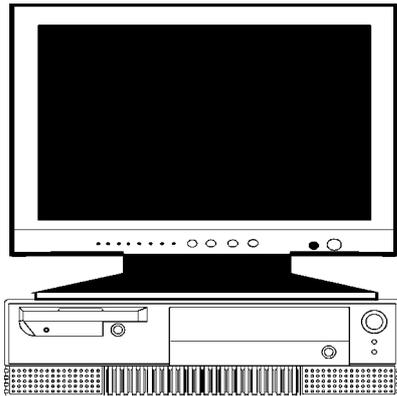


Hardware Maintenance Service for Service Level A

Machine Type 2156



2156
Aptiva

Second Edition (January 1999)

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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:

<u>Voltage Supply Range</u>	<u>Voltage Switch Setting</u>
100-127 V	110 V
200-240 V	220 V

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.

Safety Information



DANGER

To avoid a shock hazard, do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.

To avoid shock hazard:

The power cord must be connected to a properly wired and earthed receptacle.

Any equipment to which this product will be attached must also be connected to properly wired receptacles.

When possible, use one hand to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.

Electrical current from power, telephone, and communications cables is hazardous. To avoid shock hazard, connect and disconnect cables as described following when installing, moving, or opening covers of this product or attached devices.

To Connect	To Disconnect
1. Turn Everything OFF.	1. Turn Everything OFF.
2. First, attach all cables to devices.	2. First, remove power cord(s) from outlet
3. Attach signal cables to receptacles.	3. Remove signal cables from receptacles.
4. Attach power cord(s) to outlet.	4. Remove all cables from devices.
5. Turn device ON	



Caution:

When replacing the battery, use only IBM Part Number 36L9077 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

Throw or immerse into water
Heat to more than 100°C (212°F)
Repair or disassemble

Dispose of the battery as required by local ordinances or regulations.



Caution:

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

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

Removing the covers of the CD-ROM drive could result in exposure to hazardous laser radiation. There are no serviceable parts inside the CD-ROM drive. Do not remove the CD-ROM drive covers.

DANGER

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

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.



Caution:

Electrical current from power, telephone, and communication cables can be hazardous. To avoid personal injury or equipment damage, disconnect the attached power cords, telecommunications systems, networks, and modems before you open the server covers, unless instructed otherwise in the installation and configuration procedures.



PERIGO

Para evitar choques elétricos, não conecte ou desconecte nenhum cabo, nem efetue instalação, manutenção ou reconfiguração deste produto durante uma tempestade com raios.

Para evitar choques elétricos:

- O cabo de alimentação deve ser conectado a um receptáculo corretamente instalado e aterrado.**
- Todos os equipamentos aos quais este produto será conectado devem também ser conectados a receptáculos corretamente instalados.**

Quando possível, utilize uma das mãos para conectar ou desconectar cabos de sinal, para evitar um possível choque ao tocar duas superfícies com potenciais elétricos diferentes.

A corrente elétrica proveniente de cabos de alimentação, de telefone e de comunicação é perigosa. Para evitar choques elétricos, conecte e desconecte os cabos conforme descrito a seguir, ao instalar, movimentar ou abrir tampas deste produto ou de dispositivos conectados.

Para Conectar	Para Desconectar
1. DESLIGUE tudo.	1. DESLIGUE tudo.
2. Conecte primeiro todos os cabos nos dispositivos.	2. Remova primeiro o(s) cabo(s) de alimentação das tomadas.
3. Conecte os cabos de sinal nos receptáculos.	3. Remova os cabos de sinal dos receptáculos.
4. Conecte o(s) cabo(s) de alimentação nas tomadas.	4. Remova todos os cabos dos dispositivos.
5. LIGUE o dispositivo.	



cuidado:

Ao substituir a bateria, utilize apenas o Número de Peça IBM 33F8354 ou um tipo de bateria equivalente recomendado pelo fabricante. Se seu sistema possuir um módulo com uma bateria de lítio, substitua-o apenas pelo mesmo tipo de módulo, produzido pelo mesmo fabricante. A bateria contém lítio e pode explodir se não for utilizada, manuseada e descartada de forma adequada.

Não:

Jogue ou coloque na água

Aqueça a mais de 100°C (212°F)

Conserte nem desmonte.

Descarte a bateria conforme requerido pelas disposições e regulamentações locais.



cuidado:

Quando uma unidade de CD-ROM estiver instalada, observe o seguinte.

A utilização de controles ou ajustes ou a execução de procedimentos diferentes daqueles especificados nesta publicação pode resultar em exposição perigosa à radiação.

A remoção das tampas da unidade de CD-ROM pode resultar em exposição a radiação perigosa de laser. Não existem peças que possam ser consertadas no interior da unidade de CD-ROM. Não remova as tampas da unidade de CD-ROM.

PERIGO

Algumas unidades de CD-ROM contém um diodo de laser da Classe 3A ou da Classe 3B. Observe o seguinte.

Radiação de laser quando aberto. Não olhe diretamente para o feixe de laser, não olhe diretamente com instrumentos óticos, e evite exposição direta ao raio.

**cuidado:**

A corrente elétrica proveniente de cabos de alimentação, de telefone e de comunicação é perigosa. Para evitar ferimentos pessoais ou danos aos equipamentos, desconecte os cabos de alimentação, sistemas de telecomunicação, redes e modems antes de abrir as tampas do servidor, a menos que receba outras instruções nos procedimentos de instalação e configuração.

声明 1



危险!

为避免电击危险，请不要在暴风雨期间连接或断开任何电缆，或是进行此产品的安装、维护或重新配置操作。

为避免电击危险：

- 电源线必须连接到适当的电线及接地插座。
- 此产品将要连接的所有设备也必须连接到正确接线的插座上。

如果可能，请使用一只手连接或断开连接信号电缆，以避免在接触两个具有不同电势的表面时遭到电击。

电源线、电话线以及通信电缆中的电流非常危险。为避免电击，请在安装、移动或打开本产品或连接设备的外盖时，按照下述步骤连接或断开电缆。

要连接电缆

1. 关闭所有设备。
2. 首先将所有电缆与设备连接。
3. 将信号线连接到插座。
4. 将电源线连接到电源插座。
5. 打开设备。

要断开电缆

1. 关闭所有设备。
2. 首先从电源插座拔下电源线。
3. 从插座拔下信号电缆。
4. 从设备上拔下所有电缆。

声明 2



注意！

当更换电池时，仅可使用 IBM 部件号为 33F8354 的产品或由制造商推荐的同等电池。如果系统中有包含锂电池的模块，则只能使用由相同制造商制造的相同类型模块更换。该电池含有锂，如果使用、操作或处理不当会发生爆炸。

不要：

- 将其投入或浸于水中
- 加热超过100°C (212°F)
- 修理或拆卸

应按照当地法规和条例对此电池进行处理。

声明 3



注意！

在已安装 CD-ROM 驱动器的情况下，请注意下面的内容。

不遵循此处指定的控制、调整、或操作过程的操作将可能导致危险的辐射泄漏。

取下 CD-ROM 驱动器的外盖会导致危险的激光辐射泄漏。CD-ROM 驱动器内没有可以使用的部件。请不要取下 CD-ROM 驱动器的外盖。

声明 4

危险！

一些 CD-ROM 驱动器中包含内置的 3A 类或 3B 类激光二极管。
请注意下述内容。

打开驱动器会产生激光辐射。请不要凝视激光束，请不要使用光学仪器直接观看激光束，同时也要避免人体直接暴露在激光束下。

声明 10



注意！

电源线、电话线以及通信电缆中的电流非常危险。为避免人身伤害或设备损坏，除非在安装和配置过程中特别指明，请在打开服务器外盖前断开已连接的全部电源线、电信系统、网络及调制解调器。

• 聲明 1



危險

為了避免雷擊，在閃電期間，請勿連接或拔掉本裝置上的任何電纜線，或請勿安裝、維修或重新架構本產品。

為了避免雷擊：

- 電源線必須連接到接線及接地正確的插座。
- 本產品所連接的設備也必須連接到接線正確的插座。

儘可能使用單手來連接或拔掉信號電纜，以避免因接觸兩不同電位的平面，而受到電擊。

電源、電話及通信電纜上均有電流通過。為了避免電擊，在安裝、移動本產品，或開啓本產品的蓋子或與本產品連接之裝置的蓋子時，請依照下列「連接」及「拔掉」電纜線的步驟操作。

連接

1. 關掉所有開關。
2. 首先，將所有電纜線連接到裝置。
3. 將信號電纜連接到信號插座。
4. 將電源線連接到電源插座。
5. 開啓裝置電源。

拔掉

1. 關掉所有開關。
2. 首先，自電源插座拔掉電源線。
3. 拔掉信號插座上的所有信號電纜。
4. 拔掉裝置上的所有電纜線。

• 聲明 2



注意：

更換電池時，只可使用 IBM 零件編號 33F8354 的電池，或廠商建議的相當類型的電池。如您系統中的模組含有鋰電池，更換時，請使用相同廠商製造的相同模組類型。如未正常使用、處理或捨棄含有鋰的電池時，可能會造成爆炸。

