouts" on pages 5-2 through 5-13.

Yes No

069

Replace the system board.

070

- Power off the system unit.
- Remove the socketed video memory from the system board.
- Power on the system unit.
- Go to the Configuration Utility menu using option **3 (SETUP)**.

(Step **070** continues)

070 (continued)

IS THE VIDEO MEMORY SIZE INDICATED 512KB?

Yes No

071

Replace the system board.

072

Replace the video memory.

073

- Press **Esc**.
- Press **0 (SYSTEM CHECKOUT)**, then press **Enter**.
Note: Do not run the individual tests until you are instructed to do so by this MAP.
- Press **Y** or **N** as required when questions about installed devices appear on the screen.
- Select the **RUN TESTS ONE TIME** option from the system checkout menu.
- Type **24 (VIDEO GRAPHICS ARRAY)**, then press **Enter**.

The image on the screen may be distorted, or the characters may be the wrong size.

Note: You may have to refine the display controls to obtain the best image.

IS THE IMAGE ON THE SCREEN DISTORTED OR THE WRONG SIZE?

Yes No

074

Go to Step 076 on page 2-112.

075

Replace the display. If the symptom remains, replace the system board.

076

(Step **076** continues)

MAP 2400 (continued)

076 (continued)
(From step 074)

– Press **6** (**RUN TESTS 1 THROUGH 5**), then press **Enter**.

The following happens:

- A VGA test is performed.
- A video memory test is performed.
- The screen goes blank.
- The size of the video memory is displayed.

DID YOU RECEIVE AN ERROR MESSAGE PRIOR TO THE DISPLAY ATTRIBUTE SCREEN APPEARING?

Yes No

077

Go to Step 085 on page 2-113.

078

IS THE ERROR A 2408, 2409, 2418, or 2419?

Yes No

079

Go to Step 085 on page 2-113.

080

IS YOUR SYSTEM BOARD A 486SX WITH 30-PIN MEMORY SIMMS, AND DOES IT HAVE VIDEO RAM INSTALLED IN SOCKET LOCATIONS U31, U35, U36, AND U37 (FOR LEVEL 1) OR U29, U30, U31, AND U32 (FOR LEVEL 2)?

See the “System Board Layouts” on pages 5-2 through 5-13.

Yes No

081

Replace the system board. If the symptom remains, replace the display.

082

(Step **082** continues)

082 (continued)

- Power off the system unit.
- Remove the socketed video RAM from the system board.
- Power on the system unit.
- Run the VGA test.

DID THE SYMPTOM REMAIN?

Yes No

083

Replace the video RAM.

084

Replace the system board. If the symptom remains, replace the display.

085

(From steps 077 and 079)

DID THE DISPLAY ATTRIBUTE SCREEN APPEAR AFTER THE VIDEO MEMORY SIZE WAS DISPLAYED?

Yes No

086

Replace the system board.

087

- Adjust the contrast and brightness controls until the intensified line is brighter than the other lines. Also, note if the other display controls have an effect on the display.

WERE YOU ABLE TO ADJUST FOR AN INTENSIFIED LINE, AND DID THE OTHER DISPLAY CONTROLS HAVE AN EFFECT ON THE DISPLAY?

Yes No

088

(Step **088** continues)

MAP 2400 (continued)

088 (continued)

Replace the display.

089

- Answer each question of the VGA test by pressing either **Y** or **N**, then press **Enter**.

DID YOU ANSWER YES TO ALL OF THE QUESTIONS?

Yes No

090

Replace the display.

091

IS “EXTENDED MODE TESTS” AN OPTION ON THE LIST OF OPTIONS?

Yes No

092

If you have a 486SX, 486DX, or 486DX2 (72-pin memory SIMM) system board, run the Setup program, and check the display type. If the display is VGA, this option will not be available. If the display is SVGA, change the display type to the proper setting and run the test again.

- Go to Step 095 on page 2-115.

093

- Press **8 (EXTENDED MODE TEST)**.

Note: The Extended Mode Test checks the SVGA. The color bars and blocks should appear as various color shades of Red, Green, and Blue.

DID YOU ANSWER YES TO ALL OF THE QUESTIONS?

Yes No

094

Replace the display.

095

(From step 092)

DID YOU RECEIVE A 2401 ERROR?

Yes No

096

DID YOU RECEIVE A 2410 ERROR?

Yes No

097

DID YOU RECEIVE A 2411 ERROR?

Yes No

098

You have successfully completed the Advanced Diagnostics tests. If you suspect an intermittent problem, start an error log. If you need instructions, refer to "Error Log" on page 3-9.

099

Replace the display. If the symptom remains, replace the system board.

100

Replace the system board.

101

Replace the display.

102

(From step 066)

You may have a failing hard disk drive signal cable, hard disk drive, or system board.

(Step **102** continues)

MAP 2400 (continued)

102 (continued)

- Power off the system unit.
- Disconnect the hard disk signal cable from the system board.
- Power on the system unit.

DID THE SYMPTOM REMAIN?

Yes No

103

Go to MAP 1700 step 024 on page 2-83.

104

The following information helps you diagnose a video problem in the display through the use of beeps.

- Power off the system unit.
- Insert the Advanced Diagnostics diskette into drive A.
- Listen for the beep(s) at the end of the POST, and wait for the LED on drive A to come on, go off, and stay off.

Note: If the LED fails to light after 1 minute, continue with this step.

- Follow the steps in Figure 2-14 on page 2-117. Listen for the beep each time you press **Enter**.

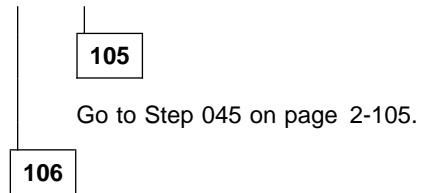
Note: Use the numbers in the typewriter area of the keyboard. Do not use the numeric keypad.

Steps	Audio Response
Press 0	None
Press Enter	1 Beep
Press Y	None
Press Enter	1 Beep
Press 0	None
Press Enter	1 Beep
Type 24	None
Press Enter	1 Beep

Figure 2-14. Steps to Select a Test

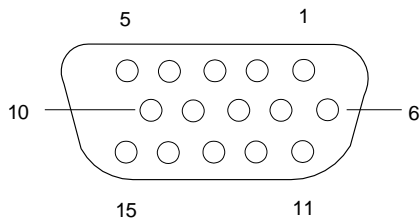
DID YOU RECEIVE THE CORRECT AUDIO RESPONSES?

Yes No



- Do not power off the system unit to perform this step.
- Unplug the display system I/O signal cable from the system unit.
- Refer to the following figure, and measure the display connector voltages at the rear of the system unit, performing steps 1 through 4 sequentially.

MAP 2400 (continued)



1. Press 7; then press **Enter** and check for:
 - 0 to +0.2 V dc from pin 13 to 10 (ground)
 - 0 to +0.2 V dc from pin 14 to 10 (ground)
2. Press **Enter**; then check for:
 - +3.5 to +4.5 V dc from pin 13 to 10 (ground)
 - 0 to +0.2 V dc from pin 14 to 10 (ground)
3. Press **Enter**; then check for:
 - 0 to +0.2 V dc from pin 13 to 10 (ground)
 - 0 to +0.2 V dc from pin 14 to 10 (ground)
4. Press **Enter**; then check for:
 - +0.5 to 1.0 V dc from pin 13 to 10 (ground)
 - +3.5 to 4.5 V dc from pin 14 to 10 (ground)

Figure 2-15. Display Connector

ARE THE VOLTAGES CORRECT?

Yes No

107

Replace the system board.

108

Replace the display. If the symptom remains, replace the system board.

MAP 8600: Mouse

Symptom Explanation	Conditions That Could Cause This Symptom
You have entered this MAP because you received an 86XX error code, you suspect a mouse problem, or you have been directed here from another MAP.	The mouse is failing. The system board is failing. The ball is dirty. The keyboard is failing.

Note: A sticking keybutton can cause the mouse not to operate correctly.

001

- Power off the system unit.
- Ensure the ball turns freely.
- Insert the Advanced Diagnostics diskette into drive A.
- Power on the system unit.
- Make a note of any error messages, then press **Esc**.
- Run the Mouse tests. Use the **RUN TESTS ONE TIME** option.
- Follow the instructions on the screen.

CAN YOU START THE MOUSE DIAGNOSTICS?

Yes No

002

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

003

(Step **003** continues)

MAP 8600 (continued)

003 (continued)

DID YOU RECEIVE AN ERROR MESSAGE?

Yes No

004

You have successfully completed the Advanced Diagnostics tests. An intermittent problem may be caused by a dirty ball.

005

DID YOU RECEIVE AN 8603 ERROR?

Yes No

006

Replace the mouse. If the problem continues, replace the system board.

007

Replace the system board.

Diagnostic Aids

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Introduction

This section explains the diagnostic aids that are available for troubleshooting problems on the system.

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.

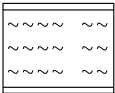
The POST checks the following:

- 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 happens:

1. The system attempts to load the operating system as customized. 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,



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

3. A count of the system memory appears at the upper-left corner of the screen.
4. If an error is detected, and error code appears under the system memory count.

Note: Memory errors appear as XXXXXX XXXX 20X 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.

Advanced Diagnostics Diskettes

The Advanced Diagnostics program comes in two versions on two diskettes (packaged together with this book). One diskette, labeled "For Machine Types 2133, 2155, and 2168," is for all 486 system boards with 72-pin memory SIMM sockets. The other, labeled "For Machine Types 2133 and 2155," is for all other system boards. If in doubt about which kind of board you are testing, try one diskette in the machine. Only the correct diskette for the machine will run the Advanced Diagnostics program.

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

To load a diagnostics diskette:

1. Power off the system unit.
2. Install the correct 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.

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.

Diagnostic Menus

Select an Option Menu

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

```
SELECT AN OPTION
- SYSTEM CHECKOUT
1 - FORMAT DISKETTE
2 - COPY DISKETTE
3 - SETUP

9 - END DIAGNOSTICS
```

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.

