IBM

Hardware Maintenance Service
for Service Level A

Machine Type 2159
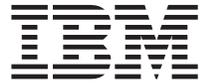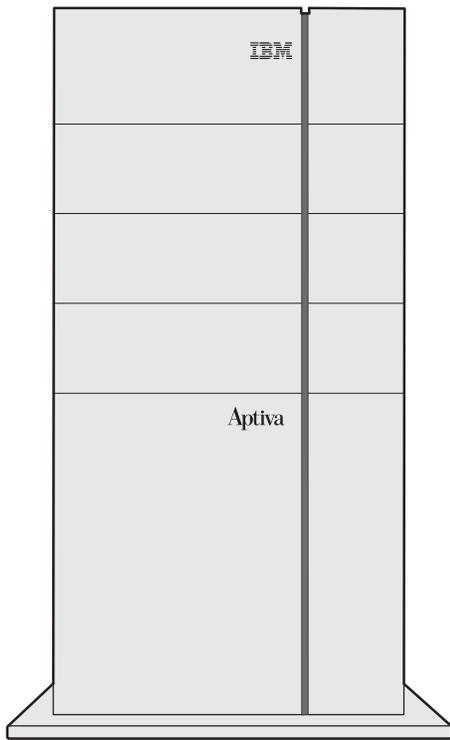and IBM Monitors

IBM

Aptiva
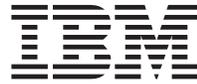
2159

Aptiva

**Hardware Maintenance Service
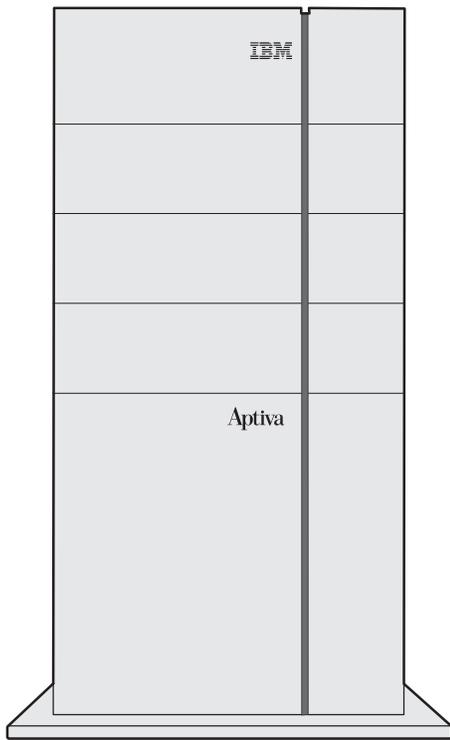for Service Level A**

IBM

Machine Type 2159
and IBM Monitors

IBM

Aptiva

2159

Aptiva

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Voltage Supply Switch Settings

Your IBM Aptiva Personal Computer *might* have voltage switches, which must be set correctly for your voltage supply. If your monitor 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 monitor or system unit. If the setting shown on the switch is:

   - Correct, start setting up your IBM Aptiva computer.

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

Positionnement du sélecteur de tension

Votre Aptiva IBM **peut** comporter des sélecteurs de tension qui doivent être positionnés correctement en fonction de la tension adéquate. Si votre écran ou votre unité centrale sont équipés d'un sélecteur de tension, vérifiez-en le positionnement en procédant de la manière suivante :

1. Le tableau ci-dessous permet de déterminer le positionnement correct du ou des sélecteurs de tension :

Tensions	Positionnement du sélecteur de tension
100–127 V	115 V ou 115
200–240 V	230 V ou 230

2. Repérez le ou les sélecteurs de tension situés à l'arrière de votre écran ou de votre unité centrale. S'ils sont positionnés de façon :

   • Correcte, démarrez la configuration de votre Aptiva IBM.

   • Incorrecte, modifiez leur position. (Vous pouvez vous aider d'un petit tournevis.)

Safety Information

The construction of the IBM Aptiva Personal Computer provides extra
protection against the risk of electrical shock. This computer has a power
cord with a three-prong plug that is required to ground metal parts. 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 you are unsure about the voltage of the electrical outlet you are using,
  contact your local power company.
- 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.
- Personal injury or electrical shock may result if you undertake actions
  other than those specifically described in this book. This is particularly
  true if you try to service or repair the power supply, monitor, or built-in
  modem. Always refer service or repairs to qualified service personnel.

Safety Notices (Multi-Lingual Translations)

The safety notices in this section are provided in the following languages:

- English
- Brazilian/Portuguese
- Chinese
- French
- German
- Hungarian
- Italian
- Russian
- Slovakian
- Spanish

___ **Safety Notice 1** _____

Before removing any FRU, power-off the computer, unplug all power
cords from electrical outlets, then disconnect any interconnecting cables.

Antes de remover qualquer unidade substituível no local (Field
Replaceable Unit - FRU), desligue o computador, retire todos os cabos
de alimentação das respectivas tomadas eléctricas, remremova a pilha
(se instalada) e, em seguida, desconecte todos os cabos de interligação.

在拆除任何FRU之前，关闭计算机电源，从电源插座拔去所有电线，
拆除电池（假如有安装），然后才拆接任何互连电缆。

Avant de retirer une unité remplaçable en clientèle, mettez le système
hors tension, débranchez tous les cordons d'alimentation des socles de
prise de courant, retirez la batterie et déconnectez tous les cordons
d'interface.

Die Stromzufuhr muß abgeschaltet, alle Stromkabel aus der Steckdose
gezogen, der Akku entfernt und alle Verbindungskabel abgenommen
sein, bevor eine FRU entfernt wird.

A helyszínen cserélhetõ egységek eltávolítása elõtt
kapcsolja ki a számítógépet, húzza ki a konnektorból
a hálózati csatlakozót, majd távolítsa el az összekötõ
kábeleket is.

Prima di rimuovere qualsiasi FRU, spegnere il sistema, scollegare dalle
prese elettriche tutti i cavi di alimentazione, rimuovere la batteria e poi
scollegare i cavi di interconnessione.

Перед тем, как снимать FRU, выключите питание
компьютера, отсоедините все кабели питания от
электрических розеток, снимите блок батарей,
затем отсоедините все кабели.

Pred odstránením lubovolného náhradného diela
vypnite poåítaå, odpoj- te napájacie káble z
elektrick—ch zásuviek, odpojte batériu (ak je inæ-
talovaná), potom odpojte prepojovacie káble.

Antes de quitar una FRU, apague el sistema, desenchufe todos los
cables de las tomas de corriente eléctrica, quite la batería y, a
continuación, desconecte cualquier cable de conexión entre dispositivos.

Safety Notice 2

The lithium battery can cause a fire, explosion, or severe burn. Do not recharge it, remove its polarized connector, 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. Use only the battery in the appropriate parts listing. Use of an incorrect battery can result in ignition or explosion of the battery.

A pilha de lítio representa risco de incêndio, explosão ou queimaduras graves. Não recarregue, desmonte ou exponha a pilha a temperaturas superiores a 100°C (212°F), não a incinere ou ponha o conteúdo da respectiva célula em contacto com a água nem remova o respectivo conector polarizado. Destrua a pilha de acordo com as normas ou regulamentações locais. Utilize apenas a pilha com o "part-number" indicado nas listas apropriadas. A utilização de uma pilha incorrecta pode resultar na igniçãou explosão da mesma.

锂电池可以引起火警、爆炸、或严重烧伤。请不要把它再充电，
拆除两极分化的连接物，拆散、加热超过 100°C (212°F)，
梵化、或把电池内含物暴露于水中。根据本地的条例或规则把电池处
理。电池只可以使用于名单适当的部件。不正确的使用电池可以导致电池
燃烧或爆炸。

Elle présente des risques d'incendie, d'explosion ou de brûlures graves. Ne la rechargez pas, ne retirez pas son connecteur polarisé et ne la démontez pas. Ne l'exposez pas à une temperature supérieure à 100°C, ne la faites pas brûler et n'en exposez pas le contenu à l'eau. Mettez la pile au rebut conformément à la réglementation en vigueur. Une pile inappropriée risque de prendre feu ou d'exploser.

Die Systembatterie ist eine Lithiumbatterie. Sie kann sich entzünden, explodieren oder schwere Verbrennungen hervorrufen. Batterien dieses Typs dürfen nicht aufgeladen, zerlegt, über 100 C erhitzt oder verbrannt werden. Auch darf ihr Inhalt nicht mit Wasser in Verbindung gebracht oder der zur richtigen Polung angebrachte Verbindungsstecker entfernt werden. Bei der Entsorgung die örtlichen Bestimmungen für Sondermüll beachten. Beim Ersetzen der Batterie nur Batterien des Typs verwenden, der in der Ersatzteilliste aufgeführt ist. Der Einsatz falscher Batterien kann zu Entzündung oder Explosion führen.

Laser Compliance Statement

Some IBM Personal Computer models are equipped from the factory with a CD-ROM drive. CD-ROM drives are also sold separately as options. The CD-ROM drive is a laser product. The CD-ROM drive is certified in the U.S. to conform to the requirements of the Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J for Class 1 laser products. Elsewhere, the drive is certified to conform to the requirements of the International Electrotechnical Commission (IEC) 825 and CENELEC EN 60 825 for Class 1 laser products.

When a CD-ROM drive is installed, note the following.

CAUTION: Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

Opening the CD-ROM drive might result in exposure of hazardous laser radiation. There are no serviceable parts inside the CD-ROM drive.

- Some CD-ROM drives might contain an embedded Class 3A laser diode. Note the following.

  DANGER

  > **Laser radiation when open. Avoid direct eye exposure.**

  CAUTION: Laser radiation when open. Do not stare into beam or view directly with optical instruments.

- Some CD-ROM drives might contain an embedded Class 3B laser diode. Note the following.

  DANGER

  > **Laser radiation when open. Avoid direct exposure to beam.**

  CAUTION: Laser radiation when open. Avoid exposure to beam.

Federal Communications Commission (FCC) Notice

The following statement applies to this IBM product. The statement for other IBM products intended for use with this product will appear in their accompanying manuals.

Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an IBM authorized dealer or service representative for help.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from IBM authorized dealers. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Canadian Department of Communications Compliance Statement

This equipment does not exceed Class B limits per radio noise emissions for digital apparatus, set out in the Radio Interference Regulation of the Canadian Department of Communications.

Avis de conformité aux normes du ministère des Communications du Canada

Cet équipement ne dépasse pas les limites de Classe B d'émission de bruits radioélectriques pour les appareils numériques, telles que prescrites par le Règlement sur le brouillage radioélectrique établi par le ministère des Communications du Canada.

Canadian Department of Communications Certification Label

Notice: The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

> **Attention**
>
> Users should not attempt to make such connections themselves, but
> should contact the appropriate electric inspection authority, or electrician,
> as appropriate.

Étiquette d'homologation du ministère des Communications du Canada

AVIS : L'étiquette du ministère des Communications du Canada identifie le
matériel homologué. Cette étiquette certifie que le matériel est conforme à
certaines normes de protection, d'exploitation et de sécurité des réseaux de
télécommunications. Le ministère n'assure toutefois pas que le matériel
fonctionnera à la satisfaction de l'utilisateur.

Avant d'installer ce matériel, l'utilisateur doit s'assurer qu'il est permis de le
raccorder aux installations de l'entreprise locale de télécommunications. Le
matériel doit également être installé en suivant une méthode acceptée de
raccordement. L'abonné ne doit pas oublier qu'il est possible que la
conformité aux conditions énoncées ci-dessus n'empêchent pas la
dégradation du service dans certaines situations.

Les réparations de matériel homologué doivent être effectuées par un centre
d'entretien canadien autorisé désigné par le fournisseur. La compagnie de
télécommunications peut demander à l'utilisateur de débrancher un appareil
à la suite de réparations ou de modifications effectuées par l'utilisateur ou à
cause d'un mauvais fonctionnement.

Pour sa propre protection, l'utilisateur doit s'assurer que tous les fils de mise
à la terre de la source d'énergie électrique, des lignes téléphoniques et des
canalisations d'eau métalliques, s'il y en a, sont raccordés ensemble. Cette
précaution est particulièrement importante dans les régions rurales.

> **Attention**
>
> L'utilisateur ne doit pas tenter de faire ces raccordements lui-même, il
> doit avoir recours à un service d'inspection des installations électriques
> ou à un électricien, selon le cas.

Load Number (LN): The load number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the load of all the devices does not exceed 100. The load number of the built-in modem is 10.

Indice de charge (IC): L'INDICE DE CHARGE (IC) assigné à chaque dispositif terminal indique, pour éviter toute surcharge, le pourcentage de la charge totale qui peut être raccordé à un circuit téléphonique bouclé utilisé par ce dispositif. L'extrémité du circuit bouclé peut consister en n'importe quelle combinaison de dispositifs pourvu que la somme des INDICES DE CHARGE de l'ensemble des dispositifs ne dépasse pas 100. L'indice de charge du modem intégré est de 10.

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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.

"Check Procedures" 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 parts 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 descriptions, illustrations, and part numbers for individual FRUs.

Appendix A, "Online Support Information" contains online support information.

"Part Number Index" contains part numbers listed in numerical order.

Appendix B, "Model/Monitor Configurations and FRU Part Numbers" contains models and FRUs listed by part number for all countries.

General Information

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 check procedures you use to diagnose and isolate product failures. Diagnostic information consists of:

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

Symptoms, Messages, Error Codes, and Beeps:
The Index of Symptoms, Messages, Error Codes, or Beeps lists symptoms and their probable causes, and directs you to the applicable check procedures to help you resolve the machine failure. The index also lists which FRU is the likely cause of the problem.

Check Procedures:
When the Start check procedure sends you to a specific check procedure or the Index of Symptoms, Messages, Error Codes, or Beeps, turn to that section and perform the steps as instructed. If there are any notes or instructions at the top of the page, read them before you start the procedure.

Carefully read each step of the check procedure 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 with that information. Always return to the check procedure after you do this. In some cases, you are sent to other check procedures to find the failure.

Diagnostic Aids:
The Diagnostic Aids chapter contains additional information to help you diagnose a failure of a specific part.

Using the Check Procedures

Failing Parts or Assemblies: The check procedures generally help you trace a problem to one part or assembly. The last step of the specific check procedure 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 might be loose, dirty, or in need of a small repair. The check procedures might lead you to two, or even three, possible failing parts or assemblies. The parts that might be failing are listed in order of the most probable failure.

Measuring Voltages: Many check procedure 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 the 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 check procedures 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 powered 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.

POST: The normal POST is initiated automatically each time the system unit is powered on (when Rapid Resume is enabled, a shorter version of POST is initiated—see "Rapid Resume" on page 1-17). The POST is a series of system checks and initializations that verify the correct operation of the base system. Two classifications of malfunctions might 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 might 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 for different start (boot) methods.

The system's default startup sequence automatically looks for the operating system files on the hard disk if the files are not found on diskette.

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

Repair Information

This chapter contains removal and replacement instructions.

Parts/Test Point Locations

This chapter contains system board layouts and jumper settings. 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. This chapter also contains jumper and dual in-line package (DIP) switch settings for modems, and jumper settings for the hard disk drive, CD-ROM (compact disc–read-only memory) drive, and sound adapter card.

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. It also contains detailed system board descriptions.

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 or to determine the part number of the system board or SIMM installed in the machine you are servicing.

Product Description

This manual contains service information for the **Service Level A** (**SL-A**) model of the IBM Aptiva Personal Computer, for the U.S., Canada, and Japan.

The Machine Type 2159 contains slots for seven adapter cards and bays for eight input/output devices (drives).

For FRU parts information, see the Appendix B, "Model/Monitor Configurations and FRU Part Numbers" on page B-1.

VESA Local Bus Note: The VESA local bus connector generally conforms to the Video Electronics Standards Association (VESA) VL-Bus Specification 2.0 (32 bit). Local bus adapter cards vary in degree of adherence to this standard. Therefore, IBM cannot guarantee that all available local bus option cards will perform according to manufacturer's claims.

This computer will support Internal or External video, but not both simultaneously.

Security: Power-on password. See "Power-On Password, CMOS Reset" on page 1-12.

System Boards: See "System Board Layout" on page 5-2 for system board jumper and connector locations.

The system board supports Pentium processors and has the following features:

- P54C socket 7-ZIF connector. You must remove the old processor to install an upgrade processor.

- 16 KB internal cache memory, and also supports an optional 256 KB or 512 KB external cache modules.

- 2 MB Video DRAM soldered on the system board.

- Four, 72-pin system memory module sockets support these memory modules:

    - 4 MB, 8 MB, 16 MB, or 32 MB SIMM modules.
    - Parity (36 bit) or Non-Parity (32 bit) memory SIMMs.
    - Memory speed of 60 nanoseconds (ns).
    - Tin-lead contacts.
    - Fast page mode or extended data out (EDO).
    - Dynamic Random Access Memory (DRAM).

- One, 168-pin Gold, EDO, 60 ns, Parity or Non-Parity DIMM module.

  Depending on model, 16 MB or 32 MB of system memory is supplied. Maximum system board memory is 128 MB. Refer to "System Memory" on page 1-25 and to "SIMM Configurations" on page 5-16.

- Ports: serial, USB (Universal Serial Bus), parallel, keyboard, mouse, and video.

- Connectors for:

  – PCI/ISA riser card (212-pin)
  – VESA Video Feature (2x20 un-shrouded)
  – Input power (12-pin)
  – AT diskette drives (34-pin)
  – Two 40-pin Enhanced IDE drive controllers: a primary local bus IDE that supports two hard disk drives and a secondary Enhanced IDE that supports a CD-ROM drive and one hard disk drive, or two hard disk drives.

    Note: Enhanced IDE for the Type A system board supports up to Mode 4. Mode 1, 2, 3, 4, etc. are the progressive industry levels for Enhanced IDE.

- Power light-emitting diode (LED)/hard disk LED (4-pin)

- 12 volt supply for external speakers

- Power-on switch 2-wire connector and a power supply auxiliary control 3-wire connector for Rapid Resume features.

- Wake Up on Ring connector for Rapid Resume automatic wake-up features.

- Lithium battery.

Processors

One of the following processors can be installed:

- Pentium P54C-133 MHz internal; 66 MHz external
- Pentium P54C-150 MHz internal; 60 MHz external
- Pentium P54C-166 MHz internal; 66 MHz external
- Pentium P54C-200 MHz internal; 66 MHz external
- Pentium P55C-166 MHz internal; 66 MHz external
- Pentium P55C-200 MHz internal; 66 MHz external

Power Supplies (with Rapid Resume Features)

- The power supply is a 145-W switchable high/low voltage power supply with a variable fan speed and a connector for a detachable grounded 3-wire power cord. The power cable has four DASD connectors: one mini power connector and three standard 4-pin connectors. The power supply also has a non-switched appliance outlet connector.

- For some countries outside the United States, the power supply might have five standard 4-pin connectors and one mini power connector, for a total of six DASD connectors.

- To support the Rapid Resume feature, all power supplies have a 3-wire auxiliary control cable that connects to the system board. There is no on/off switch cable assembly for the power supplies.

Cables

All models contain one cable for hard disk drives and one cable for diskette drives. A Wake Up on Ring modem cable, and a voice modem cable are also included.

Diskette Drive—AT-type

All models contain a 3.5-in. 1.44 MB slimline diskette drive.

Multimedia

- 5.25-in. high-performance, eight-speed (8X) CD-ROM IDE/AT drive that can read data and play audio from standard and mini CD-ROM and audio compact discs (audio CDs). It is compatible with industry-standard multimedia requirements.
- An audio cable
- Sound adapter card (on some models)
- Mwave card with fax send/receive, telephone answering, speakerphone, wavetable audio, voice-over-data, and 3D sound features (on some models).
- A CD-ROM drive system interface cable.
- One pair of speakers integrated into monitor.
- Microphone integrated into monitor.
- Joystick (on some models).

Hard Disk Drive

The hard disk drive is a 3.5-in. slimline IDE AT drive with "look-ahead" cache memory and a minimum of 14 ms average access time. Access time varies by the hard disk drive and the hard disk drive manufacturer.

Monitors

- Multimedia Monitors include:

  - .28-mm dot pitch multi-scanning, non-interlaced VGA, 800x600 and 1024x768 modes. These can also be configured to run in interlaced mode.
  - Power switch. Monitors are rated as Power Saver monitors that reduce power consumption when Rapid Resume is enabled. See "Parts Catalog" on page 7-1 for FRU part numbers.
  - Up to eleven user controls: horizontal position, vertical position, brightness, contrast, horizontal size, vertical size. speaker volume, side pincushion, and trapezoidal control, Pin corner, pin balance, and parallelogram control available on some models.
  - Connector for a detachable grounded 3-wire power cord.
  - Integrated stereo amplifier and speakers.
  - Internal microphone.
  - Provision for external headphone and microphone connections.
  - 1.5-m (4.9-ft) attached signal cable (detachable on some models).
  - Single voltage input.

Keyboard

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

Mouse

- Mouse with 1.8-m (6-foot) cable
- Remote mouse available on some models.

Hardware Interfaces

The following peripheral interfaces for adapters, options, and drives are supported in the system unit.

Table 1-1. Hardware Interfaces	
Item	**Interface**
Hard disk drives	Enhanced IDE mode 4 local bus interface (American National Standards Institute–ANSI)
Input/output (I/O) adapter cards	Adapters that are IBM AT-ISA compatible and operate at 8 MHz. PCI local bus adapter cards and Plug and Play adapter cards are supported.
Diskette drives	AT diskette interface
Video	For refresh rates and monitor frequency settings, see "Refresh Rates and Monitor Frequencies" on page 1-11. Physical interface is compatible with the IBM Personal System/2 (PS/2) VGA interface.
Serial	9-pin connector with RS232D electrical interface
USB	Universal Serial Bus. High speed serial bus designed for USB protocol.
Parallel	Bidirectional. ECP bidirectional and EPP bidirectional interfaces are supported.
Pointing device	IBM PS/2-compatible mouse
Keyboard device	IBM PS/2-compatible enhanced keyboard
CD-ROM drive	AT IDE, extended architecture (XA) enabled drive
Sound adapter card	Combination Modem/Sound Card
Joystick	Industry-standard device

Refresh Rates and Monitor Frequencies

This section provides the refresh rates and monitor frequencies the system board.

Refresh Rates and Monitor Frequencies

The following table lists the maximum vertical refresh rates for the system board that contains a ATI-MACH64 video chip with 2 MB of video DRAM.

Table 1-2. Maximum Vertical Refresh Rates (Hz)				
Type A System Board with a ATI-MACH64 Video Chip with 2 MB DRAM				
Resolution →	640x480	800x600	1024x768	1280x1024
Color ↓				
256	120 Hz.	120 Hz.	120 Hz.	75 Hz.
64,000	120 Hz.	85 Hz.	85 Hz.	N/A
16,000,000	90 Hz.	70 Hz.	N/A	N/A

Power-On Password, CMOS Reset

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 starts after the proper password is entered.

In some cases, you might be required to service a system with an active and unknown power-on password. To clear a password from the system, first identify the system CMOS jumper by referring to "System Board Layout" on page 5-2, then follow these steps.

1. Power-off the system unit.

2. Unplug the power cable from the electrical outlet.

   Attention: Do not attempt these steps with the power cord plugged into the electrical outlet. The power supply maintains +5 V dc of auxiliary power when the power switch is powered off. System damage might result if the power cord is not unplugged during testing.

3. Locate the power on password jumper on the system board.

System Board Type	Jumper
System Board Type A	Password Jumper JP12

4. Move the jumper from pins 1-2 to pins 2-3 to erase the password. See "System Board Layout" on page 5-2.

5. The system detects the change and the password, time, and date are erased from memory. Rapid Resume settings are also deleted. (See "Rapid Resume" on page 1-17.)

6. Move the jumper from pins 2-3 to pins 1-2 for normal operation.

7. Plug the power cable into the electrical outlet and power-on the system unit.

8. Run the Setup Utility to restore the configuration settings. Press **Esc** to save with the password disabled.

9. When you are finished servicing the machine, run the Setup Utility to restore the configuration settings. (You must reset the time, date, and any Rapid Resume settings. See "Rapid Resume" on page 1-17.)

Notes:

1. To reinstall the password, the user must enter a password in the Setup Utility.

2. Disabling the power on password reconfigures the system. Run the Setup Utility to clear any 16X errors.

3. To determine if the machine you are servicing has the Rapid Resume feature enabled, run the Setup Utility and check to see if Rapid Resume is enabled on the third screen (Page 3).

Flash (BIOS) Update Procedure

Attention

The system board Flash Enable jumper default position is set to *enabled*. If the following flash procedure does not work, verify that the Flash Enable jumper is set to the *enabled* position. See Flash program jumpers by referring to "System Board Layout" on page 5-2.

Also, check the Flash diskette for a README file and if present, review it for any model-specific information.

---

1. Power-off the computer.

2. Insert the Flash diskette into diskette drive A.

3. Power-on the computer.

4. Follow the instructions on the screen to complete the flash (BIOS) update procedure.

5. Machine type and serial number, if required.

Setup Utility

The Setup Utility lets you view and change important information about the computer and its hardware.

Using the Setup Utility

You might need to use the Setup Utility in the following situations:

- If you add or replace a hardware option (such as a diskette drive, hard disk drive, or memory module), and you want to verify or make a change.

- To verify a change after removing a hardware option.

- If you get an error code and message.

You can also use the Setup Utility to:

- Check the computer's hardware features. For example, you can use this program to check the amount of memory or the size of the hard disk in the computer.

- Change the computer's serial and parallel port settings, and the parallel port mode.

- Set up or change a password on the computer.

- Change the date and time on the computer.

- Reduce the amount of energy the computer uses by setting up the computer's Rapid Resume features.

- Determine which Plug and Play adapter cards you want configured by system BIOS.

Starting the Setup Utility

The Setup Utility displays screens that let you view information about how the computer is set up (called the configuration), or change certain information on the computer. There are two ways to display the Setup Utility screen:

- When you power the computer on, this symbol appears:
  Press **F1** while the symbol is displayed to get the Setup Utility screen.

- If you have an error, the computer shows a popup window with an error code and description. Press **Enter** to get the Setup Utility screen (see Figure 1-1 on page 1-16).

The Setup Utility screens display the type of information shown here. The actual screens on the computer might look slightly different, but they operate the same way.

Here are the keys you use to move through and make changes to the Setup Utility screens.

Keys	Function
↑ ↓	Use these arrow keys to highlight an option.
← →	Use these arrow keys to make a selection and change an option.
F1	Help. Press this key if you want more information about an option or using the screen.
F2	General Help. Press this key if you want general information about the computer features.
Page Down	Press this key to see the next page (screen).
Page Up	Press this key to go to the previous page (screen).

- Brackets [ ] show you which options can be changed on the screen.
- The * symbol on the screen shows you that an option has been changed.