嚴禁：

- 丟入或浸入水中
- 加熱超過攝氏100度（華氏 212 度）
- 修補或拆解

處理廢棄電池時，請遵照當地法令規章處理。

• 聲明 3



注意：
安裝光碟機時，請注意下列事項：

不依此處所指示的控制、調整或處理步驟，恐有遭致輻射之虞。

移開光碟機蓋子，恐有遭致雷射輻射之虞。光碟機中沒有需要維修的部分。請勿移開光碟機的蓋子。

• 聲明 4



危險

光碟機含有內嵌式 Class 3A 或 Class 3B 雷射二極體時，請注意下列事項：

開啓時會產生雷射輻射。請勿凝視光束，不要使用光學儀器直接觀察，且應避免直接暴露在光束下。

• 聲明 10



注意：
電源、電話及通信電纜上均有電流通過。在安裝及架構之時，若非專家指導，為了避免人員受傷、設備受損，在開啓伺服器蓋子之前，請切斷電源線、電信系統、網路及數據機。



PERIGO

Pour éviter tout risque de choc électrique, ne manipulez aucun câble et n'effectuez aucune opération d'installation, d'entretien ou de reconfiguration de ce produit au cours d'un orage.

Pour éviter tout risque de choc électrique :

Les cordons d'alimentation du présent produit et de tous les appareils qui lui sont connectés doivent être branchés sur des socles de prise de courant correctement câblés et mis à la terre.

Afin d'éviter tout risque de choc électrique provenant d'une différence de potentiel de terre, n'utilisez qu'une main, lorsque cela est possible, pour connecter ou déconnecter les cordons d'interface.

Le courant électrique passant dans les câbles de communication, ou les cordons téléphoniques et d'alimentation peut être dangereux. Pour éviter tout risque de choc électrique, lorsque vous installez ou que vous déplacez le présent produit ou des périphériques qui lui sont raccordés, reportez-vous aux instructions ci-dessous pour connecter et déconnecter les différents cordons.

Connexion	Déconnexion
1. Mettez les unités hors tension.	1. Mettez les unités hors tension.
2. Commencez par brancher tous les cordons sur les unités.	2. Commencez pas débrancher les cordons alimentation des socles de prise de courant.
3. Branchez les câbles d'interface sur les prises.	3. Débranchez les câbles d'interface des prises.
4. Branchez les cordons d'alimentation sur un socle de prise de courant.	4. Débranchez tous les câbles des unités.
5. Mettez les unités sous tension.	



attention:

Remplacez la pile usagée par une pile de référence identique exclusivement - voir la référence IBM - ou par une pile équivalente recommandée par le fabricant. Si votre système est doté d'un module contenant une pile au lithium, vous devez le remplacer uniquement par un module identique, produit par le même fabricant. La pile contient du lithium et présente donc un risque d'explosion en cas de mauvaise manipulation ou utilisation.

Ne la jetez pas à l'eau.

Ne l'exposez pas à une température supérieure à 100°C.

Ne cherchez pas à la réparer ou à la démonter.

Pour la mise au rebut, reportez-vous à la réglementation en vigueur.



attention:

Si une unité de CD-ROM est installée, prenez connaissance des informations suivantes :

Pour éviter tout risque d'exposition au rayon laser, respectez les consignes de réglage et d'utilisation des commandes, ainsi que les procédures décrites dans le présent document.

Pour éviter une exposition directe au rayon laser, n'ouvrez pas l'unité de CD-ROM. Vous ne pouvez effectuer aucune opération de maintenance à l'intérieur.

PERIGO

Certains unités de CD-ROM contiennent une diode laser de classe 3A ou 3B. Prenez connaissance des informations suivantes :

Rayonnement laser lorsque le carter est ouvert. Évitez de regarder fixement le faisceau ou de l'observer à l'aide d'instruments optiques. Évitez une exposition directe au rayon.

attention:

Ce produit pèse un poids considérable. Faites-vous aider pour le soulever.



attention:

Le courant électrique circulant dans les câbles de communication et les cordons téléphoniques et d'alimentation peut être dangereux. Pour votre sécurité et celle de l'équipement, avant de retirer les carters du serveur, mettez celui-ci hors tension et déconnectez ses cordons d'alimentation, ainsi que les câbles qui le relient aux réseaux, aux systèmes de télécommunication et aux modems (sauf instruction contraire mentionnée dans les procédures d'installation et de configuration).



VORSICHT

Aus Sicherheitsgründen bei Gewitter an diesem Gerät keine Kabel anschließen oder lösen. Ferner keine Installations-, Wartungs- oder Rekonfigurationsarbeiten durchführen.

Aus Sicherheitsgründen:

Gerät nur an eine Schutzkontaktsteckdose mit ordnungsgemäß geerdetem Schutzkontakt anschließen.

Alle angeschlossenen Geräte ebenfalls an Schutzkontaktsteckdosen mit ordnungsgemäß geerdetem Schutzkontakt anschließen.

Signalkabel möglichst einhändig anschließen oder lösen, um einen Stromschlag durch Berühren von Oberflächen mit unterschiedlichem elektrischem Potential zu vermeiden.

Elektrische Spannungen von Netz-, Telefon- und Datenübertragungsleitungen sind gefährlich. Um einen Stromschlag zu vermeiden, nur nach den Anweisungen arbeiten, die für Installation, Transport oder Öffnen von Gehäusen dieses Produkts oder angeschlossenen Einheiten gelten.

Kabel anschließen	Kabel lösen
<ol style="list-style-type: none"> 1. Alle Geräte ausschalten und Netzstecker ziehen. 2. Zuerst alle Kabel an Einheiten anschließen. 3. Signalkabel an Anschlußbuchsen anschließen. 4. Netzstecker an Steckdose anschließen. 5. Gerät einschalten. 	<ol style="list-style-type: none"> 1. Alle Geräte ausschalten. 2. Zuerst Netzstecker von Steckdose lösen. 3. Signalkabel von Anschlußbuchsen lösen. 4. Alle Kabel von Einheiten lösen.



achtung:

Eine verbrauchte Batterie nur durch eine Batterie mit der IBM Teilenummer 33F8354 oder durch eine vom Hersteller empfohlene Batterie ersetzen. Wenn Ihr System ein Modul mit einer Lithium-Batterie enthält, ersetzen Sie es immer mit dem selben Modultyp vom selben Hersteller. Die Batterie enthält Lithium und kann bei unsachgemäßer Verwendung, Handhabung oder Entsorgung explodieren.

Die Batterie nicht

- mit Wasser in Berührung bringen.
- über 100 C erhitzen.
- reparieren oder zerlegen.

Die örtlichen Bestimmungen für die Entsorgung von Sondermüll beachten.



achtung:

Wenn ein CD-ROM-Laufwerk installiert ist, beachten Sie folgendes. Steuer- und Einstellelemente sowie Verfahren nur entsprechend den Anweisungen im vorliegenden Handbuch einsetzen. Andernfalls kann gefährliche Laserstrahlung auftreten.

Das Entfernen der Abdeckungen des CD-ROM-Laufwerks kann zu gefährlicher Laserstrahlung führen. Es befinden sich keine Teile innerhalb des CD-ROM-Laufwerks, die vom Benutzer gewartet werden müssen. Die Verkleidung des CD-ROM-Laufwerks nicht öffnen.

VORSICHT

Manche CD-ROM-Laufwerke enthalten eine eingebaute Laserdiode der Klasse 3A oder 3B. Die nachfolgend aufgeführten Punkte beachten.

Laserstrahlung bei geöffneter Tür. Niemals direkt in den Laserstrahl sehen, nicht direkt mit optischen Instrumenten betrachten und den Strahlungsbereich meiden.



≥32 Kg

≥55Kg

achtung:

Beim Anheben der Maschine die vorgeschriebenen Sicherheitsbestimmungen beachten.



achtung:

An Netz-, Telefon- und Datenleitungen können gefährliche elektrische Spannungen anliegen. Um eine Gefährdung des Benutzers oder Beschädigung des Geräts zu vermeiden, ist der Server auszuschalten. Die Verbindung zu den angeschlossenen Netzkabeln, Telekommunikationssystemen, Netzwerken und Modems ist vor dem Öffnen des Servergehäuses zu unterbrechen (sofern in Installations- und Konfigurationsanweisungen nicht anders angegeben).



PERICOLO

Per evitare il pericolo di scosse elettriche durante i temporali, non collegare o scollegare cavi, non effettuare l'installazione, la manutenzione o la riconfigurazione di questo prodotto.

Per evitare il pericolo di scosse elettriche:

collegare il cavo di alimentazione ad una presa elettrica correttamente cablata e munita di terra di sicurezza;

collegare qualsiasi apparecchiatura collegata a questo prodotto ad una presa elettrica correttamente cablata e munita di terra di sicurezza.