Diskette Drive Menu

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

```
TESTING -  
6  
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.

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 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; 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.

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
8 - EXTENDED MODE TESTS
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: 40×25, 80×25, 80×30, 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.
- 8 - EXTENDED MODE TESTS: Shows the following character modes: either 80×60 or 132×43; also 132×25. Also shows the following graphic modes: 640×480×256, 800×600×256, and 1024×768×16.
Note: This option is only available for SVGA systems.
- 9 - RETURN TO CONTROL PROGRAM: Returns to the System Checkout menu or continues with the next device test.

Formatting a Hard Disk

Hard disks 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, the hard disk 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 is 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 is scanned for any defective tracks, then formatted (except for any known defective tracks).

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

3 - SURFACE ANALYSIS: Scans the hard disk 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, including system software. If you are directed to or elect to format the hard disk, 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 software on the hard disk.

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 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.

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.**

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**.

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 completes testing and returns to the Installed Devices menu.

Display the Error Log

1. Depending on the options installed in the system, questions about attached devices 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 "MAP 0010: Start" on page 2-3.

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.

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.

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 display screen should get lighter (it should not stay completely black). You may want to check the display in a dark or dimly lit room.
6. The display screen should show a power-off discharge (a flash of light) when turned off.

Note: If you can see the flash of light in Step 6 but not the lighter screen of Step 5, you may want to perform Step 5 again in a dark or dimly lit room.

Repair Information

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Hard Disk Drive Jumper Settings

Match your hard disk drive to one of the following figures. Set the first drive, 1, as the primary (master) drive. If a second drive, 2, is installed, set it as the secondary (slave) drive and make sure all software is set to recognize the second drive.

Note: ■ = Jumper, ○ = No Jumper

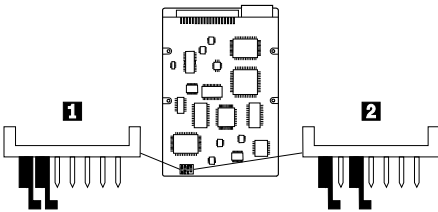


Figure 4-1. 85MB and 170MB Drives

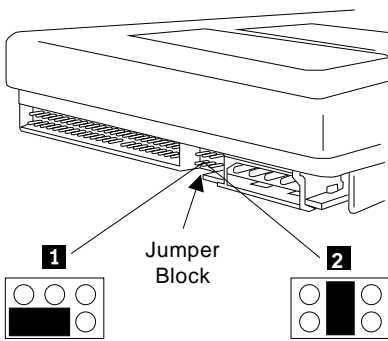


Figure 4-2. 85MB Drive

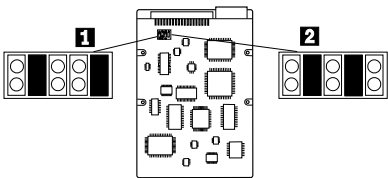


Figure 4-3. 129MB Drive

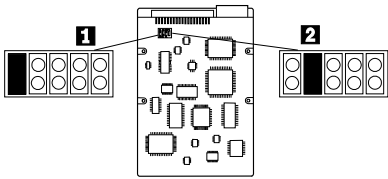


Figure 4-4. 170MB and 211MB Drives

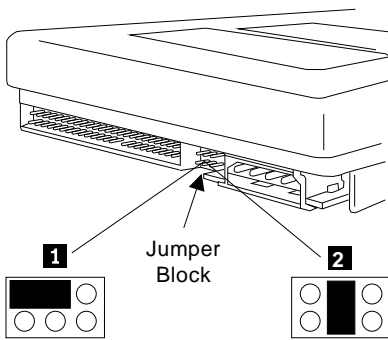


Figure 4-5. 170MB, 253MB, and 340MB Drives

Removals and Replacements—Machine Types 2133 and 2155

The arrows in the removals and replacements procedures show the direction of movement to remove a field-replaceable unit (FRU), to turn a screw, or to press a tab to release the FRU.

When other FRUs must be removed prior to removing the failing FRU, they are listed at the top of the page. Go to the removal procedure for each FRU listed, remove the FRU, and then continue with the removal of the failing FRU.

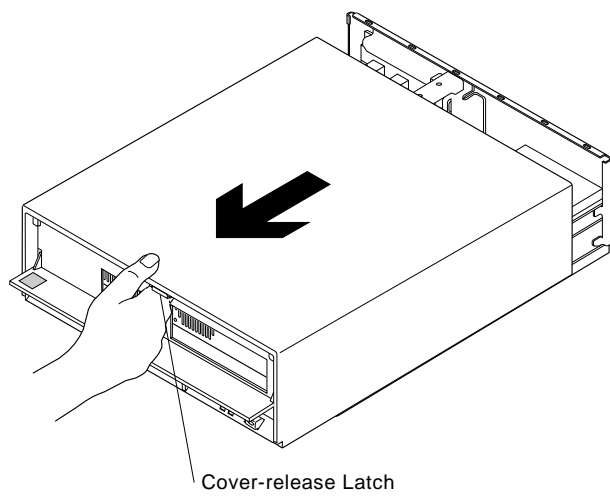
To replace a FRU, reverse the removal procedure and follow any notes that pertain to replacement. See “Parts/Test Point Locations” on page 5-1 for internal cable connection and arrangement information.

CAUTION:

Before removing any FRU, power off the system unit, unplug all power cords from electrical outlets, disconnect any interconnecting cables, and disconnect any telephone cords.

Warning: The system board, adapters, memory SIMMs, video RAM modules, and the math coprocessor can be damaged by electrostatic discharge. Use an electrostatic discharge (ESD) strap to establish personal grounding. If you don't have an ESD strap, establish personal grounding by touching a ground point with one hand before touching the static-sensitive FRUs.

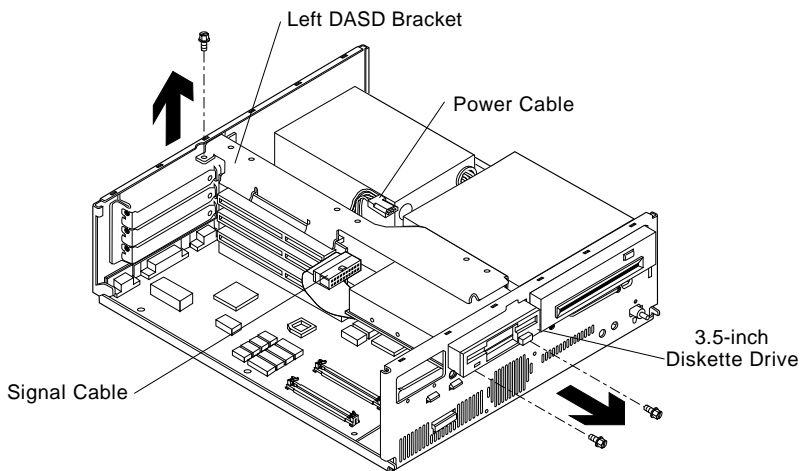
1005—Cover



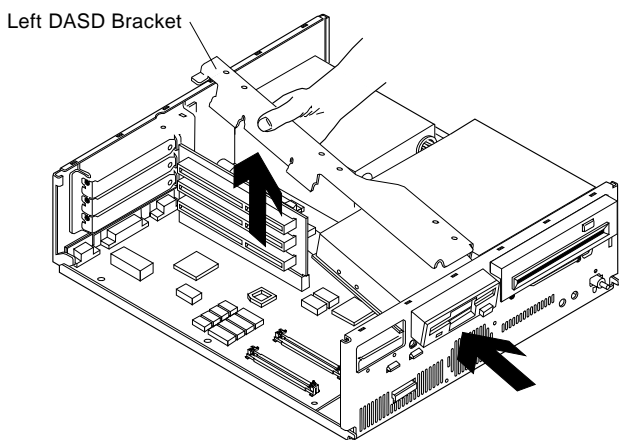
1010—Left DASD Support Bracket

Cover (1005).

Disconnect any cables necessary for removal.



(Front View)

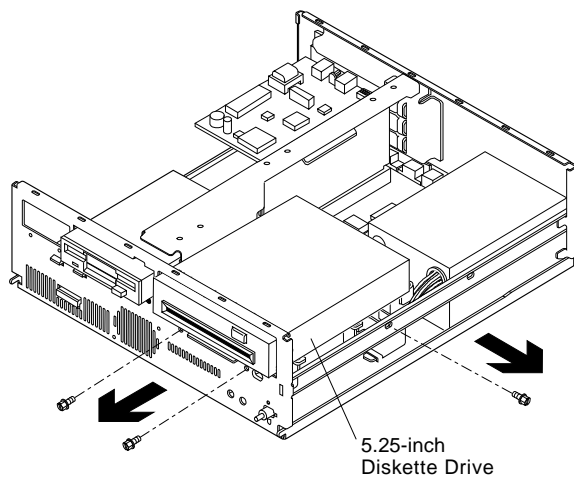


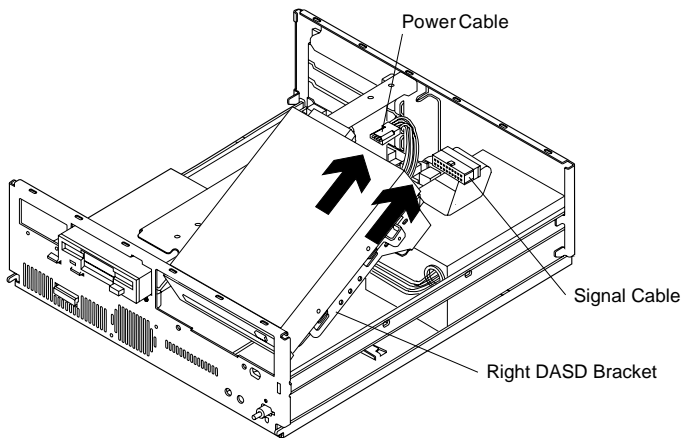
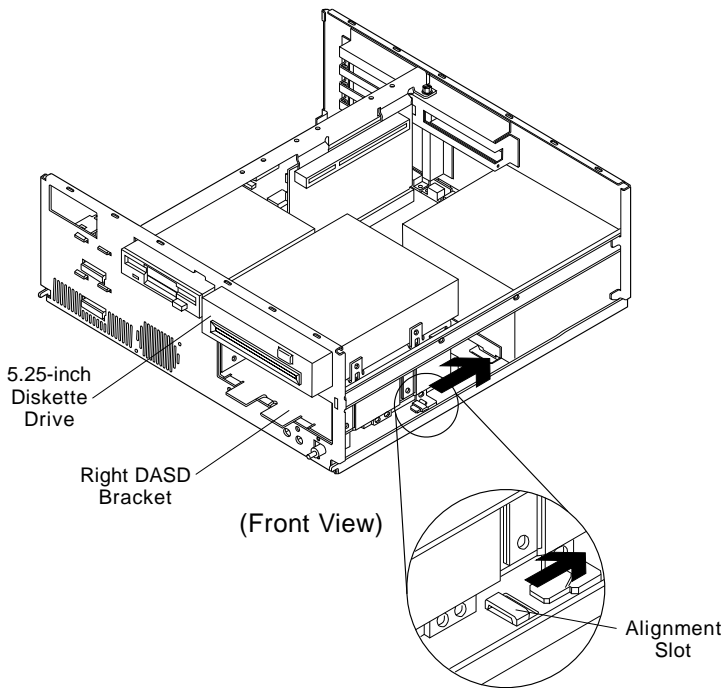
1015—Right DASD Support Bracket

Cover (1005).

Disconnect any cables necessary for removal.

When reinstalling, be certain the tab(s) on the bottom of the bracket engage the alignment slots in the bottom frame.





1020—3.5-Inch Diskette Drive

Left DASD Support Bracket (1010).

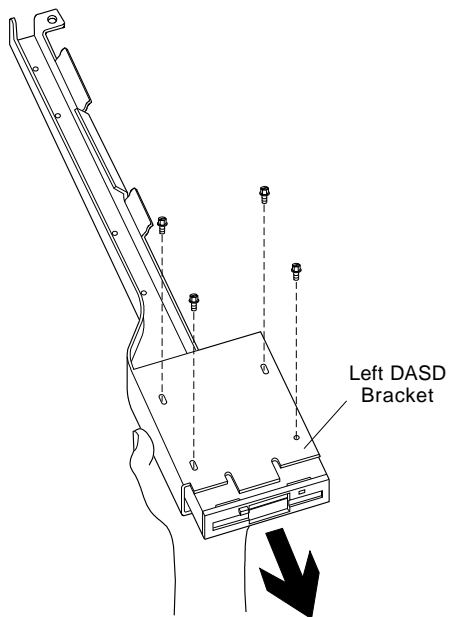


Figure 4-6. Machine Type 2133

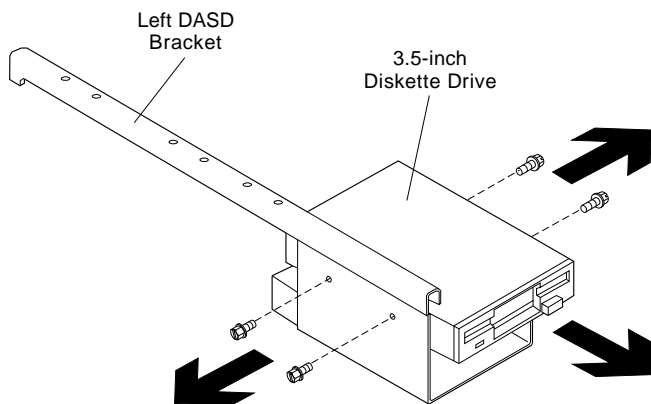
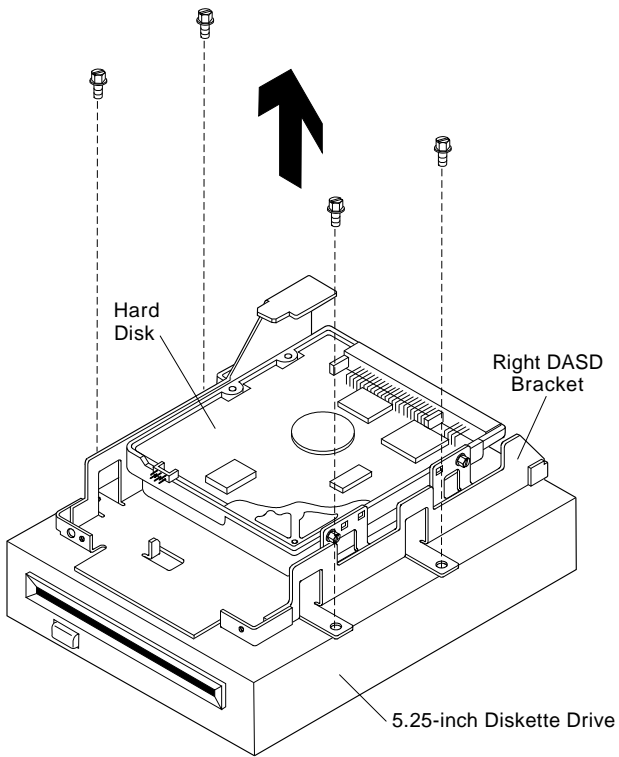


Figure 4-7. Machine Type 2155

1025—5.25-Inch Diskette Drive

Right DASD Support Bracket (1015).



(Upside-Down View)

Figure 4-8. Machine Type 2133

1030—Hard Disk Drive

Machine Type 2133 or 2155—Right DASD Support Bracket (1015)

Machine Type 2155 only—Left DASD Support Bracket (1010).

Note: Refer to Appendix, “Model Configurations and FRU Part Numbers” on page A-1 and install the correct software. For European models, refer to Table A-5 on page A-11 for the correct software.

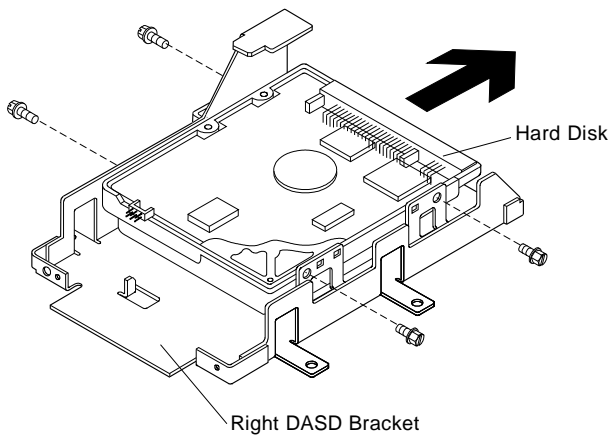


Figure 4-9. Machine Type 2133

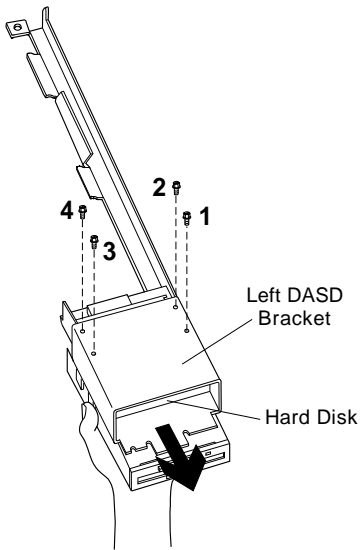


Figure 4-10. Machine Type 2155

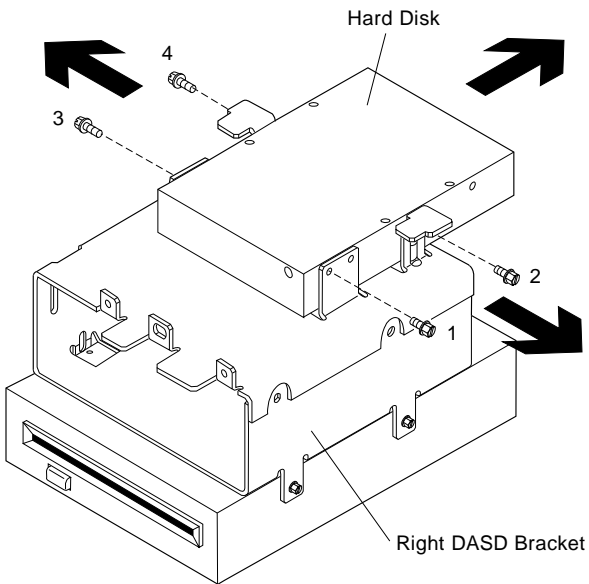
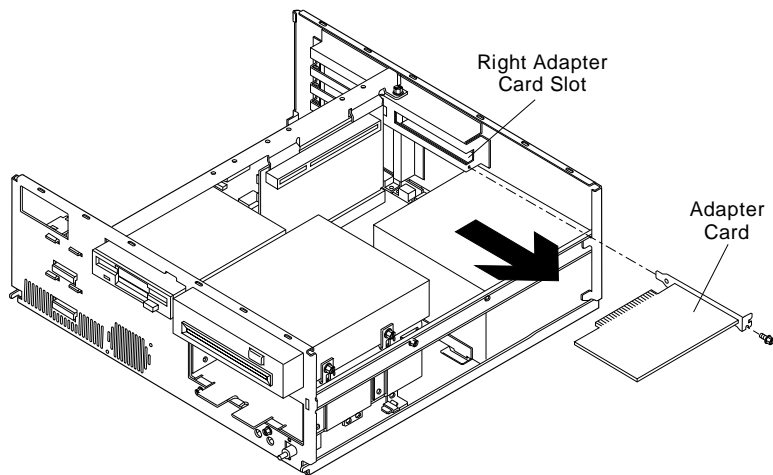
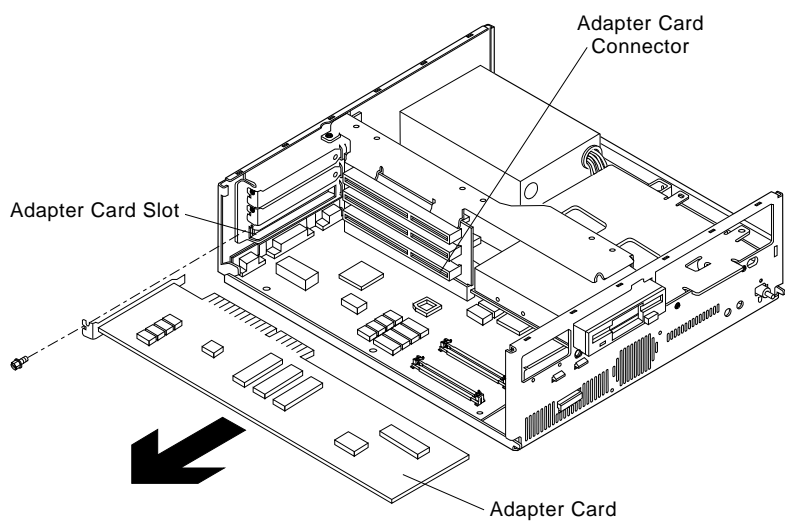


Figure 4-11. Machine Type 2155

1035—Adapter Card

Cover (1005).



(Front View)

Figure 4-12. Machine Type 2155 Only

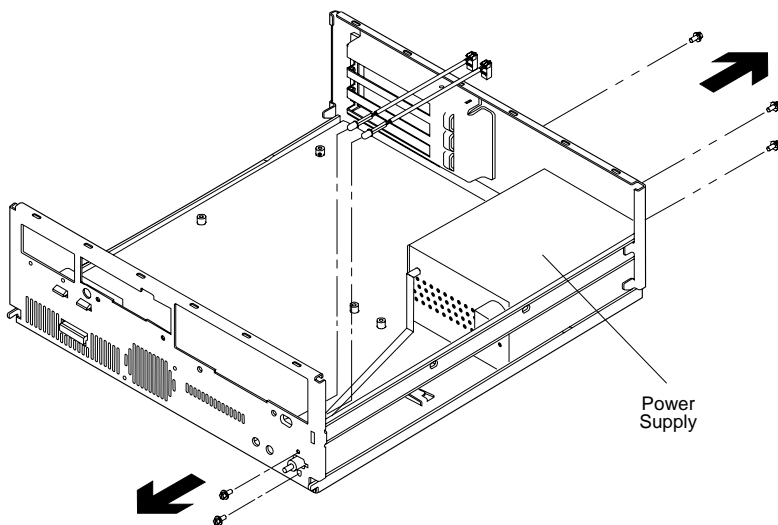
1040—Power Supply

Right DASD Support Bracket (1015).

Machine Type 2155—Adapter Card (1035).

Disconnect any cables necessary for removal.

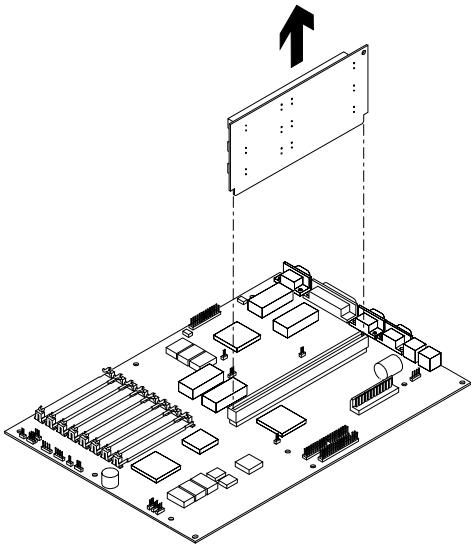
When reinstalling, be certain the tab(s) on the bottom of the power supply engage the cutouts in the frame.



1045—Riser Card

Adapter Card (1035)

Left DASD Support Bracket (1010).



1050—Memory (SIMM)

Warning: Memory cards are sensitive to static discharge. See “Handling ESD-Sensitive Parts” on page 4-47.

Cover (1005)

Adapter Card (1035) if applicable.

Note: Run the Configuration Utility after adding or removing memory.

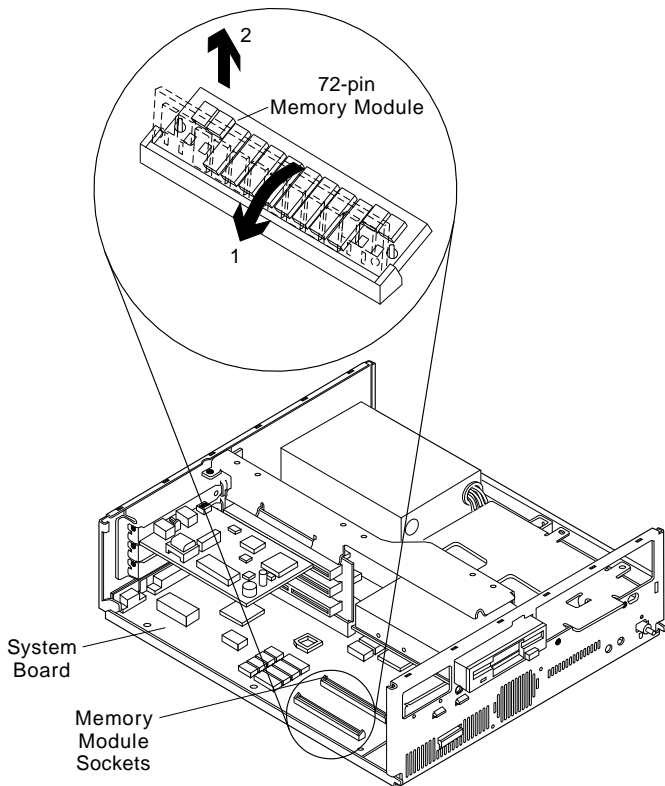


Figure 4-13. 386SX, 486SX, 486DX, and 486DX2 (72-Pin Memory SIMM) System Boards

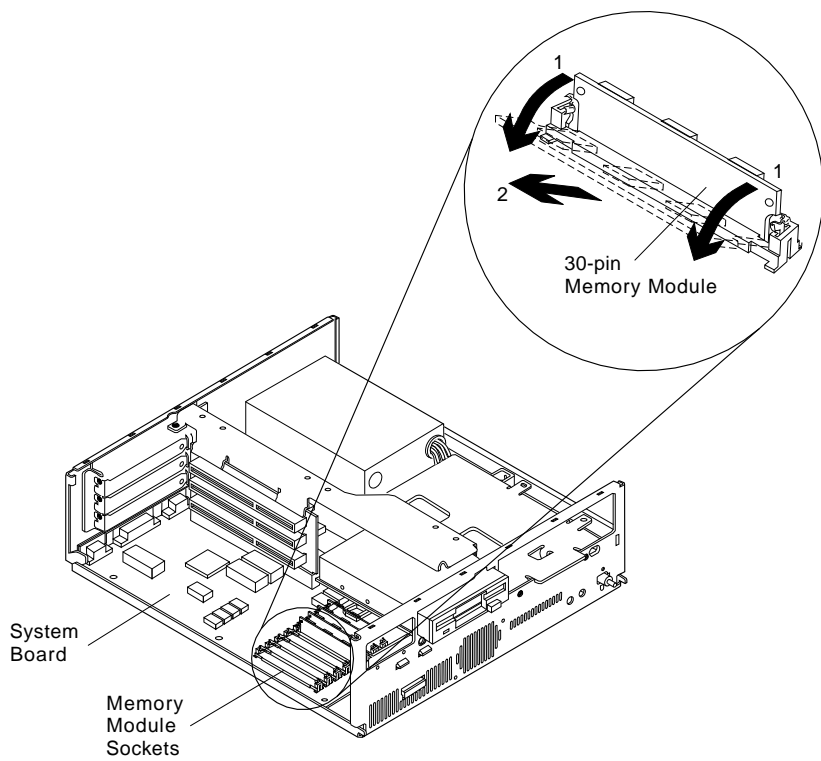


Figure 4-14. 486SX and 486DX (30-Pin Memory SIMM) System Boards

1055—Cache Memory

Warning: Memory cards are sensitive to static discharge. See “Handling ESD-Sensitive Parts” on page 4-47.

Cover (2005)
Adapter Card(s) (2035) if applicable
Riser Card (2045) if applicable.

Note: Run the Configuration Utility after adding or removing memory.

If the system board has cache memory modules already installed, the computer has 128K of cache memory. Upgrade to 256K by adding memory modules as follows:

Bank 2 Add four 28-pin modules: 32K × 8, 25 ns SRAM.
Tag Replace existing module with one 28-pin module: 32K × 8, 20 ns SRAM.

If you are installing cache memory in a board with no cache memory previously installed, install 128K or 256K as follows:

Bank 1 Add four 28-pin modules: 32K × 8, 25 ns SRAM (for 128K or 256K).
Bank 2 Add four 28-pin modules: 32K × 8, 25 ns SRAM (for 256K).
Tag Add one 28-pin module: 32K × 8, 20 ns SRAM (for 256K) **or** 8K × 8, 20 ns SRAM (for 128K).

Cache memory jumpers are preset at the factory for 128K cache memory. Reset the jumpers for 256K by moving them forward to cover two jumper pins, as shown in Figure 4-15.

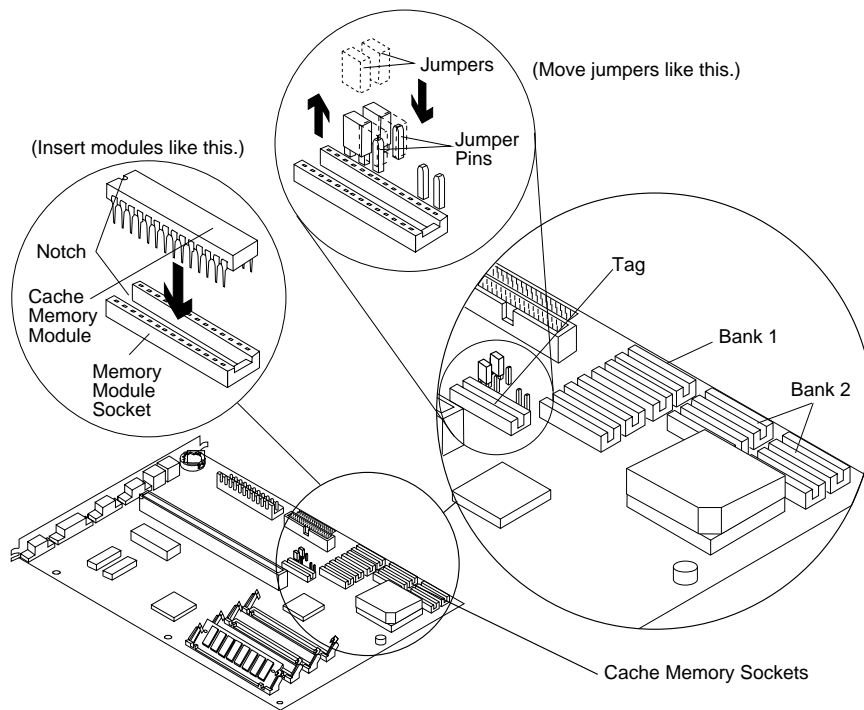


Figure 4-15. 486SX, 486DX, and 486DX2 (72-Pin Memory SIMM) System Boards

Note: Not all system boards have cache memory sockets. Some have 1 bank while others have 2 banks of cache memory.

1056—Video RAM (486SX Only)

Warning: Video RAM modules are sensitive to static discharge. See “Handling ESD-Sensitive Parts” on page 4-47.

Cover (1005).

Adapter Card (1035) if applicable.

Use the Video Memory Removal Tool to remove the video memory.

Note: Run the Configuration Utility after adding or removing memory.

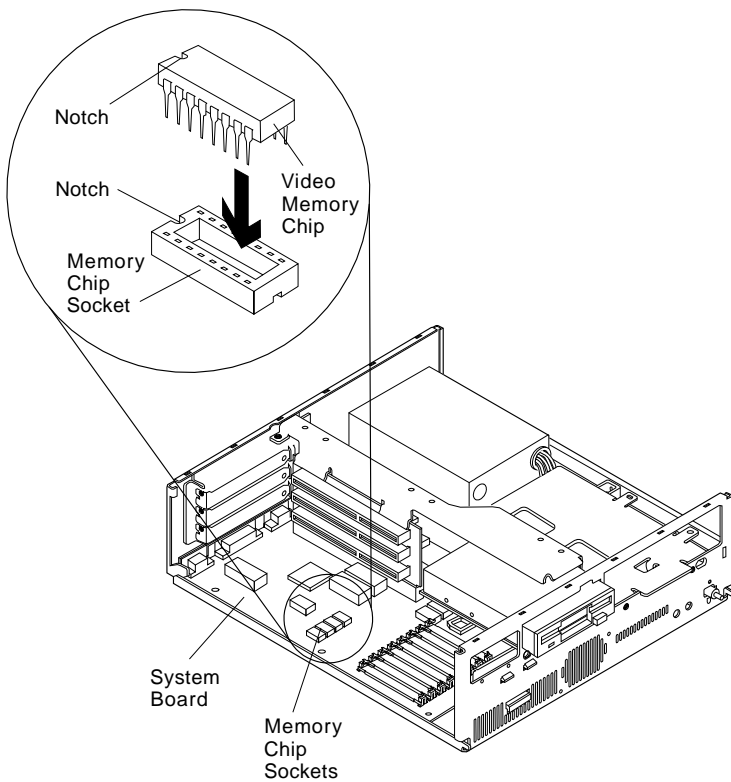


Figure 4-16. 486SX (30-Pin Memory SIMM) System Board

1060—Math Coprocessor (386SX, 486SX, and Upgrade for 486DX/486DX2)

Warning: The Math Coprocessor is sensitive to static discharge. See “Handling ESD-Sensitive Parts” on page 4-47.

Cover (1005).

Adapter Card (1035) if applicable.

Machine type 2133—Left DASD Support Bracket (1010).

Machine type 2155—Right DASD Support Bracket (1015).

Use a Coprocessor Removal Tool to remove the math coprocessor.

386SX System Board—When reinstalling, be certain the notch on the math coprocessor is aligned with the notch in the socket.

486SX System Board—When reinstalling, be certain the dot on the math coprocessor is aligned with the dot in the socket.

486DX (72-Pin Memory SIMM) System Board—When upgrading a 486DX (72-pin memory SIMM) to a 486DX2, refer to “2060—Upgrade Processor (486DX and 486DX2 with 72-Pin Memory SIMM Only)” on page 4-41 for the correct position of the processor.

Note: Run the Configuration Utility after adding or removing a math coprocessor.

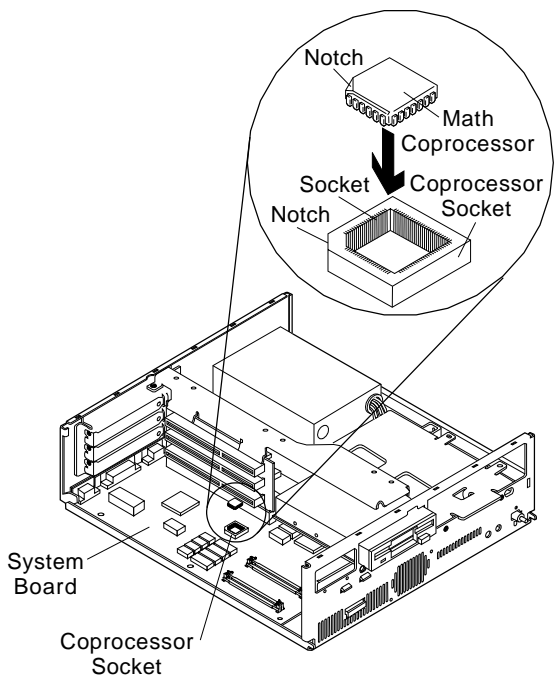


Figure 4-17. 386SX (72-Pin Memory SIMM) System Board

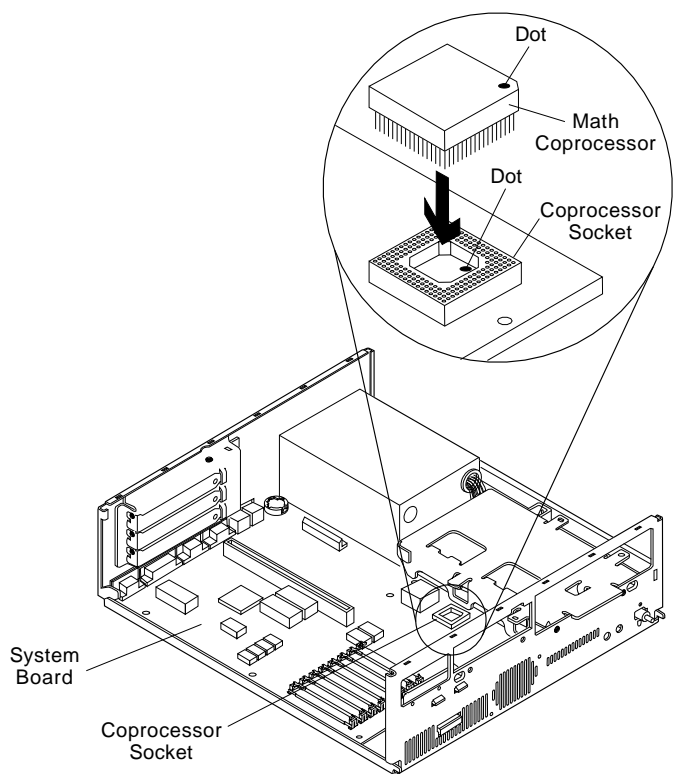