Now that you know how to work with the Setup Utility screens, read on to learn about the options you can change on the screen.

```
                   IBM SurePath Setup Utility
                   -------------------------

                           Main Menu
                   -----------------------

                        Select a Menu:

                     System Information
                     Video Information
                     Disk Drives
                     Input/Output Ports
                     Rapid Resume
                     Plug and Play
                     Startup Options
                     Model Information
                     Date and Time
                     Advanced Options
```
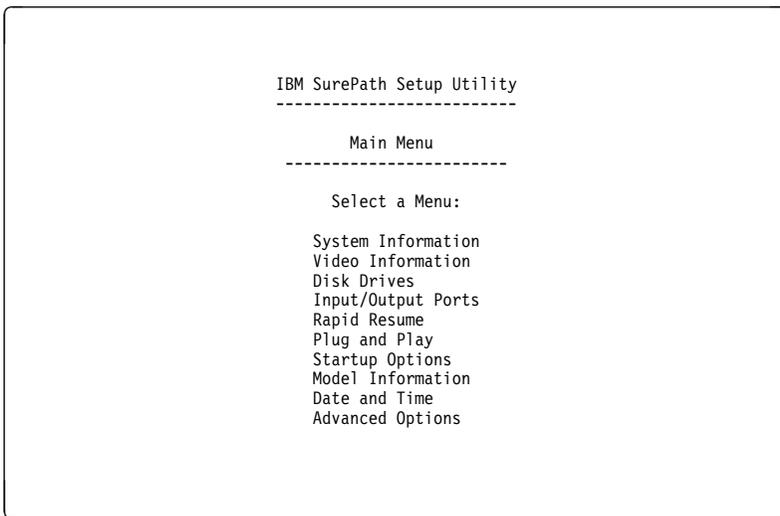
Figure   1-1. Setup Utility Screen

Making Changes with the Setup Utility

You can change only some of the information that appears on the Setup
Utility screen. The information you can change is always enclosed in
brackets like this: [**Disabled**]. The entries on the screen that you cannot
change provide useful information about the computer and its hardware. For
example, if the mouse is not working or installed incorrectly, the entry will
show if it is disabled or not installed.

Here are the options available on the Setup Utility screens:

System Information: This screen provides a summary of the computer
features. (This is an *information only* screen and cannot be changed.)

Video Information: This screen provides information about the installed
video controller and video memory. For more information on monitors,
monitor frequencies, and refresh rates, see "Hardware Interfaces" on
page 1-10.

Disk Drives: This screen provides information about the installed diskette
drives, hard disk drives, and CD-ROM installed in the computer. Hard Disk
Drive 1 on this screen is the hard disk that came with the computer.

If you add or change a drive, you must select the correct drive type on this screen. If you are adding a hard disk or CD-ROM to the computer, see "System Board Layout" on page 5-2. If both a CD-ROM drive and a hard disk drive are installed, the jumpers on the hard disk drive must be set to master for the hard drive to appear as Drive 3 on the Setup Utility screen. The CD-ROM must be set as the slave device. It will appear as Drive 4 on the screen.

If a hard disk is the only drive attached to the secondary hard disk drive connector, it appears as Drive 3 on the Setup Utility screen. If two hard disks are attached to this connector, they appear as Drives 3 and 4 on the screen.

Input/Output Ports: This screen allows you to you change the serial and parallel port addresses. Mouse and keyboard information is also provided on this screen.

The computer has two serial ports and one parallel port. Each port has a special address (identifying location) assigned to it. If you add any additional serial or parallel port adapters, make sure that each port has a different address.

- The serial port A default address is 3F8-IRQ4.
- The serial port B default address is 2F8-IRQ3.
- The parallel port default address is 3BCh.

Other serial and parallel port addresses are available. However, if you change an address on this screen, you might also need to make changes to the software. For instructions on changing the software, see the user's guide or online information supplied with the software.

The Parallel Port Mode allows you to change the mode of the parallel port. The standard mode for the parallel port is the Compatible mode. You can increase the efficiency of the parallel port by using Enhanced modes with supporting hardware.

Note: The Enhanced modes use recent technology and are only supported by newer hardware (such as a printer).

If you change the mode of the parallel port, you might need to make changes to the supported hardware and its software.

Rapid Resume: This screen provides information about the Rapid Resume features. Rapid Resume is an exclusive IBM energy-saving feature with many useful options. See "Using Rapid Resume Manager" on page 1-22 for more information.

Rapid Resume can:

- Save the current state of the computer when you power it off. Any applications or programs open when the computer is powered off will be open when the computer is powered back on.
- Automatically power off the computer when you have not used the mouse, keyboard, or hard disk for an amount of time you select. If you have an energy-saving monitor, it will also power off.
- Put the computer in a Standby mode to conserve energy when you have not used the mouse, keyboard, or hard disk for an amount of time you select.
- Reduce the time the computer takes to start up.
- Automatically power-on the computer when the phone rings so that the computer can receive a fax (Wake Up on Ring).
- Automatically power-on the computer at a date and time you choose (Wake Up on Alarm).

The following are the Rapid Resume options you can change:

APM BIOS Mode: The Basic Input/Output System (BIOS) is the machine language that runs the computer. The APM BIOS Mode option shows you the advanced power management (APM) mode that the operating system's APM driver should use when it communicates with BIOS. For Microsoft Windows 95, APM BIOS Mode should be set to 32-Bit Protected.

Note: If you are using the OS/2 operating system, select 16-Bit Protected for the APM BIOS Mode.

Rapid Resume: This screen lets you turn Rapid Resume on (`Enabled`) or off (`Disabled`).

Automatic Power Off is the option that allows you to set the amount of time that will pass before the computer powers off automatically. For example: `30 minutes` means that if the mouse, keyboard, or hard disk are not used for 30 minutes, the computer powers off automatically. Only energy-saving monitors will power off automatically with Rapid Resume.

The current state of the computer is saved before the computer powers off. Any applications or programs open when the computer powers off will be open when you power the computer back on.

Initialize Adapter Cards is the option that indicates whether the adapter cards are restarted (initialized) when you power-on the computer.

Standby Timer is the option that allows you to set the amount of time that will pass before the computer starts conserving energy. For example: `15`

`minutes` means that if the mouse, keyboard, and hard disk drive are not used for 15 minutes, the monitor goes blank and the hard disk drive in the computer starts using less power.

Note: Only energy-saving monitors power down during standby.

If you are using the Automatic Power Off feature, the time you set for Standby must be less than the time you set for Automatic Power Off. Otherwise, the computer will power off before it enters Standby.

Standby Snapshot is the option that allows you to have the state of the computer saved when it enters Standby. If the electricity goes out or the computer is powered off while in Standby, the computer resumes at the saved state when you power it back on. Any applications or programs open when the computer shut down will be open when the power returns.

Monitor mode is an option might or might not appear depending on the type of processor installed in the computer. If you see this option, you can change the power mode used to blank the monitor during Standby. If you have an energy-saving monitor, the VESA DPMS setting powers the monitor back on fastest.

Note: Only energy-saving monitors will power down during Standby.

Halt CPU when Idle is the option that allows you to halt the CPU during Standby. This conserves power without affecting the operation of the computer.

Wake Up on Ring is the option that allows you to have the computer power on automatically when the phone rings. This is useful if you have a fax modem and use the computer to receive faxes. To use this feature, you must have an internal modem that supports Wake Up on Ring, or an external modem connected to serial port A on the back of the computer.

Note: With Wake Up on Ring, the computer might power-on automatically when you dial out on a rotary or pulse telephone. If this occurs, disable the Wake Up on Ring feature and use it only when you know you will have incoming fax communications.

Indicator is a Wake Up on Ring feature that makes the power light blink at a constant rate to indicate that the computer answered the phone one or more times. The Indicator resets when you power the computer on.

Wake Up on Alarm is the option that allows you to have the computer power-on automatically at a date and time you specify. Choose the date

and time in the Alarm Date and Alarm Time fields. If you select Daily Event, you can set the Alarm Time, but not the Date.

Alarm Date and Time are options that allow you to set the date and time you want the computer to power-on automatically. Enter the date in the format shown on the screen.

Type the time in 24-hour format. For example:

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

Plug and Play: This screen provides information about the Plug and Play features. The screen includes the Auto Configure Cards option, and a list of all Plug and Play adapter cards installed in the computer.

Auto Configure Cards is an option that allows you the choice of:

- All Plug and Play adapter cards configured by system BIOS
- Only Plug and Play adapter cards required to boot the system configured by system BIOS

If you have a Plug and Play operating system, the computer might function better if only the Plug and Play adapter cards required to boot the system are configured by system BIOS. If you choose to have only the adapter cards required to boot the system configured by system BIOS, use the operating system's Plug and Play utilities to configure the other Plug and Play cards.

Plug and Play Adapter Cards is the option that lists all the Plug and Play cards you have installed in the system unit.

Note: Only the newest operating systems support Plug and Play adapter cards. See the documentation supplied with the operating system to determine if it supports Plug and Play adapter cards.

Startup Options: This screen provides information about the computer power-on (startup) sequence. When you power the computer on, it looks for the operating system files. Use the Startup Sequence option to tell the computer where to look for these files. The computer can search for these files on a diskette, an adapter card, a network, or a hard disk.

The system's startup sequence automatically looks for the operating system files on the hard disk if the files are not found on diskette.

Model Information: This screen provides model number, serial number, BIOS version level number, and BIOS manufacturing date.

Date and Time: This screen allows you to change the date and time on the computer. 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	`00:00`
12 noon is	`12:00`
1 p.m. is	`13:00`

Advanced Options: This screen provides the following features that the computer supports.

- Security options (power on password, diskette drive, keyboard)

  Power On Password is the option that allows you to create a power on password to restrict the use of the computer. Each time the computer is powered on, you must enter this password before you can use the computer. A password can be up to seven characters long (letters, numbers, or both). Once you create the password, be sure to write it down and put it in a secure place.

  Diskette Drive Access allows you to enable or disable the diskette drive access.

  Operate without Keyboard allows you the enable or disable the keyboard.

  Operate without Diskette Drive(s) allows you to enable or disable the diskette drive.
- Cache options (cache size, cache state)

  This option shows the amount of internal cache memory in the computer's processor. You cannot add internal cache memory to the computer.

  Cache memory is special buffer storage that holds frequently used instructions and data, and works faster than main storage. With cache memory installed, the applications and programs run faster. You can disable cache memory to slow down the computer.
- ROM shadowing

  This feature provides memory boundary information.
- Memory options

  This feature provides standard and EDO feature information.
- PCI card options

This feature allows you to enable or disable card bus mastering.

Using Rapid Resume Manager

The IBM Aptiva is supplied with special software called Rapid Resume Manager that makes using the computer easier and more economical.

Rapid Resume Manager Features

The Rapid Resume Manager has the following features:

Rapid Resume: Remembers all open or running applications when you power-off the computer. The next time you power-on the computer, the programs and files will open just as you left them. The Automatic Power Off option saves energy by turning the computer off after it has not been used for a period of time that you set.

Standby: Lets the computer use less energy after it has been inactive for a period of time that you set.

Scheduler: Turns on the computer for an activity that you specify, such as sending a fax.

Wake Up on Ring: Turns on the computer when the phone rings to let you receive a fax.

The following table describes the way the computer will normally operate when one of the Rapid Resume Manager features is enabled. See the online Aptiva Index for step-by-step instructions for enabling Rapid Resume Manager features.

Table   1-3 (Page 1 of 2). Rapid Resume Manager Normal Operation

What Happens	Explanation
Task List appears after turning on the computer.	This is a normal feature of Rapid Resume. Use the Task List to return to an application or disable the Task List in the Rapid Resume options window.
Delay before mouse works.	This is normal for the Standby feature of Rapid Resume. It might take a few seconds.
Computer waits before turning off.	This is normal. In some cases, it can take up to several seconds before Rapid Resume saves the data and turns off the machine.

Table 1-3 (Page 2 of 2). Rapid Resume Manager Normal Operation	
What Happens	**Explanation**
Can't start the computer from diskette if Rapid Resume is enabled.	After you power-on the computer, press **Ctrl+Alt+Del** when you see the Rapid Resume screen. There might be a slight delay before the computer restarts.
Computer comes on when the phone rings.	This is a normal feature of Wake Up on Ring. Disable Wake Up on Ring in Rapid Resume Manager or in the Setup Utility.
Computer comes on when you haven't pushed the on/off button.	This is a normal feature of Scheduler. If you don't want this to happen, disable Scheduler in Rapid Resume Manager or Wake Up on Alarm in the Setup Utility.
System unit power indicator light is blinking, but system unit is turned off.	This is a normal feature of Wake Up on Ring enabled with the Ring Indicator option selected. A fax might be waiting.

Rapid Resume Connectors

The Rapid Resume feature connectors on the system board are one 3-pin latched connector for the power supply and one 2-pin latched connector for the power switch and cable assembly. To remove the latched connector, press in the latch using the tip of a screwdriver to release the connector. See "System Board Layout" on page 5-2 for connector locations.

Attention: Do not attempt repairs with the power cord plugged into the electrical outlet. The power supply maintains +5 V dc of auxiliary power when the power switch is turned off. System damage might result if the power cord is not unplugged during testing.

POST Error History

The computer automatically keeps a history of the last three POST errors.
You can access the POST Error History by pressing **F9** while the POST

Configuration icon [icon] appears. The POST Error History shows the last
three error codes in a list, with the most recent error code added to the
bottom of the list, as shown in Figure 1-2.

Most recent error
code is listed
at bottom

The following error(s) were detected when the system was
started:

5962   Configuration Error
162   Configuration Error
301   Keyboard Error

Press Enter to run the Configuration Utility or Esc to
continue.
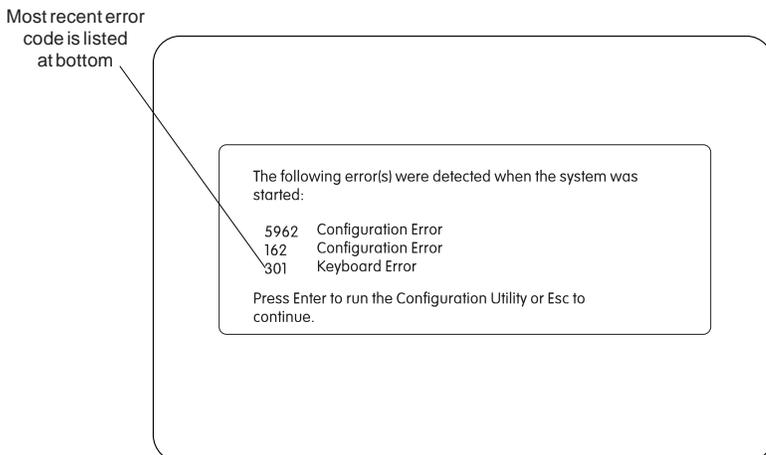
Figure   1-2. POST Error History

Note: The POST Error History is emptied whenever the password is reset
from the system board or the battery runs out of power. If Rapid Resume is
enabled, press **F9** when the memory count and POST Configuration icon
appear.

System Memory

The system board supports 72-Pin, 60 or 70 NS, tin-lead, fast page or EDO, 32 or 36 bit Single Inline Memory Module, (SIMM).

It can also accept a 168-Pin 60 NS, Gold, or EDO, 64 bit Dual Inline Memory Module, (DIMM). See "SIMM Configurations" on page 5-16 for installation information.

SIMM Identification

72-pin memory SIMMs are usually marked with a label that shows the size and speed (for example, `1Mx32, 60 ns`). To determine the SIMM capacity from the above example, divide 32 bits by 8 bytes and multiply that answer by 1M, hence, SIMM = 4 MB. 1Mx32 is Non parity and 1Mx36 is Parity. SIMMs that are not clearly labeled cannot be identified other than by part number. Consult the SIMM manufacturer documentation to identify SIMMs.

DIMM Identification

168-pin memory DIMMs can usually be identified by the information on the chip modules. (for example, `2Mx64, 60 ns, EDO`). To determine the DIMM capacity from the above example, divide 64 bits by 8 bytes and multiply that answer by 2M, hence, DIMM = 16 MB. 1Mx32 is Non parity and 1Mx36 is Parity. DIMMs that are not clearly labeled cannot be identified other than by part number. Consult the DIMM manufacturer documentation to identify DIMMs.

Specifications

Size:

- Machine Type 2159 system unit
    - Width: 241 mm (9.50 in.)
    - Depth: 438 mm (17.25 in.)
    - Height: 432 mm (17.00 in.)
- Monitor Type 7095
    - Width: 435 mm (17.1 in.)
    - Depth: 424 mm (16.7 in.)
    - Height: 349 mm (13.7 in.) with tilt/swivel stand
- Monitor Type 7097
    - Width: 476 mm (18.7 in.)
    - Depth: 438 mm (17.2 in.)
    - Height: 418 mm (16.5 in.) with tilt/swivel stand

Weight:

- Machine Type 2159 system unit
    - 10.9 kg (24 lb)
    - If CD-ROM drive installed, 11.8 kg (26 lb)
- Monitor
    - 14.5 kg (32 lb)

Environment:

- Temperature, system unit and monitor
    - Power on: 10° to 40°C (50° to 100°F)
    - Power off: 1° to 60°C (50° to 104°F)
- Humidity, system unit and monitor
    - Power on: 8% to 80%
    - Power off: 5% to 90%
- Maximum altitude: 2134 m (7000 ft)

Heat output:

- Machine Type 2159 system unit
    - Typical (as shipped): 170 Btu/hr
    - Maximum load: 700 Btu/hr
- Monitors
    - Typical: 323 Btu/hr
    - Maximum Load: 375 Btu/hr

Electrical:

- Input voltage for system unit and monitor (sinewave input is required)
  Low Range

  Nominal: 100 V ac to 127 V ac
  Maximum: 90 V ac to 132 V ac

  High Range

  Nominal: 200 V ac to 240 V ac
  Maximum: 180 V ac to 259 V ac

Operating Requirements

All machines have two power on switches: one on the system unit and one on the monitor (if the monitor was shipped with the model). Some high voltage machines (180–259 V ac) might have a power cord from the monitor to the system unit and a non-switched appliance connector.

High voltage Northern and Southern Hemisphere SVGA monitors might 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.

Note: Whether or not Rapid Resume is enabled, the on/off switch on the system unit *does not* completely power-off the power supply. Also, the appliance outlet connector is always powered on when the system unit is plugged into an electrical outlet. See "Rapid Resume" on page 1-17 for more information.

A Note About Energy Saver Monitors

- Monitors rated as "Energy Saver" models use 30 W or less when operating in the energy-saving mode or when the system unit is powered off.
- To extend monitor life, the monitor should be powered off at the end of each day.

Special Tools

The following special tools are required to service this system:

- A meter similar to the Triplett Model 310 (P/N 9900167)
- Wrap plug, P/N 72X8546
- Video memory removal tool, P/N 9900764

Check Procedures

Start

This is the entry point for all check procedures. The check procedures use failure symptoms, POST error codes, or beeps to help determine the failing field replaceable unit (FRU). Follow the suggested check procedures or use the Diagnostics CD to determine the problem FRU.

The Diagnostics program comes on one CD supplied with this book. Use only this CD for all **Service Level A Machine Type 2159** IBM Aptiva Personal Computers.

The 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 check procedures are positive unless otherwise shown. And, use frame ground for all voltage checks unless otherwise specified.

Note: If the check procedures instruct you to replace a FRU and the error message remains the same, an option adapter card might be causing the failure. Remove all option adapter cards, one at a time, until the error changes or the problem is no longer apparent. Replace the last option adapter card removed.

The hard disk drive contains preloaded software. Refer to "Software Installation Procedure" on page 4-22 to reinstall the original software. Be sure to reload the software on the primary hard disk drive (drive C) when replacing it.

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

Ask the customer to back up any additional software from the hard disk drive before you take any action.

How to Diagnose Combined FRUs: If an adapter or device consists of more than one FRU, any of the FRUs might cause an error code. Before replacing the device or adapter, remove the FRUs, one by one, to see if the symptoms change.

If you have been directed here from another check procedure and were instructed to replace the system board, and that does not correct the problem, reinstall the original system board and go through "Start" again.

POST Error Codes: A POST error code can occur in three 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 a 203 address error.

2. After two beeps, followed by an error code and/or explanatory message.

3. As a sequence of beeps with no other messages or error codes displayed.

   Note: It might take a minute or more for the system to respond with error messages or beeps.

If you have an XX62 or XX59 error with no other error codes, run the Setup Utility (see "Using the Setup Utility" on page 1-14) and note any flagged options. Note the XX62 error or flagged option and try to add it from the Configuration/Setup Utility screen. If the option cannot be added, go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-9 for additional help.

If you want to print a copy of a Setup Utility screen on an attached printer, press **Print Screen** while the screen is displayed.

How to Use Error Messages: Use the messages, error codes, and beep combinations that occur to diagnose failures. If more than one failure occurs, diagnose the first failure first. The cause of the first failure can result in false messages, error codes, or beeps.

An Access Station failure can cause multiple error codes. For more information, see "Access Station Drive Devices" on page 2-46. If you did not receive any messages, error codes, or beeps, see if the symptom is listed in "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-9.

001

To begin this check, note the following:
– To disable or reset the power-on password, see "Power-On Password, CMOS Reset" on page 1-12.
– Disconnect all external cables and devices from the system unit, except for the keyboard, mouse, and monitor.
– Power-off the system unit whenever removing or replacing FRUs.
– Remove all adapter cards from the riser card, except for the factory-installed Mwave card or FAX/modem adapter card and any IBM Aptiva factory-installed adapter cards.
(Step **001** continues)

(continued)

001 (continued)

> **Note:** Do not remove the riser card. The system generates multiple error codes when the riser card is removed and the system is powered on.

– Remove all telephone cables from the Mwave adapter card or modem, if installed.
– Disconnect any drives except:

- 3.5-in. diskette drive
- Hard disk drive (some machines can have up to 4 hard disk drives installed.)
- IBM Aptiva factory-installed devices (such as a CD-ROM drive).

– Ensure all power cords and cables are connected properly.
– Ensure the monitor brightness and contrast controls are not turned down.
– Ensure the sound volume control is not turned down.
– Power-on the system unit.

> **Note:** Some monitors have a detachable system I/O signal cable between the monitor and the system unit. In either case, check the power cord or cable before replacing the unit. See "Detachable Monitor I/O Signal Cable Connector Test Points" on page 5-17 for pin identification.
>
> High voltage Northern and Southern Hemisphere monitors might come with a voltage selector (110 V–220 V) switch. The 145-W power supply might have a voltage selector (110 V–220 V) switch. Match the switch to the line voltage.

– Ensure correct monitor refresh rate. See "Refresh Rates and Monitor Frequencies" on page 1-11.
– Note any symptoms, messages, error codes, or beeps.
– Make sure there are no diskettes or CDs in the drives.

DOES THE SYSTEM COMPLETE POST WITH ONE SHORT BEEP AND DOES AN IBM APTIVA SOFTWARE SCREEN APPEAR?

Note: If Rapid Resume is enabled, answer this question "No."

Yes No

> **002**
>
> – If Rapid Resume is enabled, you must disable Rapid Resume in the Setup Utility, and enable it again upon completion of service.
>
> To disable Rapid Resume without changing the customer settings:
>
> 1. Make sure the customer saves and closes any open files.
>
> (Step **002** continues)

002 (continued)

    2. Power-off, then power-on the system unit.

    3. Press **F1** while the POST Configuration icon is displayed.

    4. In the Setup Utility Main Menu, select Rapid Resume and press **Enter**.

    5. Write down the present setting of the `APM BIOS Mode` (top line of screen) and press the ← key, if needed, to select `Disable` in the **APM BIOS Mode** field.

    Note:

    Disabling the **APM BIOS Mode** will disable Rapid Resume without changing other customer APM settings.

    6. Press **Esc** to exit the Rapid Resume menu.

    7. Press **Esc** again to exit the screen.

    8. Press **Enter** to save the changes and exit the Setup Utility.

    9. Rapid Resume is now disabled.

When service is complete, restore the **APM BIOS Mode** to its original setting.

    1. Power-on the system unit.

    2. Press **F1** while the POST Configuration icon is displayed.

    3. In the Setup Utility, select Rapid Resume and press **Enter**.

    4. Press the ← key, if needed, to select `Enable` in the **APM BIOS Mode** field.

    5. Press **Esc** to exit the Rapid Resume menu.

    6. Press **Esc** again to exit the screen.

    7. Press **Enter** to save the changes and exit the Setup Utility.

    The system is now returned to the **APM BIOS Mode** customer setting.

– Go to Step 005 on page 2-6.

003

Insert the Diagnostics CD **Service Level A** in the CD-ROM drive.
DOES THE SYSTEM LOAD THE ADVANCED DIAGNOSTIC PROGRAM FROM THE CD-ROM DRIVE WHEN POWERED OFF AND THEN ON?
Yes   No

    004

    – Go to "Factory-Installed Drive Devices" on page 2-47.

005

(Step **005** continues)

(continued)

005 (continued)
(From step 002)
DO ANY MESSAGES, ERROR CODES, OR SYMPTOMS APPEAR?
Yes   No

> **006**
>
> – Go to Step 008.

007

– Go to "Index of Symptoms, Messages, Error Codes, or Beeps" on
   page 2-9.

008

(From step 006)
– If not already inserted, place the Diagnostics CD in the CD-ROM drive.
– Power-off the system unit.
– Power-on the system unit, and check for the following responses:

   1. One short beep
   2. Readable instructions or Main Menu

DID THE SYSTEM PRODUCE THE BEEP AND READABLE SCREEN?
Yes   No

> **009**
>
> – Go to "Index of Symptoms, Messages, Error Codes, or Beeps" on
>   page 2-9.

010

- If the keyboard responds incorrectly, go to "Keyboard" on page 2-40.
- If the monitor shows problems, such as jittering, shifting, or being out of
  focus, go to "Monitor" on page 2-67 and run the Diagnostics tests.
- If a message or error code is displayed, go to "Index of Symptoms,
  Messages, Error Codes, or Beeps" on page 2-9.

– Select **Advanced Diagnostics** on the menu.
– Select **System Info** on the menu.
– Select **Hardware Config** on the menu.
– Compare the Hardware Configuration Report screen with the actual
   devices installed in the system unit.
(Step **010** continues)

010 (continued)

> **Note:** If necessary, remove the cover and visually compare the devices installed in the system unit to those shown in the Hardware Configuration Report.

DOES THE HARDWARE CONFIGURATION REPORT CORRECTLY IDENTIFY THE DEVICES INSTALLED IN THE SYSTEM UNIT?
Yes No

> **011**
>
> – The Hardware Configuration Report shows only those devices supported by the Diagnostics CD and only factory-installed devices for the model you are servicing.
> – If a device is missing from the list and is not factory installed, refer to the service manual provided for that device. (Refer to the Appendix B, "Model/Monitor Configurations and FRU Part Numbers" on page B-1 to determine the factory-installed devices in the model you are servicing.)
> – If a factory-installed drive device or adapter card is not listed in the Hardware Configuration Report, go to either "Diagnostics for Factory-Installed Drive Devices Not Supported by the Diagnostics CD" on page 2-50 or "Diagnostics for Factory-Installed Riser Card, Sound Card, or Adapter Cards Not Supported by Diagnostics CD" on page 2-53.

012

– Select **Diagnostics Menu** from the menu.
– Select **Easy Test Diagnostics** from the menu.
DOES THE EASY TEST DIAGNOSTICS FINISH WITHOUT ERROR CODES?
Yes No

> **013**
>
> – If the last test stops and you cannot continue, first make sure all switches, power connectors, cables, and jumpers are set correctly and show the correct voltages and continuity.
> – Make note of any messages, error codes, beeps, or new symptoms. Go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-9.

014

(Step **014** continues)

(continued)

014 (continued)
– The Easy Test Diagnostics did not detect a failure. If the system still
  displays a failure:

  - Check all adapter card jumper settings.
  - Check all adapter card switch settings.
  - Check all adapter card cables and connectors for proper installation.
  - Check Access Station host card for proper installation.
  - Check Access Station client card and cable for proper installation.
  - Make sure all of the above are set correctly and show the correct
    voltages and continuity. Replace any defective cables or adapter
    cards. See "Power Supply" on page 2-35, and "System Board
    Layout" on page 5-2.