Quando possibile, collegare o scollegare i cavi di segnale con una sola mano per evitare il rischio di scosse derivanti dal contatto con due superfici a diverso potenziale elettrico.

La corrente elettrica circolante nei cavi di alimentazione, del telefono e di segnale è pericolosa. Per evitare scosse elettriche, collegare e scollegare i cavi come descritto quando si effettuano l'installazione, la rimozione o l'apertura dei coperchi di questo prodotto o durante il collegamento delle unità.

Per collegare	Per scollegare
1. SPEGNERE tutti i dispositivi.	1. SPEGNERE tutti i dispositivi.
2. Collegare prima tutti i cavi alle unità.	2. Rimuovere prima il(i) cavo(i) di alimentazione dalla presa elettrica.
3. Collegare i cavi di segnale alle prese.	3. Rimuovere i cavi di segnale dalle prese.
4. Collegare il(i) cavo(i) di alimentazione alla presa elettrica.	4. Rimuovere tutti i cavi dalle unità.
5. ACCENDERE le unità.	



ATTENZIONE:

Quando si sostituisce la batteria, utilizzare solo una batteria IBM o batterie dello stesso tipo o di tipo equivalente consigliate dal produttore. Se il sistema di cui si dispone è provvisto di un modulo contenente una batteria al litio, sostituire tale batteria solo con un tipo di modulo uguale a quello fornito dal produttore. La batteria contiene litio e può esplodere se utilizzata, maneggiata o smaltita impropriamente.

Evitare di:

- Gettarla o immergerla in acqua
- Riscaldarla ad una temperatura superiore ai 100°C
- Cercare di ripararla o smaltirla

Smaltire secondo la normativa in vigore (D.Lgs 22 del 5/2/97) e successive disposizioni nazionali e locali.



ATTENZIONE:

Quando è installata un'unità CD-ROM, notare quanto segue:

L'utilizzo di controlli, regolazioni o l'esecuzione di procedure non descritti nel presente manuale possono provocare l'esposizione a radiazioni pericolose.

L'apertura di un'unità CD-ROM può determinare l'esposizione a radiazioni laser pericolose. All'interno dell'unità CD-ROM non vi sono parti su cui effettuare l'assistenza tecnica. Non rimuovere i coperchi dell'unità CD-ROM.

PERICOLO

Alcune unità CD-ROM contengono all'interno un diodo laser di Classe 3A o Classe 3B. Prestare attenzione a quanto segue:

Aperto l'unità vengono emesse radiazioni laser. Non fissare il fascio, non guardarlo direttamente con strumenti ottici ed evitare l'esposizione diretta al fascio.



≥32 Kg

≥55Kg

ATTENZIONE:

Durante il sollevamento della macchina seguire delle norme di di sicurezza.



ATTENZIONE:

La corrente circolante nei cavi di alimentazione, del telefono e di segnale è pericolosa. Per evitare situazioni pericolose per le persone o danneggiamenti all'apparecchiatura, scollegare i cavi di alimentazione, i sistemi di telecomunicazioni, le reti e ed i modem prima di aprire i coperchi del server se non diversamente indicato nelle procedure di installazione e configurazione.

경고문 1



위험

전기 충격을 피하려면 날씨가 나쁠 때(예: 눈 또는 비가 오거나 천둥 번개가 칠 때)는 케이블을 연결하거나 끊지 않도록 하고 이 제품의 설치, 유지보수 또는 재구성 등의 작업을 수행하지 않도록 하십시오.

전기 충격을 피하려면 다음과 같아야 합니다.

- 고압선은 적절한 배선 및 접지 상태의 콘센트로 연결되어야 합니다.
- 이 제품이 접속될 모든 장비도 적절한 배서 상태의 콘센트로 연결되어야 합니다.

다른 전위를 가진 두 표면을 만졌을 때 발생할 수 있는 전기 충격을 피하려면 한 손으로 신호선을 연결하거나 끊으십시오.

전원, 전화 및 통신 케이블로부터 흘러 나오는 전류는 위험합니다. 전기 충격을 피하려면 이 제품이나 접속 장치를 설치, 이동 및 덮개를 열 때 다음 설명에 따라 케이블을 연결하고 끊도록 하십시오.

연결하려면

1. 모든 스위치를 켜다.
2. 먼저 모든 케이블을 장치에 연결한다.
3. 신호선을 콘센트에 연결한다.
4. 전원을 콘센트에 연결한다.
5. 장치 스위치를 켜다.

연결해제하려면

1. 모든 스위치를 끈다.
2. 먼저 모든 케이블을 장치에 제거한다.
3. 신호선을 콘센트에서 제거한다.
4. 장치에서 모든 케이블을 제거한다.

경고문 2



주의:

배터리를 교체할 때는 IBM 부품 번호 &PN. 또는 제조업체에서 추천하는 동등한 유형의 배터리를 사용하십시오. 시스템에 리튬 배터리를 포함하는 모듈이 있으면 이것은 동일한 제조업체에서 생산된 동일한 모듈 유형으로만 교체하십시오. 배터리에 리튬이 포함되어 있으므로 제대로 사용, 처리 또는 처분하지 않으면 폭발할 수 있습니다.

다음은 주의하십시오.

- 던지거나 물에 담그지 않도록 하십시오.
- 100°C(212°F) 이상으로 가열하지 않도록 하십시오.
- 수리하거나 분해하지 않도록 하십시오.

지역 법령이나 규정의 요구에 따라 배터리를 처분하십시오.
경고문 3



주의:

CD-ROM 드라이브가 설치되어 있으면 다음 사항을 명심하십시오.

여기에서 지정하지 않은 방식으로 CD-ROM 드라이브를 제어 또는 조절하거나 다른 절차로 사용하면 위험한 방사능 노출이 발생할 수 있습니다.

CD-ROM 드라이브의 덮개를 제거하면 위험한 레이저 방사능이 노출될 수 있습니다.

CD-ROM 드라이브 내에는 정비할 수 있는 부품이 없습니다. CD-ROM 드라이브 덮개를 제거하지 않도록 하십시오.

경고문 4

위험

일부 CD-ROM 드라이브에는 클래스 3A 또는 3B 레이저 2극 진공관(다이오드)이 들어 있습니다. 다음 사항을 명심하십시오.

열면 레이저 방사능이 노출됩니다. 광선을 주시하거나 광학 기계를 직접 쳐다보지 않도록 하고 광선에 노출되지 않도록 하십시오.

경고문 5



32kg(70.5 파운드)



55kg(121.2 파운드)

주의:

기계를 들 때는 안전하게 들어 올리십시오.
경고문 10



주의:

전원, 전화 및 통신 케이블로부터 흘러 나오는 전류는 위험합니다. 설치 및 구성 절차에 다른 지시가 없으면, 다치거나 장비 손상이 생기지 않게 하기 위해 서버 덮개를 열기 전에 접속된 전선, 원격 통신 시스템, 네트워크 및 모뎀의 연결을 끊으십시오.



PELIGRO

Para evitar una posible descarga eléctrica, no conecte ni desconecte los cables ni lleve a cabo ninguna operación de instalación, de mantenimiento o de reconfiguración de este producto durante una tormenta eléctrica.

Para evitar una posible descarga:

El cable de alimentación debe conectarse a un receptáculo con una instalación eléctrica correcta y con toma de tierra.

Los aparatos a los que se conecte este producto también deben estar conectados a receptáculos con la debida instalación eléctrica.

Cuando sea posible, utilice una sola mano para conectar o desconectar los cables de señal a fin de evitar una posible descarga al tocar dos superficies con distinto potencial eléctrico.

La corriente eléctrica de los cables de comunicaciones, teléfono y alimentación puede resultar peligrosa. Para evitar una posible descarga, siga las indicaciones de conexión y desconexión de los cables siempre que tenga que instalar, mover o abrir las cubiertas de este producto o de los dispositivos acoplados.

Instrucciones de conexión	Instrucciones de desconexión
<ol style="list-style-type: none">1. Apague todos los componentes (OFF).2. En primer lugar, conecte todos los cables a los dispositivos.3. Conecte los cables de señal a los receptáculos.4. Conecte los cables de alimentación a las tomas.5. Encienda el dispositivo (ON).	<ol style="list-style-type: none">1. Encienda todos los componentes (ON).2. En primer lugar, retire los cables de alimentación de las tomas.3. Retire los cables de señal de los receptáculos.4. Retire todos los cables de los dispositivos.



caution:

Al cambiar la batería, utilice únicamente la batería IBM Número de pieza 33F8354 o un tipo de batería equivalente recomendado por el fabricante. Si el sistema tiene un módulo que contiene una batería de litio, sustitúyalo únicamente por el mismo tipo de módulo del mismo fabricante. La batería contiene litio y puede explotar si no se utiliza, manipula o desecha correctamente.

Lo que no debe hacer

- Tirar o sumergir el producto en agua.
- Exponer el producto a una temperatura superior a 100°C.
- Reparar o desmontar el producto.