Figure 4-18. 486SX (30- or 72-Pin Memory SIMM) System Board

1080—Lithium Battery

Adapter Card (1035)

Left DASD Support Bracket (1010)

Riser Card (1045).

Insert the tip of a screwdriver under the clip and raise it carefully.

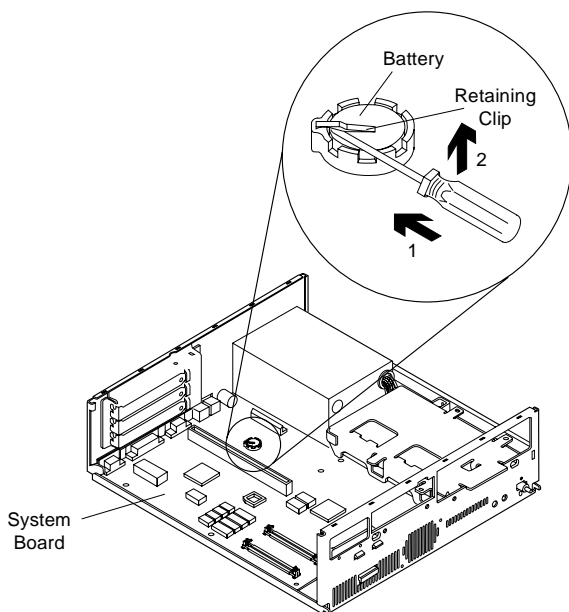
Remove the battery.

CAUTION:

The lithium battery presents a fire, explosion, or severe burn risk. Do not recharge it, disassemble it, heat it above 100°C (212°F), incinerate it, or expose its cell contents to water. Dispose of the battery as required by local ordinances or regulations.

Warning: The battery is located on the system board. Be careful when removing or replacing the battery. If the battery clip is broken, the system board must be replaced.

Note: Run the Configuration Utility after installing a battery.

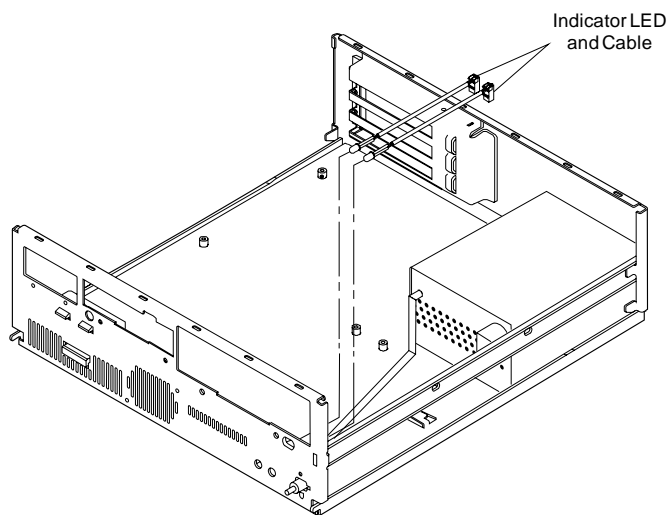


1085—Indicator LED and Cable

Left DASD Support Bracket (1010).

Right DASD Support Bracket (1015).

Push in on the indicator LED and remove from the rear.



1090—System Board

Adapter Card (1035).

Left DASD Support Bracket (1010).

Riser Card (1045).

Memory (SIMM) (1050) if applicable.

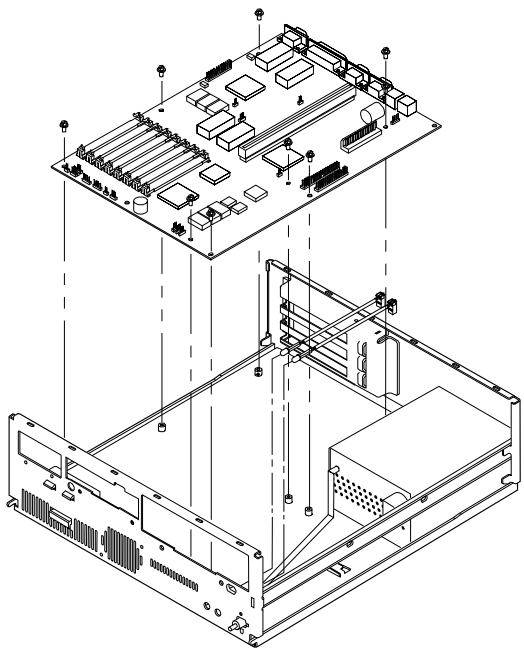
Video RAM (1055) if applicable.

Math Coprocessor (1060) if applicable.

Disconnect any cables necessary for removal.

Notes:

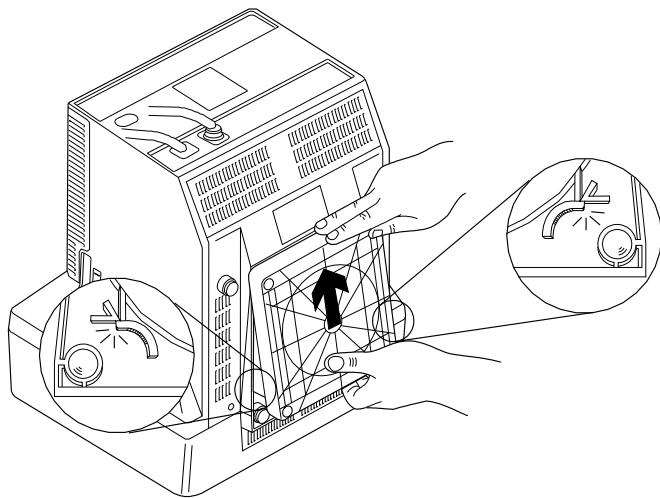
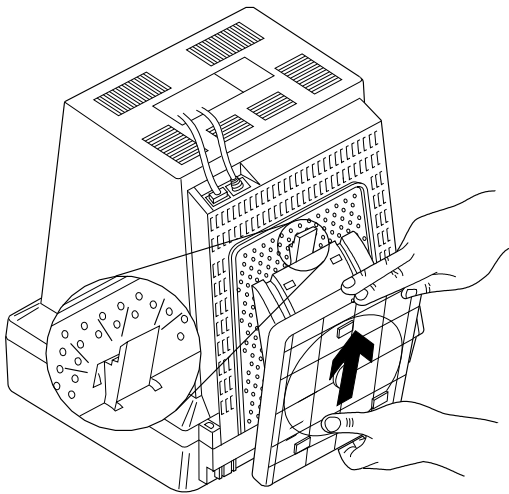
1. Be certain to reinstall the SIMMs, Math Coprocessor, video RAM, and cache in the new system board if applicable.
2. When reinstalling a new system board, push the board to the rear and place it over the front locating pin prior to installing the screws.
3. Run the Configuration Utility after changing the system board.



1100—Tilt Swivel

Use the correct picture below for your display.

Release the latch at the back of the tilt swivel assembly before removing (top picture only).



Removals and Replacements—Machine Type 2168

The arrows in the removals and replacements procedures show the direction of movement to remove a field-replaceable unit (FRU), to turn a screw, or to press a tab to release the FRU.

When other FRUs must be removed prior to removing the failing FRU, they are listed at the top of the page. Go to the removal procedure for each FRU listed, remove the FRU, and then continue with the removal of the failing FRU.

To replace a FRU, reverse the removal procedure and follow any notes that pertain to replacement. See “Parts/Test Point Locations” on page 5-1 for internal cable connection and arrangement information.

CAUTION:

Before removing any FRU, power off the system unit, unplug all power cords from electrical outlets, disconnect any interconnecting cables, and disconnect any telephone cords.

Warning: The system board, adapters, memory SIMMs, video RAM modules, and the math coprocessor can be damaged by electrostatic discharge. Use an electrostatic discharge ESD strap to establish personal grounding. If you don't have an ESD strap, establish personal grounding by touching a ground point with one hand before touching the static-sensitive FRUs.

2005—Cover

Unscrew the two screws behind the front handle.

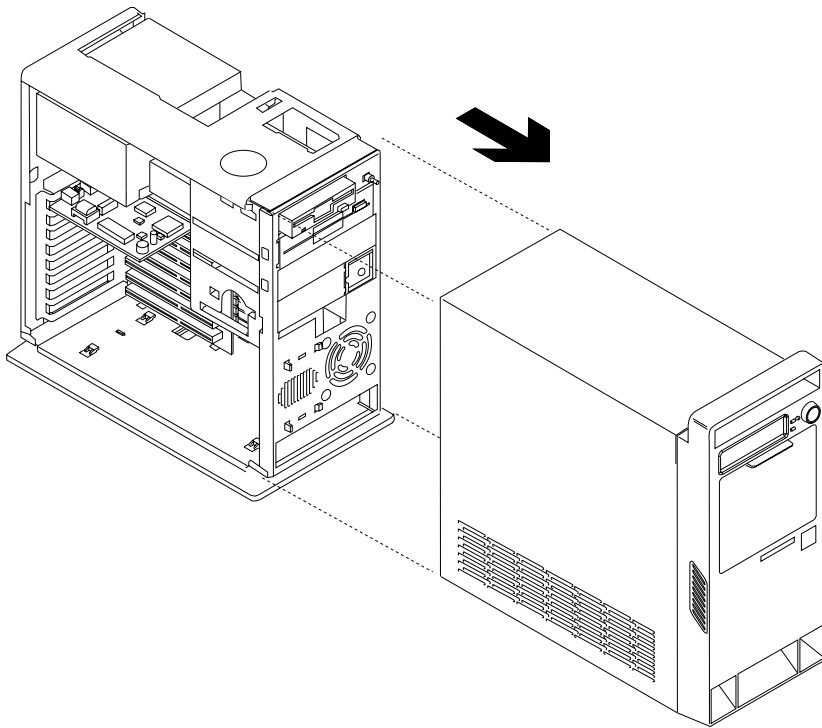


Figure 4-19. Cover Removal (Rear View)

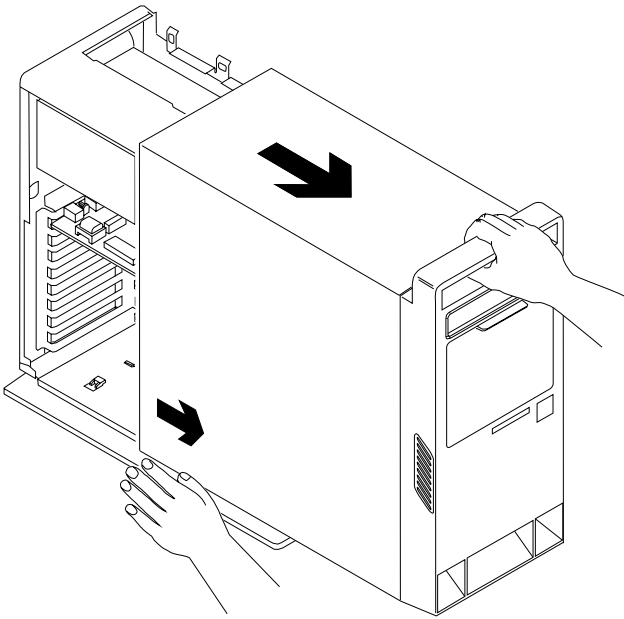


Figure 4-20. Pull Out on the Cover

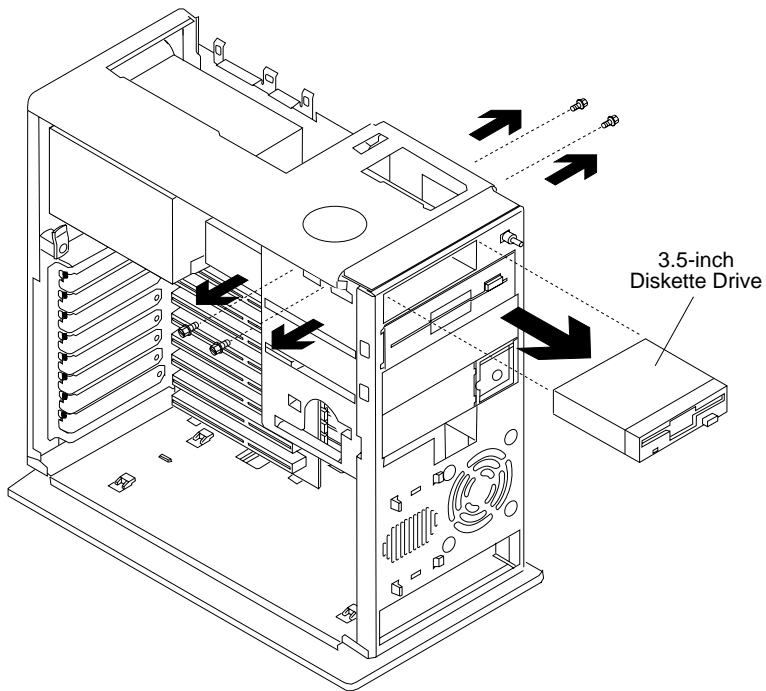
2020—3.5-Inch Diskette Drive

Cover (2005).

Disconnect any cables on the drive.

Remove the screws.

Pull out the diskette drive.



(Front View)

Figure 4-21. 3.5-inch Diskette Drive

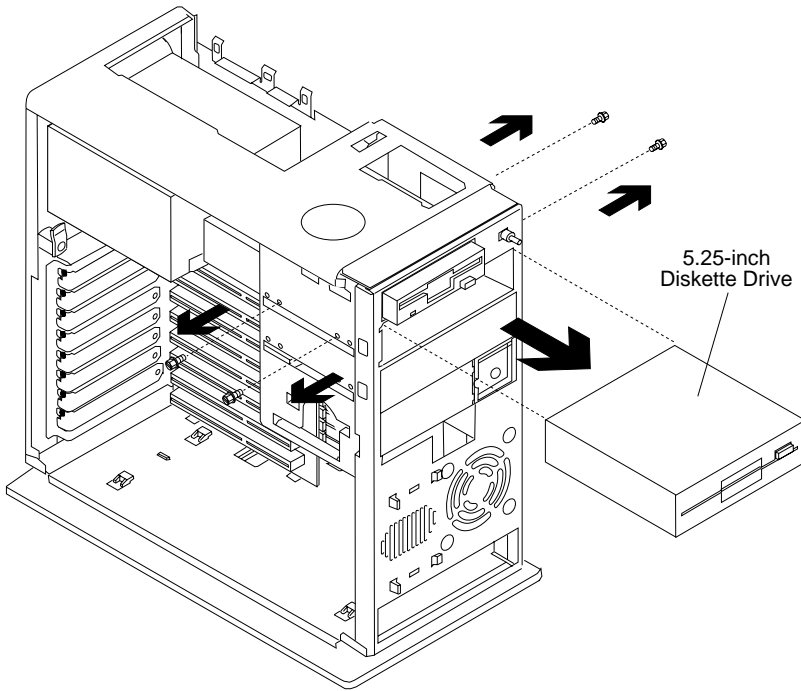
2025—5.25-Inch Diskette Drive

Cover (2005).

Disconnect any cables on the drive.

Remove the screws.

Pull out the diskette drive.



(Front View)

Figure 4-22. 5.25-inch Diskette Drive

2030—Hard Disk Drives

First Hard Disk Drive

Cover (2005).

Disconnect any cables on the drive.

Remove the screws.

Slide the hard disk drive to the rear and tilt to remove.

Note: Refer to Appendix, “Model Configurations and FRU Part Numbers” on page A-1 and install the correct software. For European models, refer to Table A-5 on page A-11 for the correct software.

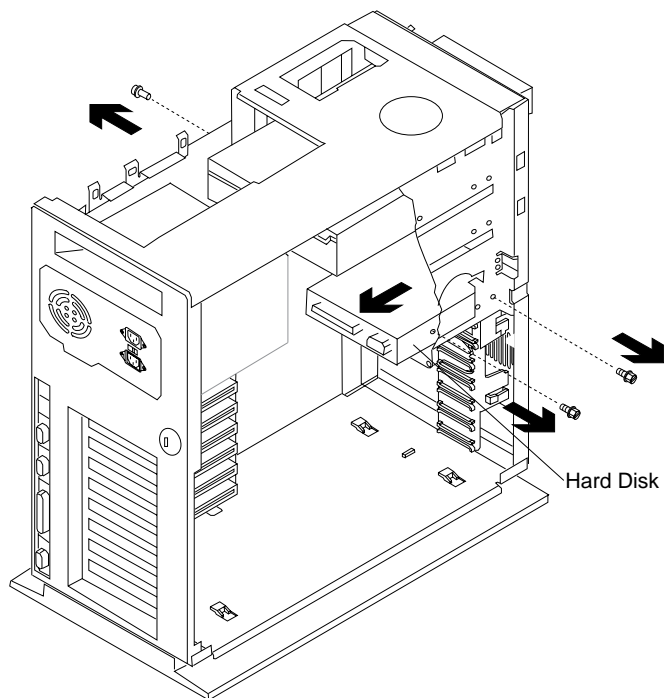


Figure 4-23. First Hard Disk Drive

Second Hard Disk Drive

Cover (2005).

Disconnect any cables on the drive.

Remove the screws.

Lift out the hard disk drive.

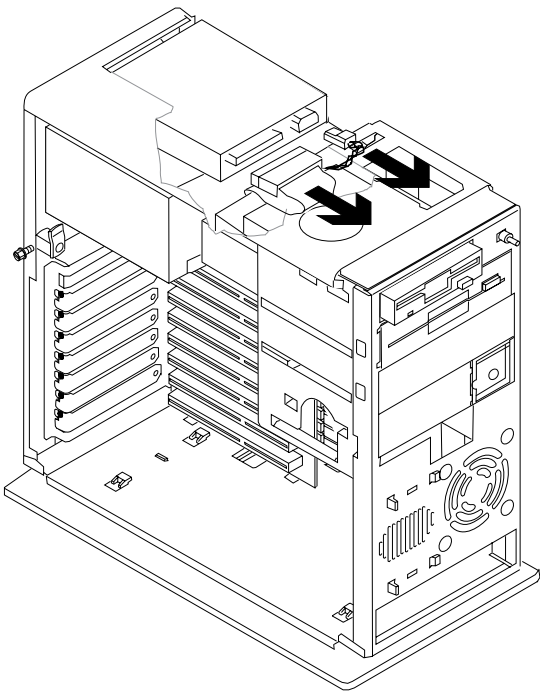


Figure 4-24. Second Hard Disk Drive

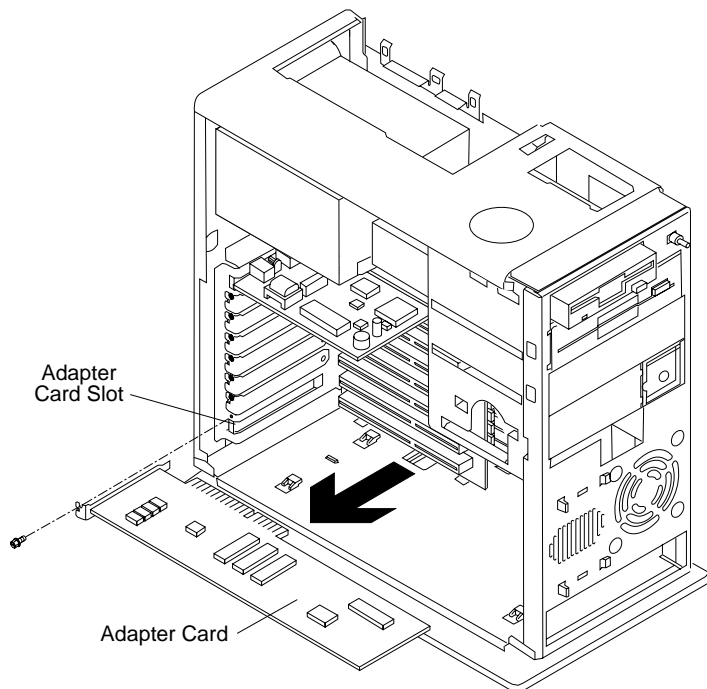
2035—Adapter Card

Note: Before replacing an adapter card, note the location of the adapter card and cables. When replacing an adapter card, install the replacement card in the same slot as the one you removed.

Cover (2005).

Remove the Adapter Card mounting screw.

Pull out the adapter card.



2040—Power Supply

Cover (2005).

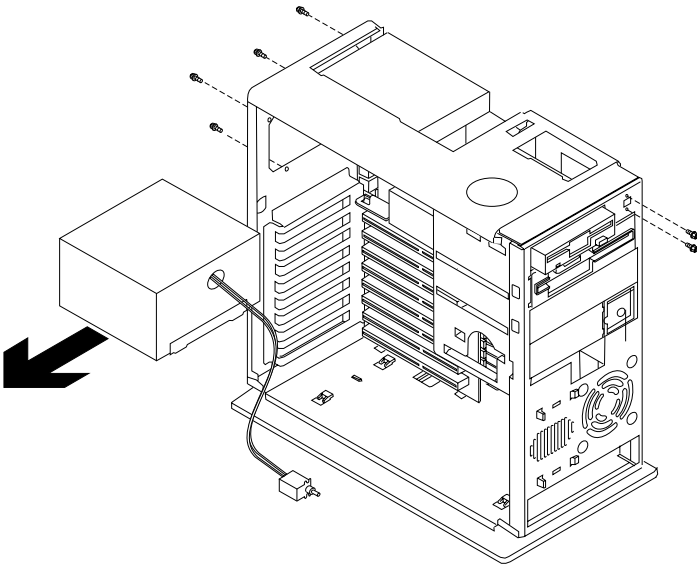
Disconnect any cables necessary for removal.

Remove the On/Off power switch mounting screws.

Remove the Power Supply mounting screws.

Lift out the Power Supply and cable/switch assembly.

Note: The Power Supply assembly includes the power switch.



2045—Riser Card

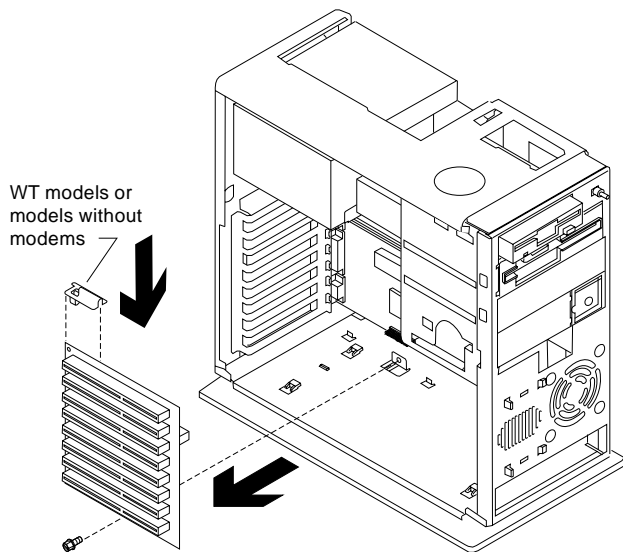
Cover (2005).

Adapter Card(s) (2035) if applicable.

Remove the Riser Card mounting screw.

Push up and remove the Riser Card support.

Remove the Riser Card.



2050—Memory (SIMM)

Warning: Memory cards are sensitive to static discharge. See “Handling ESD-Sensitive Parts” on page 4-47.

Cover (2005).

Push out on the side tabs (1) to release the module.

Pull the module straight out (2) to remove.

Note: Run the Configuration Utility after adding or removing memory.

See “Parts/Test Point Locations” on page 5-1 for SIMM type and location on the system board.

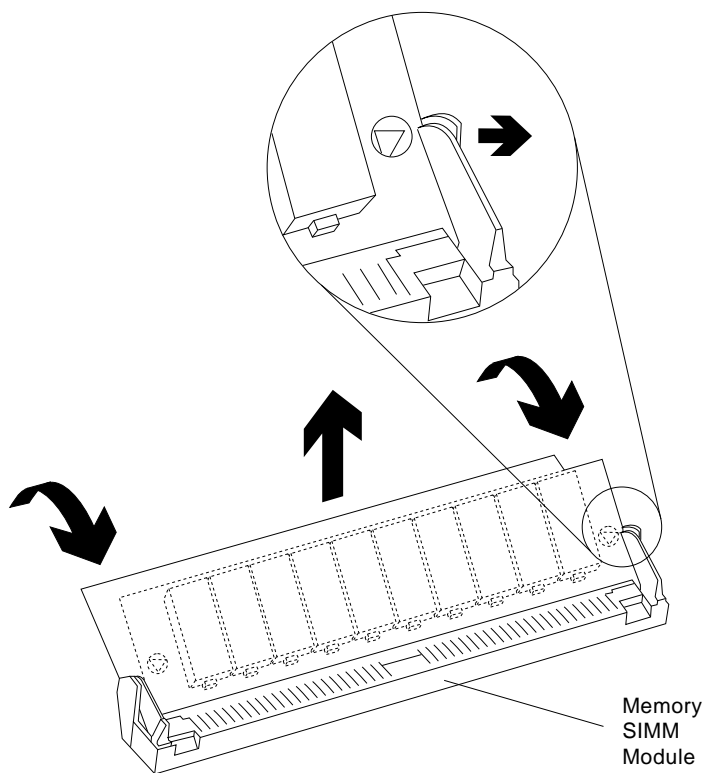


Figure 4-25. 486DX and 486DX2 72-Pin Memory SIMMs

2055—Cache Memory

Warning: Memory cards are sensitive to static discharge. See “Handling ESD-Sensitive Parts” on page 4-47.

Cover (2005)
Adapter Card(s) (2035) if applicable
Riser Card (2045) if applicable.

Note: Run the Configuration Utility after adding or removing cache memory.

If the system board has cache memory modules already installed, the computer has 128K of cache memory. Upgrade to 256K by adding memory modules as follows:

Bank 2 Add four 28-pin modules: 32K × 8, 25 ns SRAM.
Tag Replace existing module with one 28-pin module: 32K × 8, 20 ns SRAM.

If you are installing cache memory in a board with no cache memory previously installed, install 128K or 256K as follows:

Bank 1 Add four 28-pin modules: 32K × 8, 25 ns SRAM (for 128K or 256K).
Bank 2 Add four 28-pin modules: 32K × 8, 25 ns SRAM (for 256K).
Tag Add one 28-pin module: 32K × 8, 20 ns SRAM (for 256K) *or* 8K × 8, 20 ns SRAM (for 128K).

Cache memory jumpers are preset at the factory for 128K cache memory. Reset the jumpers for 256K by moving them forward to cover two jumper pins, as shown in Figure 4-26.

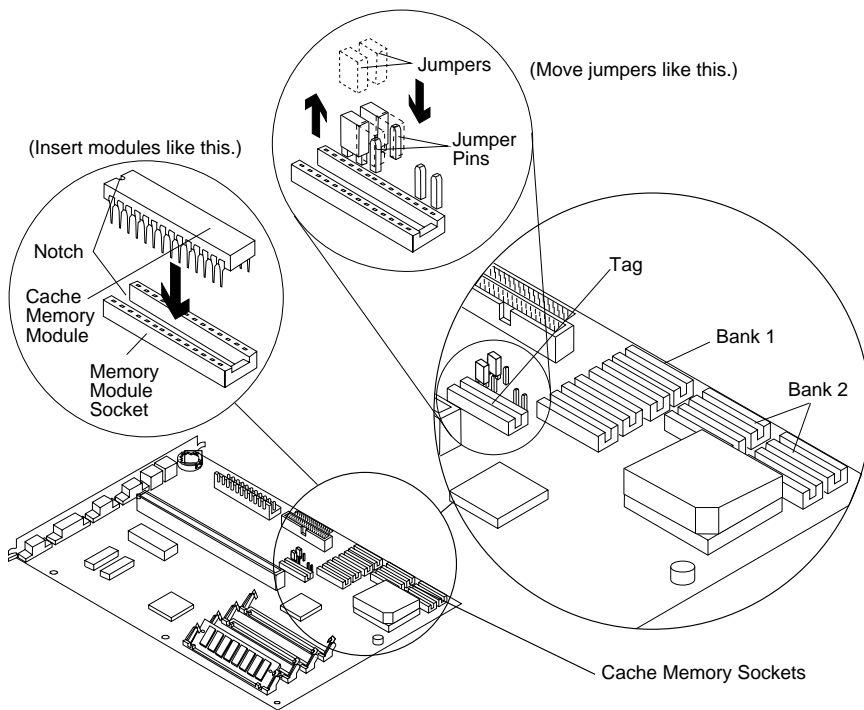


Figure 4-26. 486SX, 486DX, and 486DX2 (72-Pin Memory SIMM) System Boards

Note: Not all system boards have cache memory sockets. Some have 1 bank while others have 2 banks of cache memory.

2060—Upgrade Processor (486DX and 486DX2 with 72-Pin Memory SIMM Only)

Warning: The upgrade processor is sensitive to static discharge. See “Handling ESD-Sensitive Parts” on page 4-47.

Cover (2005).

Adapter Card(s) (2035) if applicable.

Determine which type of processor you are installing (see figures). Use a Coprocessor Removal Tool to remove the coprocessor. If you are installing in a socket like the one in Figure 4-27, remove the old processor, then insert the upgrade processor firmly in the socket. If you are installing in a socket like the one in Figure 4-28 on page 4-42, raise the socket lever, remove the old processor, insert the upgrade processor, then lower the socket lever firmly.

486DX System Board—When reinstalling, be certain the dot on the upgrade processor is aligned with the dot in the socket.

Note: Run the Configuration Utility after adding or removing an upgrade processor.

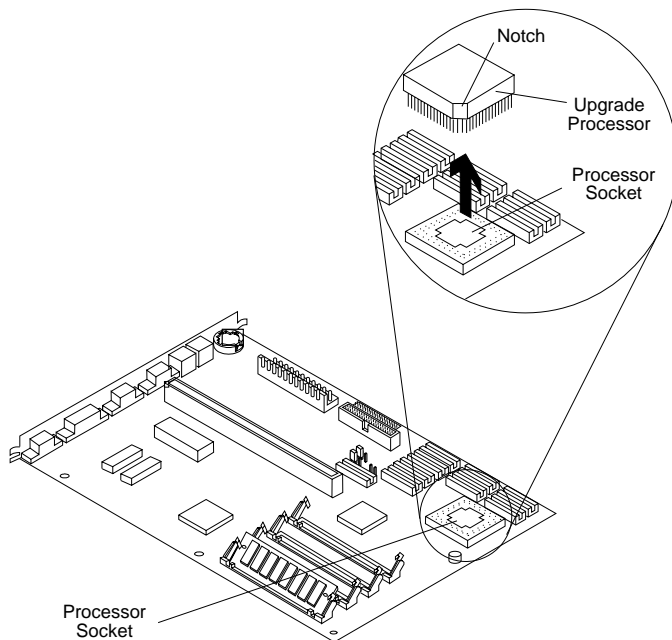


Figure 4-27. 486DX and 486DX2 (72-Pin Memory SIMM) System Boards

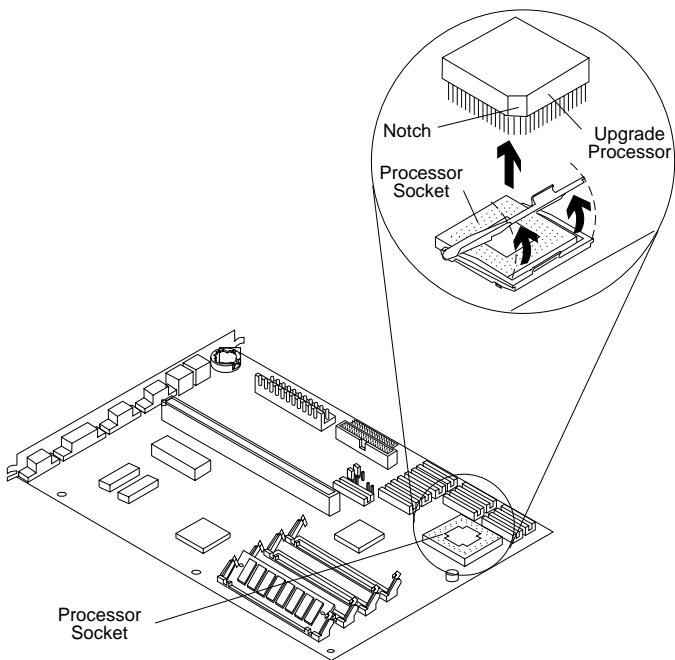


Figure 4-28. 486DX and 486DX2 (72-Pin Memory SIMM) System Boards

2080—Lithium Battery

Cover (2005).

Insert the tip of a screwdriver under the clip and raise it carefully.

Remove the battery.

CAUTION:

The lithium battery presents a fire, explosion, or severe burn risk. Do not recharge it, disassemble it, heat it above 100°C (212°F), incinerate it, or expose its cell contents to water. Dispose of the battery as required by local ordinances or regulations.

Warning: The battery is located on the system board. Be careful when removing or replacing the battery. If the battery clip is broken, the system board must be replaced.

Note: Run the Configuration Utility after installing a battery.

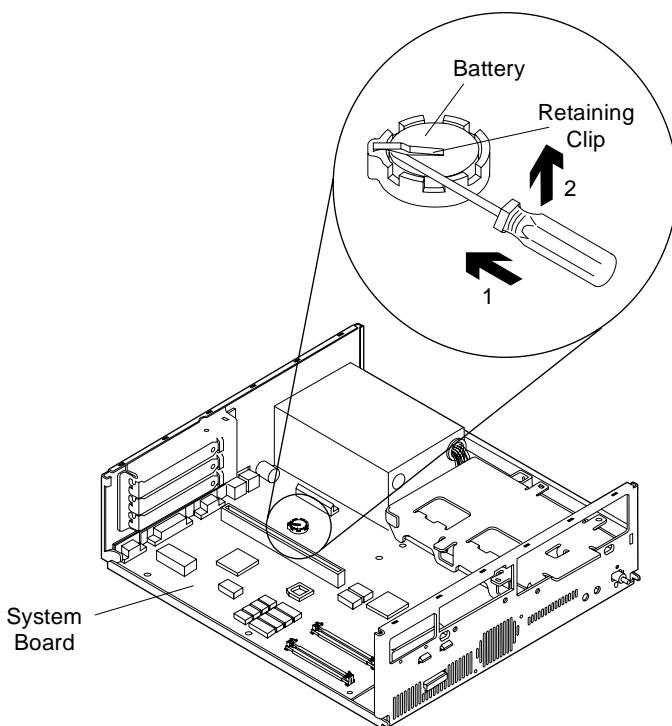


Figure 4-29. 486SX, 486DX, and 486DX2 (72-Pin Memory SIMM) System Boards

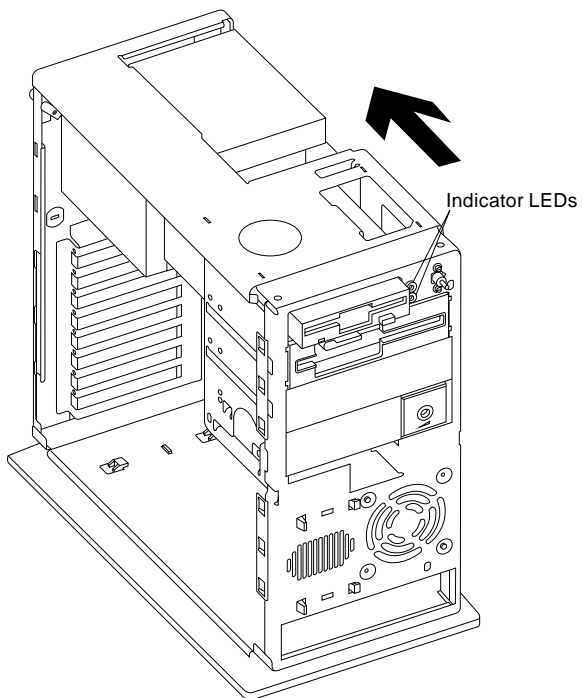
2085—Indicator LED and Cable

Cover (2005).

Push in on the indicator LED and remove from the rear.

Disconnect the LED and cable from the system board.

See “Parts/Test Point Locations” on page 5-1 for LED and cable locations.



2090—System Board

Cover (2005).

Adapter Card(s) (2035) if applicable.

Riser Card (2045) if applicable.

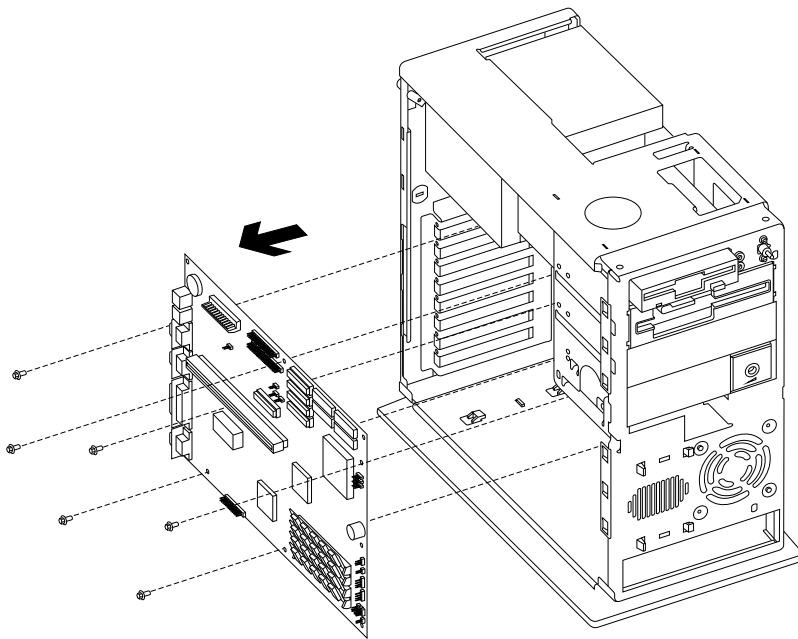
Disconnect any cables necessary for removal.

Memory (SIMM) (2050) if applicable.

Cache memory (2055) if applicable.

Notes:

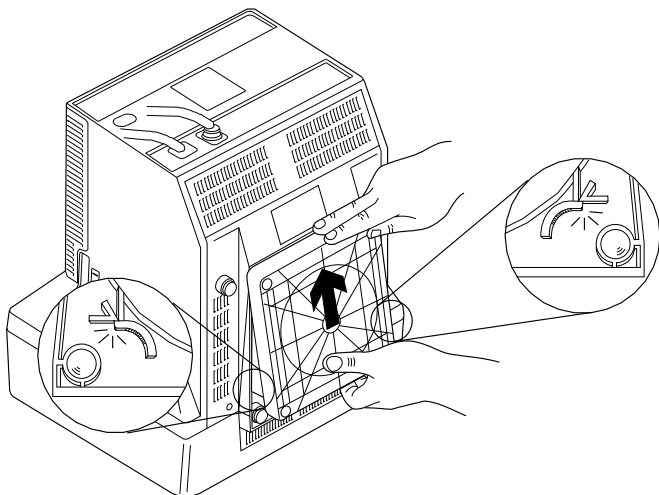
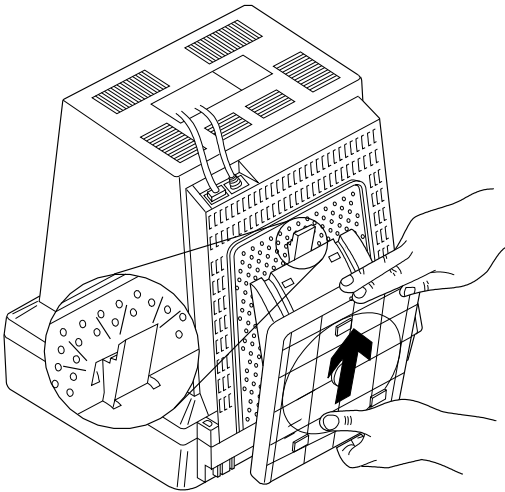
1. Be certain to reinstall the SIMMs and cache memory in the new system board if applicable.
2. When reinstalling a new system board, push the board to the rear and place it over the front locating pin prior to installing the screws.
3. Run the Configuration Utility after changing the the system board.



2100—Tilt Swivel

Use the correct picture below for your display.