– Run the **Easy Test Diagnostics** again.
– If an error or other symptom is displayed, go to "Index of Symptoms,
  Messages, Error Codes, or Beeps" on page 2-9.
– If no error can be detected or the symptom is intermittent, go to
  "Undetermined Problem" on page 2-69.

Index of Symptoms, Messages, Error Codes, or Beeps

Table 2-1 on page 2-10 lists failure symptoms and possible causes. The most likely cause is listed first. Make sure you complete all items in the cause or "Action/FRU" column. When servicing a system, always begin with "Start" on page 2-2. This index can also be used to help you decide which FRUs to have available when servicing a system.

If you are unable to correct the problem using this index, go to "Undetermined Problem" on page 2-69.

Notes:

1. If an error message and incorrect audio response occur, diagnose the error message first.

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

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

4. Check all power supply voltages, switch, and jumper settings before you replace the system board. Also check the power supply voltages if you have a system no-power condition. (See "Power Supply" on page 2-35 and "System Board Layout" on page 5-2)

In Table 2-1 on page 2-10, an **X** in an error code can be any number. If you are unable to correct the problem using this index, go to "Undetermined Problem" on page 2-69.

If you observe:	Go to:
Symptoms that are not beeps or error codes	Page 2-10
Beeps in any combination	Page 2-26
Error codes displayed on the screen	Page 2-29

Table 2-1 (Page 1 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps	
Symptoms, Messages, Error Codes, or Beeps	**Action/FRU**
Note: To diagnose a problem, first find the symptom, message, error code, or beeps in left column. If directed to a check procedure, replace the FRU indicated in the check procedure. If no check procedure is indicated, the first Action/FRU listed in right column is the most likely cause.	
Symptoms	
Address Exceeds the Size of Your Memory. An invalid memory address was entered. Diagnostics Tests display this message during the Locate Bad Chips option.	Memory SIMM System Board
Arithmetic Functions Failed. An error was detected during the CPU Test.	Processor System Board
Audio software program invoked but no sound comes out of speakers, or sound comes out of one speaker only.	"Diagnostics for Factory-Installed Riser Card, Sound Card, or Adapter Cards Not Supported by Diagnostics CD" on page 2-53. Mwave/Sound adapter card connection, cable, jumpers Mwave/Sound adapter card volume control Mwave/Sound adapter card
Audio software program does not initiate in software but CD-ROM drive works normally.	"Diagnostics for Factory-Installed Riser Card, Sound Card, or Adapter Cards Not Supported by Diagnostics CD" on page 2-53. Mwave jumper settings Mwave/Sound adapter card
Base Memory Test Failed. An error was detected in base memory.	Memory SIMM System Board
Blinking cursor only and machine not working normally.	"Factory-Installed Drive Devices" on page 2-47. Diskette drive connection/cable diskette drive Access Station host card Access Station client card Access Station cable System board

Table 2-1 (Page 2 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps

Symptoms, Messages, Error Codes, or Beeps	Action/FRU
Boot Sector Unreadable. A boot sector read error was detected on the hard disk drive.	Hard Disk Drive Hard Disk Drive Cable System Board
Bus Noise Test Failed. RAM Test detected an error in the memory bus.	Memory SIMM System Board
Butterfly Cylinder Access Test Failed. Hard Disk Drive Test detected mismatch between the data read and the data stored on the drive.	Hard Disk Drive Hard Disk Drive Cable System Board
Cannot finish diagnostic test.	"Diagnostics Device Presence Test" on page 2-43.
CD-ROM drive LED came on and stayed on more than 20 seconds before shutting off. Software asks to install disc. Software displays a `Reading CD error`.	CD is not inserted properly. CD is damaged. CD has dirt or foreign material on it.
CD-ROM drive LED comes on when inserting a disc but no CD-ROM drive icon appears in the File Manager as Drive D.	"Factory-Installed Drive Devices" on page 2-47. CD-ROM drive connections/cables/jumpers CD-ROM drive Access Station host card Access Station client card Access Station cable
CD-ROM drive LED does not come on when inserting a disc in the drive when the system is powered on and the CD-ROM drive power connector has the correct voltage.	"Diagnostics for Factory-Installed Riser Card, Sound Card, or Adapter Cards Not Supported by Diagnostics CD" on page 2-53. CD-ROM drive Access Station host card Access Station client card Access Station cable
CD-ROM drive LED does not come on but CD-ROM drive works normally.	CD-ROM drive

Table 2-1 (Page 3 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps	
Symptoms, Messages, Error Codes, or Beeps	**Action/FRU**
CD-ROM drive does not load or eject when the system is powered on, the LED light is off, and the eject button is pressed and held.	"Factory-Installed Drive Devices" on page 2-47. CD-ROM drive system connection/cable CD-ROM drive Access Station host card Access Station client card Access Station cable Power supply
CD-ROM drive does not read data files and no error codes or messages are displayed. `Cannot read from Drive E. Retry loading CD` message is displayed with disc loaded in CD-ROM drive. Mwave/Sound adapter card works properly.	"Diagnostics for Factory-Installed Drive Devices Not Supported by the Diagnostics CD" on page 2-50. Check with a known good disc and correct level of software. CD-ROM drive Access Station host card Access Station client card Access Station cable
CD-ROM drive does not play an audio disc. Mwave/Sound adapter card works properly. CD-ROM drive reads data files.	"Diagnostics for Factory-Installed Drive Devices Not Supported by the Diagnostics CD" on page 2-50. Audio cable on CD-ROM drive is not connected to sound adapter card. Check the audio cable from the CD-ROM drive to the client card in the Access Station and the audio cable that is connected from the system board to the host card. If music can be heard through headphones plugged into the sound adapter card jack, replace the CD-ROM drive. Access Station host card Access Station client card Access Station cable
Clock Stopped. Real-time clock has stopped working.	Battery System Board
CMOS Clock Test Failed Time and Date Settings for CMOS and DOS **do not** Match.	Battery System Board

Table 2-1 (Page 4 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps	
Symptoms, Messages, Error Codes, or Beeps	**Action/FRU**
Communication problem. Modem function does not work properly.	Mwave connection/jumpers Mwave Wake Up on Ring jumper connection/cable Mwave card Riser Card System Board
Controller Diagnostic Test Failed. An error was detected while testing the Hard Disk Controller (Adapter).	Hard Disk Drive System Board
Cylinder 0 errors. Test detected an error reading the first cylinder of the hard disk drive.	Hard Disk Drive System Board
Device is Not Ready Ready the Device... or **Press Any Key**	Ensure the device is powered on. Replace failing device Device Adapter (if installed) System Board
Diskette drive indicator LED remains on or does not light when drive is active.	Diskette drive connection/cable Diskette drive Access Station host card Access Station client card Access Station cable System board
3.5-in. diskette drive and CD-ROM do not work.	Access Station host card Access Station client card Access Station cable
3.5-in. diskette drive does not work.	"Factory-Installed Drive Devices" on page 2-47. Diskette drive Diskette drive connection/cable Access Station host card Access Station client card Access Station cable System board
Disk Error Encountered Opening Output File Press Any Key To Continue.	Hard Disk Drive System Board

Table 2-1 (Page 5 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps	
Symptoms, Messages, Error Codes, or Beeps	**Action/FRU**
DMA #X Failed Main Components Test detected an error while testing the DMA controller.	System Board
DMA Page Register Failed DMA page register error	System Board
Drive (x) Media (y) Mismatch FAT ID mismatch with installed drive.	Check diskette and diskette drive capacity. Diskette Drive System Board
Error in video buffer. Bad bits. Video memory test error.	Video Adapter System Board Monitor
Extended Memory Test Failed. Extended memory error.	Memory SIMM System Board
FAX/voice modem function has no sound output. (Data files are received normally; sound or sound adapter card works correctly.)	Check jumper settings and cable connections on Mwave card. Mwave card or sound card Riser Card System Board
FAX function does not receive data files.	Mwave jumper settings Mwave card Riser Card System Board
FAX/voice function has no sound output. (Data files are received normally; sound adapter card does not produce sound or cannot be activated in software.)	"Diagnostics for Factory-Installed Riser Card, Sound Card, or Adapter Cards Not Supported by Diagnostics CD" on page 2-53. Mwave card or sound card Riser Card System Board
Floppy Drive Failed. Diskette drive(s) failed.	Diskette Drive System Board Diskette Drive Cable Access Station host card Access Station client card Access Station cable

Symptoms, Messages, Error Codes, or Beeps	Action/FRU
Hard disk or power-on indicator LED does not light but machine functions normally otherwise.	Check J26 voltages, with power-on: **J26** **Hard Disk** **Pin** **Normal** **Running** 1 +5 V dc 0 V dc 2 +5 V dc +5 V dc 3 +5 V dc +5 V dc 4 0 V dc 0 V dc Pins 1, 2 = Hard Disk Drive Pins 3, 4 = Power-on LED Check voltages at Access Station card, see "Access Station" on page 5-14. LED connection/cable assembly Access Station host card Access Station client card Access Station cable System board
Hard Drives Failed. Hard Disk Drive test error.	Hard Disk Drive System Board
Home Automation failures	"Home Automation" on page 4-19
Incorrect DOS version.	Ensure you are using DOS version 3.0 or higher.
INT Mask Register Failed. INT Mask Register error.	Processor System Board
`Insert a CD` message icon appears when a known good Diagnostics CD is inserted in the CD-ROM drive.	Ensure the hard disk drive and CD-ROM drive are not disabled in the startup sequence in the Setup Utility. Hard disk drive preloaded software CD-ROM drive connection/cable CD-ROM drive Access Station host card Access Station client card Access Station cable System board
Intensity or color varies from left to right of characters and color bars.	"Monitor" on page 2-67. System board

Table 2-1 (Page 6 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps

Table 2-1 (Page 7 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps	
Symptoms, Messages, Error Codes, or Beeps	**Action/FRU**
Invalid Date Clock/DOS date mismatch.	Battery Battery System Board
`Invalid Format – Bad Track` error message appears when trying to format a known-good diskette.	Diskette drive connection/cable Diskette drive Access Station host card Access Station client card Access Station cable System board
Incorrect memory size shown or repeated during POST.	"Memory" on page 2-38.
Invalid Time Clock/DOS time mismatch. Back-up clock and DOS time of day settings do not match.	Battery System Board
I/O devices cannot be added to configuration.	Diskette drive Diskette drive connection/cable CD-ROM drive CD-ROM drive connection/cable Access Station host card Access Station client card Access Station cable
Joystick does not respond at all.	1. Ensure the joystick is plugged completely into the joystick/MIDI adapter plug on the Mwave card or the sound adapter card and secured with the screws on the adapter plug. 2. Verify that the software application used with the joystick has joystick support. 3. Ensure the joystick is enabled in the software application. This might require entering keystrokes or a configuration utility in the software application. If the above steps find no problem, see the "Joystick does not work correctly" symptom below.

Table 2-1 (Page 8 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps	
Symptoms, Messages, Error Codes, or Beeps	**Action/FRU**
Joystick does not work correctly (installation is correct—see above symptom).	1. Disable the joystick in the software application. 2. Enable the mouse as the input device in the software application. 3. If the mouse works in the software application, replace the joystick. If the symptom remains, replace the Mwave card or the sound adapter card. 4. If the mouse does not work, check the software application troubleshooting information provided by the manufacturer.
Linear Cylinder Access Test Failed. Hard disk drive error.	Hard Disk Drive Hard Disk Drive Cable System Board
Logic Function Failed. CPU Logic test error.	Processor System Board
Loopback Error COM Port Test or Parallel Port error. A wrap plug must be installed to successfully complete these tests.	System Board Wrap Plug
Machine works but fails to go into Rapid Resume mode when configuration is set with Standby mode enabled or Rapid Resume mode enabled.	Software application was fully activated before on/off switch was pushed. Try operating Rapid Resume from Microsoft Windows 95 Program Manager panel.
Main Components Failed. System board error.	System Board Processor
Memory test cannot run at this location in memory. Not enough free memory available to start the memory test.	Memory SIMM System Board
Missing QAPlus/PRO Files(s). One or more diagnostic support files are missing.	Diagnostic CD

Table 2-1 (Page 9 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps	
Symptoms, Messages, Error Codes, or Beeps	**Action/FRU**
Monitor problem: • Incorrect colors • No high intensity • Missing, broken, or incorrect characters • Blank monitor (dark) • Blank monitor (bright) • Distorted image • Unreadable monitor • Other monitor problems	"Monitor" on page 2-67. I/O monitor signal connection/cable Monitor System board
Monitor changing colors.	"Monitor" on page 2-67
Monitor problem not listed above (including blank or illegible monitor).	"Monitor" on page 2-67 System board
Mwave error Mwave communication or sound not working	"Mwave Adapter" on page 2-59 Mwave card Riser Card System Board
No beep during POST but computer works correctly. (System board speaker/beeper bad.)	System board
`Non-system disk or disk error` message appears with a known-good Advanced Diagnostics diskette.	Diskette drive connection/cable Diskette drive Access Station host card Access Station client card Access Station cable System board
No Loop-Back Plug. Skipping External loopback test. No wrap plug installed.	Install wrap plug on the serial port, rerun test. System Board
No system power, or fan not running.	"Power Supply" on page 2-35. Power switch assembly Power supply Access Station host card. Access Station client card Access Station cable System board

Table 2-1 (Page 10 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps	
Symptoms, Messages, Error Codes, or Beeps	**Action/FRU**
Not ready. Printer not on-line or not ready.	Ready Printer Printer Printer Cable System Board
No 'type-amatic' repeat. At least one repeat key must be tested during this test or an error will occur. Type-amatic test error.	Keyboard System Board
Not used by any standard device. IRQ is not currently being used by a non-standard device.	System Board
Numeric Proc Failed. NPU test error.	Processor System Board
Parallel Port Failed. Test Report Summary message.	System Board
Parallel port or serial port failure (system board port).	"Diagnostics Device Presence Test" on page 2-43. Test using a wrap plug while running Diagnostics. Cable/connections System board
Pass (N): ** Errors ** Drive (X) Failed. Diskette drive read/write test error.	Diskette Drive Access Station host card Access Station client card Access Station cable System Board Diskette Drive Cable
Pass (N) Drive Not Ready. Diskette drive door is open or defective.	Ensure diskette drive is ready. Diskette Drive Access Station host card Access Station client card Access Station cable System Board Diskette Drive Cable

Table 2-1 (Page 11 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps	
Symptoms, Messages, Error Codes, or Beeps	**Action/FRU**
Pass (N): Drive (X) Write Protected or Unformatted.	Insert a non-write protected, formatted diskette into the diskette drive; then rerun the test. Diskette Drive Access Station host card Access Station client card Access Station cable System Board Diskette Drive Cable
Pass (N): Unknown Media Drive (X). Diskette Drive Test error.	Diskette Diskette Drive Access Station host card Access Station client card Access Station cable System Board Diskette Drive Cable
Place Hi-density Media in Drive. Media/drive mismatch.	Diskette Diskette Drive Access Station host card Access Station client card Access Station cable System Board Diskette Drive Cable
Printer Failed. Printer powered-on and ready?	Printer Printer Cable System Board
Printer Fault. Printer powered on and ready?	Printer Printer Cable System Board
Printer Not Selected. Ensure the printer is powered on and ready.	Printer Printer Cable System Board
Printer problems.	Refer to the service manual for the printer.
Processor fan does not run when the power supply fan runs.	With power-on, check the processor fan connector J1 on system board for +12 V dc. Processor fan System board

Table 2-1 (Page 12 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps	
Symptoms, Messages, Error Codes, or Beeps	**Action/FRU**
Processor speed seems slower.	"Memory" on page 2-38. Cache memory System board
Program loads from the hard disk with a known-good CD in the CD-ROM drive or diagnostics diskette in the first 3.5-inch diskette drive (and CD-ROM drive or diskette drive is enabled in the Setup Utility).	"Factory-Installed Drive Devices" on page 2-47. CD-ROM Drive Diskette Drive Access Station host card. Access Station client card System Board Power Supply
Program or File Not Found **Press Any Key** Diagnostics cannot find the USER(N).COM file.	Diagnostic CD or diskette CD-ROM Drive or Diskette Drive Access Station host card Access Station client card Access Station cable System Board
Program Too Big To Fit In Memory. Too many Terminate and Stay Resident programs in memory.	Reboot the system from the Diagnostic CD.
QAPlus/PRO Cannot Be Re-run Because Of Error In Relocating Program. Diagnostics failed to relocate the Diagnostics Test programs so the memory space it resides in was not tested.	Diagnostic CD Memory SIMM System Board
RAM Memory Error in Block n. Bad bits n. Memory error.	Memory SIMM System Board
RAM Test Failed. Memory error.	Memory SIMM System Board
Read error on cylinder n. Hard disk drive format error.	Hard Disk Drive System Board

Table 2-1 (Page 13 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps	
Symptoms, Messages, Error Codes, or Beeps	**Action/FRU**
Read Errors Diskette drive read error.	Diskette Diskette Drive System Board Diskette Drive Cable
Real-time clock is inaccurate.	Time set incorrectly by user. RTC battery (if less than 2.8 V dc) System Board
Receive Error. Serial Port loopback test error.	Serial Port Cable System Board
Refresh Failure. Diagnostics Test detected an error while testing the DMA controller's RAM refresh cycle.	Memory SIMM System Board
RTC Interrupt Failure. Diagnostics Test cannot detect the Real-Time clock interrupt.	System Board
Serial Chip Error. COM Port error, general.	Serial Port Cable System Board
Serial Compare Error. COM Port error, information transmitted is not the same as information received.	Serial Port Cable System Board
Serial Time-out Error. COM Port error, time interval is too long between transmitted and received data.	Serial Port Cable System Board
Serious Memory Error — Diags Cannot Continue. Memory Test error.	Memory SIMM System Board
Some or all keys on keyboard do not work.	"Keyboard" on page 2-40. Keyboard Keyboard connection/cable Access Station host card Access Station client card Access Station cable System Board

Table 2-1 (Page 14 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps	
Symptoms, Messages, Error Codes, or Beeps	**Action/FRU**
Serial or parallel port device failure (adapter port).	"Factory-Installed Drive Devices" on page 2-47
	Test using a wrap plug while running Diagnostics. Before testing, ensure serial port A is set to address 3F8 or 3E8, whichever is not used by the Mwave card (modem settings: COMM1=3F8, COMM2=3E8). Set serial port B to address 2F8 or 2E8.
	Device Cable/connections Alternate adapter System Board Riser Card
Sorry You Need A Mouse. Mouse or mouse driver was not detected.	Mouse System Board
Sound adapter card, factory-installed adapter card, or Mwave card software gives a Microsoft Windows 95 error message after POST configuration. Hardware problem occurred.	"Diagnostics for Factory-Installed Riser Card, Sound Card, or Adapter Cards Not Supported by Diagnostics CD" on page 2-53
	Sound card, adapter card, or Mwave card connection/cable Sound card, adapter card, or Mwave card jumper settings Sound card, adapter card, or Mwave card
System fails to load the Diagnostics and Utilities software System preloaded software works correctly.	Make sure the CD-ROM drive or diskette drive is included in the Setup Utility startup sequence. "Factory-Installed Drive Devices" on page 2-47
	CD-ROM drive connection/cable CD-ROM drive Diskette drive connection/cable Diskette drive Access Station host card Access Station client card Access Station cable System Board

Table 2-1 (Page 15 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps	
Symptoms, Messages, Error Codes, or Beeps	**Action/FRU**
System Hangs. Go to "Undetermined Problem" on page 2-69.	Any device Any adapter Access Station host card. Access Station client card Access Station cable System Board
System unit does not turn off with power switch. (System unit must be unplugged from electrical outlet to completely turn off.)	"Power Supply" on page 2-35 Power switch assembly Access Station host card Access Station client card Access Station cable System Board
The Address Exceeds The Size Of Your Memory. An invalid memory address was entered. The Diagnostics Tests display this message during the Locate Bad Chips option under the interact menu if an invalid memory address was entered at the "Enter Memory Address Of Bad Chip" prompt.	Enter correct address Memory SIMM System Board
That Number is Out Of Range. An invalid bit number was entered. Diagnostics Tests display this message during the Locate Bad Chips option.	Enter the correct number. Memory SIMM System Board
Too Many Errors - Test Aborted. Too many errors, the Diagnostics Test cannot continue.	Processor System Board
Transmit Error. Internal or external serial port loopback test failure.	Serial Port Cable System Board
Video Adapter Failed. Test Result Summary, displayed if "Fail" was at the Quit/Fail/Pass menu of any video test.	Video Adapter System Board Monitor

Table 2-1 (Page 16 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps	
Symptoms, Messages, Error Codes, or Beeps	**Action/FRU**
Wake Up on Ring feature fails to power-on system when enabled in Setup Utility.	Mwave Wake Up on Ring jumper connection/cable Mwave card System Board
When you try to enable or disable Rapid Resume, Rapid Resume configuration screen is not available.	System Board
Write error on cylinder n. Hard disk drive write error.	Hard Disk Drive
Write Errors. Diskette drive write error.	Diskette Diskette Drive Access Station host card Access Station client card Access Station cable System Board Diskette Drive Cable
Write Protected or Unformatted Diskette is Write Protected or not formatted.	Insert a non-write protected, formatted diskette into the diskette drive; then rerun the test. Diskette Drive Access Station host card Access Station client card Access Station cable System Board Diskette Drive Cable
You Cannot Delete the Motherboard. "Remove Board" option was selected. The Diagnostics Tests display this message during the Locate Bad Chips option.	Make the correct selection. Memory SIMM System Board Processor
Any other problem.	"Undetermined Problem" on page 2-69.

Table 2-1 (Page 17 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps	
Symptoms, Messages, Error Codes, or Beeps	**Action/FRU**
Beeps	
Note: The system has an error if you hear one or more beeps in a row before POST is completed.	
Important	
In the following Beep Code Index, the numbers indicate the sequence and number of beeps. For example, a "2-3-2" beep code symptom (a burst of two beeps, three beeps, then a burst of two beeps) indicates a memory SIMM problem. (Continue with the Symptom-to-FRU index below for other beep/no-beep symptoms.)	
No beep and: • Blank or unreadable monitor • Blinking cursor	"Power Supply" on page 2-35.
Repeating short beeps.	"Keyboard" on page 2-40 Keyboard (sticking key) Keyboard connection/cable System Board
4	Video adapter System Board
1-1-3 CMOS read/write error.	Run the Setup Utility. System Board
1-1-4 ROM BIOS check error.	System Board
1-2-X DMA error	System Board
1-2-4 RAM error	"Memory" on page 2-38. System Board
1-3-X	"Memory" on page 2-38. Ensure all SIMMs are seated correctly. SIMMs System board
1-4-1	System Board
1-4-2	System Board
1-4-3	System Board
1-4-4	"Keyboard" on page 2-40. System board

Table 2-1 (Page 18 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps	
Symptoms, Messages, Error Codes, or Beeps	**Action/FRU**
1-4-X An error was detected in the first 64 KB of RAM.	"Memory" on page 2-38. System Board
2-1-1, 2-1-2	CMOS failure Run the Setup Utility. System Board
2-1-3 Screen initialization failed.	Video adapter System Board Monitor
2-1-4 Screen memory test failed.	"Memory" on page 2-38. System Board
2-1-X The first 64 KB of RAM failed.	"Memory" on page 2-38. System Board
2-2-1 Screen retrace test detected an error.	Video adapter System Board Monitor
2-2-2 POST is searching for video ROM.	Video adapter System Board
2-2-3 Screen believed to be operable	Video adapter System Board Monitor
3-1-1 Timer failed.	System Board
3-1-2 Interval timer failed.	System Board
3-1-3 RAM test failure	"Memory" on page 2-38. System Board
3-3-1 Memory	"Memory" on page 2-38. System Board
3-3-2 Keyboard controller failed	"Keyboard" on page 2-40. System Board
3-3-4 Screen initialization failed.	Video adapter System Board Monitor

Table 2-1 (Page 19 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps	
Symptoms, Messages, Error Codes, or Beeps	**Action/FRU**
3-4-1 Screen retrace test detected an error.	Video adapter System Board Monitor
3-4-2 POST is searching for video ROM.	Video adapter System Board
Continuous beep.	System Board
Any other beeps.	"Undetermined Problem" on page 2-69.