Cuando quiera desechar la batería, siga las disposiciones y reglamentaciones locales.



caution:

Cuando instale una unidad de CD-ROM, tenga en cuenta la siguiente información.

Si se llevan a cabo controles o ajustes o se utilizan métodos que no se atengan a lo aquí especificado, se puede producir una exposición peligrosa a las radiaciones.

Si se retiran las cubiertas de la unidad de CD-ROM, se puede producir una peligrosa exposición a radiaciones de láser. Dentro de la unidad de CD-ROM no existen piezas reparables. No retire las cubiertas de la unidad de CD-ROM.

PELIGRO

Algunas unidades de CD-ROM tienen incorporado un diodo de láser de Clase 3A o de Clase 3B. Tenga en cuenta la siguiente información.

Cuando la unidad está abierta se generan emisiones de rayos láser. No dirija la mirada al haz, no lo observe directamente con instrumentos ópticos y evite la exposición directa.



caution:

Alce la máquina con cuidado; el sobrepeso podría causar alguna lesión.



caution:

La corriente eléctrica de los cables de comunicaciones, de teléfono y de alimentación puede resultar peligrosa. Para evitar posibles lesiones o daños del aparato, desconecte los cables de alimentación, los sistemas de telecomunicaciones, las redes y los módems antes de abrir las cubiertas del servidor, salvo que se indique lo contrario en las instrucciones de las operaciones de instalación y configuración.

Laser Compliance Statement

The CD/DVD-ROM drive in the computer is a laser product. The CD/DVD-ROM drive's classification label (sample shown below) is located on the drive.



The CD/DVD-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. In other countries, the drive is certified to conform to the requirements of EN60825.

Class 1 laser products are not considered to be hazardous. The CD/DVD-ROM drive has an internal Class 1, 0.5-milliwatt, aluminum gallium-arsenide laser that operates at a wavelength of 760 to 810 nanometers. The design of the laser system and the CD/DVD-ROM drive ensures that there is no exposure to laser radiation above a Class 1 level during normal operation, user maintenance, or servicing conditions.

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AT	Personal System/2
HelpCenter	PS/1
IBM	PS/2
Operating System/2	

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Preface

This manual contains service information for the **2156 Service Level A (SL-A)** model of the IBM Aptiva Personal Computer, worldwide.

This manual is intended to be used as a stand-alone document to service Aptiva machine type 2156 product. It is divided into the following chapters:

Notices contains important safety information and notices required to service this computer.

General Information contains a brief description of this manual.

Check Procedures provide step-by-step instructions that aid in locating the failure Field Replaceable Unit (FRU).

Diagnostic Aids explain how to use the diagnostics tools for isolating failures.

Repairing Information contains illustrations and descriptions to disassemble and reassemble the computer.

Parts/Test Point Locations contains illustrations and descriptions of the locations of the major parts, jumpers, 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, FRU Number Index contains part numbers listed in numerical order.

Appendix B, Online Support Information contains online support information.

Index contains specific terms and words in alphabetical order.

General Information

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Introduction

This chapter gives a general overview of the Aptiva Machine Type 2156, describes the standard and optional features, and details functional and environmental specifications.

Product Overview

Machine Type 2156 contains one PCI slot and one shared PCI/ISA slot, and the system board supports the IBM processor.

Listed below are 2156 system features:

Processors (Machine Type 2156)

- Processor with the capabilities of MMX™ technology
- Socket-7 Zero Insertion Force (ZIF) connector. You must remove the old processor to install an upgrade processor.
- Detachable CPU heat sink with fan.
- One of the following processors can be installed:
 - AMD K6®-2/333 Processor with 3DNOW! Technology

Memory

- 512-KB Pipeline Burst Static RAM (PBSRAM). Fixed onboard.
- 168-pin synchronous dynamic random access memory (SDRAM), dual inline memory module (DIMM) sockets.
 - 2 memory sockets.
 - 16-MB, 32-MB, 64-MB or 128-MB DIMM.
 - Maximum memory is 256MB.

External Ports

- Video port (15-pin D-sub connector)
- Parallel port (25-pin D-sub connector)
- Serial port (9-pin D-sub connector)
- Game/MIDI port (15-pin D-sub connector)
- Keyboard port (6-pin PS/2 mini-din connector)
- Mouse port (6-pin PS/2 mini-din connector)
- Two USB ports
- Microphone-in jack
- Speaker-out jack
- Line-in jack

Diskette Drive

- AT-type
- 3.5-in. 1.44MB slimline diskette drive.

Hard Disk Drive

- 3.5-in., 1-in. height IDE AT drive.
- 128 KB cache buffer in hard disk drive.
- Average and minimum 11.1 ms seek time, access time varies for the hard disk drive and the hard disk drive manufacturer.

CD-ROM Drive

- 5.25-in. high-performance, 32X CD-ROM IDE/AT drive.
- Read data and play audio from standard and mini CD-ROM and audio compact discs (audio CDs).

Multimedia

- One pair of internal speakers.

Power Management

- Compliant to ACPI and supports display power management signaling (DPMS) monitor.
- Software shutdown by Windows 98.
- System enters standby mode if any of following conditions are met:
 - Execute standby from the Windows 98 Start menu
 - Press system power button if it is set to act as standby function. See "Power Management Mode" on page 1-15.
 - Standby timer set in the Windows 98 power utility timer elapses without system activity.
- Monitor enters standby mode if:
 - Windows 98 power utility timer elapses
 - System sleep timer elapses

Power Supply

- 92.85-watt switchable high/low voltage power supply.
- Standard ATX power supply with +5V standby power

Internal Cabling

- Two 40-pin ribbon cables for hard disk drive and CD-ROM drive.
- One 34-pin ribbon cable for AT diskette drive.
- One 4-pin (2-wire) cable for hard disk drive light-emitting diode (LED).
- One 3-pin (3-wire) cable for power light-emitting diode (LED).
- One 2-pin (2-wire) cable for power switch.
- One 16-pin game port cable.

Modem

- 56.6 Kbps PCI plug and play modem adapter card with data/fax features.
- Telephone line-out (RJ-11) connector.
- Telephone line-in (RJ-11) connector.

Monitor

- Super video graphics array (SVGA) monitor.
- Compliant to VESA power saving mode.
- Connector for a detachable grounded 3-wire power cord.
- 1.8-m (5.8-ft) attached signal cable.
- Auto-sensing power input for 100 VAC to 240 VAC.

Keyboard

- PS/2 104-key rubber dome IBM PS/2 Compatible Keyboard with 1.8-m (5.8-ft) cable.

Mouse

- 2 button Sleek PS/2 mouse with 1.8-m (5.8-ft) cable.

Hardware Interfaces

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

Item	Interface
Expansion slot for I/O adapter cards	Two PCI (peripheral component interconnect) v2.1 compatible expansion slots that operates at 33 MHz bus speed One IBM AT-ISA Plug and Play compatible expansion slots that operates at 8 MHz bus speed. Note: 1 PCI/1ISA slot share and 1 PCI independent slot
Hard Disk Drives	Two PCI local bus Enhanced IDE v1.0 compatible hard disk drive interfaces that support PIO mode up to mode 4, DMA 32-bit access up to mode 2 and Ultra 33 Synchronous DMA up to mode 2 (33M bytes/sec).
CD/DVD-ROM Drive	5.25-in. high-performance, thirty two-speed (32X) CD-ROM IDE/AT drive Support Bootable CD-ROM Format specification version 1.0. Compliant to Audio-CD, Video-CD, CD-ROM/XA, Karaoke-CD, and Photo-CD (both single and multi-session) format.
Diskette Drive	AT diskette interface
Video	Physical interface is compatible with the IBM Personal System/2 (PS/2) VGA interface. SiS5598 VGA on board.
Modem	One 56.6 Kbps PCI plug and play modem adapter card with data/fax features.
Audio	CS4280 Audio Controller is compatible with Sound Blaster (Creative Labs, Inc.) and CS4297-KQ Codec chip onboard.
Pointing device	IBM PS/2-compatible mouse
Keyboard device	IBM PS/2-compatible keyboard
Serial port	9-pin connector with RS232D electrical interface
Parallel port	Supports SPP (IBM PC/AT, PS/2) compatible, EPP (IEEE 1284 compliance), ECP (IEEE 1284 compliance) interface.

Table 1-1 System Board Hardware Interfaces	
Item	Interface
Game port	Game port interface for joystick. It also supports MIDI.
USB	USB controller integrated in SiS5598.

CMOS Reset

This system does not deny access to BIOS Setup Utility. Execute "Load BIOS Default Settings" in BIOS Setup to clear the corrupted CMOS data. See "Loading the Default Settings" on page 1-11.

Flash (BIOS) Update Procedure

NOTE: The flash update procedure does not change the model number and serial number information in BIOS.

1. Prepare a bootable DOS diskette with AWDFLASH.EXE and VXXYYZZ.BIN files

NOTE: The AWDFLASH.EXE is flash utility programs. The VXXYYZZ.BIN is a BIOS source code binary file.