Release the latch at the back of the tilt swivel assembly before removing (top picture only).



Handling ESD-Sensitive Parts

Many products use parts that are known to be sensitive to electrostatic discharge (ESD). To prevent damage when you work with ESD-sensitive parts, observe the following instructions. Do these in addition to taking all the usual precautions, such as switching off the power before removing logic cards.

Keep the ESD-sensitive part in its original shipping container (a special ESD bag) until you are ready to install the part into the machine.

Make the fewest possible movements with your body to prevent an increase of static electricity from clothing fibers, carpets, and furniture.

Put the ESD wrist strap on your wrist. Ensure the machine is turned off. Connect the wrist strap to the serial bracket mounting screw. This discharges any static electricity in your body to the machine frame.

Hold the ESD-sensitive part by its edge connector shroud (cover). *Do not touch its pins.* If you are removing a pluggable module, use the correct tool.

Do not place the ESD-sensitive part on the machine cover or on a metal table. If you need to put down the ESD-sensitive part for any reason, first put it into its special bag.

Machine covers and metal tables are electrical grounds. They increase the risk of damage because they make a discharge path from your body through the ESD-sensitive part. (Large metal objects can be discharge paths without being grounded.)

Prevent ESD-sensitive parts from being accidentally touched by other personnel or customers. Reinstall machine covers when you are not working on the machine.

If possible, keep all ESD-sensitive parts in a grounded metal cabinet (case).

Be extra careful while working with ESD-sensitive parts when cold-weather heating is used because low humidity increases static electricity.

Software Installation Procedure

The IBM PS/1 Recovery Diskette includes an Install program that can be used to restore the original PS/1 system software with the IBM Original PS/1 Software diskettes.

Refer to Appendix, "Model Configurations and FRU Part Numbers" on page A-1 to determine the correct software FRU part number. (For European countries, refer to Table A-5 on page A-11.) Then, install the original PS/1 software on the hard disk drive. Use the following procedure:

1. Power off the system unit.
2. Insert the IBM PS/1 Recovery Diskette into drive A.
3. Power on the system unit.
4. Select "Install PS/1 Software" item on the IBM DOS SHELL menu.
5. Follow the instructions on the display. (You will be prompted for each of the IBM Original PS/1 Software diskettes).
6. When the Install program has finished, remove the diskette and press Ctrl-Alt-Del to restart the system.

Parts/Test Point Locations

System Board Layouts	5-2
386SX 25MHz (72-Pin Memory SIMM) System Board Layout	5-3
386SX 25MHz (72-Pin Memory SIMM) System Board Layout	5-5
386SX 25MHz (72-Pin Memory SIMM) System Board Layout	5-7
486SX 20MHz/486SX 25MHz Level 1 (30-Pin Memory SIMM) System Board Layout	5-9
486SX 25MHz Level 2 (30-Pin Memory SIMM) System Board Layout	5-11
486DX 33MHz (30-Pin Memory SIMM) System Board Layout	5-13
486SX 33MHz (72-Pin Memory SIMM) System Board Layout	5-15
486DX 25MHz/486DX2 50MHz or 486DX 33MHz/486DX2 66MHz (72-Pin Memory SIMM) System Board Layout	5-17
Detachable Display System I/O Signal Cable Connector Test Points	5-19
System Board Connector Assignments	5-20

System Board Layouts

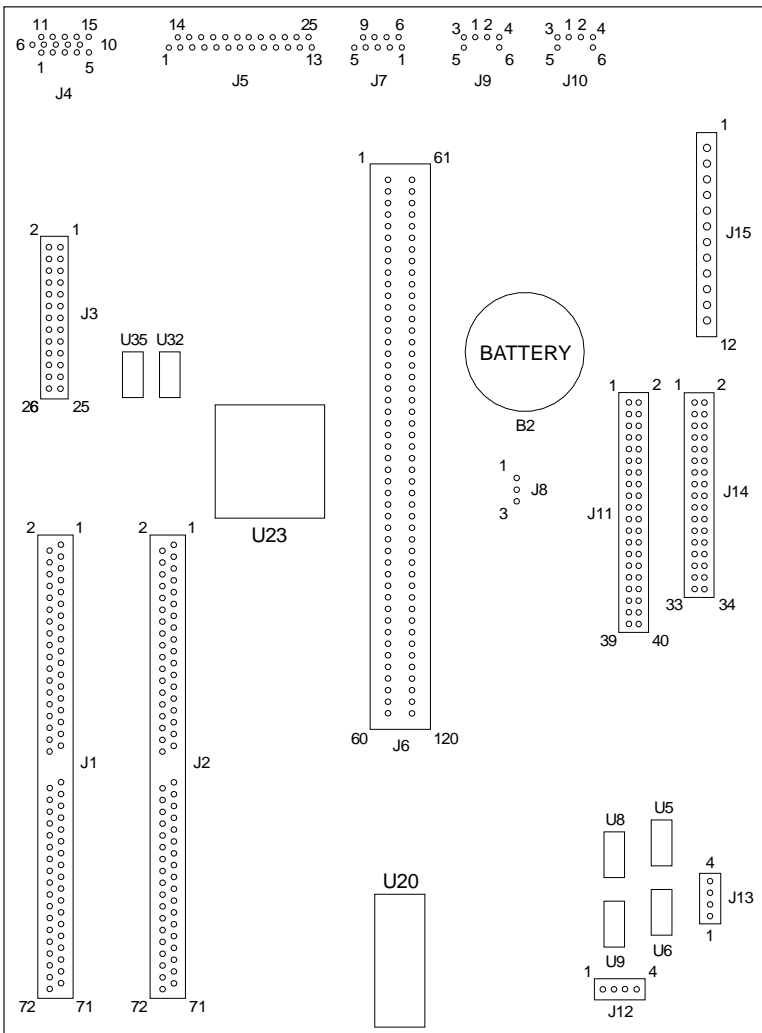


Figure 5-1. 386SX 25MHz (72-Pin Memory SIMM) System Board with 2MB RAM and 25 6K Video Memory

386SX 25MHz (72-Pin Memory SIMM) System Board Layout

B2	Battery
J1	72-Pin Memory SIMM Bank 1
J2	72-Pin Memory SIMM Bank 0
J3	Video Feature
J4	Display/Signal
J5	Parallel Port
J6	Riser
J7	Serial Port
J8	Password Bypass
J9	Mouse
J10	Keyboard
J11	Hard Disk
J12	Beeper Bypass
J13	Pins 1 and 2—Power On LED Pins 3 and 4—Hard Disk LED
J14	Diskette
J15	Power
U10	386SX Processor
U20	BIOS
U23	Math Coprocessor
U5	512K X 9 System Memory
U6	512K X 9 System Memory
U8	512K X 9 System Memory
U9	512K X 9 System Memory
U32	256K X 4 Video Memory
U33	256K X 4 Video Memory

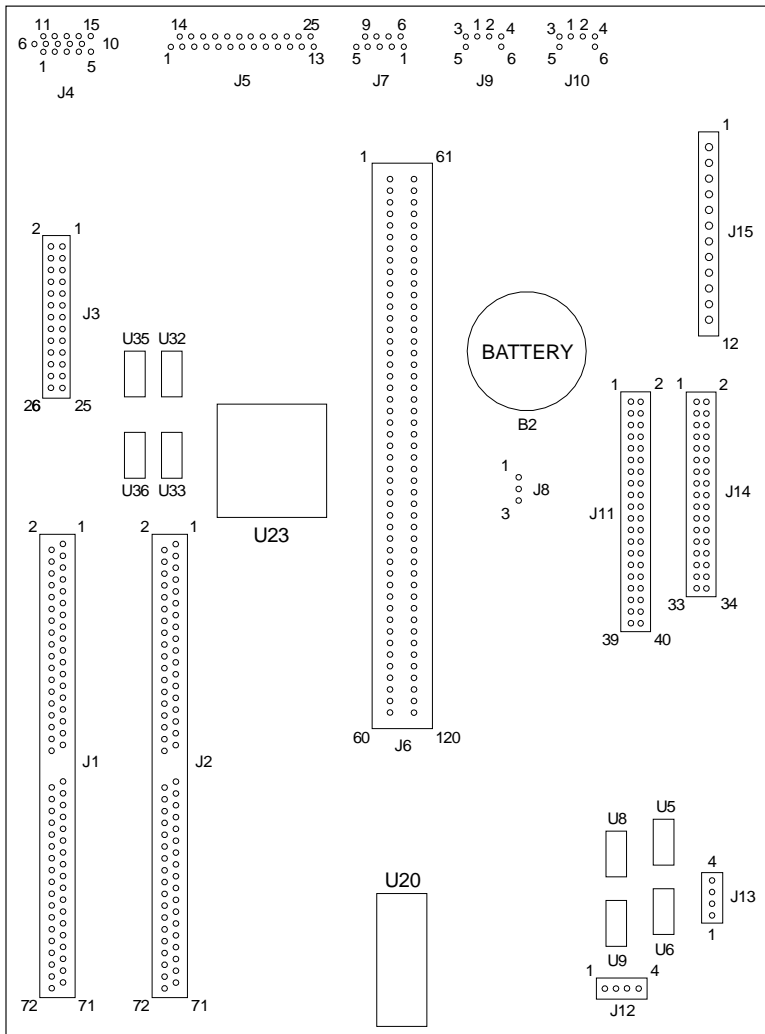


Figure 5-2. 386SX 25MHz (72-Pin Memory SIMM) System Board with 2MB RAM and 512K Video Memory

386SX 25MHz (72-Pin Memory SIMM) System Board Layout

B2	Battery
J1	72-Pin Memory SIMM Bank 1
J2	72-Pin Memory SIMM Bank 0
J3	Video Feature
J4	Display/Signal
J5	Parallel Port
J6	Riser
J7	Serial Port
J8	Password Bypass
J9	Mouse
J10	Keyboard
J11	Hard Disk
J12	Beeper Bypass
J13	Pins 1 and 2—Power On LED Pins 3 and 4—Hard Disk LED
J14	Diskette
J15	Power
U10	386SX Processor
U20	BIOS
U23	Math Coprocessor
U5	512K X 9 System Memory
U6	512K X 9 System Memory
U8	512K X 9 System Memory
U9	512K X 9 System Memory
U32	256K X 4 Video Memory
U33	256K X 4 Video Memory
U35	256K X 4 Video Memory
U36	256K X 4 Video Memory

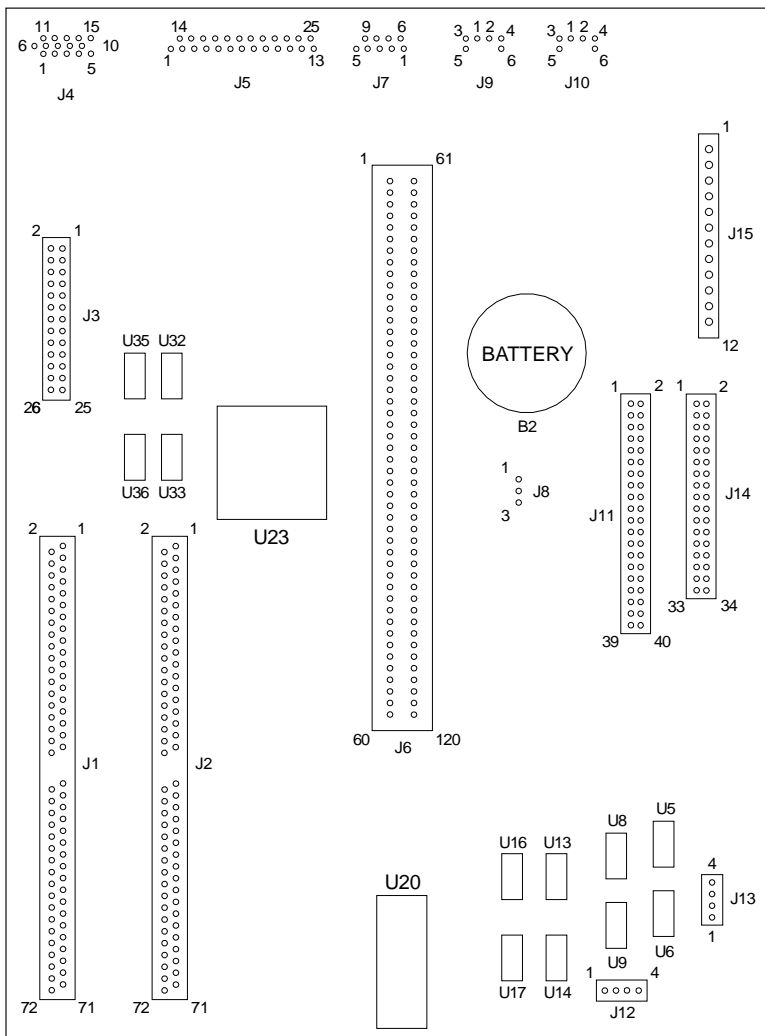


Figure 5-3. 386SX 25MHz (72-Pin Memory SIMM) System Board with 4MB RAM and 512K Video Memory

386SX 25MHz (72-Pin Memory SIMM) System Board Layout

B2	Battery
J1	72-Pin Memory SIMM Bank 1
J2	72-Pin Memory SIMM Bank 0
J3	Video Feature
J4	Display/Signal
J5	Parallel Port
J6	Riser
J7	Serial Port
J8	Password Bypass
J9	Mouse
J10	Keyboard
J11	Hard Disk
J12	Beeper Bypass
J13	Pins 1 and 2—Power On LED Pins 3 and 4—Hard Disk LED
J14	Diskette
J15	Power
U10	386SX Processor
U20	BIOS
U23	Math Coprocessor
U5	512K X 9 System Memory
U6	512K X 9 System Memory
U8	512K X 9 System Memory
U9	512K X 9 System Memory
U13	512K X 9 System Memory
U14	512K X 9 System Memory
U16	512K X 9 System Memory
U17	512K X 9 System Memory
U32	256K X 4 Video Memory
U33	256K X 4 Video Memory
U35	256K X 4 Video Memory
U36	256K X 4 Video Memory

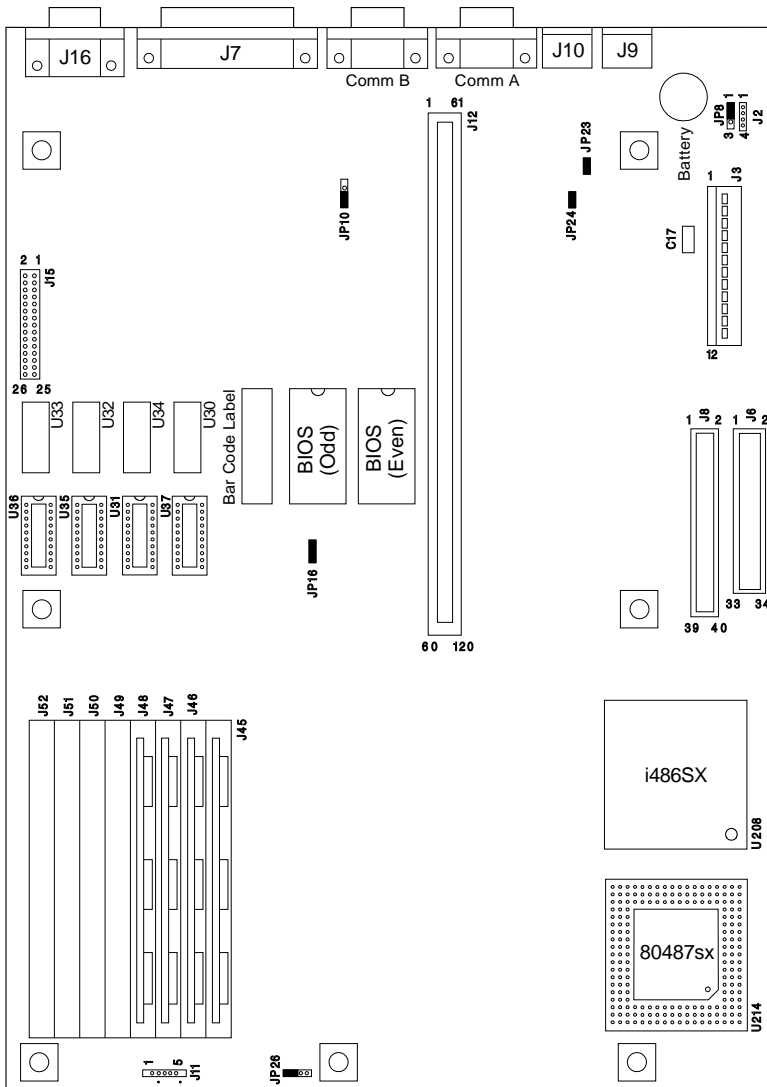


Figure 5-4. 486SX 20MHz/486SX 25MHz Level 1 (30-Pin Memory SIMM) System Board

486SX 20MHz/486SX 25MHz Level 1 (30-Pin Memory SIMM) System Board Layout

J2	External Battery
J3	Power
J6	Diskette
J7	Parallel Port
Comm A	Serial Port
Comm B	Serial Port
J8	Hard Disk
J9	Keyboard
J10	Mouse
J11	Hard Disk LED (pin 4 and 5) Power On LED (pin 1 and 2)
J12	Riser
J15	Video Feature
J16	Display/Signal
J45	30-Pin Memory SIMM Socket Bank 0, 0
J46	30-Pin Memory SIMM Socket Bank 0, 1
J47	30-Pin Memory SIMM Socket Bank 0, 2
J48	30-Pin Memory SIMM Socket Bank 0, 3
J49	30-Pin Memory SIMM Socket Bank 1, 0
J50	30-Pin Memory SIMM Socket Bank 1, 1
J51	30-Pin Memory SIMM Socket Bank 1, 2
J52	30-Pin Memory SIMM Socket Bank 1, 3
JP7	Reset Switch
JP8	Battery Select
JP10	VGA Enable
JP16	PCK Enable
JP23	BIOS Select
JP24	Mouse Enable
JP26	Beeper Enable
U31	Video RAM Socket
U35	Video RAM Socket
U36	Video RAM Socket
U37	Video RAM Socket
U208	486SX Processor
U214	Math Coprocessor Socket

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

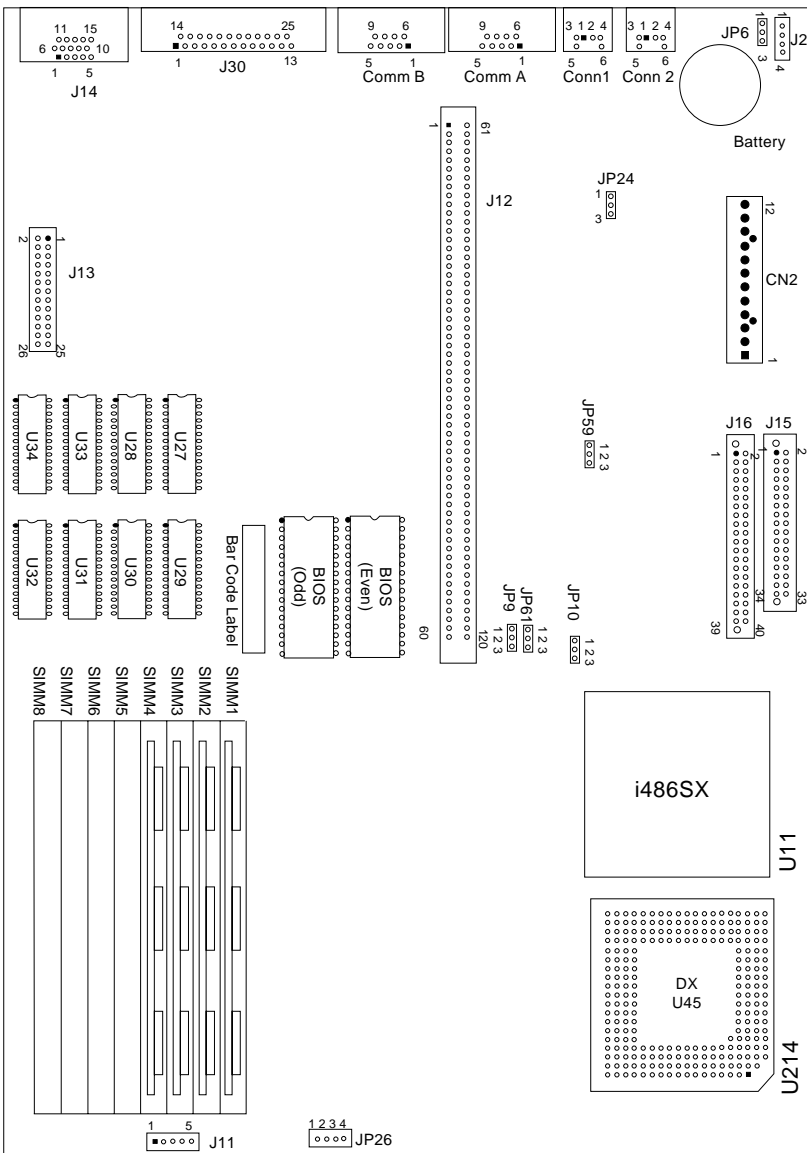


Figure 5-5. 486SX 25MHz Level 2 (30-Pin Memory SIMM) System Board

486SX 25MHz Level 2 (30-Pin Memory SIMM) System Board Layout

J2	External Battery
CN2	Power
J15	Diskette
J30	Parallel Port
J16	Hard Disk
Comm A	Serial Port
Comm B	Serial Port
CONN2	Keyboard
CONN1	Mouse
J11	Hard Disk LED (pin 4 and 5) Power On LED (pin 1 and 2)
J12	Riser
J13	Video Feature
J14	Display/Signal
SIMM1	30-Pin Memory SIMM Socket Bank 0, 0
SIMM2	30-Pin Memory SIMM Socket Bank 0, 1
SIMM3	30-Pin Memory SIMM Socket Bank 0, 2
SIMM4	30-Pin Memory SIMM Socket Bank 0, 3
SIMM5	30-Pin Memory SIMM Socket Bank 1, 0
SIMM6	30-Pin Memory SIMM Socket Bank 1, 1
SIMM7	30-Pin Memory SIMM Socket Bank 1, 2
SIMM8	30-Pin Memory SIMM Socket Bank 1, 3
JP7	Reset Switch
JP8	Battery Select
JP10	VGA Enable
JP16	PCK Enable
JP61	CPU Select
JP9	CPU Select
JP24	Mouse Enable
JP26	Beeper Enable
U29	Video RAM Socket
U30	Video RAM Socket
U31	Video RAM Socket
U32	Video RAM Socket
U11	486SX Processor
U214	Math Coprocessor Socket

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

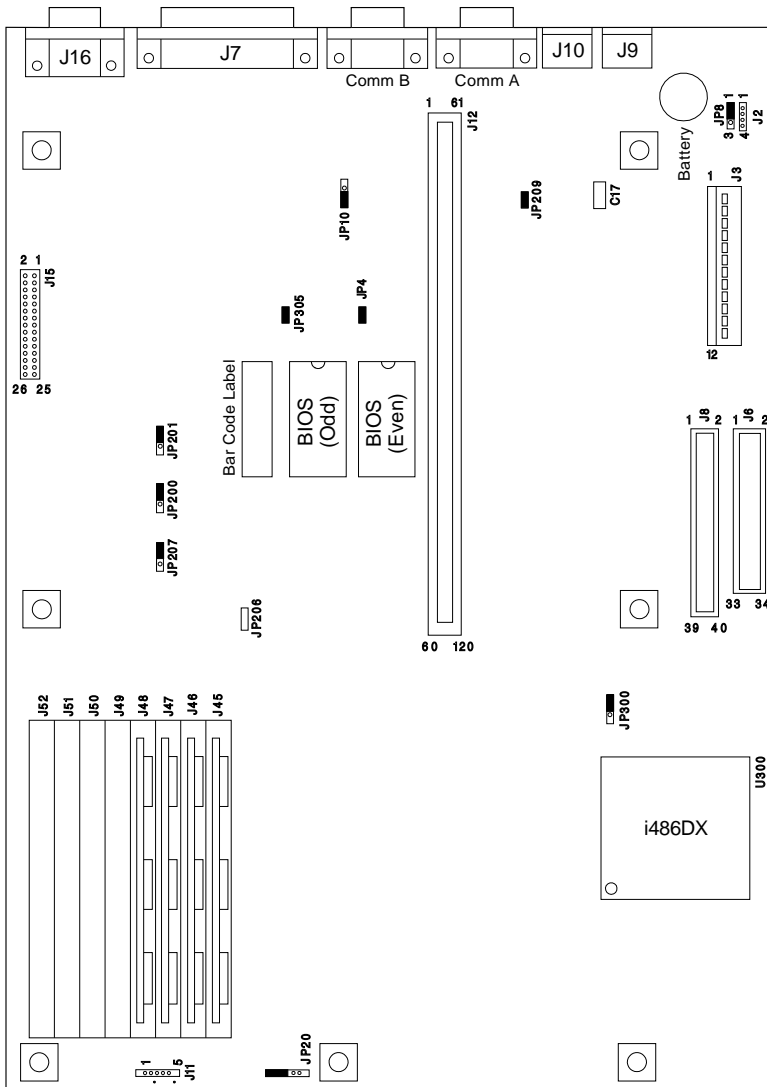


Figure 5-6. 486DX 33MHz (30-Pin Memory SIMM) System Board

486DX 33MHz (30-Pin Memory SIMM) System Board Layout

J2	External Battery
J3	Power
J6	Diskette
J7	Parallel Port
Comm A	Serial Port
Comm B	Serial Port
J8	Hard Disk
J9	Keyboard
J10	Mouse
J11	Hard Disk LED (pin 4 and 5) Power On LED (pin 1 and 2)
J12	Riser
J15	Video Feature
J16	Display/Signal
J45	30-Pin Memory SIMM Socket Bank 0, 0
J46	30-Pin Memory SIMM Socket Bank 0, 1
J47	30-Pin Memory SIMM Socket Bank 0, 2
J48	30-Pin Memory SIMM Socket Bank 0, 3
J49	30-Pin Memory SIMM Socket Bank 1, 0
J50	30-Pin Memory SIMM Socket Bank 1, 1
J51	30-Pin Memory SIMM Socket Bank 1, 2
J52	30-Pin Memory SIMM Socket Bank 1, 3
JP4	BIOS Select
JP7	Reset Switch
JP8	Battery Select
JP10	VGA Enable
JP20	Beeper Enable
JP200	Cache Configuration
JP201	Cache Configuration
JP206	Cache Configuration
JP207	Cache Configuration
JP209	Mouse Enable
JP300	Processor Type
JP305	IRQ9
U300	486DX Processor

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

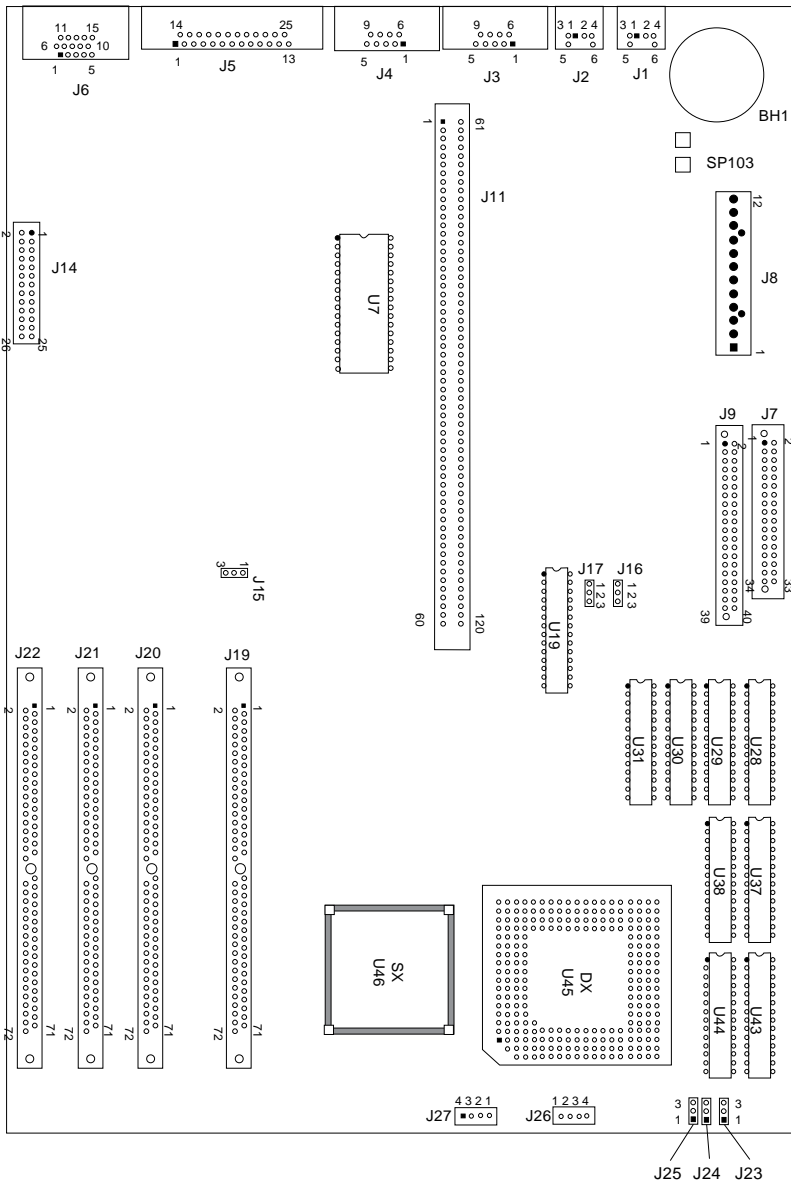


Figure 5-7. 486SX 33MHz (72-Pin Memory SIMM) System Board

486SX 33MHz (72-Pin Memory SIMM) System Board Layout

BH1	External Battery
J1	Keyboard
J2	Mouse
J3	Serial Port A
J4	Serial Port B
J5	Parallel Port
J6	Display Signal
J7	Diskette
J8	Power
J9	Hard Disk Drive
J11	Riser Card
J14	Video Feature
J15	Video Disable (normal operation is pin 1, 2)
J16	Cache Jumper (must be in pin 2, 3 for upgrade to 256K)
J17	Cache Jumper (must be in pin 2, 3 for upgrade to 256K)
	SIMM sockets can be populated in any order.
J19	RAM 72-Pin Memory SIMM Socket - Bank 3
J20	RAM 72-Pin Memory SIMM Socket - Bank 2
J21	RAM 72-Pin Memory SIMM Socket - Bank 1
J22	RAM 72-Pin Memory SIMM Socket - Bank 0
J23	Processor-type jumper. See 5-18.
J24	Processor-type jumper. See 5-18.
J25	Processor-type jumper. See 5-18.
J26	LED Connector—Power: 1, 2 Hard Disk Drive: 3, 4
J27	Speaker Volume Control (WT only)
SP103	Password Bypass
SP193	Beeper
U7	System ROM
U19	Cache Memory Socket (for address module) 128K/256K
U28	Cache Memory Socket Bank 1
U29	Cache Memory Socket
U30	Cache Memory Socket