Table 2-1 (Page 20 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps	
Symptoms, Messages, Error Codes, or Beeps	**Action/FRU**
Error Codes	
10X - System board error or continuous beep.	System Board
110 - System board parity error.	"Memory" on page 2-38. Set memory installed in Setup Utility for non-parity SIMMs. SIMMs System Board
111 - I/O channel parity error.	"Memory" on page 2-38. I/O channel memory Riser Card System Board
114 - External ROM checksum error.	"Diagnostics for Factory-Installed Riser Card, Sound Card, or Adapter Cards Not Supported by Diagnostics CD" on page 2-53. Adapter Card Riser Card System Board
12X - Processor error.	Run the Setup Utility; see "POST Error Codes" on page 2-3. Processor System Board
151 - Real-time clock error.	Set date and time. Run the Setup Utility; see "POST Error Codes" on page 2-3. CMOS clock/battery (if less than 2.8 V dc) System Board
161 - Low CMOS battery.	CMOS clock/battery (if less than 2.8 V dc) Run the Setup Utility; see "POST Error Codes" on page 2-3. System Board

Table 2-1 (Page 21 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps	
Symptoms, Messages, Error Codes, or Beeps	**Action/FRU**
162 - CMOS configuration error	CMOS clock/battery (if less than 2.8 V dc)
	Run the Setup Utility; see "POST Error Codes" on page 2-3.
	System Board
163 - Invalid Time and/or date	Set date and time.
	Run the Setup Utility; see "POST Error Codes" on page 2-3.
	CMOS clock/battery (if less than 2.8 V dc) System Board
164 - Memory size error.	"Memory" on page 2-38.
	Check SIMM installation and parity settings. Run the Setup Utility. See "POST Error Codes" on page 2-3 and also "SIMM Configurations" on page 5-16.
	SIMMs I/O channel memory System Board
201 - Memory error	"Memory" on page 2-38.
	SIMMs I/O channel memory System Board
229 - External cache memory test error	"Memory" on page 2-38.
	Cache tag address module and RAM System Board
262 - DRAM parity configuration error.	"Memory" on page 2-38.
	Run the Setup Utility; see "POST Error Codes" on page 2-3.
	SIMMs System Board
264 - External cache memory size error.	"Memory" on page 2-38.
	Cache tag address module and RAM System Board

Table 2-1 (Page 22 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps	
Symptoms, Messages, Error Codes, or Beeps	**Action/FRU**
305 - System board non-replaceable fuse can be blown by a defective keyboard, keyboard cable, or mouse. If you suspect one of these FRUs, replace it when you replace the system board.	"Keyboard" on page 2-40. Keyboard Keyboard connection/cable Mouse Access Station host card Access Station client card System Board Access Station cable
3XX - Keyboard error.	"Keyboard" on page 2-40. Keyboard connection Keyboard Access Station host card Access Station client card Access Station cable System Board
6XX - Diskette drive error.	"Factory-Installed Drive Devices" on page 2-47. Diskette drive connection/cable Diskette drive Access Station host card Access Station client card Access Station cable System Board
762 - Math coprocessor error.	"Diagnostics Device Presence Test" on page 2-43. Upgrade processor (check Setup Utility, and system board settings). System Board
962 - Parallel port conflict.	Test using a wrap plug while running Diagnostics. "Diagnostics Device Presence Test" on page 2-43 Parallel port System Board

Table 2-1 (Page 23 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps	
Symptoms, Messages, Error Codes, or Beeps	**Action/FRU**
1162 - Serial port conflict.	Test using a wrap plug while running Diagnostics. "Diagnostics Device Presence Test" on page 2-43. Serial adapter Riser Card System Board
1762 - Hard disk configuration error.	Hard disk drive connection/cable/jumpers. If an upgrade processor is installed, check that the proper speed has been set (switches and Setup Utility). Speed should be a multiple of the original processor speed. Hard disk drive size set correctly in Setup Utility. Hard disk drive System Board
On the system board: 1780/1790 - Hard Disk Drive 0 1781/1791 - Hard Disk Drive 1 1782/1792 - Hard Disk Drive 2 or CD-ROM drive 1783/1793 - Hard Disk Drive 3 or CD-ROM drive if Hard Disk Drive 2 installed	Hard disk drive connection/cable/jumpers. If an upgrade processor is installed, check that the proper speed has been set (switches and Setup Utility). Speed should be a multiple of the original processor speed. Hard disk drive size set correctly in Setup Utility. Hard disk drive System Board

Table 2-1 (Page 24 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps	
Symptoms, Messages, Error Codes, or Beeps	**Action/FRU**
180X - PCI or Plug and Play adapter card resource error.	A PCI or Plug and Play adapter card has requested memory resources that are not available. 1. Choose ISA Legacy Resources from the Setup Utility main menu, and make sure the resource settings for ISA legacy adapter cards are correct. If the resource settings are not correct, change the settings. 2. If all resources are being used by ISA legacy adapter cards, you might need to remove an ISA card to make memory available to the PCI or Plug and Play adapter card.
2401 - Video POST error.	"Monitor" on page 2-67 Optional video memory. System Board Monitor
2462 - Video configuration error.	"Monitor" on page 2-67 Optional video memory. System Board Monitor
5803 - Keyboard error	"Keyboard" on page 2-40. Keyboard connection Keyboard Access Station host card Access Station client card Access Station cable System Board

Table 2-1 (Page 25 of 25). POST and Diagnostics Index for Symptoms, Messages, Error Codes, or Beeps	
Symptoms, Messages, Error Codes, or Beeps	**Action/FRU**
5806 - Diskette drive error	"Factory-Installed Drive Devices" on page 2-47.
	Diskette drive connection/cable Diskette drive Access Station host card Access Station client card Access Station cable System Board
	Note: f both the 3.5-in. diskette drive and the CD-ROM do not work, the problem is in the Access Station
5859 - Configuration error	"Factory-Installed Drive Devices" on page 2-47
	CD-ROM drive connections/cables/jumpers CD-ROM drive Power supply Access Station host card Access Station client card Access Station cable
5862 - Configuration error	"Access Station Drive Devices" on page 2-46 Access Station host card Access Station client card Access Station cable
5886 - Pointing device error	"Mouse" on page 2-42
5962 - CD-ROM configuration error (sound adapter card driver works correctly).	"Factory-Installed Drive Devices" on page 2-47
	CD-ROM drive connections/cables/jumpers CD-ROM drive Power supply Access Station host card Access Station client card Access Station cable System Board
8601 - Pointing device interface error	"Mouse" on page 2-42 System Board
1999030X - Hard disk boot failed	Run Setup Utility Hard disk drive
Any other error codes.	"Undetermined Problem" on page 2-69.

Power Supply

001

– Check all drive and power supply connections for proper installation.
– Power-off the system unit.
– Check the power cord for continuity. Replace if necessary.
– Check for the correct line voltage from the power outlet, and verify that the voltage selector switch (if present) is set for the correct voltage.
– Power-on the system unit.
DOES THE POWER SUPPLY FAN RUN?
Yes No

> **002**
>
> – Go to Step 004.

003

– Go to Step 009 on page 2-37.

004

(From step 002)
– Disconnect the power cord from the back of the system unit.
– Disconnect all power and switch cable connectors from the system board and the power supply.
– Disconnect the power connectors to all drives.
– Locate the power supply on/off cable connector (three-wire connector) and make a connection (jumper) between the black and white wires.
– Reconnect the power cord.
DOES THE POWER SUPPLY FAN RUN?
Yes No

> **005**
>
> Replace the power supply.

006

(From step 010)
– With the system powered on and the power supply fan running, check the voltages at the power supply connectors for the system board and all drive connectors, as shown in the following figures. To access the drives in the Access Station, refer to "Access Station" on page 5-14.
(Step **006** continues)

(continued)

006 (continued)
– With the system powered off, check the Access Station cable for
  continuity.
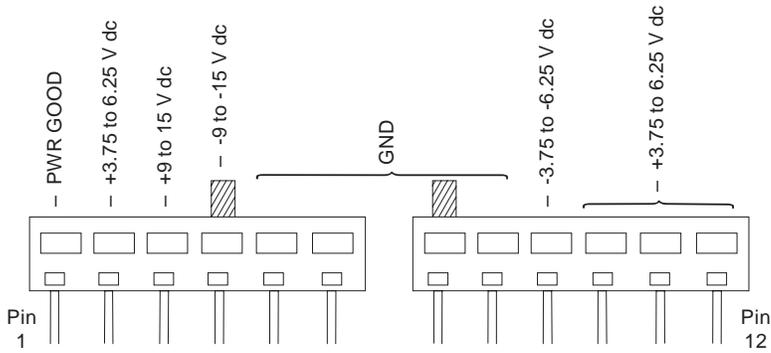
Figure   2-1. System Board Power Supply Connectors (Bottom View)
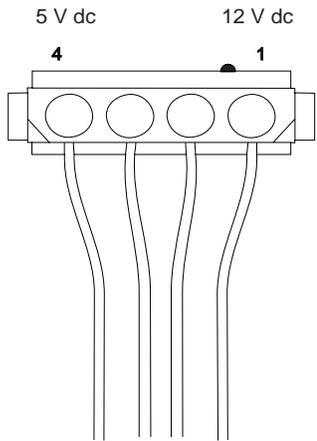
Figure   2-2. Hard Drive or CD-ROM End of Power Cable
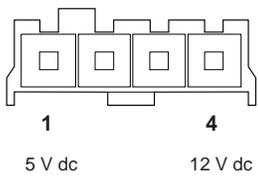
Figure   2-3. 3.5-In. Diskette Drive or Host Card End of Power Cable

(Step **006** continues)

2-36

006 (continued)
ARE THE VOLTAGES CORRECT AND DOES THE FAN RUN?
Yes   No

> **007**
>
> Replace the power supply.

008

– The power supply is working normally. (If you suspect the on/off switch
  cable assembly, see Step 009.) If the fan continues to run when all
  connectors are plugged back in, go to "Undetermined Problem" on
  page 2-69. If the fan stops running when a drive connector is plugged
  back in, go to "Factory-Installed Drive Devices" on page 2-47.

009

(From steps 003 and 008)
**DOES THE SYSTEM UNIT FAIL TO SHUT OFF WHEN THE ON/OFF
SWITCH IS PRESSED?**
Yes   No

> **010**
>
> Go to Step 006 on page 2-35.

011

– You might have a failing on/off switch assembly.
– Disconnect the on/off switch cable assembly connector from the client
  card and take an ohm reading.
**DO YOU HAVE AN OHM READING WHEN THE SWITCH IS PRESSED
AND AN OPEN READING WHEN THE SWITCH IS RELEASED?**
Yes   No

> **012**
>
> – Replace the on/off switch assembly.

013

– Replace the system board.

Memory

Note: SIMMs must be set in the Setup Utility for correct parity setting. When removing or installing a SIMM, run the Setup Utility (and set the date and time) to clear any XX62 errors. See "POST Error Codes" on page 2-3.

001

– Insert the Diagnostics CD into the CD-ROM Drive.
– Power-off the system unit.
– Ensure all SIMMs are seated correctly.
– Power-on the system unit.
– Note any messages, error codes, or symptoms. Disregard 164 errors (memory size).

DID YOU RECEIVE A 201 or 203 POST ERROR?
Yes No

002

DID YOU RECEIVE A 229 ERROR?
Yes No

003

Go to Step 006 on page 2-39.

004

Note: The system board has a pluggable cache module; continue with the following step to determine whether to replace the cache memory module or the system board.

– Replace the system board cache memory with a known good module.
– Replace the system board.

005

– Follow the screen instructions to run the Memory tests.
– If you cannot run the memory test or the test does not find a problem, use the following procedure to find the failure.
– Replace each SIMM, one at a time, with a known-good SIMM of the same size and type. For the system board, replace the DIMM, if present, with a known-good DIMM of the same size and type.

(Step **005** continues)

005 (continued)
– If the problem goes away, the last SIMM replaced is defective. If all
   SIMMs, and the DIMM on the Type A system board, have been replaced
   and the problem remains, replace the system board.

| **006** |

(From step 003)

– Follow the screen instructions to run the Memory tests.
DID THE MEMORY TESTS COMPLETE WITHOUT AN ERROR?
Yes   No

> | **007** |
>
> – Replace each SIMM, one at a time, with a known-good SIMM of the
>   same size and type. For the Type A system board, replace the
>   DIMM with a known-good DIMM of the same size and type.
> – If the problem goes away, the last SIMM replaced is defective. If all
>   SIMMs, and the DIMM on the Type A system board, have been
>   replaced and the problem remains, replace the system board.

| **008** |

– The system memory is now functioning correctly. If you suspect an
   intermittent problem, run the Memory test multiple times.

Keyboard

001

A failing mouse can show up as a keyboard failure.
– Power-off the system unit.
– Disconnect the mouse from Access Station.
– 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 Access Station.
– Remove any foreign objects that may interfere with the mechanical
  operation of the keybuttons.
– Power-on the system unit.
DID YOU RECEIVE A 3XX OR A 5803 POST ERROR?
Yes   No

> **004**
>
> Go to "Start" on page 2-2.

005

– Power-off the system unit and wait 10 seconds.
– Disconnect the keyboard cable and the mouse cable from the Access
  Station.
– Connect the keyboard cable and mouse cable to the system board.
– Power-on the system unit.
DID THE SYMPTOM CHANGE?
Yes   No

> **006**
>
> Go to Step 008 on page 2-41.

007

– Check the Access Station cable for continuity. See "Access Station" on page 5-14 for pin locations.
– Replace the keyboard, Access Station host card, Access Station client card, or Access Station cable.
– If the symptom remains, replace the system board.

008

– Disconnect the keyboard cable connector from the system board.
– Power-on the system unit.
– Check the voltage at the keyboard cable connector on the system board as shown in Figure 2-4, after the POST.

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

Pin	Voltage (Vdc)
1	KBD Data (+5.0)
2	Not Used
3	Ground
4	+5.0
5	Clock (+5.0)
6	Not Used
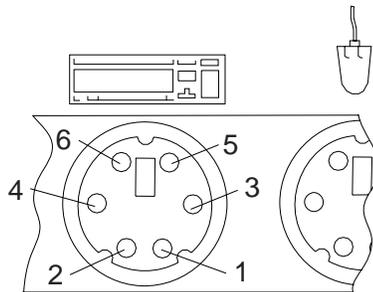
Figure   2-4. Keyboard Connector Voltage Check

ARE THE VOLTAGES CORRECT?
Yes   No

009

   Replace the system board.

010

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

Mouse

Note: A sticking keybutton can cause the mouse to operate incorrectly. If you suspect this, go to "Keyboard" on page 2-40.

| 001 |

– Insert the Diagnostics CD into the CD-ROM drive.

– Power-off the system unit.

– Make sure the mouse connector is connected to the proper port.

– Make sure the mouse ball turns freely.

– Power-on the system unit.

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

– Select **Advanced Diagnostics** from the Main Menu.

– Select **Diagnostics** from the Main Menu.

– Select **Module Tests** from the menu.

– Select **Pointer Device** from the menu.

– Follow the prompts and perform the test.

DO THE MOUSE DIAGNOSTIC TESTS RUN WITHOUT ERRORS?
Yes   No

| 002 |

– If you receive any error *except* an 8613 error replace the mouse.
– If you receive an 8613 error, replace the system board.

| 003 |

– The system unit is operating normally.
– If the symptom remains, replace the mouse.

Diagnostics Device Presence Test

| 001 |

DO ANY MESSAGES, ERROR CODES, BEEPS, OR SYMPTOMS APPEAR?
Yes   No

| 002 |

Go to Step 004.

| 003 |

Go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-9.
If directed here from the Index, go to Step 006.

| 004 |

(From step 002)
– Insert the Diagnostics CD into the CD-ROM drive.
– Power-off the system unit.
– Power-on the system unit, and check for the following responses:

    1. One short beep
    2. Main Menu screen

DID THE SYSTEM PRODUCE THE BEEP AND MAIN MENU SCREEN?
Yes   No

| 005 |

– Go to "Index of Symptoms, Messages, Error Codes, or Beeps" on
  page 2-9.

| 006 |

(From page 2-47)
(From step 003)
– Select **Advanced Diagnostics** on the menu.
– Select **System Info** on the menu.
– Select **Hardware Config** on the menu.
– Compare the Hardware Configuration Report screen with the actual
  devices installed in the system unit.

  Note: If necessary, remove the cover and visually compare the devices
           installed in the system unit to those shown in the Hardware
           Configuration Report.

(continued)

**DOES THE HARDWARE CONFIGURATION REPORT CORRECTLY
IDENTIFY THE DEVICES INSTALLED IN THE SYSTEM UNIT?**
Yes   No

> **007**
>
> – The Hardware Configuration Report shows only those devices
>   supported by the Diagnostics CD and only factory-installed devices
>   for the model you are servicing.
> – If a device is missing from the list and is not factory installed, refer
>   to the service manual provided for that device. (Refer to the
>   Appendix B, "Model/Monitor Configurations and FRU Part Numbers"
>   on page B-1 to determine the factory-installed devices in the model
>   you are servicing.)
> – If a factory-installed drive device or adapter card is not listed in the
>   Hardware Configuration Report, go to either "Diagnostics for
>   Factory-Installed Drive Devices Not Supported by the Diagnostics
>   CD" on page 2-50 or "Diagnostics for Factory-Installed Riser Card,
>   Sound Card, or Adapter Cards Not Supported by Diagnostics CD"
>   on page 2-53.

008

– Select **Diagnostics Menu** from the Main Menu.
– Select **Easy Test Diagnostics** from the Diagnostics Menu.
DOES THE EASY TEST FINISH WITHOUT ERROR CODES?
Yes   No

> **009**
>
> – If the last test stops and you cannot continue, first make sure all
>   switches, power connectors, cables, and jumpers are set correctly
>   and show the correct voltages and continuity.
> – Make note of any messages, error codes, beeps, or new symptoms.
>   Go to "Index of Symptoms, Messages, Error Codes, or Beeps" on
>   page 2-9.

010

– The Easy Test Diagnostics did not detect a failure. If the system still
  displays a failure:

  • Check all adapter card jumper settings.
  • Check all adapter card switch settings.

(Step **010** continues)

2-44

010 (continued)
- • Check all adapter card cables and connectors for proper installation.
- • Make sure all of the above are set correctly and show the correct voltages and continuity. Replace any defective cables or adapter cards. See "Power Supply" on page 2-35 and "System Board Layout" on page 5-2.

– Run the **Easy Test Diagnostics** test again.
– If an error or other symptom is displayed, go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-9.
– If no error can be detected or the symptom is intermittent, go to "Undetermined Problem" on page 2-69.

Access Station Drive Devices

Problems with the 3.5-in. diskette Drive, the CD-ROM drive, keyboard, mouse, the On/Off switch, or the hard disk drive LED may be caused by the Access Station.

Multiple error codes can also be the result of a loose Access Station cable or defective host or client cards. If the system unit powers up with some or all of the following POST error codes, the Access Station may be at fault.

1780	Hard disk error
5803	Keyboard error
5806	Diskette drive error
5862	Configuration error
5886	Pointing device error

If you receive multiple POST codes:

1. Check the installation of the Access Station cable on the host card.
2. Check the installation of the cable from pin J30 on the system board. See "System Board Layout" on page 5-2 for more information.
3. Check the installation of the power connector from the power supply to the host card.
4. Check the installation of the audio cable from the MWave card to the host card.

If the problems persist see "Diagnostic Aids" on page 3-1 for more information.
Use this check procedure to test any factory-installed drives.

Factory-Installed Drive Devices

Use this check procedure to test any factory-installed drives.

Attention: The customer may have customized settings in the Setup Utility (other than default settings) on the computer you are servicing. Running the Setup Utility might alter those settings. Note the current settings and verify that the customer settings are in place when service is complete.

Note: If you cannot access the hard disk drive or load a diskette from drive A or load a CD from the CD-ROM drive, make sure the Setup Utility has the startup sequence set with **Diskette**, **CD-ROM**, and **Hard Disk** enabled.

Insert the Diagnostics CD in the CD-ROM drive. Refer to Step 006 on page 2-43 to check Hardware Configuration.

If the number of diskette drives shown in the Installed Devices list is not correct:

1. Check the installation of the drive ribbon cable to the system board.

   Note: If the drive is installed the Access Station, check the drive ribbon cable from the system board to the host card and from the drive to the client card. Also check the Access Station cable.

2. Check the voltages to the diskette drive with the power on (see "Power Supply" on page 2-35).

3. Check the installation of the Access Station cable on the system board.

4. Try to correct the drive setting in the **(SETUP)** option in the Setup Utility.

5. Run the "Diagnostics Device Presence Test" on page 2-43.

If you can correct the Installed Devices list, but cannot complete the Diagnostics test for that device, replace FRUs, in the following order, until the problem goes away:

1. Diskette drive
2. Diskette drive cable (if continuity check fails)
3. Access Station host card.
4. Access Station client card.
5. Access Station cable (Canada and Japan only)
6. Access Station

   Note: The Access Station is replaced as a FRU in the U.S. only. Canada models can order replacement parts for the Access Station.

7. System board

(continued)

If the number of hard disk drives or CD-ROM in the Installed Devices list is not correct:

1. Check the installation of the drive ribbon cable from the host card to the system board and the drive cable from the drive to the client card. Be sure that Hard Disk Drive 1 and Hard Disk Drive 2 in the Setup Utility are connected to the primary hard disk drive connector J5 on the system board.

2. Check the hard disk drive jumper settings (see "Parts/Test Point Locations" on page 5-1).

3. Check the voltages to the disk drive power connectors with the power on (see "Power Supply" on page 2-35).

4. Try to correct the drive setting in the **3 (SETUP)** option in the Setup Utility.

5. Run the "Diagnostics Device Presence Test" on page 2-43 for hard disk drives and CD-ROM drive.

6. Restart the system and check the Setup Utility.

7. In the Setup Utility, check that the correct drive size is set for the flagged drive shown in the Installed Devices list.

   - If any drive is flagged as **Not Installed**, check the signal and power cable for that drive.
   - If the first drive is flagged as **Not Installed**, replace the primary drive.
   - If all drives are flagged as **Not Installed**, replace the primary drive.
   - If any drive (other than the first drive) is flagged as **Not Installed**, replace that drive.

   If the problem remains, check the continuity on the drive cable and replace the cable if necessary. If that does not fix the problem, replace the system board.

8. If an upgrade processor is installed, make sure that the processor speed shown is correct.

   Note: The CD-ROM must be the last device installed and jumpers set correctly to be listed in the Setup Utility. See "Hard Disk Drive Jumper Settings" on page 5-10 for factory-installed drive device jumper settings and "CD-ROM Drive Jumper Settings" on page 5-13.

   Also ensure the CD-ROM cable is installed in connector J6 on the system board.

   For Aptiva models that come with an internal Zip drive, the

CD-ROM drive is jumpered as slave.

If any other adapter or device is flagged as `Not Installed`, run the Setup program.

Check to see if any adapter or device is set to a conflicting address with any other adapter or device. Also be sure that any adapter or device missing from the list is not set to `Disabled`.

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

Diagnostics for Factory-Installed Drive Devices Not Supported by the Diagnostics CD

Use these procedures as a general check of any factory-installed DOS-supported drive device not detected by the Diagnostics CD.

Note: While performing this check, you may need to enter and exit Microsoft Windows 95 several times. When instructed to select an icon or button, double-click on the item with the mouse.

For more information about using Microsoft Windows 95, see the user's guide provided with the computer.

If an operating system other than Microsoft Windows 95 is installed, program screens and icons may differ from these instructions.

If a separately boxed external Zip drive is included with the Aptiva model, the Aptiva customer must contact the Zip drive manufacturer for questions about installation and operation, and for Zip drive service.

001

(From step 003)
– Remove the Diagnostics CD from the CD-ROM drive.
– Power-off the system unit and wait 10 seconds.
– Power-on the system unit.
– Wait until POST is completed.

IS `(device) not ready--(A)bort or (R)etry` DISPLAYED WHILE SOFTWARE IS LOADING?

Yes   No

> | **002** |
> |---|
>
> Go to Step 007 on page 2-51.

003

– If a `(device) not ready--(A)bort or (R)etry` message appears, press **A** to cancel the message and continue.
– The Program Manager window should appear. (If you make the wrong selection in Microsoft Windows 95, return to Step 001 and try again.)

> **Note:** If the system does not go directly to the Program Manager window, double-click on the Program Manager icon from the Microsoft Windows 95 desktop or start Microsoft Windows 95 from the Welcome screen.

(Step **003** continues)

003 (continued)
– In Program Manager, double-click on the Main icon and then on the File
  Manager icon.
– With File Manager open, verify that the device drive you wish to check is
  listed at the top of the window with the other drives.
IS THE DEVICE DRIVE LISTED AS ONE OF THE INSTALLED DRIVES?
Yes No

> **004**
>
> – Ensure all device drive cables are connected properly.
> – Ensure the power connector has the correct voltage (see "Power
>   Supply" on page 2-35).
> – Check continuity of the device drive system cable, from the drive to
>   the system board.
> – Replace the device drive.

005

– Install a known good disk in the drive.
– Click on the drive icon at the top of the File Manager window.
**DOES THE FILE MANAGER PANEL CHANGE TO LIST THE CONTENTS
OF THE DRIVE?**
Yes No

> **006**
>
> – If clicking sounds are heard coming from the drive, replace the
>   diskette and try again.
> – Check continuity of the drive system cable, and replace if
>   necessary.
> – Replace the drive.

007

(From step 002)
– With power on, press the drive **Eject** button to eject the diskette.
DID THE DRIVE EJECT THE MEDIA DISKETTE?
Yes No

> **008**
>
> – Use a paper clip to hook the manual eject lever, then pull gently
>   until the disk ejects. After the disk is ejected, return the eject lever
>   to its original position.
> (Step **008** continues)

(continued)

> **008** (continued)
> – Replace the drive.

009

– The drive should be operating normally.
– If any new symptom appears, go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-9.

Diagnostics for Factory-Installed Riser Card, Sound Card, or Adapter Cards Not Supported by Diagnostics CD

Note: While performing this check, you may need to enter and exit Microsoft Windows 95 several times. When instructed to select an icon or button, double-click on the item with the mouse.

For more information about using Microsoft Windows 95, see the user's guide provided with the computer.

If an operating system other than Microsoft Windows 95 is installed, program screens and icons may differ from these instructions.

This diagnostics test is intended to be used only with factory-installed adapter cards.

| 001 |

– Remove the Diagnostics CD.
– Power-off the system unit and wait 10 seconds.
– Power-on the system unit.
IS A POST ERROR CODE DISPLAYED?
Yes   No

> | 002 |
>
> Go to Step 004.

| 003 |

– Go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-9.

| 004 |

(From step 002)
ARE ANY MESSAGES OR ERROR CODES DISPLAYED AFTER POST COMPLETES BUT BEFORE MICROSOFT WINDOWS 95 STARTS?

Note: If POST does not complete, answer this question "No."

Yes   No

> | 005 |
>
> (Step **005** continues)

(continued)

> **005** (continued)
> Go to Step 007.

006

Go to Step 011 on page 2-55.

007

(From step 005)
– Power-off the system unit.
– Disconnect the riser card and any adapter card **cables or connectors**
 from the system unit.

   Notes:

   1. When removing adapter cards, be careful not to change any jumper
    or switch settings on the card.

   2. Do not remove the riser card. The system generates multiple error
    codes when the riser card is removed and the system is powered on.

– Power-on the system unit.
DOES THE SYSTEM UNIT WORK CORRECTLY BY ITSELF?
Yes No

> **008**
>
> Go to "Start" on page 2-2.

009

– Power-off the system unit.
– Reconnect (reseat) the riser card.
– Do not install any adapter cards on the riser card.
– Power-on the system unit.
– Check the voltages at pins B3, B5, B7, and B9 on the top of the riser
 card.

 B3 = +5 V dc
 B5 = –5 V dc
 B7 = –12 V dc
 B9 = +12 V dc

(Pin side)

(Connector side)
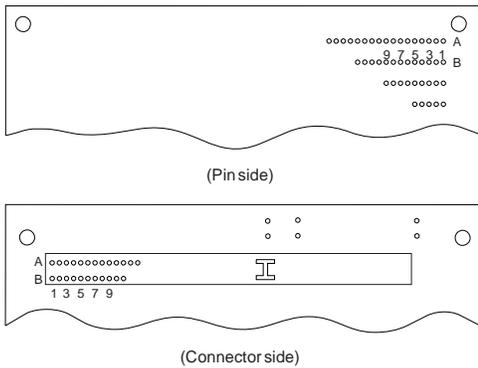
Figure 2-5. Riser Card - Machine Type 2159

ARE THE VOLTAGES CORRECT?
Yes No

> **010**
>
> Replace the riser card.

011

(From step 006)
– Install the failing factory-installed adapter card in a different slot in the riser
  card than where originally installed.

DOES THE FEATURE FUNCTION NORMALLY?
Yes No

> **012**
>
> Go to Step 014.

013

Replace the riser card.

014

(From step 012)
– 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.
(Step **014** continues)

(continued)

014 (continued)
– Repeat this with each adapter card if necessary.
IS A WINDOWS 95 DRIVER ERROR DISPLAYED FOR THE INSTALLED ADAPTER CARD?
Yes   No

> **015**
>
> Go to Step 017.

016

– Check for proper installation of the adapter card.
– Check all adapter card jumper positions. See "Power Supply" on
  page 2-35, and "System Board Layout" on page 5-2.
– Check all cables and connectors on the adapter card for proper
  installation.
– Check continuity of any cable attached to the adapter card and replace if
  necessary.
– If the problem remains, replace the factory-installed adapter card.
– If the problem remains with a card that was not factory installed, consult
  the service information provided by the card manufacturer.

017

(From step 015)
– Power-off the system unit.
– Reinstall the sound adapter card or adapter card and any cables.
– Power-on the system unit without the Diagnostics CD inserted.

> **Note:** This procedure can be used for most factory-installed adapter
> cards. However, you must select the correct window (see steps 3
> and 4 below) to access the feature icon before any test or before
> testing any feature in step 6.

– Perform the following when the system is running:

> **Note:** If an operating system other than Microsoft Windows 95 is
> installed, program screens and icons may differ from these
> instructions.

  1. Open Microsoft Windows 95 if not already opened by the system.
  2. Select the Start icon.
  3. Select Settings, then select Control Panel.
  4. Select the Sound icon.
(Step **017** continues)

017 (continued)

    5. In the Sound window, select `chimes` from the Names field. (To test
       other adapter card software, select an action from a menu in that
       software.)