2. Insert the diskette and boot from drive A.

WARNING: Do not boot with any memory related driver such as HIMEM.SYS, EMS.SYS

3. At the DOS prompt, type A:> AWDFLASH VXXYYZZ.BIN and then press Enter.
4. The screen shows: "Do You Want To Save Bios (Y/N)". Type Y if you want to save old bios data, and N if you do not.
5. When the screen shows: "Are You Sure To Program (y/n)", type Y to flash and update the system bios.
6. The program updates the BIOS automatically.
7. Wait for the update to complete.

WARNING: Do not turn off the system power while the BIOS is programming, or the flash ROM will be destroyed.

8. Press F1 to Reset (or press F10 to exit) the system after the BIOS is completely updated.

BIOS-contained Model Number and Serial Number

The model number and serial number information is stored in BIOS ROM and displayed in the "Model Information" of BIOS Setup main menu. If a repair is completed by replacing the system board or installing a new BIOS ROM, then you need to enter the original system's model number and serial number in the new BIOS ROM.

To enter the model number and serial number into BIOS:

1. Prepare a bootable DOS diskette with VPD.EXE files.
2. Insert the diskette and boot from drive A.

WARNING: Do not boot with any memory related driver such as HIMEM.SYS, EMS.SYS

3. At the DOS prompt, type A:>VPD then press Enter. You will be asked if you want to update the serial number, type Y to continue. When the screen shows:

Serial Number:

Enter the serial number and press Enter to continue. You can type a maximum of 7 characters (without spaces).

Follow the instructions on the screen to complete the procedure.

4. Type A:>VPD and press Enter to display and verify your input model number and serial number information.

BIOS Setup Utility

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

Working with the Setup Menus

Starting the Setup Utility

Follow these steps to enter Setup when the computer is off:

1. Turn on your monitor.
2. Turn on the system unit.
3. When you see the IBM Aptiva logo, press F1 to enter Setup and display the Main Menu.

Refer to the Setup Utility Main Menu below.

ROM PCI/ISA BIOS (BKWEN03A)
CMOS SETUP UTILITY
AWARD SOFTWARE, INC.

STANDARD CMOS SETUP	INTEGRATED PERIPHERALS
BIOS FEATURES SETUP	PASSWORD SETTING
POWER MANAGEMENT SETUP	SAVE & EXIT SETUP
PNP/PCI CONFIGURATION	EXIT WITHOUT SAVING
	LOAD SETUP DEFAULTS
Esc : Quit F10 : Help	↑ ↓ → ← : Select Item (Shift)F2 : Change Color
Time, Date, Hard Disk Type....	

The following table lists specific keys on the keyboard that will help you move through the Setup menus:

Keys	Function
Down- or up- arrow key	Use these arrow keys to highlight an option on the menu. (Press the Enter key to choose the option.)
Left- or right- arrow key	Use these arrow keys to make a selection and change an option's setting. On some menus, you can use these keys to move from one field to another.
PgUp	Press this key to move from a menu to the menu immediately preceding it. This key works only in options with multiple menus.
PgDn	Press this key to move from a menu to the menu immediately following it. This key works only in options with multiple menus.
F1	Press this key if you want help for a selected menu option.
Esc	After viewing or making changes to the settings on a menu, press this key to exit the menu.
Enter	Press this key to choose a highlighted option from a menu.

Changing Parameter Settings

In the Setup menus, the configuration information that you can change is enclosed in brackets like these: []. You cannot change any information that is not enclosed in brackets. Use the up- or down-arrow keys to highlight options then press Enter to display a menu. When changing the setting of a particular parameter, highlight the setting then use the left- or right-arrow key to change the setting.

Loading the Default Settings (Setup Defaults)

When you purchase an Aptiva computer, it is already configured for use. The original configuration settings, also called factory or default settings, are stored in the CMOS. Setup includes an option Load Default Settings that allows you to reload the original configuration at any time.

If you have made changes in Setup but would like to restore the default settings, follow these steps:

1. Press F5 to load default settings. A dialog box appears asking if you want to load the default settings.
2. Use the left-arrow key to select Yes, then press Enter.

3. Press Esc to exit Setup.
A dialog box appears asking if you want to save the CMOS settings (in this case, the default settings that you reloaded).
4. Use the left-arrow key to select Yes, then press Enter to save the changes in CMOS.

You must load the Setup default settings in the following instances:

- When you replace the system battery
- When you customize your system configuration settings and some resource assignments conflict causing the computer to hang.

Exiting Setup (Save & Exit Setup/Exit Without Saving)

When you complete your changes or finish viewing information, return to the main menu. From this location, you can exit Setup and save your changes or exit without saving your changes.

Follow these steps to exit Setup:

1. From the main menu, press the Esc key.
2. The Exit Setup dialog box appears. If you have made changes in the parameter settings, it will contain an option for saving your changes.
 - If you would like to save your changes, press the left-arrow key to select the option Yes then press Enter to save your changes and exit Setup.
 - If you do not want to save your changes, press the right-arrow key to select the option No then press Enter, to exit Setup without saving.

Standard CMOS Setup

Setup automatically updates this menu when you do either of the following:

- Add or change hardware on your computer
- Make changes to other menus in Setup and save those changes

To view the computer information such as the model number, serial number, and BIOS version and date, select the Standard CMOS Setup option from the Setup main menu. The items displayed are not configurable.

Date and Time

Use PgUp / PgDn / +/- keys to change date and time of the system from the Standard **CMOS Setup menu**.

Disk Drives

If you install a new diskette, hard disk, or CD-ROM drive, BIOS auto-detects the presence of these devices. Enter Setup to identify or verify the type of drive installed in the computer.

If you want to change any drive setting, select Standard CMOS Setup from the main menu. The Standard CMOS Setup menu appears showing the diskette drive and IDE drive parameters.

Diskette Drive (A or B)

These options display the size and storage capacity of the currently installed diskette drive or drives. Empty drive bays are indicated with a "None" setting. Your Aptiva computer comes with a diskette drive A. If you add an additional diskette drive, it will be designated as diskette drive B.

IDE Hard Disk and CD-ROM Drives

The Standard CMOS Setup menu includes four IDE drive items that allow you to configure the hard disk drives and the CD-ROM drive. Selecting any one of these items displays a submenu with details on a particular IDE drive.

The IDE drive items are identified as follows:

- *IDE Primary Channel Master* is attached to IDE connector 1 on the system board and set as the master device. This is the hard disk that comes preinstalled with your computer.
- *IDE Primary Channel Slave* (if installed) is attached to IDE connector 1 on the system board and set as the slave device.
- *IDE Secondary Channel Master* (if installed) is attached to IDE connector 2 on the system board and set as the master device. A preinstalled CD-ROM drive is connected here.
- *IDE Secondary Channel Slave* (if installed) is attached to IDE connector 2 on the system board and set as the slave device.

Proceed to the following for details on the parameters under each IDE drive submenu.

Type

This item specifies the number of cylinders, heads, and sectors, and the size of a particular IDE drive. If no information appears opposite the parameters, there is no drive installed in that channel.

Hard Disk Block Mode

This function enhances disk performance depending on the hard disk in use. BIOS automatically detects if your hard disk supports this feature.

Setting this function to Auto allows data transfer in blocks (multiple sectors) to increase the data transfer rate. If your system does not boot after setting this parameter to Auto, change the setting to Disabled. The default setting for this parameter is Auto.

Advanced PIO Mode

The advanced PIO mode feature improves system performance by allowing the use of faster hard disk drives. If your hard disk supports this feature, you may set this parameter to Auto (default), Mode 0, Mode 1, Mode 2, Mode 3, or Mode 4 depending on the hard disk requirements. See the documentation that came with the hard disk.

If your hard disk does not support this function, set this parameter to Disabled.

Hard Disk Size > 528MB

This enhanced IDE feature works only under DOS and Windows environments. If set to Auto, which is the default, BIOS allows you to use a hard disk with a capacity of more than 528MB. This is made possible through the Logical Block Address (LBA) mode translation. You may be required to set this parameter to Disabled if you use other operating systems.

To prevent data loss, set this parameter to Auto if you are using a hard disk with more than 528MB capacity that was previously configured through the LBA mode. If you use a hard disk configured through the user-specific Cylinder-Head-Sector (CHS) mode, set this parameter to Disabled.

Halt On

The category determines whether the computer will stop if an error is detected during power up.

No errors	Whenever the BIOS detects a non-fatal error the system will be.
All errors	The system boot will not be stopped for any error that may be detected.
All, But Keyboard	The system boot will not stop for a keyboard error; it will stop for all other errors.
All, But Diskette	The system boot will not stop for a disk error; it will stop for all other errors.
All, But Disk/Key	The system boot will not stop for a keyboard or disk error; it will stop for all other errors.

BIOS Features Setup

This section allows you to configure your system for basic operation. You have the opportunity to select the system default speed, boot-up sequence, keyboard operation, and shadowing.