U31	Cache Memory Socket
U37	Cache Memory Socket Bank 2
U38	Cache Memory Socket Bank 2
U43	Cache Memory Socket Bank 2
U44	Cache Memory Socket Bank 2
U45	486DX, 486 Math, 486DX2, 486 Overdrive, or Pentium** ODP Processor
U46	486SX Processor

Note: Jumpers must be checked against information above.

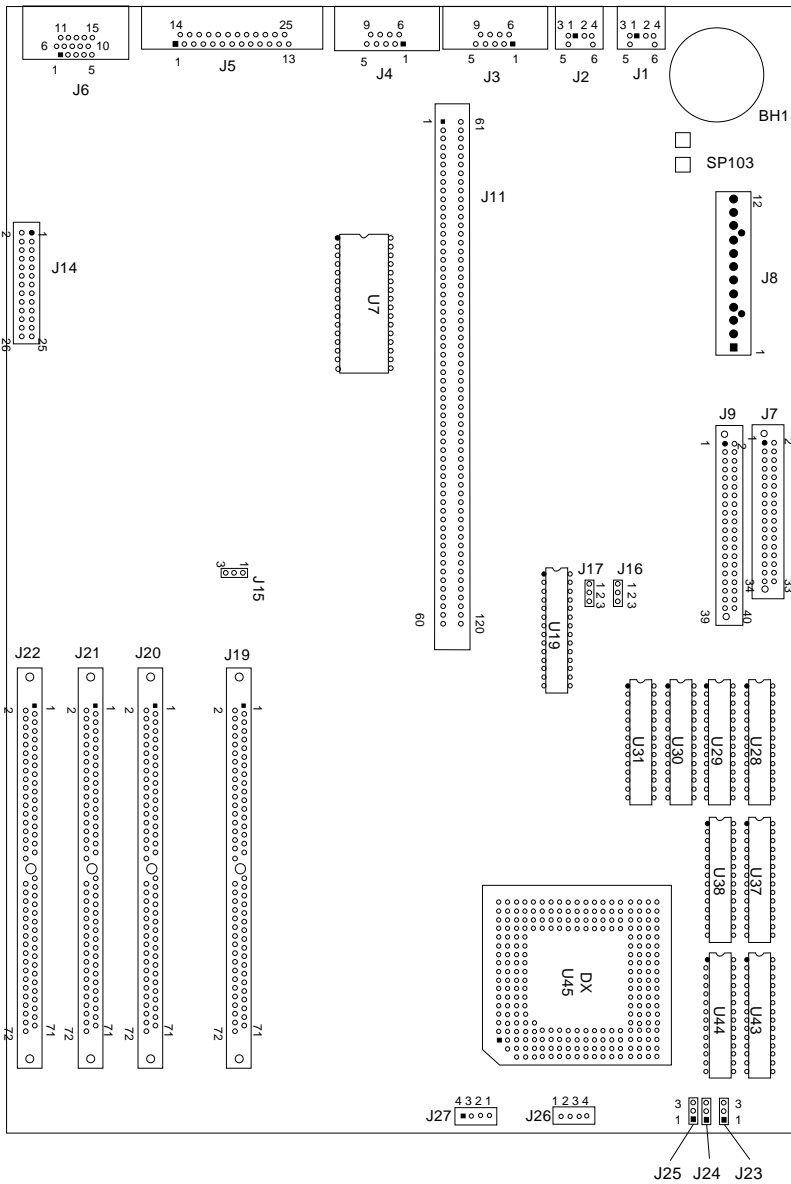


Figure 5-8. 486DX 25MHz/486DX2 50MHz or 486DX 33MHz/486DX2 66MHz (72-Pin Memory SIMM) System Board

486DX 25MHz/486DX2 50MHz or 486DX 33MHz/486DX2 66MHz (72-Pin Memory SIMM) System Board Layout

BH1	External Battery
J1	Keyboard
J2	Mouse
J3	Serial Port A
J4	Serial Port B
J5	Parallel Port
J6	Display Signal
J7	Diskette
J8	Power
J9	Hard Disk Drive
J11	Riser Card
J14	Video Feature
J15	Video Disable (normal operation is pin 1, 2)
J16	Cache Jumper (must be in pin 2, 3 for upgrade to 256K)
J17	Cache Jumper (must be in pin 2, 3 for upgrade to 256K)
	SIMM sockets can be populated in any order.
J19	RAM 72-Pin Memory SIMM Socket - Bank 3
J20	RAM 72-Pin Memory SIMM Socket - Bank 2
J21	RAM 72-Pin Memory SIMM Socket - Bank 1
J22	RAM 72-Pin Memory SIMM Socket - Bank 0
J23	Processor-type jumper. See 5-18.
J24	Processor-type jumper. See 5-18.
J25	Processor-type jumper. See 5-18.
J26	LED Connector—Power: 1, 2 Hard Disk Drive: 3, 4
J27	Speaker Volume Control (WT only)
SP103	Password Bypass
SP193	Beeper
U7	System ROM
U19	Cache Memory Socket (for address module) 128K/256K
U28	Cache Memory Socket Bank 1
U29	Cache Memory Socket
U30	Cache Memory Socket
U31	Cache Memory Socket
U37	Cache Memory Socket Bank 2
U38	Cache Memory Socket Bank 2
U43	Cache Memory Socket Bank 2
U44	Cache Memory Socket Bank 2
U45	486DX, 486 Math, 486DX2, 486 Overdrive, or Pentium ODP Processor

Note: Jumpers must be checked against information above.

Table 5-1. Processor Jumper Settings for J23, J24, and J25

486SX System Boards				
	486SX	486SX/487 Math	486SX/486 Overdrive	486SX/Pentium ODP
J23	1, 2	1, 2	1, 2	1, 2
J24	1, 2	1, 2	1, 2	1, 2
J25	1, 2	2, 3	2, 3	2, 3
486DX and 486DX2 System Boards				
	486DX	486DX2	Pentium ODP	
J23	1, 2	1, 2	1, 2	
J24	1, 2	1, 2	1, 2	
J25	1, 2	1, 2	2, 3	

If the system board has cache memory modules already installed, the computer has 128K of cache memory. Upgrade to 256K by adding memory modules as follows:

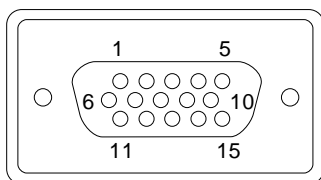
- Bank 2** Add four 28-pin modules: 32K × 8, 25 ns SRAM.
- Tag** Replace existing module with one 28-pin module: 32K × 8, 20 ns SRAM.

If you are installing cache memory in a board with no cache memory previously installed, install 128K or 256K as follows:

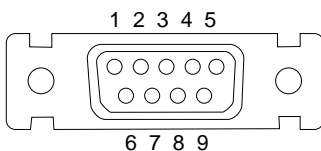
- Bank 1** Add four 28-pin modules: 32K × 8, 25 ns SRAM (for 128K or 256K).
- Bank 2** Add four 28-pin modules: 32K × 8, 25 ns SRAM (for 256K).
- Tag** Add one 28-pin module: 32K × 8, 20 ns SRAM (for 256K) **or** 8K × 8, 20 ns SRAM (for 128K).

Cache memory jumpers are preset at the factory for 128K cache memory. Reset the jumpers for 256K by moving them forward to cover two jumper pins, as shown in Figure 4-15 on page 4-19.

Detachable Display System I/O Signal Cable Connector Test Points



System-end



Display-end

Figure 5-9. Detachable Display System I/O Signal Cable Connectors

Test each connector between the following pins:

Display Pin	System Pin
1	1
2	2
3	3
13	4
14	5
6	6
7	7
8	8
10	9
11	9

System Board Connector Assignments

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	Synch Ground	
6	Red Ground	
7	Green Ground	
8	Blue Ground	
9	No Connection	
10	Synch Ground	
11	Monitor ID Bit 0	I
12	Monitor ID Bit 1	I
13	Horizontal Synch	O
14	Vertical Synch	O
15	Monitor ID Bit 3	I

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

Pin	Signal Name	I/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

Serial Ports

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

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	

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	

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

Pin	Signal Name
7	Ground
8	Ground
9	-5 V dc
10	+5 V dc
11	+5 V dc
12	+5 V dc

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	

Pin	Signal Name	I/O
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.

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	

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

AT Expansion Bus (Riser)

Note: Pin A is the system board pin. Pin B is the riser card pin.

Pin A	Signal Name	Pin B	I/O
1	+12 V dc	B9	
2	+5 V dc		
3	Ground		
4	Ground	B1	
5	Reset Drv	B2	O
6	+5 V dc	B3	
7	IRQ9	B4	I
8	-5 V dc	B5	
9	DRQ2	B6	I
10	-12 V dc	B7	
11	OVS	B8	
12	+12 V dc	B9	
13	Ground	B10	
14	SMEMW	B11	O
15	SMEMR	B12	O
16	IOW	B13	I/O
17	IOR	B14	I/O
18	DACK3	B15	O
19	DRQ3	B16	I
20	DACK1	B17	O
21	DRQ1	B18	I
22	Refresh	B19	I/O
23	System Clock	B20	O
24	IRQ7	B21	I
25	IRQ6	B22	I
26	IRQ5	B23	I
27	IRQ4	B24	I

Pin A	Signal Name	Pin B	I/O
28	IRQ3	B25	I
29	DACK2	B26	O
30	T/C	B27	O
31	BALE	B28	O
32	+5 V dc	B29	
33	OSC	B30	I
34	Ground	B31	
35	Ground		
36	+5 V dc		
37	+5 V dc		
38	MEMCS16	D1	I
39	IOCS16	D2	I
40	IRQ10	D3	I
41	IRQ11	D4	I
42	Power Good		I
43	IRQ15	D6	I
44	IRQ14	D7	I
45	DACK0	D8	O
46	DRQ0	D9	I
47	DACK5	D10	O
48	DRQ5	D11	I
49	DACK6	D12	O
50	DRQ6	D13	I
51	DACK7	D14	O
52	DRQ7	D15	I
53	+5 V dc	D16	
54	MASTER	D17	I

Pin A	Signal Name	Pin B	I/O
55	Ground	D18	
56	Ground		
57	Ground		
58	+5 V dc		
59	+5 V dc		
60	+5 V dc		
61	+12 V dc	B9	
62	Ground		
63	Ground		
64	I/O Check	A1	I
65	SD7	A2	I/O
66	SD6	A3	I/O
67	SD5	A4	I/O
68	SD4	A5	I/O
69	SD3	A6	I/O
70	SD2	A7	I/O
71	SD1	A8	I/O
72	SD0	A9	I/O
73	I/O CH Ready	A10	I
74	AEN	A11	O
75	SA19	A12	O
76	SA18	A13	O
77	SA17	A14	O
78	SA16	A15	O
79	SA15	A16	O
80	SA14	A17	O
81	SA13	A18	O
82	SA12	A19	O
83	SA11	A20	O
84	SA10	A21	O

Pin A	Signal Name	Pin B	I/O
85	SA9	A22	O
86	SA8	A23	O
87	SA7	A24	O
88	SA6	A25	O
89	SA5	A26	O
90	SA4	A27	O
91	SA3	A28	O
92	SA2	A29	O
93	SA1	A30	O
94	SA0	A31	O
95	Ground		
96	Ground		
97	+5 V dc		
98	SBHE	C1	I/O
99	LA23	C2	I/O
100	LA22	C3	I/O
101	LA21	C4	I/O
102	LA20	C5	I/O
103	LA19	C6	I/O
104	LA18	C7	I/O
105	LA17	C8	I/O
106	MEMR	C9	I/O
107	MEMW	C10	I/O
108	SD8	C11	I/O
109	SD9	C12	I/O
110	SD10	C13	I/O
111	SD11	C14	I/O
112	SD12	C15	I/O
113	SD13	C16	I/O
114	SD14	C17	I/O
115	SD15	C18	I/O

Pin A	Signal Name	Pin B	I/O
116	Ground		
117	Ground		
118	Ground		
119	+5 V dc		
120	+5 V dc		

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 Synch	O
11	Pixel Data 5	I
12	Enable Ext Pixel Clock	O
13	Pixel Data 6	I

Pin	Signal Name	I/O
14	No Connection	
15	Pixel Data 7	I
16	Ground	
17	Pixel Clock	I/O
18	Ground	
19	Blanking	
20	Ground	
21	Horizontal Synch	
22	Ground	
23	Vertical Synch	
24	No Connection	
25	Ground	
26	No Connection	

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

Pin	Signal Name	I/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

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

Pin	Signal Name	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
37	DP1	I
38	DP1	I
39	Ground	I
40	BCAS0	I

Pin	Signal Name	I/O
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

Pin	Signal Name	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	

Safety Inspection Guide

General Guidelines

The purpose of this Safety Inspection Guide is to aid you in identifying possible unsafe conditions on machines that are being inspected for a Maintenance Agreement. Each machine has needed items installed to provide the operators and service personnel with an acceptable level of safety. This guide lists only these items. Good judgment should be used to identify possible safety conditions not covered by this Safety Inspection Guide.

If any unsafe conditions are present, you must find out how serious the hazard is and if you can continue before you correct the hazard.

A copy of all current Service Memorandums (SMs), Engineering Change Announcements (ECAs), and feature/model changes, along with the machine history, should be reviewed.

Check the following items:

- Damaged, missing, or changed parts, especially in the area of the On/Off switch and the power supply.

- Damaged, missing, or changed covers.

- Possible safety exposure from any non-IBM attachments.

Parts Catalog

How to Use This Parts Catalog

SIMILAR ASSEMBLIES: If two assemblies contain a majority of identical parts, they are broken down on the same list. Common parts are shown by one index number. Parts peculiar to one or the other of the assemblies are listed separately and identified by description.

AR: (As Required) in the Units column indicates that the quantity is not the same for all machines.

NP: (Non-Procurable) in the Units column indicates that the part is non-procurable and that the individual parts or the next higher assembly should be ordered.

NR: (Not Recommended) in the Units column indicates that the part is procurable but not recommended for field replacement, and that the next higher assembly should be ordered.

NS: (Not Shown)

R: (Restricted) in the Units column indicates that the part has a restricted availability.

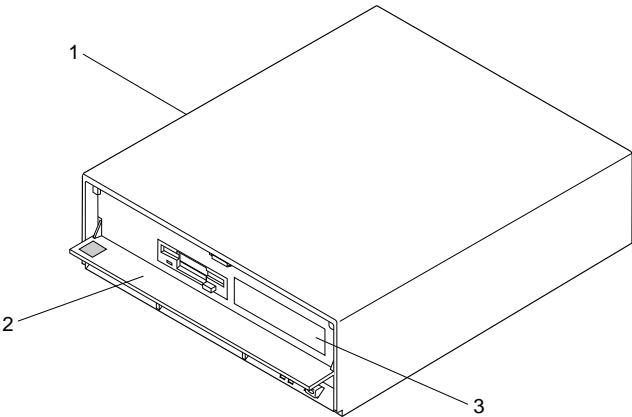
Note: See Appendix, "Model Configurations and FRU Part Numbers" on page A-1 for model specifications.

Assemblies

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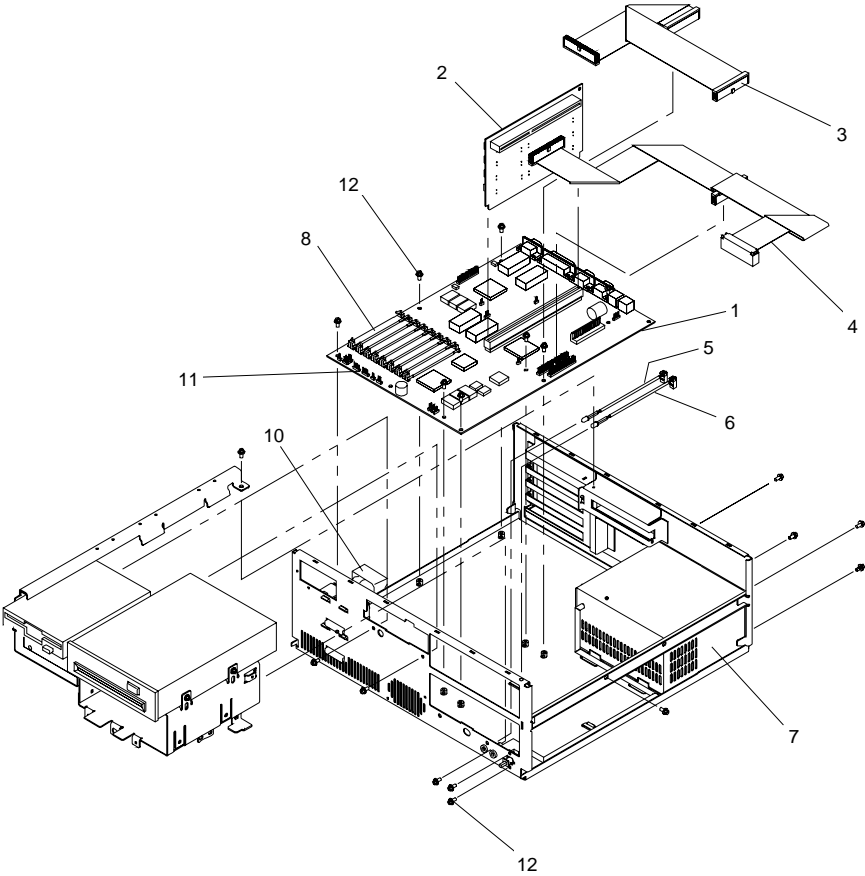
Catalog Section

Assembly 1: Machine Types 2133 and 2155 System Unit - Exterior



Asm- Index	Part Number	Units	Description
1-1			Top Cover Assembly with Bezel, Pull-Down Door, and Label
-1	93F2381	1	- Machine Type 2133 (labels included)
-1	93F2382	1	- Machine Type 2155 (labels included)
-2			Pull-Down Door
-2	93F2383	1	- Machine Type 2133
-2	93F2384	1	- Machine Type 2155
-3	93F2385	1	5.25-inch Bay Panel
-NS	93F2386	1	Feet (Packet of 4)

Assembly 2: Machine Types 2133 and 2155 System Unit - Interior



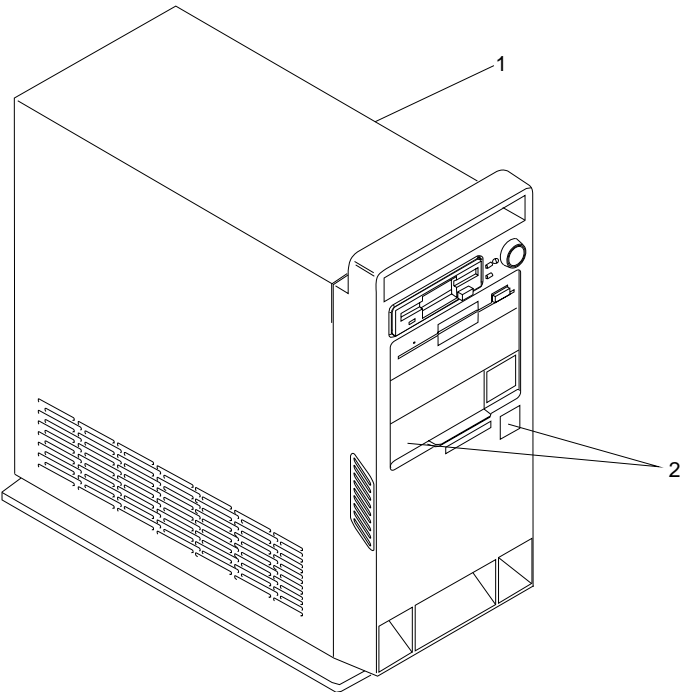
Asm- Index	Part Number	Units	Description
2-1			System Boards Note: See Appendix, "Model Configurations and FRU Part Numbers" on page A-1 for model specifications.
-1	93F2397	1	72-Pin Memory SIMMs - 386SX 25MHz, 256KB VRAM, 2MB SIMMs
-1	93F2398	1	- 386SX 25MHz, 512KB VRAM, 2MB SIMMs
-1	93F2399	1	- 386SX 25MHz, 512KB VRAM, 4MB SIMMs