**IS THE PREVIEW BUTTON (OR ACTION IN OTHER SOFTWARE)
SELECTABLE ON THE SCREEN (SHOWN IN BLACK AND NOT GRAY)?**
Yes No

> **018**
>
> – Power-off the system unit.
> – Check the Mwave card or sound adapter card for proper installation.
> – Check the Mwave card, sound adapter card, or adapter card jumper
>   positions.
> – Replace the Mwave card, sound adapter card, or adapter card.

019

– Select the Preview button from the Sound window.
DO YOU HEAR ANY SOUND FROM THE SYSTEM?

Note: If you hear sound from only one speaker, answer this question NO.

Yes No

> **020**
>
> – Make sure the speaker connectors are plugged in to the rear of the
>   MWave card.
> – Make sure the volume control on the sound adapter card (if any) is
>   not turned low.
> – Check the Mwave card or sound adapter card jumper positions.
>   Refer to "CD-ROM Drive Jumper Settings" on page 5-13.
> – Check continuity of any cable attached to the adapter card and
>   replace if necessary.
> – Make sure the speakers are not damaged. If damaged, replace the
>   monitor.
> – Repeat the test in Step 019.
> **DID THE SYMPTOM CHANGE?**
> **Yes No**
>
> > **021**
> >
> > Go to Step 024 on page 2-58.

(continued)

022

– If you hear sound from the speakers, the system is working normally. If you suspect another problem, go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-9.

023

– The system is working normally.
– Click Cancel to close the dialog box. Exit Microsoft Windows 95.
– If the symptom remains or has changed, go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-9.

024

(From step 021)
– Try playing a .wav file. To do this:

 • Double click on the Aptiva Entertainment icon.
 • Double click on the Smartsound SE icon.

DO YOU HEAR SOUND FROM ONE OR BOTH SPEAKERS?
Yes   No

025

Replace the Mwave card or sound adapter card.
– or –
Replace the monitor.

026

– Check the CD-ROM drive and cable for proper installation
– Check the CD-ROM drive jumper positions.
– Check the Access Station host card, client card and cable.
– Replace the CD-ROM drive, cable, Access Station host card, client card or cable. See "Access Station Drive Devices" on page 2-46 for more information.

Mwave Adapter

Note:

If the factory-installed Mwave card has been replaced with an internal modem, Wake Up on Ring may not be supported unless the replacement modem has a 2-pin Wake Up on Ring keyed connector (see "Mwave Card" on page 5-7).

<div style="border:1px solid black; display:inline-block; padding:2px 6px">001</div>

– Insert the Diagnostics CD in the CD-ROM drive.
– Power-off the system unit.
– Remove all adapter cards from the riser card except for the Mwave card.
– Remove all external devices, speakers and microphone, except for the keyboard and mouse.
– Disconnect all telephone cables from the rear of the Mwave card.
– Power-on the system unit.
– Make a note of any error messages, then press **Esc**.
– Select **Advanced Diagnostics** from the Main Menu.
– Select **Diagnostics** from the Main Menu.
– Select **Module Tests** from the menu.
– Select **User Diags** from the menu using the Tab key.
– Follow the prompts and perform the Mwave tests.
DID YOU RECEIVE AN ERROR CODE?

Note: If the problem was reported that **no** sound came from speakers, or right or left speaker was dead – answer "Yes."

Yes No

    <div style="border:1px solid black; display:inline-block; padding:2px 6px">002</div>

    – Reconnect the telephone cable.
    – Link to a computer service, such as a bulletin board or to another computer.
    DID THE MWAVE COMMUNICATE?
    Yes No

        <div style="border:1px solid black; display:inline-block; padding:2px 6px">003</div>

        – Check the outside phone line by connecting a working telephone to the telephone wall jack. Listen for a dial tone.
        – If the phone line is good, replace the Mwave card. If the symptom remains, replace the system board.
        (Step **003** continues)

Check Procedures   **2-59**

(continued)

003 (continued)
– If the phone line is bad, tell the customer to contact the
   telephone company. The Mwave card does not need
   replacing.

004

**DOES THE SYSTEM FAIL TO WAKE UP WHEN THE WAKE UP ON
RING FEATURE IS ENABLED IN THE CONFIGURATION UTILITY?**
Yes   No

   005

   – The Wake Up on Ring feature is working normally. If the
      symptom remains, go to "Index of Symptoms, Messages,
      Error Codes, or Beeps" on page 2-9.

006

– Power-off the system unit.
– Power-on the system unit and press **F1** while the memory count is
   running.
– In the Setup Utility, select the Rapid Resume option. (If you cannot
   access Rapid Resume, replace the system board.)
– If disabled, use the ← key to enable APM BIOS Mode (top line of
   screen)
– Press the ← key to disable or enable both the Wake Up on Ring
   and Ring Indicator fields.
**CAN THE WAKE UP ON RING FEATURES BE ENABLED IN THE
CONFIGURATION UTILITY?**
Yes   No

   007

   Replace the system board.

008

– Check the Wake Up on Ring feature cable from the system board to
   the Mwave card for continuity. Replace if necessary.
– Check for proper installation of the Wake Up on Ring cable to the
   system board. See "System Board Layout" on page 5-2
(Step **008** continues)

008 (continued)
**DOES THE SYSTEM WAKE UP WHEN WAKE UP ON RING IS
ENABLED IN THE CONFIGURATION UTILITY?**
Yes   No

> **009**
>
> **Note:**   If the phone lines attached to the Mwave card have
>   experienced a high voltage surge (struck by lightning, for
>   example), replace the Mwave card.
>
> Replace the system board.

010

The communications of the Mwave card is functioning correctly.

011

– Power-off the system unit.
– Plug the Mwave adapter card into a different riser card slot.
– Power-on the system unit.
– Run the Mwave adapter tests.
DID THE SYMPTOM REMAIN?
Yes   No

> **012**
>
> Replace the riser card.

013

– Power-off the system unit.
– Remove the Mwave adapter card from the riser card.
– Reconnect (reseat) the riser card.
– Power-on the system unit.
– Check the voltages at pins B3, B5, B7, and B9 on the top of the riser
  card.

  B3 = +5 V dc
  B5 = –5 V dc
  B7 = –12 V dc
  B9 = +12 V dc

(continued)

(Pin side)

(Connector side)
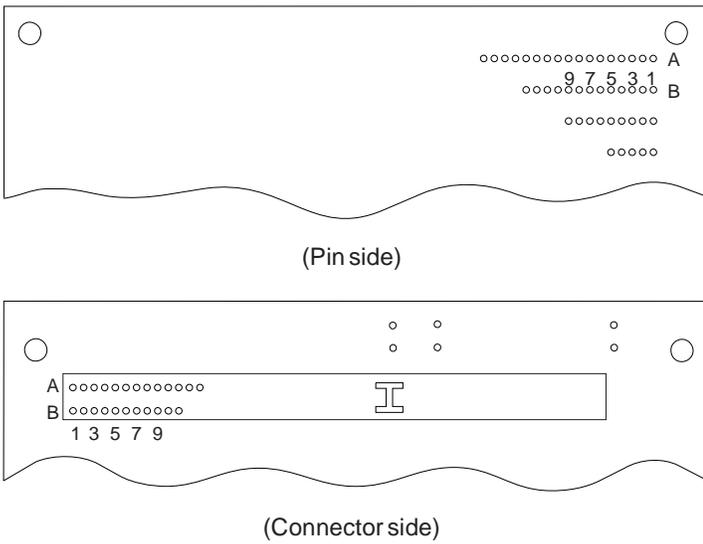
Figure 2-6. Riser Card - Machine Type 2159

ARE THE VOLTAGES CORRECT?
Yes No

> **014**
>
> Replace the riser card. If the symptom remains, replace the system board.

015
Check all jumper and switch settings.
If the symptom remains, replace the Mwave adapter card.
– or –
Replace the system board.

33.6 Kbps DSVD Factory-Installed Modem Adapter

Note: The factory-installed modem is a 33.6 Kbps DSVD (Digital Simultaneous Voice and Data) modem with cables for Wake Up on Ring and sound adapter card.

If the factory-installed modem has been replaced with a different internal modem, Wake Up on Ring may not be supported unless the replacement modem has a 2-pin Wake Up on Ring keyed connector. See "Factory-Installed Modem Card" on page 5-9.

Aptiva models such as the 2159-B60, which have the factory-installed 33.6 Kbps DSVD modem, offer online modem troubleshooter software. To run the factory-installed 33.6 Kbps DSVD modem online troubleshooter:

- Select the Start icon at the bottom of the Windows 95 desktop.
- Select Programs
- Select 33.6 Kbps DSVD Modem
- Select 33.6 Kbps DSVD Modem Troubleshooter
- Follow the online instructions.

001

– Run the modem online Troubleshooter tests.

DID ANY TESTS FAIL?

Yes   No

> ### 002
>
> – Link to a computer service, such as a bulletin board or to another computer.
>
> **DID THE MODEM COMMUNICATE?**
>
> **Yes   No**
>
> > ### 003
> >
> > – Check the outside phone line by connecting a working telephone to the telephone wall jack. Listen for a dial tone.
> > – If the phone line is good, replace the modem. If the symptom remains, replace the system board.
> > – If the phone line is bad, tell the customer to contact the telephone company. The modem does not need replacing.
>
> ### 004
>
> (Step **004** continues)

(continued)

004 (continued)
DOES THE SYSTEM FAIL TO WAKE UP WHEN THE WAKE UP ON RING FEATURE IS ENABLED IN THE CONFIGURATION UTILITY?
Yes   No

> **005**
>
> – The Wake Up on Ring feature is working normally. If the symptom remains, go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-9.

006

– Power-off the system unit.
– Power-on the system unit and press **F1** while the memory count is running.
– In the Setup Utility, select the Rapid Resume option. (If you cannot access Rapid Resume, replace the system board.)
– If disabled, use the ← key to enable `APM BIOS Mode` (top line of screen)
– Press the ← key to disable or enable both the Wake Up on Ring and Ring Indicator fields.
CAN THE WAKE UP ON RING FEATURES BE ENABLED IN THE CONFIGURATION UTILITY?
Yes   No

> **007**
>
> Replace the system board.

008

– Check the Wake Up on Ring feature cable from the system board to the modem for continuity. Replace if necessary. See "Factory-Installed Modem Card" on page 5-9.
– Check for proper installation of the Wake Up on Ring jumper cable. See "System Board Layout" on page 5-2.
DOES THE SYSTEM WAKE UP WHEN WAKE UP ON RING IS ENABLED IN THE CONFIGURATION UTILITY?
Yes   No

> **009**
>
> **Note:** If the phone lines attached to the modem have experienced a high voltage surge (struck by lightning, for example), first replace the modem and go to Step 001

on page 2-63.

Replace the system board.

010

The modem is functioning correctly.

011

– If the audio tones are incorrect, replace the modem.
– Power-off the system unit.
– Plug the modem adapter card into a different riser card slot.
– Power-on the system unit.
– Run the modem adapter tests.
DID THE SYMPTOM REMAIN?
Yes No

012

Replace the riser card.

013

**DOES THE SYSTEM UNIT WORK NORMALLY EXCEPT FOR THE
MODEM?**
Yes No

014

Go to "Start" on page 2-2.

015

– Power-off the system unit.
– Remove the modem adapter card from the riser card.
– Reconnect (reseat) the riser card.
– Power-on the system unit.
– Check the voltages at pins B3, B5, B7, and B9 on the top of the riser
  card.

  B3 = +5 V dc
  B5 = –5 V dc
  B7 = –12 V dc
  B9 = +12 V dc

(continued)

(Pin side)

(Connector side)
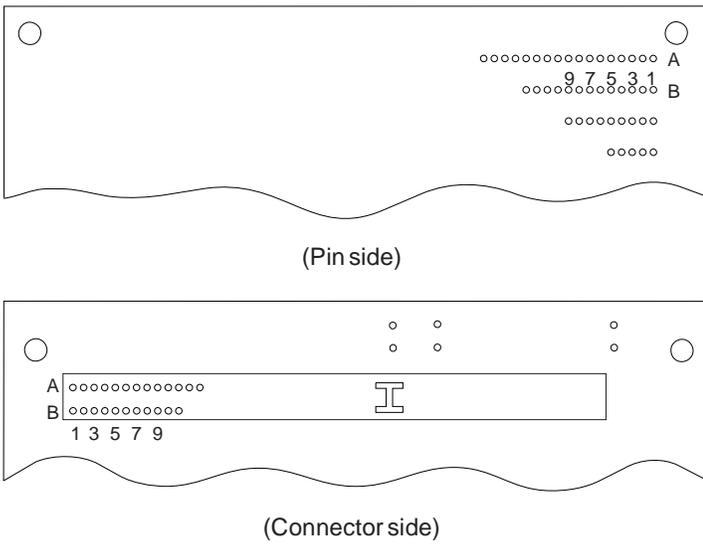
Figure   2-7. Riser Cards - Machine Type 2159

ARE THE VOLTAGES CORRECT?
Yes   No

> **016**
>
> Replace the riser card. If the symptom remains, replace the system
> board.

017

Check all jumper and switch settings.
If the symptom remains, replace the modem adapter card.
– or –
Replace the system board.

Monitor

First, set the system to VGA mode. To do this in Windows 95, depress the **F8** function key during startup. Safe mode (VGA) will be set for Windows 95. Use the operating system's video setup to change the monitor resolution.

Check the line voltage and power cord before replacing the monitor. See "Detachable Monitor I/O Signal Cable Connector Test Points" on page 5-17 for pin identification.

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

<div style="border:1px solid">001</div>

– Power-off the system unit and monitor.
– Remove all adapter cards from the riser card.
– Make sure the monitor I/O signal cable is properly connected to the system unit.
– Make sure the power cords are properly connected to the system unit and monitor, and that the line voltage is correct. See "Power Supply" on page 2-35.
– Make sure the monitor contrast and brightness controls are not turned too low.
– Power-on the monitor, and wait 20 seconds.
– Power-on the system unit.

> **Note:** The Multimedia monitors shipped with **Machine Type 2159** are a plug and play design to optimize monitor performance. These monitors do not use a Monitor Self Test. See the Specifications section in the *Multimedia Monitor User's Guide* for more information.

DOES THE LED COME ON?

Yes No

<div style="border:1px solid">002</div>

– Check the line cords for the monitor and the system unit for continuity.
– Check the line voltage.
– Replace the monitor.

(continued)

| **003** |

IS THE LED STEADY GREEN?
Yes   No

> | **004** |
>
> Go to Step 008

| **005** |

Check that the monitor I/O signal cable connector has no bent pins and that
the cable is properly connected to the system unit.
IS THE SCREEN BLANK?
Yes   No

> | **006** |
>
> Go to Step 010.

| **007** |

Replace the monitor.
– or –
Replace the system board

| **008** |

– If the LED is flashing or steady amber:
– Check that the monitor I/O signal cable connector has no bent pins and
  that the cable is properly connected to the system unit.
DOES THE SCREEN LIGHT UP?
Yes   No

> | **009** |
>
> Replace the monitor
> – or –
> Replace the system board

| **010** |

You have successfully completed the video diagnostics and utilities tests. If
there are problems with the image on the monitor, refer to the *Monitor
Maintenance Manual* for more information.

Undetermined Problem

Check the POST Error History

The system board retains the last three POST error codes in a POST Error History saved in CMOS memory. Each time a POST error code is detected at the power-on/power-off cycle, it is added to the bottom of the list in the POST Error History.

Most recent error code is listed at bottom


```
The following error(s) were detected when the system was
started:

   5962   Configuration Error
   162    Configuration Error
   301    Keyboard Error

Press Enter to run the Configuration Utility or Esc to
continue.
```
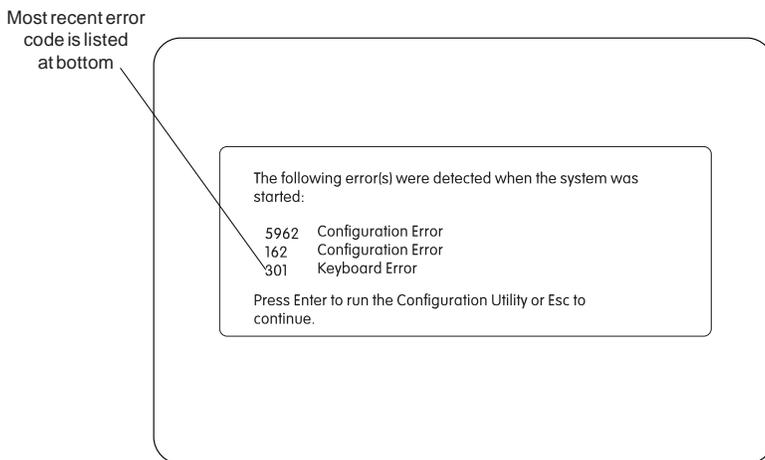
Figure   2-8. POST Error History Example

To view the POST Error History:

Note: The POST Error History can be accessed only during the initial long

POST when the POST Configuration icon [icon] appears.

- Press **F9** while the POST Configuration icon appears.

- If any POST errors are recorded, the POST Error History is displayed with the most-recent error shown at the bottom of the list.

To check for the error again, repeat the above steps to add the error to the list once more. You should see the same POST error code listed in the last two lines of the POST Error History.

To print a copy of the screen to an attached printer, press **Print Screen**.

If an error code is present, go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-9. If no error code is present, continue with this check.

(continued)

Check the power supply voltages (see "Power Supply" on page 2-35). If the voltages are correct, return here and continue with the following steps:

1. Power-off the system unit.

2. Perform the following checks, one by one, until you have isolated the problem FRU (refer to "Parts/Test Point Locations" on page 5-1 for locations):

    - Check all system board jumper positions.
    - Check all adapter card jumper positions.
    - Check all adapter card switch settings.
    - Check all device jumper positions.
    - Check all cables and connectors for proper installation.
    - Check the Access Station cable for proper installation.

If the jumpers, switch settings, and voltages are correct, return here and continue:

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

    a. Non-IBM devices
    b. External devices
    c. Mwave/Sound adapter card
    d. Access Station cable
    e. Any adapters
    f. Modem card, if installed
    g. Riser card
    h. SIMMs
    i. Zip Drive, if installed
    j. CD-ROM drive
    k. Diskette drive
    l. Hard disk drive

4. Power-on the system unit.

    Note: If you have removed the Access Station cable, you can power-on the system unit by pressing the on/off switch located on the rear of the Access Station host card. For more information, see "Access Station Drive Devices" on page 2-46.

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

If the symptom changes, go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-9 or to the check procedure for the last item tested.

Replace the last item tested if the system operates normally after removing the last item.

Note: If you are unable to find a check procedure that corresponds to the device or error code, you either have an IBM device with its own

service manual or a device not supported by IBM diagnostic tests.

If all devices and adapters have been removed, and the problem remains:

1. Remove all cables from connectors on the system board except the power supply and switch cables. See and "System Board Layout" on page 5-2 for connector locations.

2. Remove all SIMMs from sockets.

3. Power-on the system unit and listen for any beeps.

4. If there are beeps, replace the system board and use the current processor on the FRU system board.

5. If there are no beeps, replace the processor and use the current system board.

6. If there are still no beeps, replace the current system board and use the FRU processor obtained in step 5.

Diagnostic Aids

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 120 seconds to complete (with Rapid Resume disabled or not installed), 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)
- CD-ROM drive
- Sound adapter card

To start the POST, turn on the monitor and the system unit. The following happens:

1. The POST Configuration icon, appears at the upper-right corner of the monitor.

   Pressing **F1** at this time causes the Setup Utility menu to appear after the POST has completed.

2. A count of the system memory appears at the upper-left corner of the screen.

3. If an error is detected, an error code appears under the system memory count.

   Note: A memory error can appear without the memory count as: XXXXXX XXXX 20X, where the first six Xs = memory address, the next four Xs = data, and the 20X can be 201 or 203.

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

5. If a critical error is encountered, the system halts.

6. 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.

Diagnostics CD

The Diagnostics program comes on a CD packaged with this book. The CD is labeled "Diagnostics CD."

The QAPlus/PRO diagnostic programs, developed by DiagSoft for IBM, are the primary method of testing the computer. You can use them to test the IBM components of the system and some external devices. The amount of time required to test all components depends on the number of components. The more optional adapters and devices you have attached to your system, the longer the testing takes.

The 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 the Diagnostics CD:

Note: Before beginning, ensure that Rapid Resume is disabled in the Setup Utility.

1. Install the Diagnostics CD in the CD-ROM drive.
2. Power-off, then power-on the system unit.
3. Do not press **F1** during POST.
4. If any POST errors appear after POST, make a note of the errors and press the **Esc** key.
5. Select an option on the "Aptiva Diagnostics and Utilities Menu."
6. Follow the instructions that appear on your screen. If an error occurs, go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-9.

   Note:

   This Service Level A Diagnostics will not support Low Level format.

   When performing hard disk diagnostics, the system may go into Standby mode. Depression of any key will bring the system out of standby mode.

Creating a Diagnostics Bootable Diskette

The Diagnostics CD allows you to create a bootable advanced diagnostics diskette. This permits the flexibility of loading the diagnostics program from either the CD-ROM drive or the Diskette drive.

Note: Because of the expanded options of the Service Level A Diagnostics CD, the preferred way of running the diagnostics is from the CD. Use the diagnostics on the diskette if the CD-ROM unit is inoperable.

To create a bootable diagnostics diskette:

 1. Install the Diagnostics CD in the CD-ROM drive.
 2. Power-off, then power-on the system unit.
 3. Do not press **F1** during POST.
 4. When the **Aptiva Diagnostics and Utilities Menu** appears, depress the **zero** key to select the DOS screen. The A: drive prompt will appear.
 5. Select the CD drive (the CD drive default is G:).
 6. Select the **DIAGNOST** and **IMG** directories by typing:
    CD\DIAGNOST\IMG and press **enter**.
 7. Install a blank 1.44 KB diskette in diskette drive A.

    Note: The diskette does not need to be formatted.
 8. Type: **LOADDSKF DIAGDISK.DSK B:** and press **enter**. (At this point, the diskette drive is B:).
 9. There will appear on the screen a statement that the diskette is about to be overwritten. Make sure the diskette in drive A is the one you want to use, then answer **Y**.

    Attention

    This procedure will overwrite all data on the diskette in drive A.

    ---

10. After the copy is finished, you will have a bootable advanced diagnostics diskette.

To Load the Diagnostics Diskette:

Note: Before beginning, ensure that Rapid Resume is disabled in the Setup Utility. This Service Level A Diagnostics will not support Low Level format.

 1. Power-off the system unit.
 2. Install the diagnostics diskette in drive A.
 3. Power-on the system unit.
 4. Do not press **F1** during POST.
 5. If any POST errors appear after POST, make a note of the errors and press the **Esc** key.

A message will display on the screen saying that due to disk space constraints, no mouse driver has been included in the diskette. One is available on the Diagnostics CD-ROM (MOUSE.COM file).

6. Press any key to manually invoke the advanced diagnostics. The advanced diagnostics will now check out the system.
7. Select an option from the advanced diagnostics **Main Menu**.
8. Follow the instructions that appear on your screen. If an error occurs, go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-9. This Service Level A Diagnostics will not support Low Level format.

Diagnostic Test Programs

The test programs on the Diagnostics CD include the following features:

Feature	Description
Easy Test Diagnostics	Automatic test of major components of the system.
Advanced Diagnostic Tests	Identifies most problems associated with the following major components: • System board • Hard disk drives • Diskette drives • CD-ROM drives • RAM • Serial and parallel ports • Video adapter • Printer • Keyboard • Mouse
Flexible Test Control	Allows you to: • Run groups of tests in batch • Specify parameters to use for each test (for example, video modes, disk cylinders, and port addresses) • Specify the number of passes you want to run (one to continuous) • Log the test results to a text dBase (DBF) format file • Save all test settings for future use • View System Information • View the server's configuration information. (For example, you can view the IRQ/DMA assignments, memory usage, and device drivers) • Select System Utilities • Format a diskette

Error Messages

Messages generated by the software—the operating system or application programs—generally are text messages, but they also can be numeric. The following are the various error messages.

- POST error messages
- POST beep codes
- Diagnostic error messages
- Software generated messages
- Multiple messages

Error Message	Description
POST Error Messages	Displayed when POST finds problems with the hardware or detects a change in the hardware configuration.
POST Beep Codes	Sounds emitted from the speaker if POST finds a problem. One beep indicates POST completed successfully. Multiple beeps indicate a problem was found by the POST.
Diagnostic Error Messages	Displayed when a test program finds a problem with a hardware option.
Software Generated Error Messages	Displayed if a problem or conflict is found by an application program, the operating system, or both. For an explanation of these messages, refer to the information supplied with that software package.
Multiple Messages	The first error that occurs can cause additional errors. Follow the suggested action of the first error displayed. In this case, the system displays more than one error message. Always follow the suggested action instructions for the *first* error message displayed.

Return Codes

For the test programs to properly determine if a test *Passed*, *Failed*, or *Aborted*, the test programs check the error-return code at test completion. To register the test properly in the test log, the test programs must generate one of the following return codes:

Return Code	Description
0	Indicates the device passed its test.
1	Indicated the device failed its test.
2 or greater	Indicates the test stopped or was aborted.

Using the Advanced Diagnostic Test Programs

The test programs provide advanced functions and utilities for users and service or support professionals to troubleshoot even the most difficult problems.

Program Navigation

You can maneuver within the test programs by typing the first letter of a menu choice, using the function keys, or using command-line options.

Using the First Letter of a Menu Choice

Throughout the test programs, pressing the first letter of an option on a menu is the same as moving to that item with the cursor and pressing Enter.

Using the Function Keys

Use the following keys to maneuver throughout the test programs:

Keys	Action
Enter	Select an item, run the test module, or run the test
Down Arrow ($\downarrow$)	Moves the cursor down
Up Arrow ($\uparrow$)	Moves the cursor up
F1	Calls up the appropriate Help information. Use the up arrow key ($\uparrow$) or the down arrow key ($\downarrow$) to scroll through the information. Pressing F1 from within a Help screen provides a help index from which you can select different categories. One of the important help categories is function key usage. Pressing Esc exits Help and returns to where you left off.
Esc	Go back to the previous menu.

Additional functions are available in the Module Tests screen and the Test Group screen using the following keys:

Keys	Action
Tab	Move to test group (or move to parameters)
Spacebar	Toggle modules on/off (or toggle tests on/off)

Keys	Action
F2	View test results log
F10	Local menu
+	Next logical unit number (for example, LUN 1, LUN 2, and so on)
−	Previous logical unit number

Command Line Options

To enter QAPlus/Pro commands:

Note: Before beginning, ensure that Rapid Resume is disabled in the Setup Utility.

1. Install the Diagnostics CD in the CD-ROM drive.
2. Power-off, then power-on the system unit.
3. Do not press **F1** during POST.
4. If any POST errors appear after POST, make a note of the errors and press the **Esc** key.
5. When the "Aptiva Diagnostics and Utilities Menu" screen is displayed, depress the **zero** key for a DOS prompt, then change the DOS prompt to G:
6. Type **QAPLPRO/XXX** (where **/XXX** represents one of the following from the list below) then press Enter.

Command	Action
/B&W	The **/B&W** command line option forces the program to load in Black and White (Monochrome) mode, which is often more readable on laptop computers.
/LOG=file	The **/LOG=file** command line option directs the test programs to start using a specified Error Log file.
/INT10	The **/INT10** command line option forces the test programs to use the BIOS for screen writes.
/OXXX	The **/OXXX** command line option, where XXX=test group (for example, MBD/MEM/VID/HDU/FDU/KBD/COM/LPT, and so on), omits the designated test group from testing.
/USRCONFIG =file	The **/USERCONFIG=file** command line option tells the test programs to look for a user diagnostic configuration file other than the default USERDIAG.CFG.