Internal/External Cache

The Memory/Cache Options menu allows you to configure the Level 1 and Level 2 caches. Enabling the cache parameters optimize system performance. Some older applications, however, may not run properly with the caches enabled. Set the parameters to Disabled when you run these applications. Disabling the caches will degrade system performance.

PCIVGA Palette Snoop

The VGA palette snoop function allows the system to refresh all ISA and PCI graphic adapters installed in the system. This is needed if you install an additional graphics overlay card such as an MPEG or an advanced 3D graphics adapter. If the image on your monitor has problems after installing such an adapter, set this parameter to Enabled. Otherwise, leave it to the default Disabled to achieve better performance.

Power Management

The system power management features allow you to reduce power consumption.

NOTE: These Power Management settings do not work in Windows 98. Use the Control Panel Power utility for Win98 Power Management settings.

Power Management Mode

When the Power Management Mode parameter is set to Enabled, you can configure the different power saving timers to your desired settings. Setting this parameter to Disabled deactivates the power management feature and all the timers. The default setting is Enabled.

PnP/PCI Configuration

This feature allows for automatic or manual configuration of PCI devices. If you use Plug and Play devices, you can keep the default setting Auto. The system then automatically configures the Plug and Play devices. If you install

non-Plug and Play adapter cards, set this parameter to Manual. This allows you to assign resources to non-Plug and Play cards first.

Integrated Peripherals

This section page includes all the items of IDE hard drive and Programmed Input / Output features.

Also included in this menu are items for enabling or disabling the onboard controller chipsets.

Onboard Floppy Disk Controller

This parameter allows you to enable or disable to onboard floppy disk controller chipset. When set to Enabled, the controller enables the diskette drive on your computer. When set to Disabled, the controller deactivates the drive but simultaneously frees IRQ to another device.

Serial Port

Your computer comes with a 9-pin serial port. This parameter displays the current address for serial port. The default setting Base Address is 3F8.

Parallel Port

Your computer comes with one parallel port. This parameter shows the default Enabled to activate the parallel port. The default base address is 378. The default mode is ECP. The default DMA is 3.

Onboard USB

This parameter allows you to enable or disable the universal serial bus (USB) controller. The default setting is Enabled.

USB / Keyboard Mode

This parameter enables or disables the use of a USB keyboard outside of Windows. The default is Disabled.

Power Button Override < 4 sec

When set to Suspend, this parameter adds the suspend function to the system power button on the front panel. The suspend function allows you to put the system into suspend mode by pressing the power button for less than four seconds while the system is on. When this parameter is set to Instant Off, the power button simply turns the system power on or off. This parameter is set to Instant Off by default.

Ring Power-up Control

This parameter allows you to enable or disable the Modem Wake-Up on Ring feature. When enabled and if the computer is in suspend, an incoming call automatically resumes normal power on mode. When disabled, the system does not return to the "normal on" state even if there is an incoming modem access. The default setting is Enabled.

Lan Power Up Control

This parameter allows you to enable or disable the Wake Up On Lan function. When enabled and if the computer is suspended, an incoming data packet from any other network neighbor will wake up this system unit.

Password Setting

Select this parameter and press the left- or right-arrow key to display the Password window. In this window, you can either set up a password or both to restrict the use of your computer. You can also change or remove the password.

If you set up a password, you must type this password each time you turn on your computer. If you do not key in the correct password, you cannot use your computer. You must also type this password if you want to enter Setup.

Specifications

Dimensions (width x depth x height):

- System unit:
 - 316 mm (12.44 in.) x 380 mm (14.96 in.) x 85 mm (3.35 in.)

Weight:

- System unit:
 - 9 kg (19.8 lb)

Environment:

- Temperature for system unit:
 - Power on: 10° to 35°C (50° to 95°F)
 - Power off: -20° to 60°C (14° to 140°F)
- Humidity for system unit:
 - Power on: 8% to 80%
 - Power off: 8% to 80%

Power consumption:

- System unit:
 - Maximum: 92.85-watts

Electrical input:

- Input voltage for system unit (Sine-wave input is required) :
 - Low Range: 100 VAC to 127 VAC
 - High Range: 200 VAC to 240 VAC

Operating Requirements

All machines require two power inputs: one on the system unit and one on the monitor display.

The system unit comes with a voltage selector switch, allowing selection of either 115 VAC or 230 VAC. This switch must be in the 230 VAC position when the machine is plugged into a 230 VAC electrical outlet.

Special Tools

The following special tool is required to service this system when running the diagnostics program (PC-Doctor):

- Wrap plug, P/N 72X854

Check Procedures

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Introduction

This chapter contains the check procedures used to diagnose the causes of product failures. The diagnostic information consists of:

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

Index of Symptoms, Messages, Error Codes, or Beeps: The tables for BIOS Error Messages, Codes, Beeps, and Error Symptoms list symptoms along with their probable causes, and direct you to the applicable check procedures to help resolve machine failures. These tables also list the field replaceable units (FRUs) most likely to cause a particular problem.

Check Procedures: When the Start check procedure or the Index of Symptoms, Messages, Error Codes, or Beeps tables point you to a specific check procedure, proceed to that section. If there are any notes or instructions at the top of the page, read them before you begin with the procedure. Carefully read each step of the check procedure and perform the steps as instructed. If you do not remember the location of a specific part or test point, or an adjustment or removal procedure, see the chapter that contains that information. Always return to the check procedure after you do this. In some cases, you are referred to other check procedures to detect the cause of the failure.

Start

This is the entry point for all check procedures. The check procedures use failure symptoms, Power-On Self Test (POST) error codes, or beeps to help determine the defective field replaceable unit (FRU). Follow the suggested check procedures or use the diagnostics diskette to determine the problem FRU.

IMPORTANT: Replace FRUs ONLY when it is determined that the error is not a result of software, loose contacts, or dirty component surfaces. Any FRU change should be verified by running a complete test ("Diagnostics - All Tests" in PC-Doctor diagnostics program).

This book comes with a diagnostic program diskette. This diskette should be used ONLY with **Machine Type 2156 Computer**. Do not use this diskette on other models.

POST error codes and error messages are displayed on the screen after the IBM logo. A beep will precede each error code or message. Please refer to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-8 for additional help.

All voltages in the check procedures are positive unless otherwise indicated. Use frame ground for all voltage checks unless otherwise specified.

IMPORTANT: There is a voltage selector on the rear panel of the machine. Use a flat-head screwdriver to turn the voltage selector to the voltage setting for the area in which you will be using the system.

NOTE: If the check procedures instruct you to replace a FRU and the error message persists, 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 Recovery CD contains pre-loaded software that may reinstall the original software and recover the system. Ensure data and programs of the hard drive have a backup copy.

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 a newly replaced FRU does not correct the problem: If you have reached this point of the check procedures and were instructed to replace a FRU but doing so did not correct the problem, reinstall the original FRU and go through "Start" again.

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

PLEASE READ THE FOLLOWING:

Human Error is a cause for concern when applied to check procedures. It exists in every first time set of analysis procedures. It is therefore essential for effective and time-efficient servicing that each stage of every procedure be verified. (For example: When a symptom is found, or when a symptom appears to have been cured; the preceding steps should be repeated for accuracy of analysis.)

001 - START

To begin, note the following:

Disable the setting of "Quick Power-On Self Test" from BIOS Setup.

Disconnect all external cables and devices including speakers and microphone from the system unit, except for the keyboard, mouse, and monitor.

Power off the system unit before moving it or when replacing FRUs.

Remove all adapter cards, except for the factory-installed modem adapter card and any other IBM Aptiva factory-installed adapter cards.

Disconnect any drives except:

3.5-in. diskette drive

hard disk drive

IBM Aptiva factory-installed devices (such as a CD-ROM drive)

Make sure that all power cords and cables are connected properly.

Make sure that the monitor brightness and contrast controls are 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 this case, check this signal cable before replacing the unit. See "Monitor Port Signals" on page 5-15 for pin identification.

Make sure that the monitor refresh rate is correct.
Note any symptoms, messages, error codes, or beeps.
Make sure that there are no diskettes or CDs in the drives.

**002 - DOES AN IBM LOGO SCREEN APPEAR? (YES, READ AHEAD.
NO, GO TO STEP 004.)**

Insert the diagnostics diskette in the diskette drive.

**003 - DOES SYSTEM LOAD THE DIAGNOSTICS PROGRAM FROM THE
DISKETTE DRIVE? (YES, READ AHEAD. NO, GO TO STEP 004.)**

Follow the instructions on the screen and select **Utility** from the diagnostics program menu.

Select **Tech Support Form** from the menu, press F5 to execute, then generate a system configuration report.

Compare the system configuration list with the actual devices installed in system.

NOTE: If necessary, remove the machine cover and visually compare the devices installed in system to those shown in the system configuration report.

Go to step 006.

**004 - DO ANY MESSAGES, ERROR CODES, OR SYMPTOMS APPEAR?
(YES, READ AHEAD. NO, GO TO STEP 005)**

Go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-8.