-1	93F0007	1	30-Pin Memory SIMMs - 486SX 20MHz, 512KB VRAM, without SIMMs
-1	93F0008	1	- 486DX 33MHz, 1MB VRAM, without SIMMs
-1	34G1885	1	- 486SX 20MHz, 512MB VRAM, 4MB SIMMs
-1	34G1849	1	- 486SX 25MHz, 512MB VRAM, without SIMMs
-1	34G1848	1	- 486SX 25MHz, 512MB VRAM, 4MB SIMMs
-1	34G1893	1	- 486DX 33MHz, 1MB VRAM, 4MB SIMMs
-1	34G1894	1	- 486DX 33MHz, 1MB VRAM, 8MB SIMMs
-1	52G2968	1	72-Pin Memory SIMMs - 486SX 25MHz, 512KB VRAM, without SIMMs
-1	34G1871	1	- 486SX 25MHz, 512KB VRAM, 2MB SIMMs
-1	34G1872	1	- 486SX 25MHz, 512KB VRAM, 4MB SIMMs
-1	52G2969	1	- 486SX 33MHz, 128K Cache, 1MB VRAM, without SIMMs
-1	34G1874	1	- 486SX 33MHz, 1MB VRAM, 4MB SIMMs

Assembly 2: (continued)

-1	52G2970	1	- 486SX 33MHz, 1MB VRAM, without SIMMs
-1	52G6538	1	- 486DX 33MHz, 128K Cache, 1MB VRAM, without SIMMs
-1	34G1876	1	- 486DX 33MHz, 128K Cache, 1MB VRAM, 4MB SIMMs
-1	52G2971	1	- 486DX2 50MHz, 128K Cache, 1MB VRAM, without SIMMs
-1	34G1942	1	- 486DX2 50MHz, 128K Cache, 1MB VRAM, 4MB SIMMs
-1	52G6537	1	- 486DX2 66MHz, 128K Cache, 1MB VRAM, without SIMMs
-1	34G1881	1	- 486DX2 66MHz, 128K Cache, 1MB VRAM, 8MB SIMMs
-2	93F2393	1	Riser Card (Machine Type 2133)
-2	93F2396	1	Riser Card (Machine Type 2155)
-3	93F2394	1	Hard Disk Drive Ribbon Cable (if two drives)
-3	34G1865	1	Hard Disk Drive Ribbon Cable (if one drive)
-4	93F2395	1	Diskette Drive Cable
-5	93F2388	1	Indicator LED and Cable, Hard Disk Drive
-6	93F2389	1	Indicator LED and Cable, Power
-7			Power Supplies
-7	93F2390	1	- 65-W Low Voltage (Machine Type 2133)
-7	93F2391	1	- 65-W High Voltage (Machine Type 2133)
-7	93F2392	1	- 85-W Low Voltage (Machine Type 2155)
-7	52G8741	1	- 145-W High/Low Switchable (Machine Type 2155)
-8	93F0058	1	SIMM, 1MB, 30-Pin
-8	92F0102	1	SIMM, 2MB, 72-Pin
-8	92F0105	1	SIMM, 4MB, 72-Pin
-8	64F3606	1	SIMM, 8MB, 72-Pin
-NS	93F0063	1	Lithium Battery (CR2032)
-10	93F2387	1	Adapter Card Support
-11	93F0067	1	Jumper, 2 position (Packet of 4)

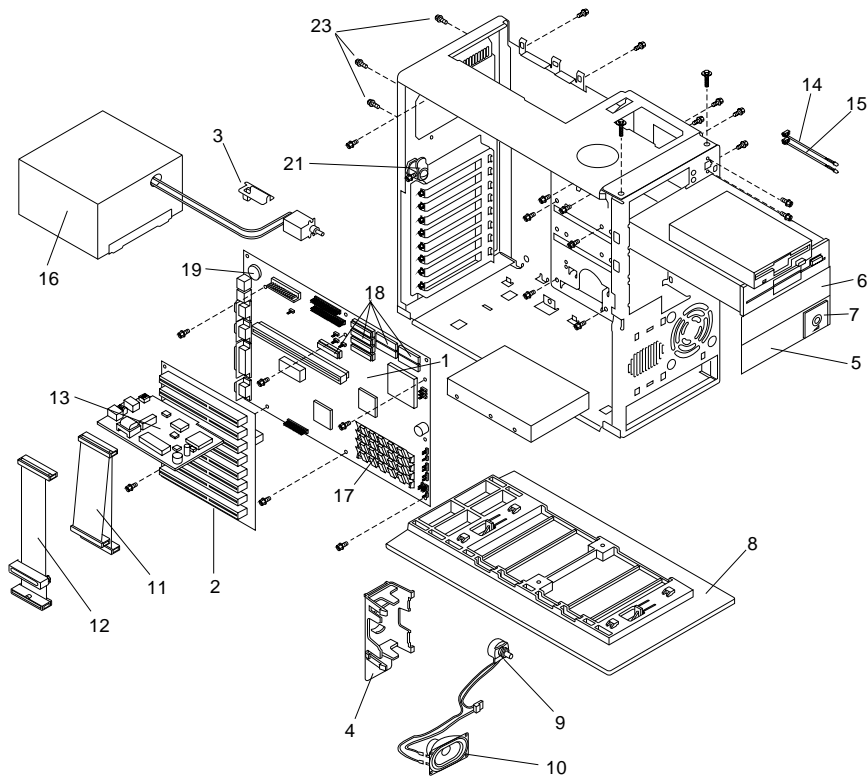
-12	93F0041	1	Packet (Mounting Screws)
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Assembly 3: Machine Type 2168 System Unit - Exterior



Asm- Index	Part Number	Units	Description
3-1			Top Cover Assembly with Bezel and Pull-Down Door (Does not include system base—see "Assembly 4: Machine Type 2168 System Unit - Interior" on page 7-12)
-1	34G1859	1	- Machine Type 2168 (includes logo and label)
-2		1	- Logo and label (included in 34G1859)

Assembly 4: Machine Type 2168 System Unit - Interior

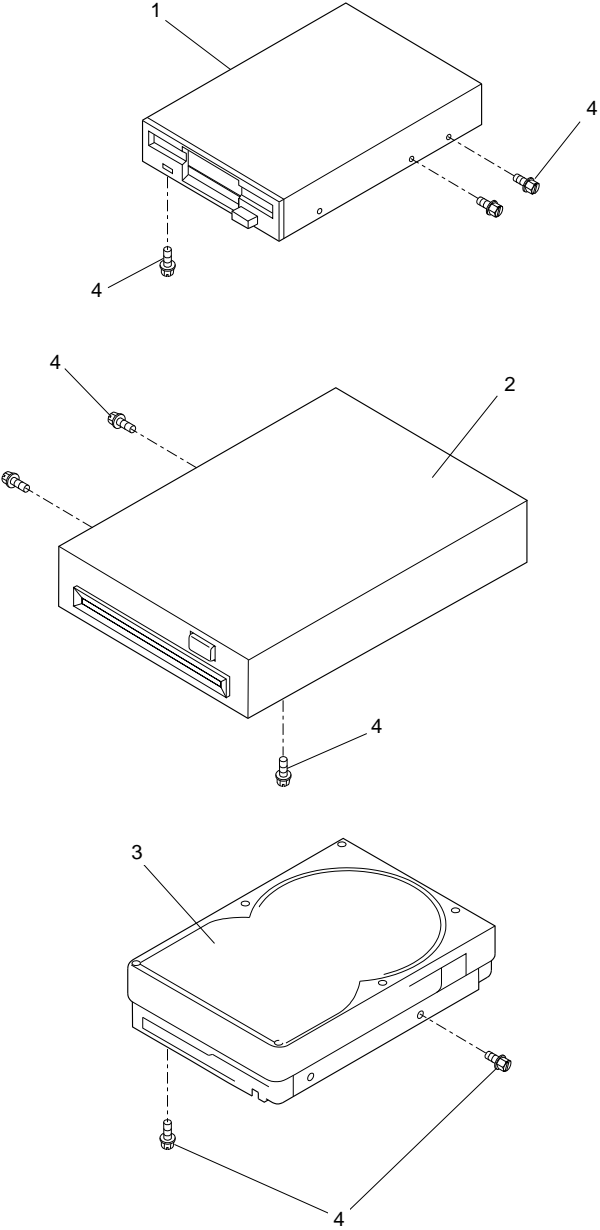


Asm- Index	Part Number	Units	Description
4-1			System Boards Note: See Appendix, "Model Configurations and FRU Part Numbers" on page A-1 for model specifications.
-1	52G2968	1	72-Pin Memory SIMMs - 486SX 25MHz, 512KB VRAM, without SIMMs
-1	34G1871	1	- 486SX 25MHz, 512KB VRAM, 2MB SIMMs
-1	34G1872	1	- 486SX 25MHz, 512KB VRAM, 4MB SIMMs
-1	52G2969	1	- 486SX 33MHz, 128K Cache, 1MB VRAM, without SIMMs
-1	34G1874	1	- 486SX 33MHz, 1MB VRAM, 4MB SIMMs
-1	52G2970	1	- 486SX 33MHz, 1MB VRAM, without SIMMs
-1	52G6538	1	- 486DX 33MHz, 128K Cache, 1MB VRAM, without SIMMs
-1	34G1876	1	- 486DX 33MHz, 128K Cache, 1MB VRAM, 4MB SIMMs
-1	52G2971	1	- 486DX2 50MHz, 128K Cache, 1MB VRAM, without SIMMs
-1	34G1942	1	- 486DX2 50MHz, 128K Cache, 1MB VRAM, 4MB SIMMs
-1	52G6537	1	- 486DX2 66MHz, 128K Cache, 1MB VRAM, without SIMMs
-1	34G1881	1	- 486DX2 66MHz, 128K Cache, 1MB VRAM, 8MB SIMMs
-2	34G1856	1	Riser Card
-3	60G2077	1	Riser Card Support (WT only)
-4	34G1870	1	Adapter Card Front Support
-5	34G1867	1	3.5-inch Bay Panel
-6	34G1866	1	5.25-inch Bay Panel
-7	34G1868	1	Blank Audio Panel with hole (WT only)
-7	34G1869	1	Blank Audio Panel without hole
-8	34G1861	1	Base Assembly

Assembly 4: (continued)

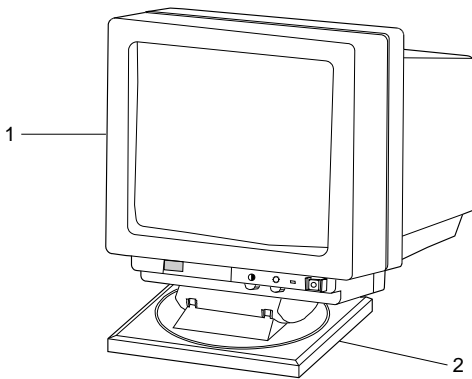
-9	34G1857	1	Volume Control Assembly (WT only)
-10	92F0421	1	Speaker (WT only)
-11	34G1865	1	Hard Disk Drive Ribbon Cable (if one drive)
-11	93F2394	1	Hard Disk Drive Ribbon Cable (if two drives)
-12	93F2395	1	Diskette Drive Ribbon Cable
-14	34G1864	1	Indicator LED and Cable, Hard Disk Drive
-15	34G1863	1	Indicator LED and Cable, Power
-16			Power Supply
-16	60G1996	1	- 145-W High/Low Switchable
-17	92F0102	1	SIMM, 2MB, 72-Pin
-17	92F0105	1	SIMM, 4MB, 72-Pin
-17	64F3606	1	SIMM, 8MB, 72-Pin
-18	34G1879	1	Cache Memory, 128K (Bank 1 only)
-19	93F0063	1	Lithium Battery (CR2032)
-NS	93F0067	1	Jumper, 2 position (Packet of 4)
-21	34G1858	1	Keylock with key (WT only)
-NS	34G2040	1	Key replacement (WT only)
-23	93F0041	1	Packet (Mounting Screws)
-NS	60G1995	1	Packet (Cover Mounting Screws)

Assembly 5: Diskette and Hard Disk Drives - All Machine Types



Asm- Index	Part Number	Units	Description
5-1	93F2361	1	3.5-inch 1.44MB Diskette Drive
-2	93F2362	1	5.25-inch 1.2MB Diskette Drive
-3			Hard Disk Drives
			Note: See Appendix, "Model Configurations and FRU Part Numbers" on page A-1 for model specifications.
-3	59G9567	1	- 85MB
-3	93F2329	1	- 129MB
-3	93F2363	1	- 170MB
-3	93F0118	1	- 211MB
-3	59G9562	1	- 253MB
-3	59G9564	1	- 340MB
			Refer to "Software Installation Procedure" on page 4-48 and install the correct software.
-4	93F0041	1	Packet (Mounting Screws)

Assembly 6: Display and Power Cord (Linecord) - All Machine Types



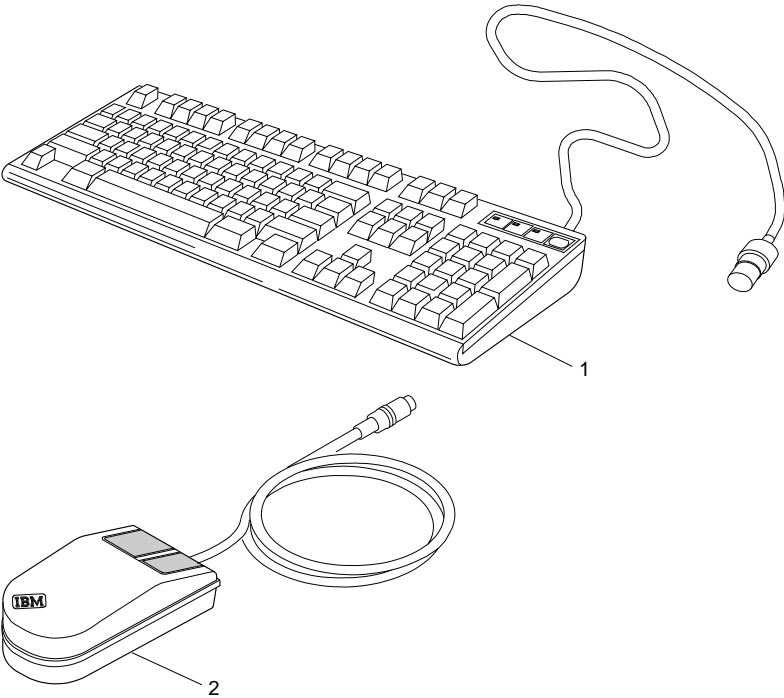
Asm-Index	Part Number	Units	Description
6-1			14-inch Displays with Tilt Swivel
-1			NH = Northern hemisphere
-1			SH = Southern hemisphere
			Note: See Appendix, "Model Configurations and FRU Part Numbers" on page A-1 for model specifications.
-1			VGA Displays
-1	33G4393	1	- .39, 110/120 V, NH
-1	33G5264	1	- .39, 220/240 V, NH
-1	33G4575	1	- .39, 220/240 V, SH
-1			SVGA Displays
-1	68G2622	1	- .39, 110/120 V, NH
-1	33G5373	1	- .28, 110/120 V, NH, Door
-1	39G2723	1	- .28, 110/120 V, NH
-1	39G2724	1	- .28, 220/240 V, NH
-1	33G5375	1	- .28, 110/220 V, NH, Switchable
-1	33G5377	1	- .28, 110/220 V, SH, Switchable
-1			SVGA+ Displays
-1	59G7874	1	- .28, 110/120 V, NH

-1	59G7876	1	- .28, 220/240 V, NH
-1	59G7878	1	- .28, 220/240 V, SH
-2	33G4508	1	Tilt Swivel
-NS	59G9966	1	- Display System I/O Cable
-NS			Power cord (linecord) for display and system unit
-NS	93F2364	1	- U.S.
-NS	14F0033	1	- Arabic countries
-NS	93F2365	1	- Australia
-NS	13F9979	1	- Belgium (Dutch)
-NS	13F9979	1	- Belgium (French)
-NS	93F2366	1	- Brazil
-NS	13F9979	1	- Bulgaria
-NS	93F2364	1	- Canada (English)
-NS	93F2364	1	- Canada (French)
-NS	13F9979	1	- Czech Republic
-NS	13F9979	1	- Denmark
-NS	13F9979	1	- Finland
-NS	13F9979	1	- France
-NS	13F9979	1	- Germany
-NS	13F9979	1	- Greece
-NS	13F9979	1	- Hungary
-NS	14F0087	1	- Israel
-NS	14F0069	1	- Italy
-NS	93F2366	1	- Latin America (Spanish)
-NS	13F9979	1	- Netherlands
-NS	93F2365	1	- New Zealand
-NS	13F9979	1	- Norway
-NS	13F9979	1	- Poland
-NS	13F9979	1	- Portugal
-NS	13F9979	1	- Romania
-NS	13F9979	1	- Russia
-NS	13F9979	1	- Serbia
-NS	13F9979	1	- Slovakia
-NS	14F0015	1	- South Africa
-NS	13F9979	1	- Spain
-NS	13F9979	1	- Sweden
-NS	14F0051	1	- Switzerland (French)
-NS	14F0051	1	- Switzerland (German)
-NS	14F0051	1	- Switzerland (Italian)
-NS	13F9979	1	- Turkey
-NS	14F0033	1	- UK/Ireland

Assembly 6: (continued)

-NS	13F9979	1	<p>- Yugoslavia (Latin)</p> <p>Note: Power cords (linecords) for the following countries are controlled in those countries.</p> <p>Bangladesh, Brunei, China, Hong Kong, Indonesia, Macau, Malaysia, Myanmar, Philippines, Singapore, Sri Lanka, Thailand</p>
-NS	33G6561	1	<p>Power Cord, Display to System Unit High Voltage countries only</p>

Assembly 7: Keyboard and Mouse - All Machine Types

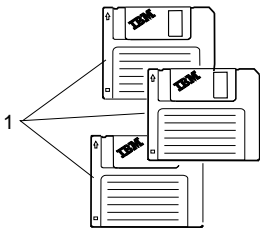


Asm- Index	Part Number	Units	Description
7-1			Keyboard
-1	1395900	1	- U.S.
-1	1395900	1	- Australia, Bangladesh, Brunei, China, Hong Kong, Indonesia, Macau, Malaysia, Myanmar, New Zealand, Philippines, Singapore, South Africa, Sri Lanka, Thailand
-1	1396497	1	- Arabic countries
-1	1395910	1	- Belgium (Dutch)
-1	1395908	1	- Belgium (French)
-1	1399045	1	- Brazil
-1	1399358	1	- Bulgaria (Cyrillic)
-1	1395900	1	- Canada (English)
-1	1395901	1	- Canada (French)
-1	1399377	1	- Czech Republic
-1	1395916	1	- Denmark
-1	1395913	1	- Finland
-1	93F0114	1	- France
-1	1395907	1	- Germany
-1	1399078	1	- Greece
-1	1399379	1	- Hungary
-1	1395919	1	- Israel
-1	1395912	1	- Italy
-1	1397036	1	- Latin America (Spanish)
-1	1395909	1	- Netherlands
-1	1395914	1	- Norway
-1	1399376	1	- Poland
-1	1395915	1	- Portugal
-1	1399380	1	- Romania
-1	1399375	1	- Russia (Cyrillic)
-1	1399374	1	- Serbia (Cyrillic)
-1	1399378	1	- Slovakia
-1	1395920	1	- Spain
-1	1395913	1	- Sweden
-1	1395921	1	- Switzerland (French)
-1	1395922	1	- Switzerland (German)
-1	1395912	1	- Switzerland (Italian)
-1	1395917	1	- Turkey
-1	1395906	1	- UK/Ireland
-1	1399081	1	- Yugoslavia (Latin)

Assembly 7: (continued)

-2	93F2379	1	Mouse
-NS	60G1990	1	Ball and Clip for mouse—Level 2 (match to FRU part number on mouse 33G1913)
-NS	93F2380	1	Ball and Clip for mouse—Level 1 (match to FRU part number on mouse 33G3835)

Assembly 8: Software - Level 1



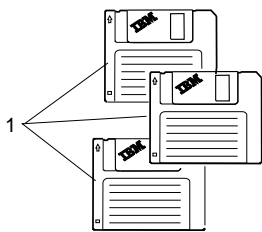
Note: Refer to Appendix, “Model Configurations and FRU Part Numbers” on page A-1 for model specifications.

Asm-Index	Part Number	Units	Description
8-1			Diskette Package (1)—Windows** 3.1, DOS 5.0, Microsoft** Works for Windows, PRODIGY**, Promenade**, PS/1 Club*
-1	93F2367	1	- U.S.
-2			Diskette Package (2)—Windows 3.1, DOS 5.0, Microsoft Works for Windows
-2	33G6563	1	- Australia, Bangladesh, Brunei, China, Hong Kong, Indonesia, Macau, Malaysia, Myanmar, New Zealand, Philippines, Singapore, South Africa, Sri Lanka, Thailand
-2	16G1212	1	- Belgium (Dutch)
-2	16G1252	1	- Belgium (French)
-2	33G6564	1	- Canada (English)
-2	93F2370	1	- Canada (French)
-2	16G1079	1	- Denmark
-2	16G1039	1	- Finland
-2	16G0799	1	- France
-2	16G0839	1	- Germany
-2	16G0879	1	- Italy
-2	93F2369	1	- Latin America (Spanish)

Assembly 8: (continued)

-2	16G1119	1	- Netherlands
-2	16G0959	1	- Norway
-2	16G0919	1	- Spain
-2	16G0999	1	- Sweden
-2	16G1332	1	- Switzerland (French)
-2	16G1292	1	- Switzerland (German)