Command	Action
/SCRIPT =file[,R]	The **/SCRIPT=file[,R]** command line option with the ",R" runs the selected script. Please see "Scripting" on page 3-10 for a description of scripting.
	Note: You can use a "–" instead of a "/" as the command line switch.

Viewing the Test Groups

As you move the cursor bar up or down in the Module Tests window, the right hand screen changes to show the attributes, parameters, and the selected tests of the corresponding Test Group. The ◊ mark indicates a module selected for testing.

The indicated attributes are characteristics of the selected test module that are used by the test programs to determine which tests to run or how to run selected tests. Attributes are also used to limit the allowable range of parameters (for example, – ending cylinder).

Parameters are values you select to establish the scope of tests. For example, you can select Extended Memory testing parameters and limit the testing to a specific range of test blocks by specifying the starting and ending memory block. This might be appropriate if prior experience indicates that problems are likely to exist in a specific area of memory. By selecting these limiting parameters, you reduce memory testing time.

Scripting

Scripting allows you to select specific groups of tests, testing parameters, and options. Your selection is saved for later use as a test *Script*. To set up a test script, first select all the appropriate test groups and specific tests you want to run from the Module Testing section under Diagnostics. You should also select appropriate testing parameters and options. See "Program Navigation" on page 3-8, for instructions to save a test script.

Changing Logical Unit Numbers

In some instances, you can have more than one logical unit number (LUN) for a particular module. LUNs represent individual devices within a test group or module. For example, you might have two diskette drives or two hard disk drives; or, you might have base, extended, shadow, and cache memory installed in the computer. This configuration might result in as many as four or five different LUNs in the Memory Test Group. Or you might have base, extended, shadow, and cache memory installed in the system which might result in as many as four or five different LUNs in the Memory Test Group.

From either the Module Test Menu or the Test Group window, you can change to a different LUN (where applicable) by pressing the plus (+) key (next LUN), or the minus (−) key (previous LUN).

Test Group Specifications

In the upper-right-hand portion of the testing screen (or just the upper portion if you switched to an individual test group screen) are the specifications for the related test group.

Note: In the Hard Disk Test Group specification area, if a software program was to compress your drive, the indicated size is the compressed size of the logical drive.

Module Testing Mode

If the easy test diagnostics programs do not find a problem, or you want to perform in-depth testing, the Module Testing mode provides a method to run individual tests on a single module. For example, you can run an individual test for the diskette drive, or you can run groups of tests for several modules.

In the Module Testing mode, you can define how many times each test should run and how the test program should log the errors.

To start the Module Testing mode:

 1. Start the Diagnostics CD.
 2. Select **Run Advanced Diagnostics** from the Main Menu.
 3. Select **Diagnostics** from the Main Menu.
 4. Select **Module Test** from the next menu.
 5. Use the up and down arrow keys (↑ and ↓) to move the highlight bar from one selection to the next.

6. Follow the instructions on the screen.

Note: As you scroll down the selection menu, the Test Group window to the right changes to correspond to the highlighted Module.

Running Selected Module Tests

To run all selected tests for a test group:

1. Use the up and down arrow keys (↑ and ↓) to move the cursor to your selection.
2. Press **Enter**.

Note: A ◊ appears next to your selection.

Running All Selected Modules

To run all selected test modules:

1. Use the down arrow key (↓) to move the cursor to the last choice, **Run All Selected Modules**.
2. Press **Enter**.

Note: A ◊ appears next to your selection.

Changing Selected Tests in Test Groups

To change selected tests in a Test Group:

1. In the Module Tests Menu, use the up and down arrow keys (↑ and ↓) to move the cursor to your selection.
2. Press **Tab** to move into the expanded Test Group window.
3. Scroll to the test you want to select or de-select.

   Attention: Items indicated by a directly adjacent "*" (**red** text on color screens) are destructive tests.
4. Press the spacebar at the highlighted test to toggle between select (indicated by a ◊) and de-select.

   Note: Pressing the first letter of a test does not activate the test, unlike menu operation.
5. Press **Enter**.

Running an Individual Test

To run an individual test:

1. Use the up and down arrow keys (↑ and ↓) to move to the highlighted bar to the test you want to run.
2. Press **Enter** to run the test.

   Note: The results of the test appear in the lower-right-hand Test Log window. Also, if you enabled Test Logging, the results are recorded in the Test Log.

3. When the test completes, press Esc to return to the Test Group Menu.

Stopping the Tests

To stop running a specific test or stop testing after you have started a test, press Esc while the test is running. The test pauses at the first possible opportunity, and the Skip/Abort Test Menu appears with the following options:

Option	Action
Continue	The test program begins testing where it left off.
Skip to next test	The test program skips the current test, but remaining tests for the selected Module Tests continue.
Skip to next group	The test program skips the remaining tests in the current test group.
Abort all tests	The test program stops and returns to the previous menu.

Formatting Diskettes

To format a diskette within the Diagnostic programs, select **Format Diskettes** from the Utilities Menu, and select one of the following options:

Format A: high density — 1.44 MB

Format A: low density — 720 KB

Format B: high density — 1.44 MB

Format B: low density — 720 KB

After selecting a diskette format option, follow the instructions that appear on the screen.

Hard Disk Drive Boot Error

A hard disk drive boot error (error codes I999030X) can be caused by the following:

Cause	Actions
The start-up drive is not in the boot sequence in configuration.	Check the configuration and ensure the start-up drive is in the boot sequence.
No operating system installed on the boot drive.	Install an operating system on the boot drive.
The boot sector on the start-up drive is corrupted.	The drive must be formatted, do the following: 1. Attempt to access and recover (back-up) the failing hard disk drive. 2. Using the operating systems programs, format the hard disk drive.
The drive is defective.	Replace the hard disk drive.

File Editor

The File Editor is an ASCII text editor that uses simple function key commands. To access the File Editor:

1. Select **File Editor** from the *Utility Menu*; then press **Enter**.
2. Insert a diskette into Drive A or Drive B before selecting the file you want to edit, then select the file you want to edit from the Files selection box.
3. Make your changes. The arrow keys move the cursor, and the function keys perform search and block editing functions. (See "File Edit Function Key Usage.")
4. When you are done, press **F10** to update the file with the changes you made, or press **Esc** to quit the editing process without saving the changes.

File Edit Function Key Usage
The following information describes the function of the function keys and keyboard keys when you are using the File Editor.

Key	Description
Arrows	Move the cursor to the place in the text where you want to make changes.
Home	Press **Home** once, to move the cursor to the start of the current line. Press **Home** twice, to move to the beginning of the file. Press **Home** three times, to move to the beginning of the file.
End	Press **End** once, to move the cursor to the end of the current line. Press **End** twice, to move the cursor to the end of the current screen. Press **End** three times, to move the end of the file.
F2	Press **F2** to be in search mode, You are prompted to enter the search word or words on a reverse highlighted line at the bottom of the File Edit Screen. After typing in the search word, press **Enter.**
F3	Press **F3** to find the next occurrence of a search word.
F4	Press **F4** to mark the start of a block of text (if you have not previously marked it). If you previously marked the block of text, pressing this key unmarks the text block.
F5	Press **F5** to complete the block marking (started with F4). If you did not previously press **F4** to start marking a block of text, **F5** is ignored.
F6	Press **F6** while the cursor is within the active block to move an active (marked) block of text. Move the cursor to the new location where the active block is to be moved, then press **F6** again. If there is no active block of text, **F6** is ignored.
F7	To copy an active (marked) block of text to a new location, move the cursor to the new location and then press **F7**. If there is no active block of text **F7** is ignored.
F8	To delete an active (marked) block of text, move the cursor within the active block and press **F8.** If there is no active block of text, **F8** is ignored.
F10	Press **F10**, to save all changes and exit the file.

Notes:

1. Always make a backup copy on a self-starting diskette of the AUTOEXEC.BAT and CONFIG.SYS files *before* making any changes.

2. The default text editing mode of the File Editor is the insert mode. To toggle between overtype and insert modes, press Insert.

Diagnostics Control Keys

The following is a list of the Diagnostics Control Keys, when used and a description of the Diagnostics response.

Control Keys	When Used	Diagnostics Response
Ctrl+A	Main Menu	Allows you to select test from the sub menus that are highlighted with red letters. **Attention:** If selected, these test will erase the information stored on the diskette or hard disk drive.
Up and Down Arrow Keys	Main Menu Module Test Menu Test Group Menu	Highlights an item you want to select.
Space Bar	Module Test Menu Test Group Menu	Adds a ◊ to the left of the highlighted test. The test will run when **Run All Selected** is highlighted and the Enter key is pressed. Also removes the ◊ to the left of the item. The test will not run when **Run All Selected** is highlighted and the Enter key is pressed.
Tab Key	Main Menu Module Test Menu	Selects the additional test for the menu you are in.
+/– Keys	Test Group Menu	Selects additional test. The LUN displayed on the top right Test Group Menu shows which test is selected and how and remain (example LUN 1 of 2).

Repair Information

Removals and Replacements—Machine Type 2159

Note: The Machine Type 2159 might contain drives and devices not illustrated in this book. Follow replacement instructions for the same size device if in doubt. See Appendix B, "Model/Monitor Configurations and FRU Part Numbers" on page B-1 for exact model configurations.

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.

Begin all removals by removing the cover (and rear cover, if applicable).

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.

Before disconnecting any cables, note their locations. Reinstall any new FRUs with cables in the same locations.

See Safety Notice 1: Translation on page xi

Before removing any FRU, power-off the computer, unplug all power cords from electrical outlets, then disconnect any interconnecting cables.

Attention: The system board, processors, adapter cards, SIMMs, video memory modules, and upgrade processors 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.
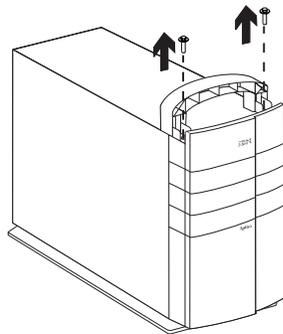
(Front View)

Figure 4-1. Remove the Screws
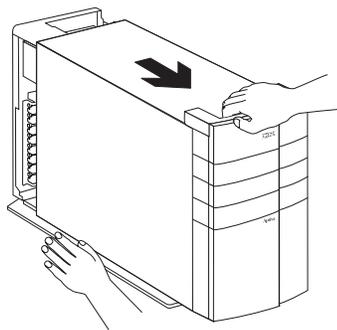
(Front View)

Figure 4-2. Pull Out on the Cover

2020—3.5-In. Bays

- Disconnect any cables on the drive.
- Remove the screws.
- Pull out the diskette drive.

(Front View)
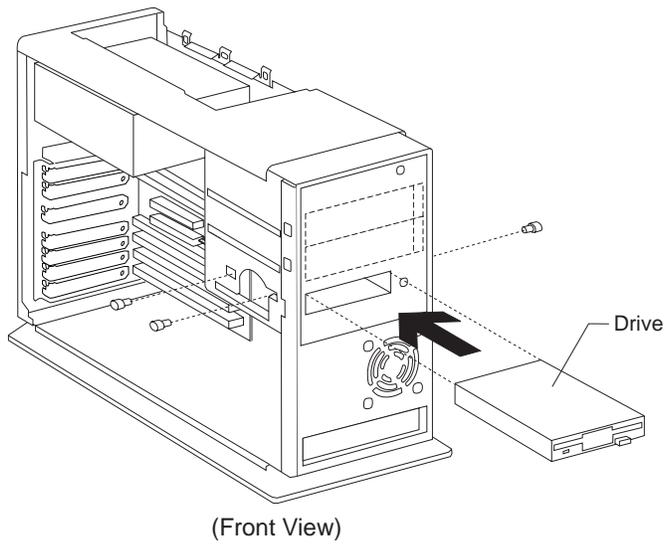
Figure   4-3. Bay 3 (3.5-In.)

2025—5.25-In. Bays

- Disconnect any cables on the drive.
- Remove the screws.
- Pull out the diskette drive.

When removing a drive, install the new FRU in the same bay. Any of these devices may be installed in any 5.25-in. bay:

- CD-ROM drive
- 5.25-in. diskette drive
- Dual 3.5-in. and 5.25-in. diskette drive
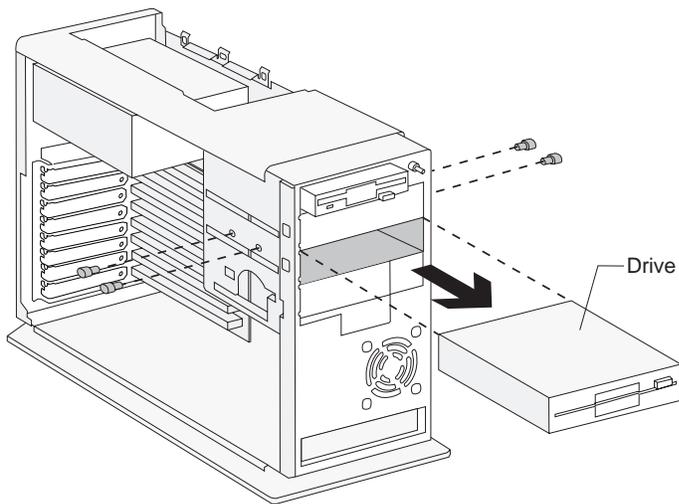
(Front View)

Figure 4-4. Bays 1 and 2 (5.25-In.)

2030—Hard Disk Drives

Bay 4

- Disconnect any cables on the drive.
- Remove the screws.
- Slide the hard disk drive to the rear and tilt to remove.
- Remove the mounting bracket from the old drive and install the bracket on the replacement drive.

Note: Refer to Appendix B, "Model/Monitor Configurations and FRU Part Numbers" on page B-1 and install the correct software.

(Back View)
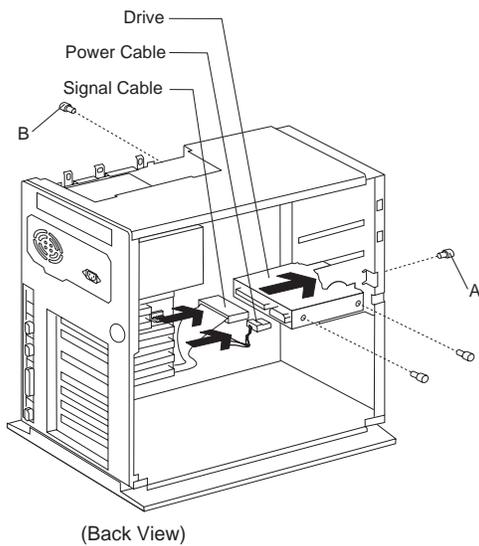
Figure 4-5. Hard Disk Drive—Bay 4

(Front Upside Down View)
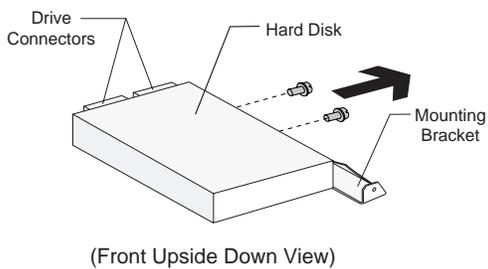
Figure 4-6. Mounting Bracket—Bay 4

Bay 5

- Disconnect any cables on the drive.
- Remove the screws.
- Lift out the hard disk drive.

Hard Disk

(Front View)
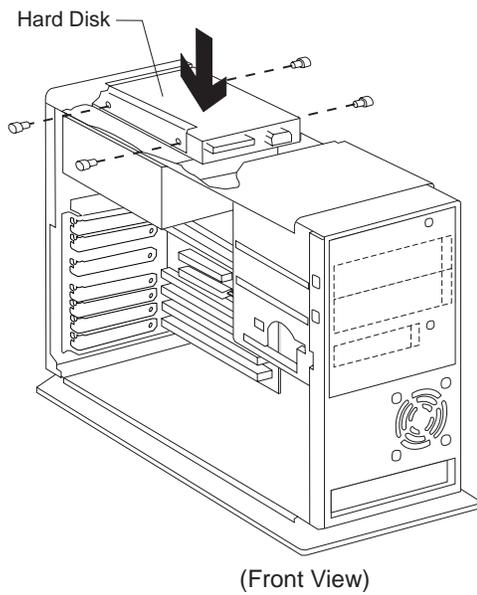
Figure   4-7. Hard Disk Drive—Bay 5

2032—Access Station

- Disconnect the Access Station cable from the system unit.
- Remove the two bottom screws.
- Pry off the left and right wing covers as shown in Figure 4-8.
- Open the Access Station
- Press in the tabs on the left and right sides of the bottom cover as shown in Figure 4-9.
- Snap the On/Off switch assembly out of the front cover and feed it back through the hole in the front cover.
- Pry out the bottom cover at the pivot as shown in Figure 4-9 and raise upward to release the Access Station from the bottom cover.
- Raise the top cover assembly from the bottom cover and remove the spring.
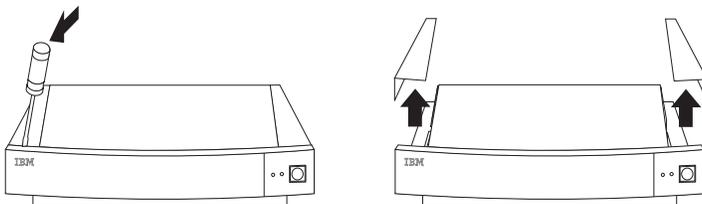
Figure 4-8. Access Station Wing Cover Removal
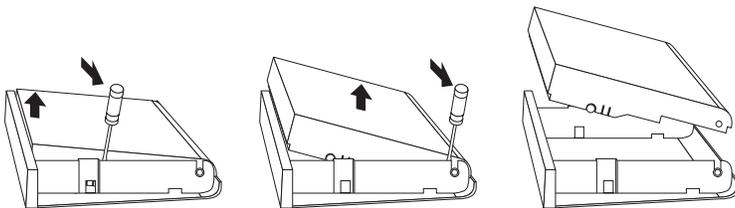
Figure 4-9. Access Station Bottom Cover Removal

Note: When reassembling the Access Station to the bottom cover, be sure to put the two ends of the spring in the holes in the bottom of the Access Station frame.

2035—Adapter Cards

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

- Remove any cables (note location of cables).
- Remove the adapter card mounting screw (**1**).
- Pull out the adapter card (**2**).
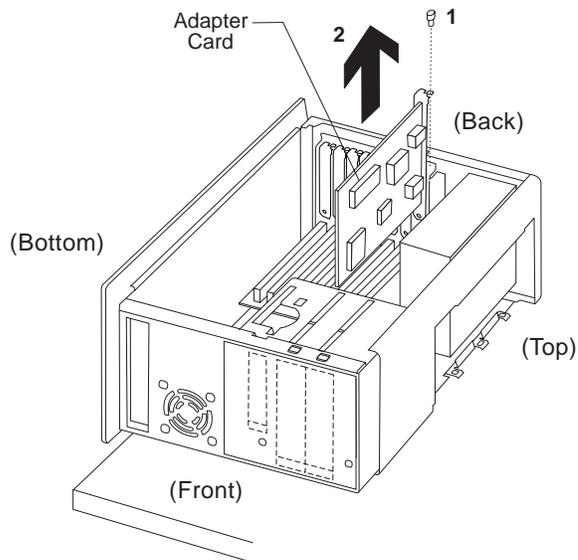
Figure   4-10. Adapter Cards

Note: When reinstalling a modem adapter card, ensure the modem Wake Up on Ring cable is connected from the 2-pin keyed connector on the modem to Wake Up on Ring connector on the system board. See "System Board Layout" on page 5-2 for locations.

2040—Power Supply

- Disconnect any cables necessary for removal.
- Remove the power supply mounting screws.
- Lift out the power supply.
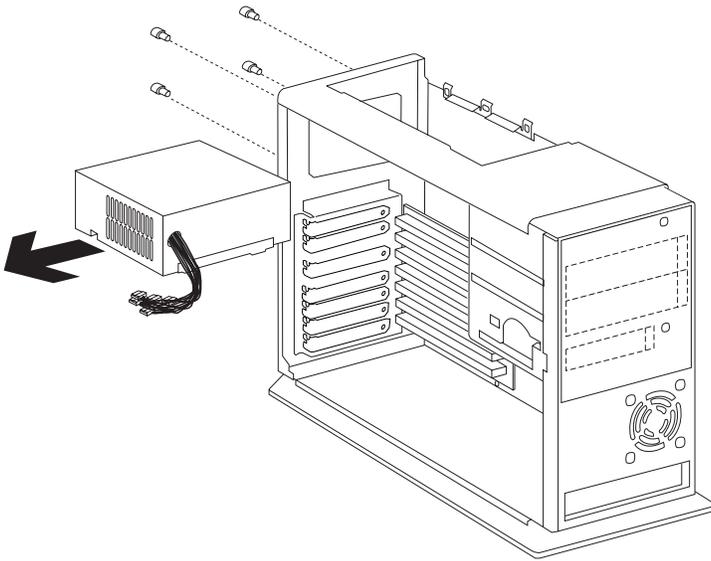
Figure 4-11. Power Supply

2045—Riser Card

- Adapter cards (2035) if applicable.
- Riser card power connector.
- Remove the riser card mounting screw (**1**).
- Remove the riser card (**2**).

Some riser cards may contain a VESA local bus extension. See "System Board Layout" on page 5-2 for socket locations on the system board.
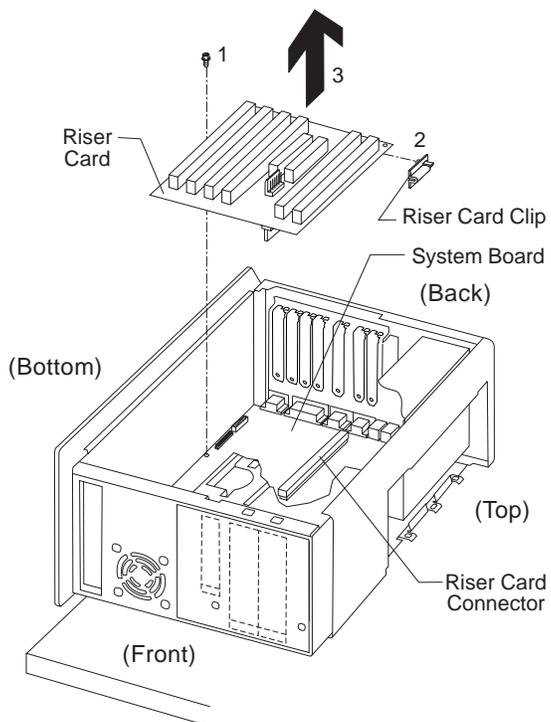
Figure 4-12. Riser Card

2050—Memory (SIMM)

Attention: Memory modules are sensitive to static discharge See "Handling ESD-Sensitive Parts" on page 4-18.

- Adapter cards (2035) if applicable.
- Riser card (if SIMMs located behind riser card).
- Push out on the side clamps to release the module.
- Pull the module up and out to remove.

Note: Run the Setup Utility after adding or removing memory.
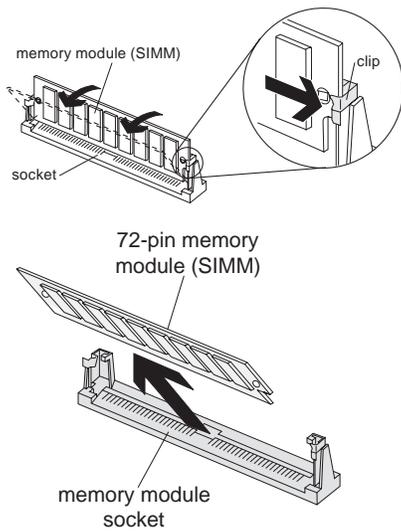
Figure 4-13. Memory SIMM

2051—Memory (DIMM)

Attention: Memory modules are sensitive to static discharge. See "Handling ESD-Sensitive Parts" on page 4-18.

- Adapter cards (2035) if applicable.
- Riser card (if DIMM is located behind riser card).
- Push out on the side clamps to release the module.
- Pull the module up and out to remove.

Note: Run the Setup Utility after adding or removing memory.
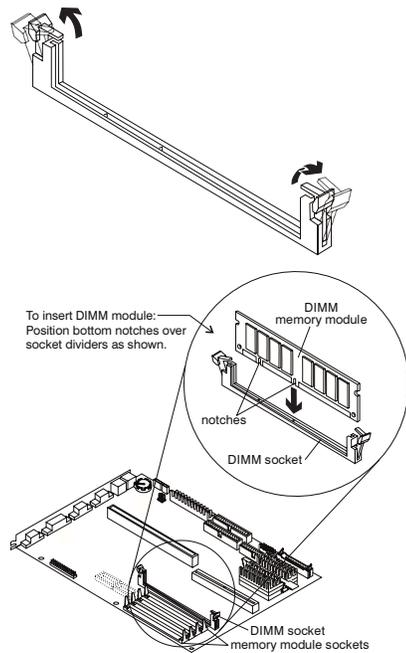
Figure   4-14. Memory DIMM

2055—Cache Memory

Attention: Memory cards are sensitive to static discharge. See "Handling ESD-Sensitive Parts" on page 4-18.

* Adapter cards (2035) if applicable
* Riser card (2045) if applicable

Note: Run the Setup Utility after adding or removing memory.
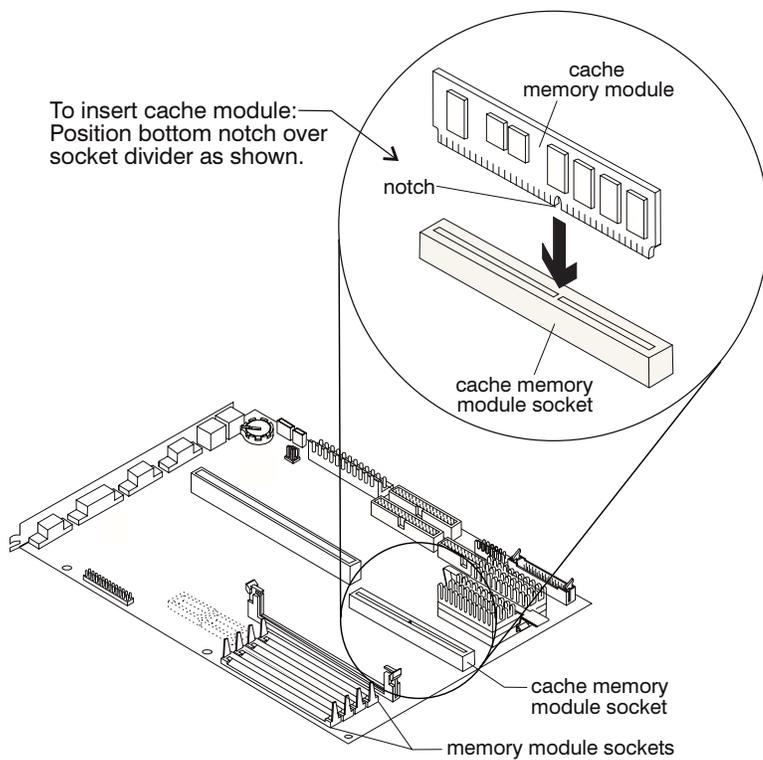
Figure   4-15. Cache Memory

2060—Processor Removal

Attention: Processors are sensitive to static discharge. See "Handling ESD-Sensitive Parts" on page 4-18.

- Adapter cards (2035) if applicable.
- To remove the processor: remove the processor retaining clip, raise the socket lever, remove the old processor, insert the upgrade processor, lower the socket lever firmly, then install the processor retaining clip.
- When installing, be certain the dot on the processor is aligned with the dot in the socket.