End.

005 -

If the keyboard responds incorrectly, go to "Keyboard" on page 2-32.

006 - DOES THE SYSTEM CONFIGURATION REPORT CORRECTLY IDENTIFY THE DEVICES INSTALLED IN SYSTEM? (YES, READ AHEAD. NO, GO TO STEP 007.)

Select **Diagnostics** from the diagnostics program menu.

Select and execute **All Tests**.

Go to step 008.

007 -

The system configuration report shows only those devices supported by the diagnostics diskette.

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 A, "FRU Number" to determine the factory-installed devices in the model you are servicing.)

008 - DOES THE DIAGNOSTICS FINISH WITHOUT ANY ERRORS? (YES, READ AHEAD. NO, GO TO STEP 009.)

If the **Diagnostics \ All Tests** did not detect a failure but the system still indicates a failure:

Check all adapter card jumper settings.

Check all adapter card switch settings.

Check all adapter card cables and connectors.

Make sure that all of the above are set correctly and show the correct voltages and continuity. Replace any defective cables or adapter cards. See "Power Supply Cable Connector Specifications" on page 5-7 and "Machine Type 2156 System Board Layout" on page 5-3.

Run the **Diagnostics \ All Tests** again.

If an error or other symptom is displayed, go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-8.

If no error can be detected or the symptom is intermittent, go to "Undetermined Problems" on page 2-40.

End

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.

Take note of any messages, error codes, beeps, or new symptoms. Go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-8.

If there is no error symptom or the error symptom is intermittent, go to "Undetermined Problems" on page 2-40.

Index of Symptoms, Messages, Error Codes, or Beeps

How to Use Error Messages: Use the messages, error codes, and beeps combinations that occur to diagnose failures. If more than one failure occurs, diagnose from the first failure that appears. The cause of the first failure can result in false messages, error codes, or beeps. If you did not receive any messages, error codes, or beeps, see if the symptom is listed in Table 2-3, "Error Symptoms List" on page 2-15.

ATTENTION: When you have replaced a FRU, you must run the diagnostics to ensure that no other activity has been affected by the change. This system check can be done through the diagnostics program (Select **Diagnostics**, then select and execute **All Tests** from PC-Doctor).

POST: 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. The POST is a series of system checks and initializations that verify the correct operation of the base system.

After a successful POST, the system attempts to load operating system. The system can be customized for different startup (boot) methods by the BIOS Setup Utility. See "BIOS Features Setup" on page 1-15.

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

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

Table 2-1 lists BIOS error codes, messages, and beeps to their possible causes, table 2-3 lists error symptoms and their 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 2-3.

If you are unable to correct the problem using these two index tables, go to "Undetermined Problems" on page 2-40.

NOTES:

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

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

If you did not receive any error message, look for a description of your error symptoms in "Error Symptoms List" in table 2-3.

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 Cable Connector Specifications" on page 5-7 and "Machine Type 2156 System Board Layout" on page 5-3.)

If you are unable to correct the problem by using the "BIOS Error Codes, Messages, And Beeps List" table and "Error Symptoms List" table, go to "Undetermined Problems" on page 2-40.

Table 2-1 BIOS Error Codes, Messages, and Beeps List	
BIOS Error Codes, Messages, beeps	Action/FRU
NOTE: To diagnose a problem, first find the BIOS error messages, codes, 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.	
POST Error Codes and Messages	
161 CMOS battery failed	Load default settings in Setup and reboot the system. CMOS battery. System board.
162 CMOS checksum error	Make sure the equipment (diskette drive, hard disk drive, keyboard, mouse, etc.) are connected properly and are set correctly in BIOS Setup. Load default settings in setup. CMOS battery should be replaced. System board.
164 Memory size error	Make sure the DIMMs are inserted properly. System board.

Table 2-1 BIOS Error Codes, Messages, and Beeps List	
BIOS Error Codes, Messages, beeps	Action/FRU
NOTE: To diagnose a problem, first find the BIOS error messages, codes, 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.	
201 Memory test failure.	Insert the memory modules in the DIMM sockets properly, then reboot the system. Memory module. See the "Step 005" of "Memory" on page 2-31 to replace memory module. System board.
301 Keyboard error or no keyboard present.	Make sure the keyboard is connected properly and are set correctly in BIOS Setup. System board.
662 FLOPPY DISK(S) failure (80)	Unable to reset floppy subsystem.
662 FLOPPY DISK(S) failure (40)	Floppy Type mismatch.
1701 Hard disk(s) Diagnosis failure	Make sure the hard disks are set correctly in BIOS setup. Hard disk drive cable/connection. Hard disk drive. System board.
1762 Primary master IDE has changed Primary slave IDE has changed Secondary master IDE has changed Secondary slave IDE has changed	Make sure that the System Boot Drive parameter in the Startup Options of BIOS Setup is not set to [Drive A only]. Load default settings in Setup. Insert a system diskette into diskette drive and reboot system. Make sure the diskette drive configuration setting in BIOS Setup is correct. Hard disk drive power. Diskette drive. System board.

Table 2-1 BIOS Error Codes, Messages, and Beeps List	
BIOS Error Codes, Messages, beeps	Action/FRU
NOTE: To diagnose a problem, first find the BIOS error messages, codes, 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.	
1780 Primary master hard disk failure	A warning message to indicate there has been change of IDE Primary (Secondary) Channel Master (Slave) device. Load default settings in Setup.
1781 Primary slave hard disk failure	Check IDE drive jumper. See "3.5-In. Hard Disk Drive Jumper Locations" on page 5-11. IDE drive power. IDE drive cable/connection. IDE drive.
1782 Secondary master hard disk failure	A warning message to indicate there has been change of IDE Primary (Secondary) Channel Master (Slave) device. Load default settings in Setup.
1783 Secondary slave hard disk failure	Check IDE drive jumper. See "3.5-In. Hard Disk Drive Jumper Locations" on page 5-11. IDE drive power. IDE drive cable/connection. IDE drive.
8602 PS/2 Mouse error on no PS/2 Mouse present	Make sure the PS/2 mouse is connected properly and are set correctly in BIOS Setup. Mouse. System board.
SYSTEM HALTED, (CTRL-ALT-DEL) TO REBOOT ...	Indicates the present boot attempt has been aborted and the system must be rebooted. Press and hold down the CTRL and ALT keys and press DEL.
Hard Disk(s) failure (80)	HDD reset failed.
Hard Disk(s) failure (40)	HDD controller diagnostics failed.
Hard Disk(s) failure (20)	HDD initialization error.
Hard Disk(s) failure (10)	Unable to recalibrate fixed disk.

Table 2-1 BIOS Error Codes, Messages, and Beeps List	
BIOS Error Codes, Messages, beeps	Action/FRU
NOTE: To diagnose a problem, first find the BIOS error messages, codes, 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.	
Hard Disk(s) failure (08)	Sector Verify failed.
Non-System disk or disk error Replace and strike any key when ready	Insert a system disk into Drive A: and press <Enter>. If you assumed the system would boot from the hard drive, make sure the controller is inserted correctly and all cables are properly attached. Be sure the disk is formatted as a boot device. Then reboot the system.
OFFENDING SEGMENT:	This message is used in conjunction with the I/O CHANNEL CHECK and RAM PARITY ERROR messages when the segment that has caused the problem has been isolated.
PRESS A KEY TO REBOOT	This will be displayed at the bottom of the screen when an error occurs that requires you to reboot. Press any key and the system will reboot.
PRESS F1 TO DISABLE NMI, F2 TO REBOOT	When BIOS detects a Non-maskable Interrupt condition during boot, this will allow you to disable the NMI and continue to boot, or you can reboot the system with the NMI enabled.
RAM PARITY ERROR – CHECKING FOR SEGMENT ...	Indicates a parity error in Random Access Memory.
Memory parity Error at ...	Indicates a memory parity error at a specific location. You can use this location along with the memory map for your system to find and replace the bad memory chips.
Memory Verify Error at ...	Indicates an error verifying a value already written to memory. Use the location along with your system's memory map to locate the bad chip.

Table 2-1 BIOS Error Codes, Messages, and Beeps List	
BIOS Error Codes, Messages, beeps	Action/FRU
NOTE: To diagnose a problem, first find the BIOS error messages, codes, 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.	
OFFENDING ADDRESS NOT FOUND	This message is used in conjunction with the I/O CHANNEL CHECK and RAM PARITY ERROR messages when the segment that has caused the problem cannot be isolated.
ERROR ENCOUNTERED INITIALIZING HARD DRIVE	Hard drive cannot be initialized. Be sure the adapter is installed correctly and all cables are correctly and firmly attached. Also be sure the correct hard drive type is selected in Setup.
ERROR INITIALIZING HARD DISK CONTROLLER	Cannot initialize controller. Make sure the cord is correctly and firmly installed in the bus. Be sure the correct hard drive type is selected in Setup. Also check to see if any jumper needs to be set correctly on the hard drive.
FLOPPY DISK CNTRLR ERROR OR NO CNTRLR PRESENT	Cannot find or initialize the floppy drive controller. Make sure the controller is installed correctly and firmly. If there are no floppy drives installed, be sure the Diskette Drive selection in Setup is set to NONE.