-2	16G0879	1	- Switzerland (Italian)
-2	16G0759	1	- UK/Ireland, Arabic countries, Bulgaria, Czech Republic, Greece, Hungary, Israel, Poland, Romania, Serbia, Slovakia, Yugoslavia (Latin)
-3			Diskette Package (3)—Windows 3.1, DOS 5.0, Microsoft Works for DOS
-2	34G1664	1	- Brazil
-3	16G1159	1	- Portugal
-3	62G7056	1	- Turkey
-4			Diskette Package (4)—OS/2 2.0, Microsoft Works for Windows, PRODIGY, PS/1 Club
-4	93F2368	1	- U.S.
-5			Diskette Package (5)—OS/2 2.0, Microsoft Works for Windows
-5	33G6565	1	- Canada (English)
-5	33G6566	1	- Canada (French)
-5	16G2215	1	- France
-5	16G2216	1	- Germany
-5	16G2217	1	- Italy
-5	16G2218	1	- Spain
-5	16G2228	1	- Switzerland (French)
-5	16G2227	1	- Switzerland (German)
-5	16G2217	1	- Switzerland (Italian)
-5	16G2214	1	- UK/Ireland

Assembly 9: Software - Level 2



Note: Refer to Appendix, “Model Configurations and FRU Part Numbers” on page A-1 for model specifications.

Asm-Index	Part Number	Units	Description
9-1			Diskette Package (1)—Windows 3.1, DOS 6.0, Microsoft Works for Windows, PRODIGY, America Online**, PS/1 Club
-1	59G9531	1	- U.S.
-2			Diskette Package (2)—Windows 3.1, DOS, Microsoft Works for Windows
-2	59G9534	1	- Australia, Bangladesh, Brunei, China, Hong Kong, Indonesia, Macau, Malaysia, Myanmar, New Zealand, Philippines, Singapore, South Africa, Sri Lanka, Thailand
-2	63G4872	1	- Belgium (Dutch)
-2	63G4909	1	- Belgium (French)
-2	59G9532	1	- Canada (English)
-2	59G9533	1	- Canada (French)
-2	63G2832	1	- Denmark
-2	63G2795	1	- Finland
-2	63G2573	1	- France
-2	63G2610	1	- Germany
-2	63G2650	1	- Italy
-2	59G9535	1	- Latin America (Spanish)
-2	63G2869	1	- Netherlands

Assembly 9: (continued)

-2	63G2724	1	- Norway
-2	63G2687	1	- Spain
-2	63G2758	1	- Sweden
-2	63G4946	1	- Switzerland (French)
-2	63G4983	1	- Switzerland (German)
-2	63G2650	1	- Switzerland (Italian)
-2	63G2539	1	- UK/Ireland, Arabic countries, Bulgaria, Czech Republic, Greece, Hungary, Israel, Poland, Romania, Serbia, Slovakia, Yugoslavia (Latin)
-3			Diskette Package (3)—Windows 3.1, DOS 5.0, Microsoft Works for DOS
-2	59G9536	1	- Brazil
-2	63G2903	1	- Portugal
-2	63G2940	1	- Turkey

Part Number Index

Part Number	Asm-Index	Page	Part Number	Asm-Index	Page
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	6-NS	7-19	1395920	7-1	7-23
	6-NS	7-19	1395921	7-1	7-23
	6-NS	7-19	1395922	7-1	7-23
	6-NS	7-19	1396497	7-1	7-23
	6-NS	7-19	1397036	7-1	7-23
	6-NS	7-19	1399045	7-1	7-23
	6-NS	7-19	1399078	7-1	7-23
	6-NS	7-19	1399081	7-1	7-23
	6-NS	7-19	1399358	7-1	7-23
	6-NS	7-19	1399374	7-1	7-23
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	6-NS	7-19	1399380	7-1	7-23
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	6-NS	7-19	14F0033	6-NS	7-19
	6-NS	7-19		6-NS	7-19
	6-NS	7-20	14F0051	6-NS	7-19
1395900	7-1	7-23		6-NS	7-19
	7-1	7-23		6-NS	7-19
	7-1	7-23	14F0069	6-NS	7-19
1395901	7-1	7-23	14F0087	6-NS	7-19
1395906	7-1	7-23	16G0759	8-2	7-26
1395907	7-1	7-23	16G0799	8-2	7-25
1395908	7-1	7-23	16G0839	8-2	7-25
1395909	7-1	7-23	16G0879	8-2	7-25
1395910	7-1	7-23		8-2	7-26
1395912	7-1	7-23	16G0919	8-2	7-26
	7-1	7-23	16G0959	8-2	7-26
1395913	7-1	7-23	16G0999	8-2	7-26
	7-1	7-23	16G1039	8-2	7-25
1395914	7-1	7-23	16G1079	8-2	7-25
1395915	7-1	7-23	16G1119	8-2	7-26
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Part Number	Asm-Index	Page	Part Number	Asm-Index	Page
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16G1252	8-2	7-25		4-1	7-13
16G1292	8-2	7-26	34G1872	2-1	7-7
16G1332	8-2	7-26		4-1	7-13
16G2214	8-5	7-26	34G1874	2-1	7-7
16G2215	8-5	7-26		4-1	7-13
16G2216	8-5	7-26	34G1876	2-1	7-8
16G2217	8-5	7-26		4-1	7-13
	8-5	7-26	34G1879	4-18	7-14
16G2218	8-5	7-26	34G1881	2-1	7-8
16G2227	8-5	7-26		4-1	7-13
16G2228	8-5	7-26	34G1885	2-1	7-7
33G4393	6-1	7-18	34G1893	2-1	7-7
33G4508	6-2	7-19	34G1894	2-1	7-7
33G4575	6-1	7-18	34G1942	2-1	7-8
33G5264	6-1	7-18		4-1	7-13
33G5373	6-1	7-18	34G2040	4-NS	7-14
33G5375	6-1	7-18	39G2723	6-1	7-18
33G5377	6-1	7-18	39G2724	6-1	7-18
33G6561	6-NS	7-20	52G2968	2-1	7-7
33G6563	8-2	7-25		4-1	7-13
33G6564	8-2	7-25	52G2969	2-1	7-7
33G6565	8-5	7-26		4-1	7-13
33G6566	8-5	7-26	52G2970	2-1	7-7
34G1664	8-2	7-26		4-1	7-13
34G1848	2-1	7-7	52G2971	2-1	7-8
34G1849	2-1	7-7		4-1	7-13
34G1856	4-2	7-13	52G6537	2-1	7-8
34G1857	4-9	7-14		4-1	7-13
34G1858	4-21	7-14	52G6538	2-1	7-8
34G1859	3-1	7-11		4-1	7-13
34G1861	4-8	7-13	52G8741	2-7	7-8
34G1863	4-15	7-14	59G7874	6-1	7-18
34G1864	4-14	7-14	59G7876	6-1	7-19
34G1865	2-3	7-8	59G7878	6-1	7-19
	4-11	7-14	59G9531	9-1	7-27
34G1866	4-6	7-13	59G9532	9-2	7-27
34G1867	4-5	7-13	59G9533	9-2	7-27
34G1868	4-7	7-13	59G9534	9-2	7-27
34G1869	4-7	7-13	59G9535	9-2	7-27
34G1870	4-4	7-13	59G9536	9-2	7-28

Part Number	Asm-Index	Page	Part Number	Asm-Index	Page
59G9562	5-3	7-17	93F0063	continued	
59G9564	5-3	7-17		4-19	7-14
59G9567	5-3	7-17	93F0067	2-11	7-8
59G9966	6-NS	7-19		4-NS	7-14
60G1990	7-NS	7-24	93F0114	7-1	7-23
60G1995	4-NS	7-14	93F0118	5-3	7-17
60G1996	4-16	7-14	93F2329	5-3	7-17
60G2077	4-3	7-13	93F2361	5-1	7-17
62G7056	8-3	7-26	93F2362	5-2	7-17
63G2539	9-2	7-28	93F2363	5-3	7-17
63G2573	9-2	7-27	93F2364	6-NS	7-19
63G2610	9-2	7-27		6-NS	7-19
63G2650	9-2	7-27		6-NS	7-19
	9-2	7-28	93F2365	6-NS	7-19
63G2687	9-2	7-27		6-NS	7-19
63G2724	9-2	7-28	93F2366	6-NS	7-19
63G2758	9-2	7-28		6-NS	7-19
63G2795	9-2	7-27	93F2367	8-1	7-25
63G2832	9-2	7-27	93F2368	8-4	7-26
63G2869	9-2	7-27	93F2369	8-2	7-25
63G2903	9-2	7-28	93F2370	8-2	7-25
63G2940	9-2	7-28	93F2379	7-2	7-24
63G4872	9-2	7-27	93F2380	7-NS	7-24
63G4909	9-2	7-27	93F2381	1-1	7-5
63G4946	9-2	7-28	93F2382	1-1	7-5
63G4983	9-2	7-28	93F2383	1-2	7-5
64F3606	2-8	7-8	93F2384	1-2	7-5
	4-17	7-14	93F2385	1-3	7-5
68G2622	6-1	7-18	93F2386	1-NS	7-5
92F0102	2-8	7-8	93F2387	2-10	7-8
	4-17	7-14	93F2388	2-5	7-8
92F0105	2-8	7-8	93F2389	2-6	7-8
	4-17	7-14	93F2390	2-7	7-8
92F0421	4-10	7-14	93F2391	2-7	7-8
93F0007	2-1	7-7	93F2392	2-7	7-8
93F0008	2-1	7-7	93F2393	2-2	7-8
93F0041	2-12	7-9	93F2394	2-3	7-8
	4-23	7-14		4-11	7-14
	5-4	7-17	93F2395	2-4	7-8
93F0058	2-8	7-8		4-12	7-14
93F0063	2-NS	7-8	93F2396	2-2	7-8

Part Number	Asm- Index	Page
93F2397	2-1	7-7
93F2398	2-1	7-7
93F2399	2-1	7-7

Appendix. Model Configurations and FRU Part Numbers

Tables A-1 through A-6 outline by model the FRUs that may be ordered by the part number indicated. You can find the the Machine Type (21XX) and Model (-XXX) on the front of the system unit.

To determine the correct FRU to install, find the appropriate country table in the list below. Then, look across the top of the table for the FRU you want to replace. The part number to order is listed by model.

Table	Page
U.S. Machine Types 2133/2155/2168 (Factory-Installed Parts)	A-2
Asia-Pacific Machine Types 2133/2155	A-7
Canada Machine Types 2133/2155/2168	A-8
EMEA Machine Types 2133/2155/2168	A-10
European Software Packages	A-11
Latin America Machine Types 2155/2168	A-13

Table A-1 (Page 1 of 4). U.S. Machine Types 2133/2155/2168 (Factory-Installed Parts). Refer to "System Board Layouts" on page 5-2 for system board details and to "Parts Catalog" on page 7-1 for parts assemblies.

Model	System Board		Memory	Disk Drives		Hard Drive	Power Supply	Display	Modem	Software
	Filled Board	Basic Board		Drive A (3.5-in)	Drive B (5.25-in)					
G11	93F2397	N/A	N/A	93F2361	N/A	59G9567	93F2390	33G4393	93F0024	93F2367
G13	93F2397	N/A	N/A	93F2361	93F2362	93F2329	93F2390	33G4393	93F0024	93F2367
G14	93F2398	N/A	N/A	93F2361	93F2362	93F2363	93F2392	33G5373	93F0024	93F2367
G43	34G1885	N/A	N/A	93F2361	N/A	93F2329	93F2390	33G4393	93F0024	93F2367
G44	34G1885	N/A	N/A	93F2361	93F2362	93F2363	93F2392	33G5373	93F0024	93F2367
G46	34G1871	N/A	92F0102	93F2361	N/A	N/A	93F2390	33G4393	93F0024	59G9531
G49	34G1871	N/A	92F0102	93F2361	93F2362	93F2329	93F2390	33G4393	93F0024	59G9531
G50	34G1848	N/A	N/A	93F2361	93F2362	93F2329	93F2390	33G4393	93F0024	93F2367
G52	34G1872	N/A	92F0105	93F2361	93F2362	93F2363	52G8741	33G5373	34G1854	59G9531
G53	34G1848	N/A	N/A	93F2361	93F2362	93F2329	93F2390	33G4393	93F0024	93F2367
G54	34G1848	N/A	N/A	93F2361	93F2362	93F2363	93F2392	33G5373	93F0024	93F2367
G57	34G1874	N/A	92F0105	93F2361	93F2362	93F2363	60G1996	39G2723	34G1854	59G9531
G72	34G1876	N/A	92F0105	93F2361	93F2362	N/A	52G8741	33G5373	34G1854	59G9531
G76	34G1894	N/A	N/A	93F2361	93F2362	93F0118	93F2392	33G5373	93F0024	93F2368
G77	34G1894	N/A	N/A	93F2361	93F2362	93F0118	93F2392	33G5373	93F0024	93F2368

N/A = FRU part number varies. See "Parts Catalog" on page 7-1.

Table A-1 (Page 2 of 4). U.S. Machine Types 2133/2155/2168 (Factory-Installed Parts). Refer to "System Board Layouts" on page 5-2 for system board details and to "Parts Catalog" on page 7-1 for parts assemblies.

Model	System Board		Memory	Disk Drives		Hard Drive	Power Supply	Display	Modem	Software
	Filled Board	Basic Board		Drive A (3.5-in)	Drive B (5.25-in)					
G78	34G1894	N/A	N/A	93F2361	93F2362	93F0118	93F2392	33G5373	93F0024	93F2367
G82	34G1942	N/A	92F0105	93F2361	93F2362	59G9562	52G8741	59G7874	34G1854	59G9531
G87	34G1881	N/A	64F3686	93F2361	93F2362	59G9562	60G1996	59G7874	34G1854	59G9531
M40	34G1871	N/A	92F0102	93F2361	N/A	59G9567	93F2390	33G4393	93F0024	59G9531
M46	34G1872	N/A	92F0105	93F2361	93F2362	93F2363	93F2390	68G2622	93F0024	59G9531
P57	34G1848	N/A	N/A	93F2361	93F2362	93F0118	93F2392	33G5373	93F0024	93F2367
P71	34G1893	N/A	N/A	93F2361	93F2362	93F2363	93F2392	33G5373	93F0024	93F2367
P74	34G1876	N/A	92F0105	93F2361	93F2362	59G9562	52G8741	59G7874	34G1854	59G9531
P84	34G1942	N/A	92F0105	93F2361	93F2362	59G9564	52G8741	59G7874	34G1854	59G9531
P89	34G1881	N/A	64F3686	93F2361	93F2362	59G9564	60G1996	59G7874	34G1854	59G9531
S11	93F2397	N/A	N/A	93F2361	N/A	59G9567	93F2390	33G4393	93F0024	93F2367
S13	93F2397	N/A	N/A	93F2361	93F2362	93F2329	93F2390	33G4393	93F0024	93F2367
S14	93F2398	N/A	N/A	93F2361	93F2362	93F2363	93F2392	33G5373	93F0024	93F2367
S43	34G1885	N/A	N/A	93F2361	N/A	93F2329	93F2390	33G4393	93F0024	93F2367
S44	34G1885	N/A	N/A	93F2361	93F2362	93F2363	93F2392	33G5373	93F0024	93F2367

N/A = FRU part number varies. See "Parts Catalog" on page 7-1.