Notes:

1. Determine which type of processor you are installing and make sure the jumpers are set correctly.

2. Run the Setup Utility after installing a processor.
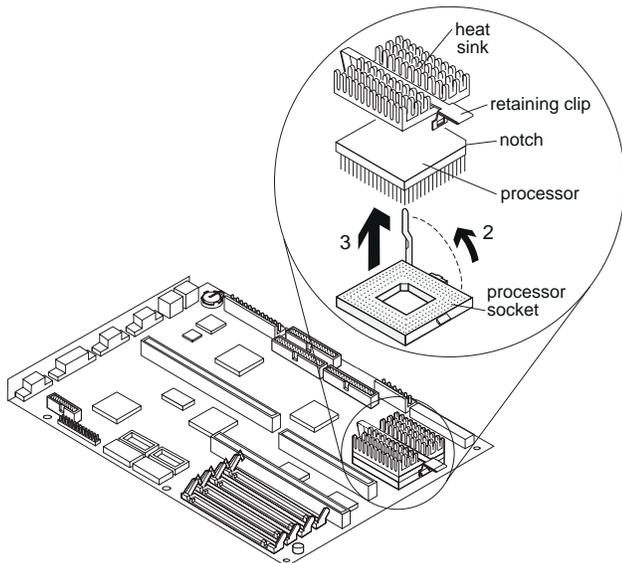
Figure   4-16. Processor removal

2080—Lithium Battery

- Adapter cards (2035) if applicable.
- Riser card (2045).
- Insert the tip of a screwdriver (**1**) under the clip and raise the clip (**2**) carefully to remove the battery.

See Safety Notice 2: Translation on page xii

The lithium battery can cause a fire, explosion, or severe burn. Do not recharge it, remove its polarized connector, 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. Use only the battery in the appropriate parts listing. Use of an incorrect battery can result in ignition or explosion of the battery.

Attention: Be careful when removing the battery. If the retaining clip is broken, the system board must be replaced.

Note: Run the Setup Utility after installing a battery.
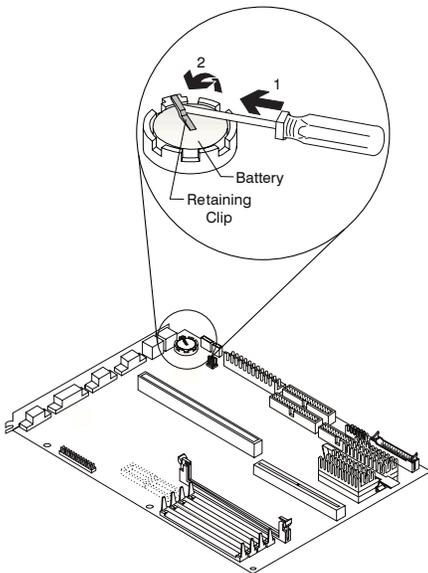
Figure   4-17. Lithium Battery

2090—System Board

- Adapter cards (2035) if applicable.
- Access Station host card (2035).
- Riser card (2045).
- Disconnect any cables necessary for removal.
- Memory (SIMM) (2050) if applicable.
- Video memory (2056) if applicable.
- Cache memory (2055) if applicable.
- Processor (2060).

Notes:

1. Be certain to reinstall the processor, SIMMs, video memory, 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 Setup Utility after changing the system board.
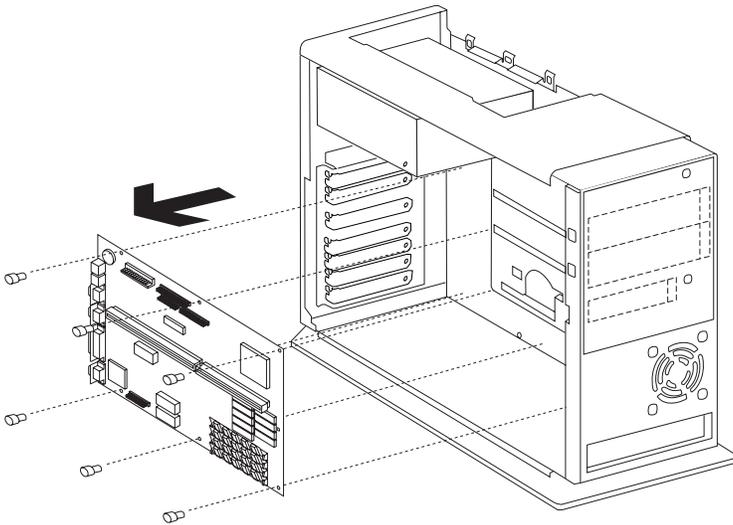
Handling ESD-Sensitive Parts

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 and unplugging the power cord before removing adapter 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.

Home Automation

Home Director Technical Service and Support

Aptiva computers purchased through Radio Shack offer Home Automation with the Home Director package.

Because of their years of experience in this area, Radio Shack will assist the Aptiva owner with any problems that are encountered with the Home Director on the Aptiva, at no charge.

Should there be a Home Director problem on the Aptiva, call: 1-800-843-7422.

Radio Shack's help line is available:

Monday-Friday 9:00AM - 7:00PM Central Time
Saturday   9:00AM - 5:00PM Central Time
Sunday   Closed

The Home Automation package includes:

- Home Automation CD
- Serial Interface Module
- Cable
- Lamp Module
- Appliance module

Installation and operating instructions are included with the Home Automation package. On-line Diagnostics and Troubleshooting Aids are included in the Home Automation software.

How Home Automation Works

The Serial Interface Module sends commands to the device modules for on-off and Dim control of the connected appliance or lighting through the house AC power wiring. The Aptiva computer, with Home Automation Software installed, is used to program and send control data to the device modules via the Serial Interface module. The data interface is RS232 Industry Standard.

```
┌─ Note ─────────────────────────────────────────────────────────┐
│                                                                  │
│   Dim control is for incandescent lighting only.  Dim control must **not** be │
│   used for fluorescent lighting or for appliances.               │
│                                                                  │
└──────────────────────────────────────────────────────────────────┘
```

Home Automation Troubleshooting

Refer to the Home Automation On-line help information and troubleshooting
aids.

Things to Check:

- Make sure the Serial Interface Module is plugged into a working outlet.
  If the outlet is controlled by a switch, make sure the switch is on.
- **Do not** connect the Serial Interface Module into a surge protector. The
  surge protector will block signals from the computer to the power lines.
- Make sure the House Code is set correctly in the Home Director
  software.
- Make sure the Serial interface is configured to the correct COM port.

  If the COM port tests correctly and you can not control any modules,
  unplug the Serial Interface module from the wall outlet for about two
  minutes. Plug the Serial Interface back into the wall outlet and try
  running the Home Director program again.
- Make sure the module you are trying to control is fully plugged into the
  wall outlet and that the switch for the appliance or light you are trying to
  control is on and it works when directly plugged into a working wall
  outlet.
- Make sure the device module is **not** plugged into a surge protector.
- Power line noise can cause solid or intermittent failures.

  Check these items to see if they are operating when the problem
  occurs:
    - Baby monitors that transmit over the power line
    - Blenders
    - Electric carving knives
    - Electric hair dryers
    - Electric motors
    - Electric shavers
    - Floor scrubbers
    - Food processors
    - Laser printers
    - Mixers

- Vacuum cleaners
- Wireless doorbells that use the power line
- Wireless intercoms in transmit (talk) mode

If the COM port tests correctly and you can not control any modules, unplug the Serial Interface module from the wall outlet and try running the Home Director program again.

- Be aware that voltage distribution in homes is split from the 220 volt power input line. There are two separate 110 volt power lines used in the house. When a signal is sent to a device module, the signal could travel from one 110 volt line, out to the power transformer, then back to the other 110 volt line. If this distance is too long, you might experience intermittent problems. Try plugging the device module in another outlet socket in the same room.
- If you suspect a software problem, exit all other software programs and try running the Home Director program again. Conflicts may exist between Home Director and another program. Start the other programs one at a time to determine which program is causing the conflict.
- If you need to reinstall the Home Director software, first backup all the .HOM files.

Software Installation Procedure

The Aptiva Recovery CD includes an Install program that can be used to restore the original Aptiva system software.

Refer to Appendix B, "Model/Monitor Configurations and FRU Part Numbers" on page B-1 to determine the correct software FRU part number. Then, install the original Aptiva software on the hard disk drive. Use the following procedure:

1. Insert the Recovery CD into the CD-ROM drive.

2. Power-off, then power-on the system unit.

3. If Rapid Resume is enabled, press **Ctrl+Alt+Del** while the Rapid Resume logo screen is displayed.

4. A message will appear telling you that old data will be erased and asks if you wish to continue. If you wish to continue, press enter.

5. Follow the instructions on the display.

Parts/Test Point Locations

System Board Layout

Figure   5-1. System Board

System Board Locations

J1	Fan +12 V dc connector
J2	USB (Universal Serial Bus)
J3	System board voltage regulator connector
J4	Cache connector
J5	Primary Hard Disk IDE (Hard Disk 1, Hard Disk 2)
J6	Secondary Hard Disk IDE (Hard Disk 3 or CD-ROM, Hard Disk 4)
	(For hard disk drive jumper settings, see page 5-10)
J7	Mouse connector
J8	Keyboard connector
J9	SIMM 72-pin Socket - Bank 1
J10	SIMM 72-pin Socket - Bank 2
J11	DIMM 168-pin Socket - Bank 2
J12	SIMM 72-pin Socket - Bank 3
J13	SIMM 72-pin Socket - Bank 4
J16	Riser Connector—PCI/ISA
J17	VESA Video feature connector
J19	Serial Port A connector
J20	Parallel Port connector
J21	Diskette drive connector
J23	Power Supply 2-pin connector (On/off switch)
J24	Power Supply 3-pin connector
J25	Wake Up On Ring connector
J26	HDD/Power LED connector (Power: 1-2, HDD: 3-4)
J27	Internal VGA connector
J28	Monitor signal connector
J29	External speaker power connector
J30	Media console connector
JP1	External speaker (Enable: 1-2, Disable: open)
JP2	System board bus clock (see page 5-4)
JP3	Processor bus factor (see page Figure 5-3 on page 5-4)
JP7	System board flash jumper (Normal: 1-2, write protect: 2-3)
JP8	Video interrupt
JP10	VGA (Enable: 1-2, Disable: 2-3)
JP11	Diskette Drive (FDD) write enable (Enable: 1-2, Disable: open)
JP12	CMOS, Power-on Password Reset (Normal: 1-2, Clear: 2-3)
P1,P2	Power supply connector
P11	3.3 V dc Power supply connector
U1	Processor

System Bus Clock

The System bus clock jumpers are set to the Type and Model of the Aptiva computer. Other jumper settings are not supported and might cause system failures.

Function	Jumper	66.6 MHz	60 MHz	50 MHz
System Bus Clock	JP2	1-3, 2-4	3-5, 4-6	3-5, 2-4

Figure   5-2. System Bus Clock

Core Bus Frequency Ratio Settings

The Core bus frequency ratio jumpers are set to the Type and Model of the Aptiva computer. Other jumper settings are not supported and might cause system failures.

Function	Jumper	3:2	2:1	2.5:1	3:1
Core/Bus Frequency Ratio	JP3	1-3, 2-4	3-5, 2-4	3-5, 4-6	1-3, 4-6

Figure   5-3. Core Bus Frequency Ratio Settings

Power Supply Cable Connector Specifications

Refer to the following figures when checking for voltages on power supply cable connectors.

When checking voltages, the power supply fan must be running. To power-on the power supply without using the on/off switch, use a screwdriver or other tool to connect pins 2 and 3 on connector J30 (with the switch cable plug disconnected from the connector on the system board).
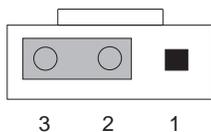
Figure 5-4. Connector J30 on System Board
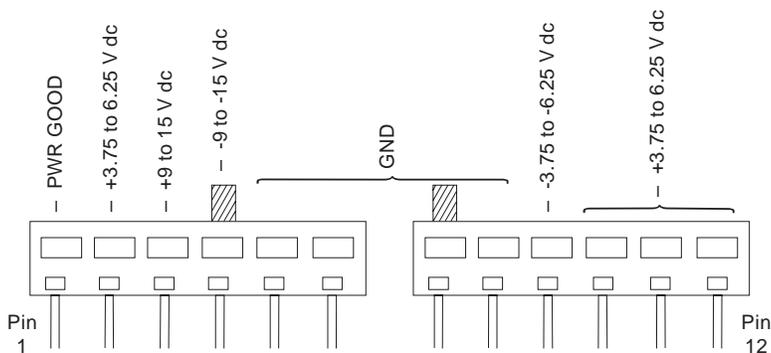
Figure 5-5. System Board Power Supply Connectors (J8 Bottom View)

5 V dc   12 V dc

4   **1**
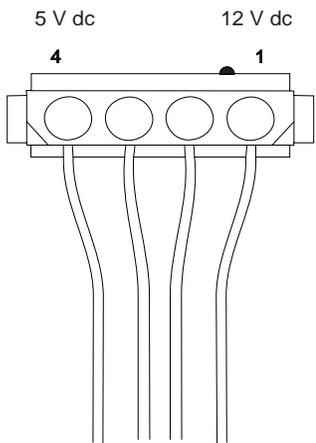
Figure   5-6. Hard Drive or CD-ROM Power Cable Connector

1   **4**

5 V dc   12 V dc
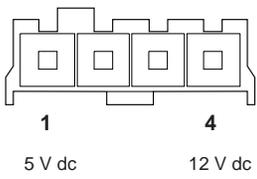
Figure   5-7. 3.5-In. Diskette Drive and Host Card Power Cable Connector

Mwave Card
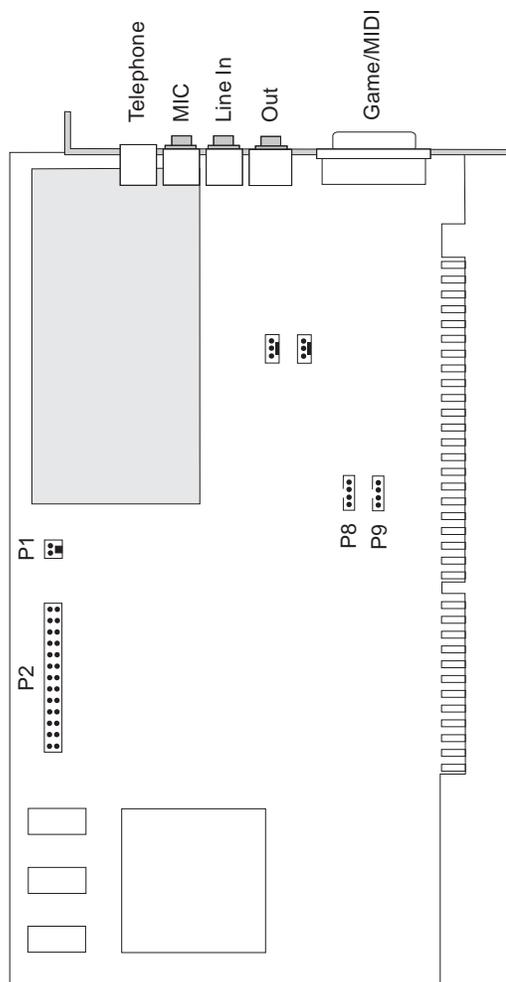
Figure   5-8. Mwave Card (Combination Modem/Sound)

Connectors

P1   Wake Up On Ring
P2   Unused
P8   Audio
P4   Audio

Sound Card
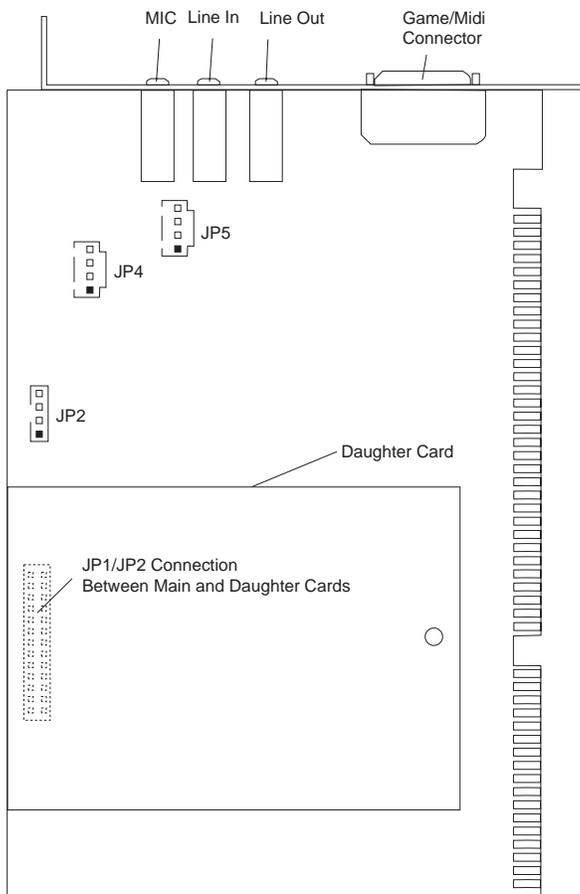
Figure   5-9. Sound Card

Sound Card Connectors

Table 5-1. Sound Card Connectors	
Connector	**Description**
JP2	CD-ROM connector
JP4	Video Conference connector
JP5	TV Connector

Factory-Installed Modem Card
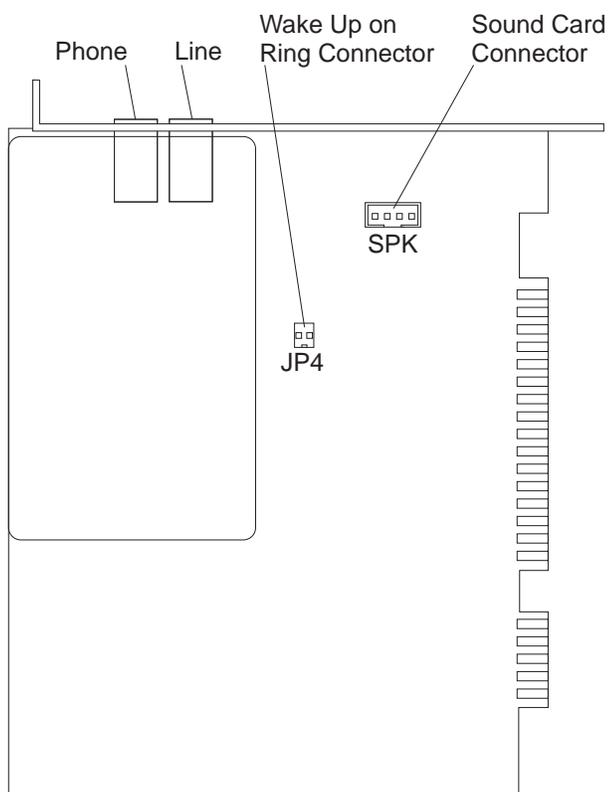
Figure 5-10. 33.6 Kbps DSVD Modem Card

The 33.6 Kbps DSVD (Digital Simultaneous Voice and Data) modem is controlled by the Windows 95 Control Panel. Online modem help is in the 33.6 Kbps DSVD Modem selection in the Program window, from the Start icon.

See "33.6 Kbps DSVD Factory-Installed Modem Adapter" on page 2-63.

Hard Disk Drive Jumper Settings

Up to four drive devices (hard disk, CD-ROM, or Zip drives) can be installed in **Service Level A** systems. If any drives do not show in the Installed Devices list in the Setup Utility, ensure the jumper settings and connectors are set as shown here. Refer to "System Board Layout" on page 5-2 for connector location information.

Primary Hard Disk Drive IDE Local Bus Connector

At the primary hard disk drive IDE connector, make sure the first drive installed is set as the master drive (**1** in the following figures).

Note: If a second drive is installed, it must be attached to the secondary IDE connector. Set the jumpers as the slave drive (**2** in the following figures).

All recovery preloaded software should be installed on the master hard disk drive on the primary connector.

Secondary Hard Disk Drive Connector

If additional drives are connected to the secondary hard disk drive connector, set the first drive connected to this connector as the master drive (**1** in the following figures). If a second drive is connected to the secondary hard disk drive connector, set the jumpers as the slave drive (**2** in the following figures). Ensure all software is set to recognize all installed drives.

For non-internal Zip models, the CD-ROM drive is connected to the secondary drive connector at the factory as the master drive. If an additional hard disk drive is connected to the secondary connector, it must be set as the master drive, **1** , and the CD-ROM drive jumpers reset as the slave drive (see "CD-ROM Drive Jumper Settings" on page 5-13).

Note: Check the Setup Utility for correct installation:

Hard Disk 1 Master drive
Hard Disk 2 Slave drive
Hard Disk 3 Master drive (CD-ROM if other drive not connected to this connector. Also, Zip drive with internal Zip drive models)
Hard Disk 4 Slave drive (CD-ROM if hard disk or internal Zip drive installed at secondary connector, Hard Disk 3)

For jumper settings, match your hard disk drive to one of the following figures. **1** = Master Drive   **2** = Slave Drive.
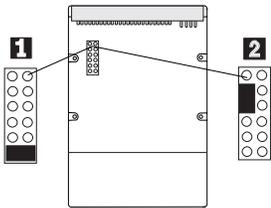
Figure   5-11. 1.6 GB, 2.0 GB Drive
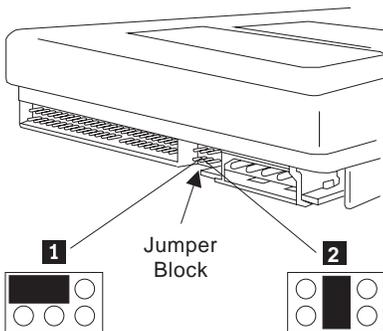
Figure   5-12. 850 MB, 2.0 GB, 2.5 GB Drive

Continued on next page.

For jumper settings, match your hard disk drive to one of the following figures. **1** = Master Drive **2** = Slave Drive.
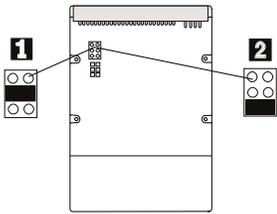
Figure 5-13. 850 MB, 1.2 GB Drive
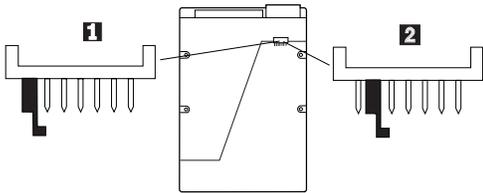
Figure 5-14. 1.6 GB, 3.2 GB Drive

CD-ROM Drive Jumper Settings

The CD-ROM drive is connected to the system board secondary drive
connector at the factory. CD-ROM drive jumpers are set as the master
drive, as shown in Figure 5-15. If an additional hard disk drive is connected
to the secondary connector, it must be set as the master drive (see **1** in
figure 5-11) and the CD-ROM drive jumpers reset as the slave drive as
shown in Figure 5-15.

Check the Setup Utility for correct installation.
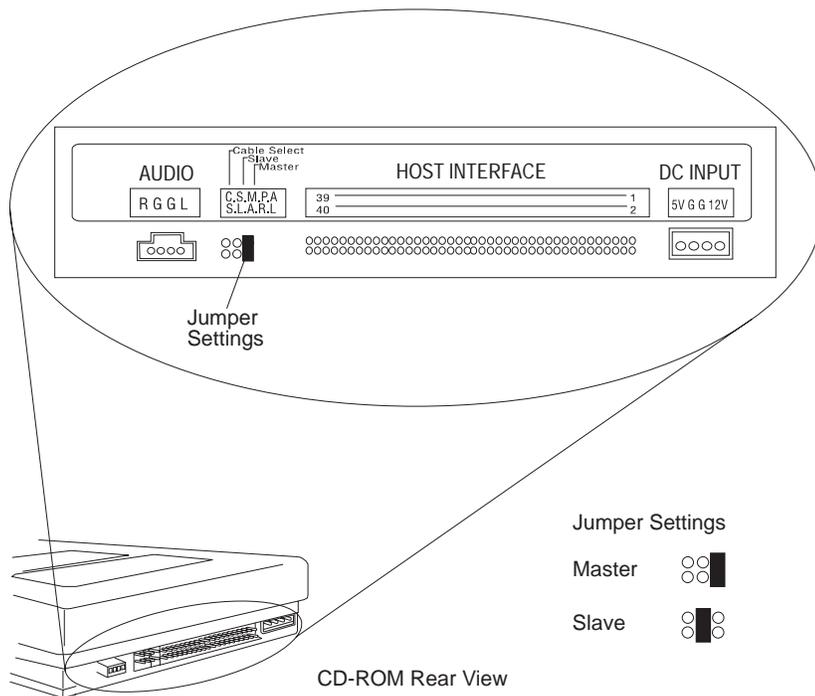
Figure   5-15. CD-ROM Drive Jumper Settings

Access Station
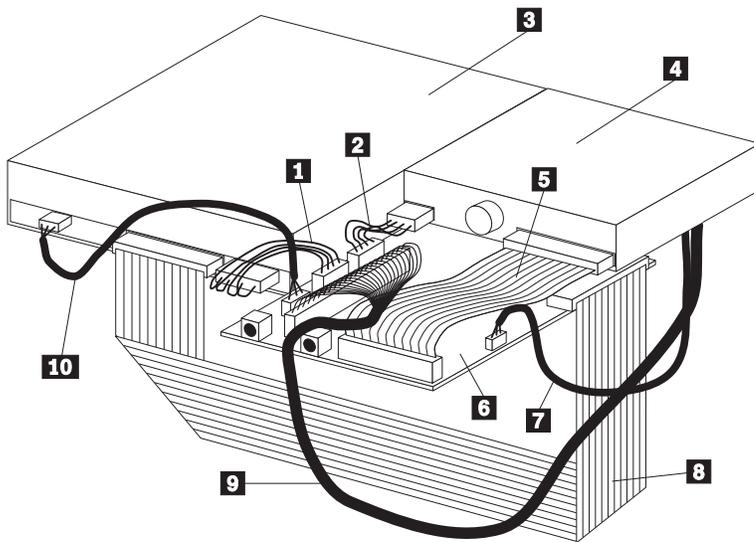
Figure   5-16. Access Station Connectors (Rear View)

1	CD-ROM drive power connector
2	3.5-in. diskette drive power connector
3	CD-ROM drive
4	3.5-in. diskette drive
5	3.5-in. diskette drive cable
6	Access Station Client card
7	On/Off switch cable
8	CD-ROM cable
9	Access Station cable
10	CD-ROM audio cable
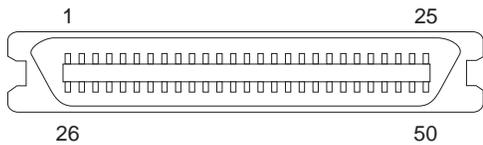
Figure   5-17. Access Station Cable Connector

Pin	Signal	Pin	Signal
Pin	**Signal**	**Pin**	**Signal**
1	DATA15	26	CD_AUDIO_L
2	DATA14	27	CD_AUDIO_LGND
3	DATA13	28	CD_AUDIO_R
4	DATA12	29	CD_AUDIO_RGND
5	DATA11	30	+12V_DROP
6	DATA10	31	+12V_DROP
7	DATA_9	32	+12V_DROP
8	DATA8	33	+12VDC
9	ADR_EN	34	+12VDC
10	DAT_EN#	35	+12VDC
11	R/W#	36	GND
12	IRQ_STRB#	37	GND
13	TC_BUF	38	GND
14	DRQA#	39	GND
15	DRQB#	40	GND
16	DRQC#	41	GND
17	HDD_IORDY	42	GND
18	DATA7	43	GND
19	DATA6	44	GND
20	DATA5	45	GND
21	DATA4	46	GND
22	DATA3	47	SPARE
23	DATA3	48	PWR_LED_ANODE
24	DATA1	49	AUX5
25	DATA0	50	ON_PULSE

Table   5-2. Access Station Pin Numbering

SIMM Configurations

Factory-installed SIMMs are non-parity SIMMs. However, both parity and non-parity industry standard SIMMs are supported. When installing SIMMs, run the Setup Utility to clear XX62 or 164 error codes.