Table A-1 (Page 3 of 4). U.S. Machine Types 2133/2155/2168 (Factory-Installed Parts). Refer to "System Board Layouts" on page 5-2 for system board details and to "Parts Catalog" on page 7-1 for parts assemblies.

Model	System Board		Memory	Disk Drives		Hard Drive	Power Supply	Display	Modem	Software
	Filled Board	Basic Board		Drive A (3.5-in)	Drive B (5.25-in)					
S45	34G1871	N/A	92F0102	93F2361	N/A	59G9567	93F2390	33G4393	93F0024	59G9531
S47	34G1871	N/A	92F0102	93F2361	93F2362	93F2329	93F2390	33G4393	93F0024	59G9531
S50	34G1872	N/A	92F0105	93F2361	93F2362	93F2363	52G8741	33G5373	34G1854	59G9531
S53	34G1848	N/A	N/A	93F2361	N/A	93F2329	93F2390	33G4393	93F0024	93F2367
S54	34G1848	N/A	N/A	93F2361	93F2362	93F2363	93F2392	33G5373	93F0024	93F2367
S55	34G1874	N/A	92F0105	93F2361	93F2362	93F2363	60G1996	39G2723	34G1854	59G9531
S70	34G1876	N/A	92F0105	93F2361	93F2362	N/A	52G8741	33G5373	34G1854	59G9531
S75	34G1894	N/A	N/A	93F2361	93F2362	93F0118	93F2392	33G5373	93F0024	93F2368
S76	34G1894	N/A	N/A	93F2361	93F2362	93F0118	93F2392	33G5373	93F0024	93F2368
S78	34G1894	N/A	N/A	93F2361	93F2362	93F0118	93F2392	33G5373	93F0024	93F2367
S80	34G1942	N/A	92F0105	93F2361	93F2362	59G9562	52G8741	59G7874	34G1854	59G9531
S85	34G1881	N/A	64F3686	93F2361	93F2362	59G9562	60G1996	59G7874	34G1854	59G9531
W11	93F2397	N/A	N/A	93F2361	N/A	59G9567	93F2390	33G4393	93F0024	93F2367
W13	93F2397	N/A	N/A	93F2361	93F2362	93F2329	93F2390	33G4393	93F0024	93F2367
W14	93F2398	N/A	N/A	93F2361	93F2362	93F2363	93F2392	33G5373	93F0024	93F2367

N/A = FRU part number varies. See "Parts Catalog" on page 7-1.

Table A-1 (Page 4 of 4). U.S. Machine Types 2133/2155/2168 (Factory-Installed Parts). Refer to "System Board Layouts" on page 5-2 for system board details and to "Parts Catalog" on page 7-1 for parts assemblies.

Model	System Board		Memory	Disk Drives		Hard Drive	Power Supply	Display	Modem	Software
	Filled Board	Basic Board		Drive A (3.5-in)	Drive B (5.25-in)					
W42	34G1871	N/A	92F0102	93F2361	N/A	59G9567	93F2390	33G4393	93F0024	59G9531
W44	34G1885	N/A	N/A	93F2361	93F2362	93F2363	93F2392	33G5373	93F0024	93F2367
W45	34G1871	N/A	92F0102	93F2361	93F2362	93F2329	93F2390	33G4393	93F0024	59G9531
W48	34G1872	N/A	92F0105	93F2361	93F2362	93F2363	52G8741	33G5373	34G1854	59G9531
W52	34G1874	N/A	92F0105	93F2361	93F2362	93F2363	60G1996	39G2723	34G1854	59G9531
W53	34G1848	N/A	N/A	93F2361	N/A	93F2329	93F2390	33G4393	93F0024	93F2367
W54	34G1871	N/A	92F0102	93F2361	93F2362	93F2363	93F2392	33G5373	93F0024	93F2367
W67	34G1876	N/A	92F0105	93F2361	93F2362	N/A	52G8741	33G5373	34G1854	59G9531
W72	34G1894	N/A	N/A	93F2361	93F2362	93F0118	93F2392	33G5373	93F0024	93F2368
W76	34G1894	N/A	N/A	93F2361	93F2362	93F0118	93F2392	33G5373	93F0024	93F2368
W77	34G1942	N/A	92F0105	93F2361	93F2362	59G9562	52G8741	59G7874	34G1854	59G9531
W78	34G1894	N/A	N/A	93F2361	93F2362	93F0118	93F2392	33G5373	93F0024	93F2367
W82	34G1881	N/A	64F3686	93F2361	93F2362	59G9562	60G1996	59G7874	34G1854	59G9531

N/A = FRU part number varies. See "Parts Catalog" on page 7-1.

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Table A-2. Asia-Pacific Machine Types 2133/2155

Model	System Board		Memory	Disk Drives		Hard Drive	Power Supply	Display	Software
	Filled Board	Basic Board		Drive A (3.5-in)	Drive B (5.25-in)				
X11	93F2397	N/A	N/A	93F2361	93F2362	95F4721	93F2391	33G5264	33G6563
X43	N/A	93F0007	N/A	93F2361	93F2362	93F2329	93F2391	33G5375	33G6563
X51	N/A	52G2968	N/A	93F2361	93F2362	59G9567	93F2391	33G5375	59G9534
X63	N/A	52G2969	N/A	93F2361	93F2362	93F2329	93F2391	33G5375	59G9534
X74	N/A	93F0008	N/A	93F2361	93F2362	93F2363	93F2391	33G5375	33G6563
X75	N/A	52G6538	N/A	93F2361	93F2362	93F2363	52G8741	33G5375	59G9534
Y11	93F2397	N/A	N/A	93F2361	93F2362	95F4721	93F2391	33G4575	33G6563
Y43	N/A	93F0007	N/A	93F2361	93F2362	93F2329	93F2391	33G5377	33G6563
Y53	N/A	34G1849	N/A	93F2361	93F2362	93F2329	93F2391	33G5377	33G6563
Y51	N/A	52G2968	N/A	93F2361	93F2362	59G9567	93F2391	33G5377	59G9534
Y63	N/A	52G2969	N/A	93F2361	93F2362	93F2329	93F2391	33G5377	59G9534
Y74	N/A	93F0008	N/A	93F2361	93F2362	93F2363	93F2391	33G5377	33G6563
Y75	N/A	52G6538	N/A	93F2361	93F2362	93F2363	52G8741	33G5377	59G9534

N/A = FRU part number varies. See "Parts Catalog" on page 7-1.

Table A-3 (Page 1 of 2). Canada Machine Types 2133/2155/2168

Model	System Board		Memory	Disk Drives		Hard Drive	Power Supply	Display	Modem	Software
	Filled Board	Basic Board		Drive A (3.5-in)	Drive B (5.25-in)					
E11	93F2397	N/A	N/A	93F2361	93F2362	95F4721	93F2390	33G5373	93F0024	33G6564
E43	N/A	93F0007	N/A	93F2361	93F2362	93F2329	93F2390	33G5373	93F0024	33G6564
E46	N/A	52G2968	N/A	93F2361	93F2362	59G9567	93F2390	33G4393	93F0024	59G9532
E49	N/A	52G2968	N/A	93F2361	93F2362	93F2329	93F2390	33G5373	93F0024	59G9532
E52	N/A	52G2968	N/A	93F2361	93F2362	93F2363	52G8741	33G5373	34G1854	59G9532
E53	N/A	34G1849	N/A	93F2361	93F2362	93F2329	93F2390	33G5373	93F0024	33G6564
E57	N/A	52G2970	N/A	93F2361	93F2362	93F2363	60G1996	33G5373	34G1854	59G9532
E76	N/A	93F0008	N/A	93F2361	93F2362	93F0118	93F2392	33G5373	93F0024	33G6565
E82	N/A	52G2971	N/A	93F2361	93F2362	59G9562	52G8741	59G7874	34G1854	59G9532
F11	93F2397	N/A	N/A	93F2361	93F2362	95F4721	93F2390	33G5373	93F0024	93F2370
F43	N/A	93F0007	N/A	93F2361	93F2362	93F2329	93F2390	33G5373	93F0024	93F2370
F46	N/A	52G2968	N/A	93F2361	93F2362	59G9567	93F2390	33G4393	93F0024	59G9533
F49	N/A	52G2968	N/A	93F2361	93F2362	93F2329	93F2390	33G5373	93F0024	59G9533
F52	N/A	52G2968	N/A	93F2361	93F2362	93F2363	52G8741	33G5373	34G1854	59G9533
F53	N/A	34G1849	N/A	93F2361	93F2362	93F2329	93F2390	33G5373	93F0024	93F2370

N/A = FRU part number varies. See "Parts Catalog" on page 7-1.

Table A-3 (Page 2 of 2). Canada Machine Types 2133/2155/2168

Model	System Board		Memory	Disk Drives		Hard Drive	Power Supply	Display	Modem	Software
	Filled Board	Basic Board		Drive A (3.5-in)	Drive B (5.25-in)					
F57	N/A	52G2970	N/A	93F2361	93F2362	93F2363	60G1996	33G5373	34G1854	59G9533
F74	N/A	52G6538	N/A	93F2361	93F2362	59G9562	52G8741	59G7874	34G1854	59G9533
N74	N/A	52G6538	N/A	93F2361	93F2362	59G9562	52G8741	59G7874	34G1854	59G9532
R45	N/A	52G2968	N/A	93F2361	93F2362	59G9567	93F2390	33G4393	93F0024	59G9532
R47	N/A	52G2968	N/A	93F2361	93F2362	93F2329	93F2390	33G5373	93F0024	59G9532
R50	N/A	52G2968	N/A	93F2361	93F2362	93F2363	52G8741	33G5373	34G1854	59G9532
R55	N/A	52G2970	N/A	93F2361	93F2362	93F2363	60G1996	33G5373	34G1854	59G9532
R80	N/A	52G2971	N/A	93F2361	93F2362	N/A	52G8741	59G7874	34G1854	59G9532

N/A = FRU part number varies. See "Parts Catalog" on page 7-1.

Table A-4. EMEA Machine Types 2133/2155/2168

Model	System Board		Memory	Disk Drives		Hard Drive	Power Supply	Display	Software
	Filled Board	Basic Board		Drive A (3.5-in)	Drive B (5.25-in)				
110	93F2397	N/A	N/A	93F2361	N/A	95F4720	93F2391	6134302	See Table A-5.
111	93F2397	N/A	N/A	93F2361	N/A	95F4721	93F2391	33G5264	See Table A-5.
114	93F2398	N/A	N/A	93F2361	N/A	93F2363	93F2391	33G5375	See Table A-5.
144	N/A	93F0007	N/A	93F2361	N/A	93F2363	93F2391	33G5375	See Table A-5.
154	N/A	34G1849	N/A	93F2361	N/A	93F2363	93F2391	33G5375	See Table A-5.
174	N/A	93F0008	N/A	93F2361	N/A	93F2363	93F2391	33G5375	See Table A-5.
274	N/A	93F0008	N/A	93F2361	N/A	93F2363	93F2391	33G5375	See Table A-5.
451	N/A	52G2968	N/A	93F2361	N/A	59G9567	93F2391	33G5375	See Table A-5.
452	N/A	52G2968	N/A	93F2361	N/A	59G9567	60G1996	39G2724	See Table A-5.
461	N/A	52G2969	N/A	93F2361	N/A	59G9567	93F2391	33G5375	See Table A-5.
463	N/A	52G2969	N/A	93F2361	N/A	93F2329	60G1996	59G7876	See Table A-5.
471	N/A	52G6538	N/A	93F2361	N/A	59G9567	52G8741	39G2724	See Table A-5.
473	N/A	52G6538	N/A	93F2361	N/A	93F2329	60G1996	59G7876	See Table A-5.
483	N/A	52G2971	N/A	93F2361	N/A	93F2329	52G8741	59G7876	See Table A-5.
493	N/A	52G6537	N/A	93F2361	N/A	N/A	60G1996	59G7876	See Table A-5.

N/A = FRU part number varies. See "Parts Catalog" on page 7-1.

Table A-5. European Software Packages. See "Assembly 8: Software - Level 1" on page 7-25 and "Assembly 9: Software - Level 2" on page 7-27 for package contents.

Country	Level 1 Models 110, 111, 114, 144, 154, 174	Level 2 Models 451, 452, 461, 463, 471, 473, 483, 493	OS/2 Model 274
Belgium (Dutch)	16G1212	63G4872	Not available.
Belgium (French)	16G1252	63G4909	Not available.
Denmark	16G1079	63G2832	Not available.
Finland	16G1039	63G2795	Not available.
France	16G0799	63G2573	16G2215
Germany	16G0839	63G2610	16G2216
Italy	16G0879	63G2650	16G2217
Netherlands	16G1119	63G2869	Not available.
Norway	16G0959	63G2724	Not available.
Portugal	16G1159	63G2903	Not available.
Spain	16G0919	63G2687	16G2218
Sweden	16G0999	63G2758	Not available.
Switzerland (French)	16G1332	63G4946	16G2228
Switzerland (German)	16G1292	63G4983	16G2227
Switzerland (Italian)	16G0879	63G2650	16G2217
Turkey	62G7056	63G2940	Not available.
United Kingdom	16G0759	63G2539	16G2214

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Table A-6. Latin America Machine Types 2155/2168

Model	System Board		Memory	Disk Drives		Hard Drive	Power Supply	Display	Software
	Filled Board	Basic Board		Drive A (3.5-in)	Drive B (5.25-in)				
H11	93F2397	N/A	N/A	93F2361	93F2362	95F4721	93F2390	33G4393	93F2369
H43	N/A	93F0007	N/A	93F2361	93F2362	93F2329	93F2390	33G5373	93F2369
H53	N/A	34G1849	N/A	93F2361	93F2362	93F2329	93F2390	33G5373	93F2369
K11	93F2397	N/A	N/A	93F2361	93F2362	95F4721	93F2392	33G5377	34G1664
K51	N/A	52G2968	N/A	93F2361	N/A	59G9567	52G8741	33G5377	59G9536
K53	N/A	34G1849	N/A	93F2361	93F2362	93F2329	93F2392	33G5377	34G1664
K64	N/A	52G2970	N/A	93F2361	93F2362	93F2363	52G8741	33G5377	59G9536
K97	N/A	52G6537	N/A	93F2361	93F2362	59G9562	52G8741	33G5377	59G9536
L11	93F2397	N/A	N/A	93F2361	93F2362	95F4721	93F2391	33G4575	93F2369
L43	N/A	93F0007	N/A	93F2361	93F2362	95F4721	93F2391	33G5377	93F2369
L51	N/A	52G2968	N/A	93F2361	N/A	59G9567	52G8741	33G5377	59G9535
L53	N/A	34G1849	N/A	93F2361	93F2362	93F2329	93F2391	33G5377	93F2369
L64	N/A	52G2970	N/A	93F2361	93F2362	93F2363	52G8741	33G5377	59G9535
L97	N/A	52G6537	N/A	93F2361	93F2362	59G9562	52G8741	33G5377	59G9535

N/A = FRU part number varies. See "Parts Catalog" on page 7-1.

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