The following are the *preferred* combinations of SIMMs that provide the best performance. SIMMs must be installed in pairs of same size and speed.

Table 5-3. SIMM Configurations				
Total Memory	**J9 (Socket 1)**	**J10 (Socket 2)**	**J12 (Socket 3)**	**J13 (Socket 4)**
8 MB	4 MB	4 MB	—	—
8 MB	—	—	4 MB	4 MB
16 MB	4 MB	4 MB	4 MB	4 MB
16 MB	8 MB	8 MB	—	—
16 MB	—	—	8 MB	8 MB
24 MB	4 MB	4 MB	8 MB	8 MB
24 MB	8 MB	8 MB	4 MB	4 MB
32 MB	8 MB	8 MB	8 MB	8 MB
32 MB	16 MB	16 MB	—	—
32 MB	—	—	16 MB	16 MB
40 MB	4 MB	4 MB	16 MB	16 MB
40 MB	16 MB	16 MB	4 MB	4 MB
48 MB	8 MB	8 MB	16 MB	16 MB
48 MB	16 MB	16 MB	8 MB	8 MB
64 MB	16 MB	16 MB	16 MB	16 MB
64 MB	32 MB	32 MB	—	—
64 MB	—	—	32 MB	32 MB
72 MB	4 MB	4 MB	32 MB	32 MB
72 MB	32 MB	32 MB	4 MB	4 MB
80 MB	8 MB	8 MB	32 MB	32 MB
84 MB	32 MB	32 MB	8 MB	8 MB
96 MB	16 MB	16 MB	32 MB	32 MB
96 MB	32 MB	32 MB	16 MB	16 MB
128 MB	32 MB	32 MB	32 MB	32 MB

Detachable Monitor I/O Signal Cable Connector Test Points
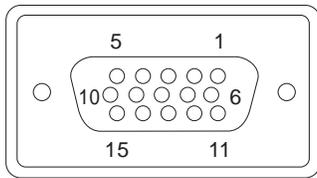
System board
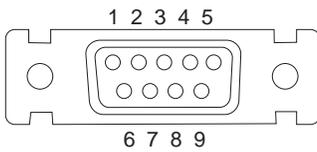
Monitor end of cable
(on some models)

Figure   5-18. Detachable Monitor I/O Signal Cable Connectors

Test each connector between the following pins:

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

System Board Connector Specifications

Refer to "System Board Layout" on page 5-2 for connector identification and location information.

Monitor/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	

Pin	Signal Name	I/O
8	Blue Ground	
9	+5 V dc	
10	Synch Ground	
11	Monitor ID Bit 0	I
12	SDA	I
13	Horizontal Synch	O
14	Vertical Synch	O
15	SCL	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	N/A
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 Port

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

Mouse

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

Keyboard

Pin	Signal Name	I/O
1	Data	I/O
2	Mouse Data	
3	Ground	Power
4	+5 V dc	Power
5	Clock	I/O
6	Mouse Clock	

USB (Universal Serial Bus)

Pin	Signal Name
1	+5 V dc
2	-Data
3	+Data
4	GND

Rapid Resume Power

Pin	Signal Name
1	AUX5
2	POWER_CNTRL
3	Ground

On/Off Switch Connector

Pin	Signal Name
1	AUX5
2	Switch

Modem Wake Up on Ring Detect Connector

Pin	Signal Name
1	AUX5
2	Key (not populated)
3	EXT_WAKEUP
4	Ground

Speaker Connector

Pin	Signal Name
1, 2	Disabled
3, 4	Enabled

Power Cable Connector

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

Power Cable Connector 3.3 V dc

Pin	Signal Name	Pin	Signal Name
1	3.3 V dc	4	Ground
2	3.3 V dc	5	Ground
3	3.3 V dc	6	Ground

Diskette Cable Connector

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

Pin	Signal Name	I/O	Pin	Signal Name	I/O
1	Host Reset	O	21	No Connection	
2	Ground		22	Ground	
3	Host Data 7	I/O	23	Host IOW	O
4	Host Data 8	I/O	24	Ground	Power
5	Host Data 6	I/O	25	Host IOR	O
6	Host Data 9	I/O	26	Ground	Power
7	Host Data 5	I/O	27	I/O Channel Ready	I
8	Host Data 10	I/O	28	No Connection	
9	Host Data 4	I/O	29	No Connection	
10	Host Data 11	I/O	30	Ground	Power
11	Host Data 3	I/O	31	Host IRQ	I
12	Host Data 12	I/O	32	No Connection	
13	Host Data 2	I/O	33	Host A1	O
14	Host Data 13	I/O	34	No Connection	
15	Host Data 1	I/O	35	Host A0	O
16	Host Data 14	I/O	36	Host A2	O
17	Host Data 0	I/O	37	Host CS0	O
18	Host Data 15	I/O	38	Host CS1	O
19	Ground	Power	39	$\overline{ACTIVE}$	I
20	No Connection		40	Ground	Power

Safety Inspection Guide

General Guidelines

The purpose of this Safety Inspection Guide is to help you identify 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.

All current IBM Aptiva service supplements outlining 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 the Appendix B, "Model/Monitor Configurations and FRU Part Numbers" on page B-1 for model specifications.

Assemblies (Service Level A)

Catalog Section

Assembly 1: Machine Type 2159 System Unit - Exterior (SL-A)
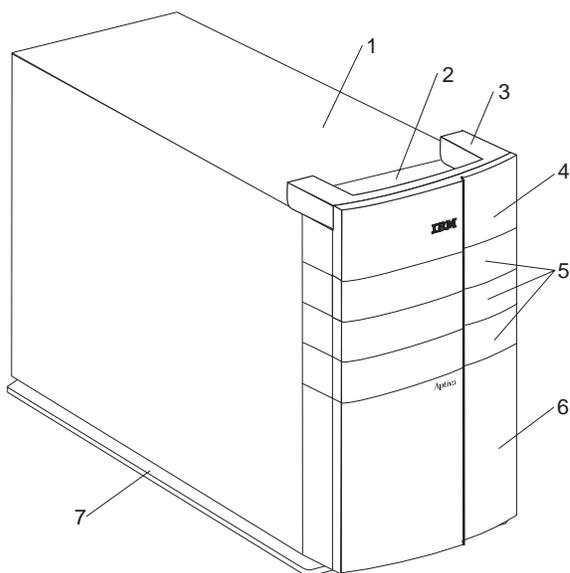
Asm–Index	Part Number	Units	Description
1–1			Top Cover Assembly with Bezel and Handle (Does not include system base—see "Assembly 2: Machine Type 2159 System Unit - Interior (SL-A)" on page 7-4)
–1	76H3641	1	Machine Type 2159 Top Cover
–2	76H3644	1	Front Cover
–3	76H3643	1	Handle
–4	76H3645	1	Bezel,Facade
–5	76H3642	3	Bezel, Blank
–6	76H3646	1	Bezel, Belly
–7	76H1735	1	Pedestal

Assembly 2: Machine Type 2159 System Unit - Interior (SL-A)

Asm–Index	Part Number	Units	Description
2–1			System Boards **Note** SeeAppendix B, "Model/Monitor Configurations and FRU Part Numbers" on page B-1 for model specifications. **All system board FRUs are shipped without processor, cache memory modules, video DRAM modules, or SIMMs**. When replacing a system board, remove all FRUs from the original system board and install them on the new system board.
–1	12H2001	1	System Board
–2	06H8228	1	P54C-133 MHz Processor
–2	06H9892	1	P54C-150 MHz Processor
–2	07H0971	1	P54C-166 MHz Processor
–2	75H9575	1	P54C-200 MHz Processor
–2	42H4865	1	P55C-166 MHz Processor
–2	42H4866	1	P55C-200 MHz Processor
–NS	07H1687	1	Shorting Block
–NS	76H3658	1	Voltage Regulator Block(MMX)
–3	07H1150	1	L2 Cache 256 KB Memory (1 module)
–4	76H1735	1	Pedestal
–5	92G7321	1	SIMM EDO, 8 MB, 72-Pin Non Parity
–5	92G7323	1	SIMM EDO, 16 MB, 72-Pin Non Parity
–6	11H8453	1	Riser Card, (ISA/PCI)
–7	60G2254	1	CD-ROM/Hard Disk Drive Cable
–8	75H8905	1	Diskette Drive Cable (System Unit)
–9	76H1736	1	Access Station Host Card
			For Sound Card, see page7-10 . For Modem Card, see page7-10 .
–10	60G2077	1	Bracket, Riser Card

Assembly 2: (continued)

−11	93F0063	1	Lithium Battery (CR2032)
−NS	41H7820	1	Modem Splitter
−12	06H2973	1	Power Supply (3.3 V dc) (145-W LV/HV Switch-selectable)
−12	55H6630	1	Power Supply (3.3 V dc) (145-W LV/HV Switch-selectable Japan only)
−13	93F0041	1	Packet (Mounting Screws)
−NS	06H1796	2	Processor Fan
−NS	75H8910	1	Interface Cable
−NS	76H1496	1	Audio Cable
−NS	76H4691	1	Stereo Audio Cable
−NS	04H5934	1	Ring Detect Cable

Assembly 3: Diskette and Hard Disk Drives
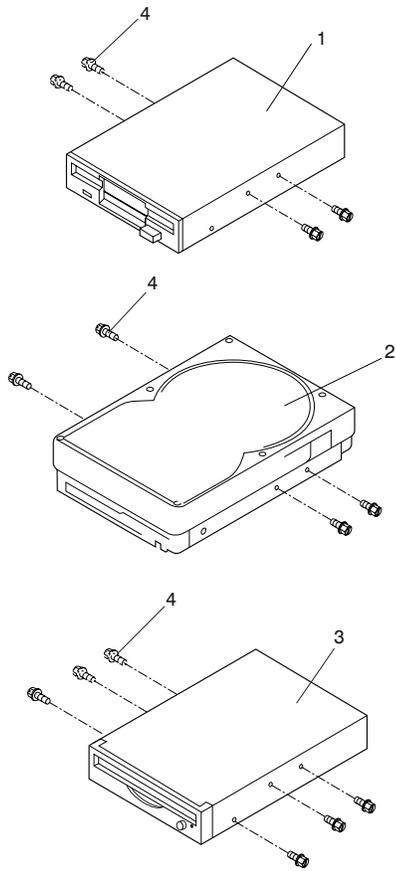
Assembly 3: (continued)

Asm– Index	Part Number	Units	Description
3–1	75H9550	1	3.5-in. 1.44 MB Diskette Drive
–1	75H9552	1	3.5-in. 1.44 MB Diskette Drive (Japan)
–2	07H1122	1	2.0 GB Hard Disk Drive
–2	07H1123	1	2.5 GB Hard Disk Drive
–2	75H8971	1	3.2 GB Hard Disk Drive
			Note
			When referring to hard-disk-drive capacity, MB means 1 000 000 bytes; total user-accessible capacity may vary depending on operating environment.
			When referring to hard-disk-drive capacity, GB means 1 000 000 000 bytes; total user-accessible capacity may vary depending on operating environment.
			Note
			See theAppendix B, "Model/Monitor Configurations and FRU Part Numbers" on page B-1 for model specifications.
–3	76H3226	1	Zip Drive, 100 MB (If Used)
–4	93F0041	1	Packet (Mounting Screws)

Assembly 4: Access Station
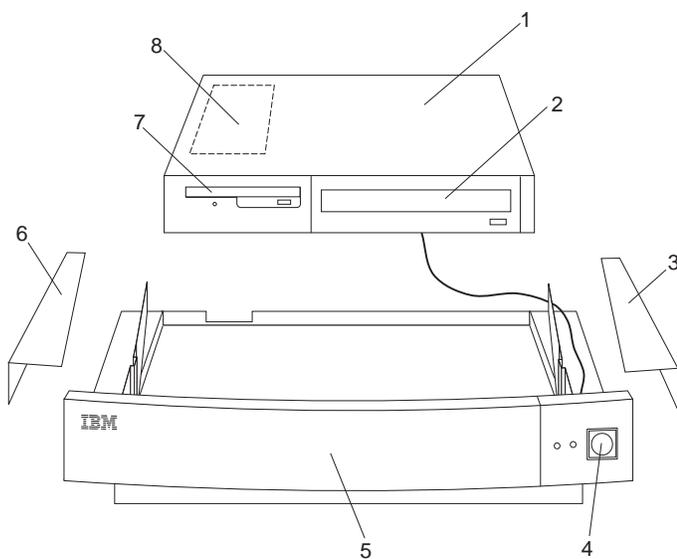
Asm–Index	Part Number	Units	Description
4–NS	76H1729	1	Access Station Assembly
–NS	76H1730	1	Access Station Assembly (Japan)
			Note
			The Access Station is replaced as an assembly in the U.S. Individual parts can be ordered for other countries.
–1	76H1733	1	Access Station Base/Top Covers
–2	76H0479	1	CD-ROM Drive
–3	76H1732	1	Right Wing Cover
–4	76H4738	1	On/Off Switch Assembly
–5	76H1733	1	Access Station Base/Top Covers
–6	76H1731	1	Left Wing Cover
–7	75H9550	1	3.5-in. 1.44 MB Diskette Drive
–7	75H9552	1	3.5-in. 1.44 MB Diskette Drive (Japan)
–8	76H1734	1	Client Card
–NS	60G2254	1	CD-ROM/Hardfile Cable
–NS	76H3649	1	CD-ROM Audio Cable

Assembly 5: MWave, Host, Sound, and Modem Cards
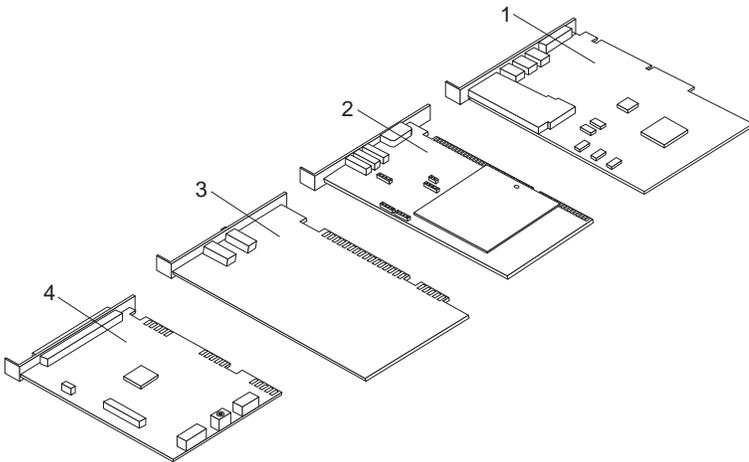
Asm–Index	Part Number	Units	Description
5–1	75H9986	1	MWave Adapter Card
–2	60H6111	1	Sound Card
–3	76H6912	1	33.6 Kbps Modem Card
–3	76H1760	1	33.6 Kbps Modem Card (Japan)
–4	76H1736	1	Access Station Host Card
–NS	76H1616	1	Modem Audio Cable

Assembly 6: Monitor and Power Cord (Linecord)

Asm– Index	Part Number	Units	Description
6–1	60H7538	1	Speaker Grill, 15 Inch
–1	60H7555	1	Speaker Grill, 17 Inch
–2			Monitor (includes I/O cable) EQ = Equatorial NH = Northern hemisphere SH = Southern hemisphere LV = Low Voltage HV = High Voltage UV = Universal Voltage (auto-sense)
			See the Appendix B, "Model/Monitor Configurations and FRU Part Numbers" on page B-1 for model specifications.

			For monitors sold separately from IBM Aptiva system units, see the service information provided with the monitor.
			15-Inch Monitor - Type 7095
			  (13.7-Inch diagonal viewing area)
			   Multimedia Monitor

–2	60H7534	1	- .28, 100/240V 50/60Hz, NH/UV
–2	60H7537	1	- .28, 100/240V 50/60Hz, NH/UV (Japan)

Assembly 6: (continued)

			17-Inch Monitor - Type 7097 **(15.7-Inch diagonal viewing area)** **Multimedia Monitor**
–2	60H7551	1	- .28, 100/240V 50/60Hz, NH/UV
–2	60H7554	1	- .28, 100/240V 50/60Hz, NH/UV (Japan)
–NS	60H7570	1	Swivel 15 Inch
–NS	60H7571	1	Swivel 17 Inch
			Power Cord (linecord) **for monitor and system unit**
–NS	93F2364	1	- U.S.
–NS	93F2364	1	- Canada (English)
–NS	76H1583	1	Monitor Mounting Screws

Assembly 7: Keyboard and Mouse
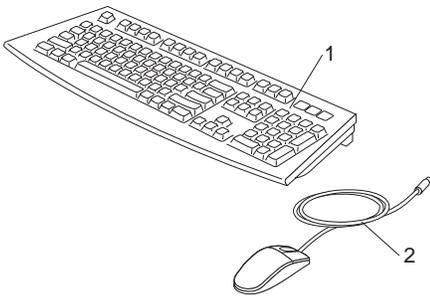
Asm– Index	Part Number	Units	Description
7–1			**Keyboard**
–1	76H0896	1	- U.S. English (104-key)
–1	76H0933	1	- Japan (109-key)
–2	07H0889	1	Mouse
–NS	07H0893	1	Ball and Clip for Mouse
–NS	76H0890	1	Mouse Selector (RF)
–NS	76H0891	1	Mouse Receiver (RF)
–NS	76H0892	1	Ball and Clip for Mouse (RF)
–NS	76H1572	1	Joystick

Assembly 8: Software
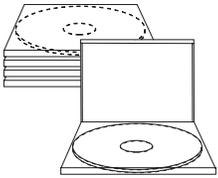
CD-ROM

Asm–Index	Part Number	Units	Description
8–			**Preloaded Software Recovery CD** Aptiva owners will need to call their local IBM HelpCenter to order the preloaded software recovery CD.

Part Number Index

Part Number	Asm–Index	Page	Part Number	Asm–Index	Page
04H5934	2–NS	7-6	75H9986	5–1	7-10
06H1796	2–NS	7-6	76H0479	4–2	7-9
06H2973	2–12	7-6	76H0890	7–NS	7-13
06H8228	2–2	7-5	76H0891	7–NS	7-13
06H9892	2–2	7-5	76H0892	7–NS	7-13
07H0889	7–2	7-13	76H0896	7–1	7-13
07H0893	7–NS	7-13	76H0933	7–1	7-13
07H0971	2–2	7-5	76H1496	2–NS	7-6
07H1122	3–2	7-8	76H1572	7–NS	7-13
07H1123	3–2	7-8	76H1583	6–NS	7-12
07H1150	2–3	7-5	76H1616	5–NS	7-10
07H1687	2–NS	7-5	76H1729	4–NS	7-9
11H8453	2–6	7-5	76H1730	4–NS	7-9
12H2001	2–1	7-5	76H1731	4–6	7-9
41H7820	2–NS	7-6	76H1732	4–3	7-9
42H4865	2–2	7-5	76H1733	4–1	7-9
42H4866	2–2	7-5		4–5	7-9
55H6630	2–12	7-6	76H1734	4–8	7-9
60G2077	2–10	7-5	76H1735	1–7	7-3
60G2254	2–7	7-5		2–4	7-5
	4–NS	7-9	76H1736	2–9	7-5
60H6111	5–2	7-10		5–4	7-10
60H7534	6–2	7-11	76H1760	5–3	7-10
60H7537	6–2	7-11	76H3226	3–3	7-8
60H7538	6–1	7-11	76H3641	1–1	7-3
60H7551	6–2	7-12	76H3642	1–5	7-3
60H7554	6–2	7-12	76H3643	1–3	7-3
60H7555	6–1	7-11	76H3644	1–2	7-3
60H7570	6–NS	7-12	76H3645	1–4	7-3
60H7571	6–NS	7-12	76H3646	1–6	7-3
75H8905	2–8	7-5	76H3649	4–NS	7-9
75H8910	2–NS	7-6	76H3658	2–NS	7-5
75H8971	3–2	7-8	76H4691	2–NS	7-6
75H9550	3–1	7-8	76H4738	4–4	7-9
	4–7	7-9	76H6912	5–3	7-10
75H9552	3–1	7-8	92G7321	2–5	7-5
	4–7	7-9	92G7323	2–5	7-5
75H9575	2–2	7-5	93F0041	2–13	7-6

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Appendix A. Online Support Information

This section describes online technical support services available to help repair the Aptiva computer.

This section covers:

- IBM PC Company Bulletin Board Service (BBS)
- IBM PC Company Fax-Back Service
- IBM Online HelpCenter on Prodigy, America Online, CompuServe
- IBM useful sites on the World Wide Web (WWW)

Online technical support offers convenient and valuable information when you need it. IBM offers support areas on several online services where you can work with IBM technicians for solutions to your questions, download key files, and access database information for the Aptiva computer.

The IBM PC Company offers online resources including several Internet World Wide Web sites, the IBM Online HelpCenter support areas, a Fax-Back service, and a Bulletin Board Service.

The IBM PC Company BBS telephone number is (919) 517-0001. (U.S. and Canada only). The BBS contains a valuable file library with drivers, software updates, product information, and other file updates. To access the BBS, set your modem for **eight data bits, one stop bit, and no parity bit**.

The IBM PC Company Automated Fax-Back System offers a variety of IBM computer-related articles. To access this service, call 800-IBM-3395. The Fax-Back system file library can also be accessed through the PC Company BBS.

Aptiva technical support is offered through the IBM Online HelpCenters on the Prodigy Service, America Online, and through the IBM support forums on CompuServe.

IBM online support areas on all of the services can assist with your technical questions. These areas offer message boards monitored by IBM technicians, databases of computer-related solutions, and file libraries.

World-wide users can access the IBM Aptiva support forums on CompuServe. CompuServe users can use the **Go** word: **APTIVA** to reach the Aptiva support forum. For information about CompuServe, call (800) 848-8990 (U.S. and Canada only).

To reach the IBM Online HelpCenter on Prodigy, use the jumpword: **IBM**. For information about Prodigy, please call (800) 776-3449 (U.S. and Canada only). You can reach the IBM Online HelpCenter on America Online using keyword: **IBM Connection**. For information about America Online, please call (800) 827-6364 (U.S. and Canada only). Prodigy and America Online have limited international availability.

To access the IBM PC Company Internet sites, you will need to acquire Internet access. Please check with your local Internet provider for more information. (Members of Prodigy, AOL, and CompuServe can reach these sites through the Internet capabilities of the services.)

Here are useful IBM Internet addresses for Aptiva information:

http://www.pcco.ibm.com
> IBM PC Company Home Page on the World Wide Web

http://www.pc.ibm.com/aptiva/index.html
> Aptiva Home Page

http://www.pc.ibm.com/aptiva/apmatrix.html
> Aptiva Product Specifications

http://www.pc.ibm.com/files.html
> IBM PC Company Searchable File Library

http://www.pc.ibm.com/answerbk/ansbank.html
> Aptiva-PS/1 Answer Bank -- A database of answers to frequently asked questions.

Appendix B. Model/Monitor Configurations and FRU Part Numbers

The models described in this Appendix are **Machine Type 2159** machines. Only factory-installed parts are listed.

If the machine you are servicing has **Machine Type 2159** on the label, but you cannot find it listed in this appendix, call your local IBM Aptiva Servicer Bulletin Board for updated model information (in the U.S., call 1-919-248-3540).

Table B-2 outlines by model the FRUs that may be ordered by the part number indicated. You can find the Machine Type (2159) and Model (-XXX) on the front of the system unit.

To determine the correct FRU to install, go to the appropriate country table listed below. Then, look across the top of the country table for the FRU you want to replace. The part number to order is listed by model. For descriptions of system boards and parts, see "Parts Catalog" on page 7-1.

For IBM monitors sold separately from IBM Aptiva system units, see Table B-3 on page B-4.

Table	Page
U.S. Machine Type 2159 (**SL-A**)	B-2
Japanese Machine Type 2159 (**SL-A**)	B-3
Monitor-to-FRU Index	B-4

Table B-1. U.S. Machine Type 2159 (Factory-Installed Parts).

Model	System Board	Processor	Memory	Hard Drive	Monitor	CD-ROM	MWave, Sound, Modem	Power Supply	Software
S64	12H2001	07H0971	92G7321	07H1123	N/A	76H0479	75H9986	06H2973	See 7-14.
S66	12H2001	07H0971	92G7321	75H8971	N/A	76H0479	75H9986	06H2973	See 7-14.
S74	12H2001	75H9575	92G7321	07H1123	N/A	76H0479	75H9986	06H2973	See 7-14.
S7H	12H2001	75H9575	92G7321	75H8971	N/A	76H0479	75H9986	06H2973	See 7-14.
S78	12H2001	75H9575	92G7323	75H8971	N/A	76H0479	75H9986	06H2973	See 7-14.
S80	12H2001	42H4865	92G7323	75H8971	N/A	76H0479	60H6111 76H6912	06H2973	See 7-14.
S90	12H2001	42H4866	92G7323	75H8971	N/A	76H0479	60H6111 76H6912	06H2973	See 7-14.

Notes:

1. SXX Models = U.S.A. and Canada-English.
2. N/A = Not included in model.
3. For software, see page 7-14.
4. For monitor frequencies, see Table B-3 on page B-4.

Table B-2. Japan Machine Type 2159 (Factory-Installed Parts)

Model	System Board	Processor	Memory	Hard Drive	Monitor	CD-ROM	Sound, Modem	Power Supply	Software
B60	12H2001	07H0971	92G7321	75H1122	See 7-11.	76H0479	60H6111 76H1760	55H6630	See 7-14.
B65	12H2001	07H0971	92G7321	07H1123	See 7-11.	76H0479	60H6111 76H1760	55H6630	See 7-14.
B75	12H2001	75H9575	92G7321	75H8971	See 7-11.	76H0479	60H6111 76H1760	55H6630	See 7-14.
B85	12H2001	42H4865	92G7323	75H8971	See 7-11.	76H0479	60H6111 76H1760	55H6630	See 7-14.
B95	12H2001	42H4866	92G7323	75H8971	See 7-11.	76H0479	60H6111 76H1760	55H6630	See 7-14.

Notes:

1. N/A = Not included in model.
2. For software, see page 7-14.
3. For monitor frequencies, see Table B-3 on page B-4.

Appendix B. Model/Monitor Configurations and FRU Part Numbers   **B-3**

Table B-3 applies only to monitors sold with **Service Level A** computers.
The monitor part number can be found on the back of the monitor.

See "Assembly 6: Monitor and Power Cord (Linecord)" on page 7-11 for
FRU part numbers.

Table B-3. Monitor-to-FRU Index and Monitor Frequency Settings		
Monitor Part Number	**FRU Number**	**Monitor Frequency (KHz)**
60H7525	60H7534	69.0
60H7529	60H7551	69.0
60H7528	60H7537	69.0
60H7533	60H7554	69.0

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Wake Up on Ring modem
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Wake Up on Ring Mwave
  connector   2-59
Windows 95 software recovery
  package   7-14
world wide web, www   A-1

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