Table 2-2 BIOS Error Codes, Messages, and Beeps List	
BIOS Error Codes, Messages, beeps	Action/FRU
<p>NOTE: To diagnose a problem, first find the BIOS error messages, codes, 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.</p>	
Beeps	
(2: long, 1: short) 2-1-1	This code indicates that a video error has occurred and the BIOS cannot initialize the video screen to display any additional information.
2- (repeatedly)	The code indicates that DRAM error has occurred. See "Memory (DIMM)" on page 4-15 to get more information.

Table 2-3 Error Symptoms List	
Error Symptoms	Action/FRU
<p>NOTE: To diagnose a problem, first find the error symptom in the 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.</p>	
Processor / Processor Fan	
<p>NOTE: Normally, the processor fan should be operative, and the processor clock setting should be exactly set to match its speed requirement before diagnosing any processor problems.</p>	
Processor fan does not run but power supply fan runs.	<p>Make sure that the system is not in power saving mode. See "Power Management" on page 1-15.</p> <p>With the system power on, measure the voltage of processor fan connector FN (see "Machine Type 2156 System Board Layout" on page 5-3 or see "2156 System Board Connectors and Functions" on page 5-6). Its reading should be +12Vdc.</p> <p>Processor fan. System board.</p>
Processor test failed.	<p>Processor. System board.</p>
System Board and Memory	
<p>NOTE: Ensure that the memory modules are installed properly and the contact lead is clean before diagnosing any system problems.</p>	
Memory test failed.	<p>"Memory" on page 2-31 System board</p>
Incorrect memory size shown or repeated during POST.	<p>Insert the memory modules in the DIMM sockets properly, then reboot the system.</p> <p>Memory module. See the "Step 005" of "Memory" on page 2-31 to replace memory module.</p> <p>System board.</p>

Table 2-3 Error Symptoms List	
Error Symptoms	Action/FRU
NOTE: To diagnose a problem, first find the error symptom in the 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.	
System works but fails to enter power saving mode when the "Power Management" is set to [Enabled], and power saving timer set in BIOS has elapsed.	Load default settings. In Win98, check settings in Control Panel Power utility. Reload software from Recovery CD.
System hangs before system boot.	"Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-8. "Undetermined Problems" on page 2-40.
System hangs after system boot.	Execute a system test ("Diagnostics/All Tests" in PC-Doctor diagnostics program) and set it to stop at "Halt on Error" to see the potential cause of the problem. "Undetermined Problems" on page 2-40.
Blinking cursor only; system does not work.	"Start" on page 2-3. Diskette/IDE drive connection/cables Diskette/IDE disk drives "Undetermined Problems" on page 2-40. System board
Diskette Drive	
NOTE: Ensure that the diskette drive is configured correctly in BIOS Setup and its read/write head is clean before diagnosing any diskette drive problems.	
Media and drive are mismatched.	Make sure that the diskette drive is configured correctly in the Disk Drives of BIOS Setup. Make sure that the diskette drive is correctly formatted. Diskette drive connection/cable Diskette drive System board

Table 2-3 Error Symptoms List	
Error Symptoms	Action/FRU
NOTE: To diagnose a problem, first find the error symptom in the 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.	
Diskette drive does not work.	Make sure that the diskette drive is not set to [None] in the "Standard CMOS Setup" of BIOS Setup. Diskette drive power Diskette drive connection/cable Diskette drive System board
Diskette drive test failed.	Diskette Diskette drive Diskette drive cable System board
Hard Disk Drive	
NOTE: Ensure hard disk drive is configured correctly in BIOS Setup, cable/jumper are set correctly before diagnosing any hard disk drive problems.	
Hard disk drive test failed.	Load default settings. Hard disk drive cable. Hard disk drive. System board.
Hard disk drive format error.	Load default settings. Hard disk drive cable. Hard disk drive. System board.
Hard disk drive write error.	Load default settings. Hard disk drive.

Table 2-3 Error Symptoms List							
Error Symptoms	Action/FRU						
<p>NOTE: To diagnose a problem, first find the error symptom in the 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.</p>							
<p>Hard disk drive LED fails to light, but system operates normally.</p>	<p>With the system power on, measure the voltage of hard disk LED connector JP7 (See "Machine Type 2156 System Board Layout" on page 5-3). Its reading should be:</p> <table border="1"> <thead> <tr> <th>CN9</th> <th>HDD Idle/Active</th> </tr> </thead> <tbody> <tr> <td>pin-5</td> <td>0 Vdc / 0 Vdc</td> </tr> <tr> <td>pin-7</td> <td>+5 Vdc / +5 Vdc</td> </tr> </tbody> </table> <p>Hard drive LED cable.</p>	CN9	HDD Idle/Active	pin-5	0 Vdc / 0 Vdc	pin-7	+5 Vdc / +5 Vdc
CN9	HDD Idle/Active						
pin-5	0 Vdc / 0 Vdc						
pin-7	+5 Vdc / +5 Vdc						
CD-ROM Drive							
<p>NOTE: Make sure CD-ROM drive is configured correctly in BIOS Setup, cable/jumper are set correctly and its laser beam is clean before diagnosing any CD-ROM drive problems.</p>							
<p>CD-ROM drive LED flashes for more than 30 seconds before LED shutting off. Software asks to reinstall disc. Software displays a reading CD error.</p>	<p>CD may have dirt or foreign material on it. Check with a known good disc. CD is not inserted properly. CD is damaged.</p>						
<p>CD-ROM drive LED doesn't come on but works normally.</p>	<p>CD-ROM drive</p>						
<p>CD-ROM drive cannot load or eject when the system is turned on and its eject button is pressed and held.</p>	<p>CD-ROM drive power. "CD-ROM Drive" on page 2-30. CD-ROM drive</p>						
<p>CD-ROM drive does not read and there are no error codes or messages are displayed.</p>	<p>CD may have dirt or foreign material on it. Check with a known good disc. Make sure that the CD-ROM driver is installed properly. CD-ROM drive.</p>						

Table 2-3 Error Symptoms List	
Error Symptoms	Action/FRU
NOTE: To diagnose a problem, first find the error symptom in the 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.	
CD-ROM drive can play audio CD but no sound output.	Make sure that the headphone jack of the CD-ROM has an output, then check if the audio cable from CD-ROM drive to system board J18 (see "Machine Type 2156 System Board Layout" on page 5-3) is connected properly. Turn up the sound volume. Speaker power/connection/cable. CD-ROM drive.
Real-Time Clock	
Real-time clock is inaccurate.	Make sure that the information in the Date and Time of BIOS Setup is set correctly. Load default settings. RTC battery. System board
Audio	
Audio software program invokes but no sound comes from speakers.	Speaker power/connection/cable.
Modem	
Data/fax modem software program invokes but cannot receive/send data/fax	"Factory-Installed Modem Card" on page 2-26.
Video and Monitor	
Video memory test failed. Video adapter failed.	Remove all non-factory cards. Load default settings (if screen is readable). System board

Table 2-3 Error Symptoms List	
Error Symptoms	Action/FRU
NOTE: To diagnose a problem, first find the error symptom in the 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.	
Display problem: <ul style="list-style-type: none"> - Incorrect colors - No high intensity - Missing, broken, or incorrect characters - Blank monitor(dark) - Blank monitor(bright) - Distorted image - Unreadable monitor - Other monitor problems 	Monitor signal connection/cable. Monitor System board
Display changing colors.	Monitor signal connection/cable Monitor System board
Display problem not listed above (including blank or illegible monitor).	"Monitor" on page 2-38. Load default settings (if screen is readable). System board
Parallel/Serial Ports	
NOTE: Execute "Load BIOS Default Settings" in BIOS Setup to confirm ports' presence before diagnosing any parallel/serial ports problems.	
Serial or parallel port loop-back test failed.	Make sure that the LPT# or COM# you test is the same as is set in BIOS Setup. Loop-back. System board.
Printing failed.	Make sure that the printer driver is properly installed. Refer to the service manual for the printer. Printer. Printer cable. System board.
Printer problems.	Refer to the service manual for the printer.

Table 2-3 Error Symptoms List	
Error Symptoms	Action/FRU
NOTE: To diagnose a problem, first find the error symptom in the 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.	
Joystick	
Game port does not respond or does not work.	Connect a joystick to the game port, then execute "Interactive Test/Joystick test" in PC-Doctor diagnostics program. System board.
Diagnostic Program	
Diagnostics programs cannot be executed.	Reboot the system from the diagnostics diskette. Load default settings. Diagnostics diskette. Memory module. System board.
Missing diagnostics files(s).	Diagnostics diskette.
Keyboard	
Some or all keys on keyboard do not work.	"Keyboard" on page 2-32.
Power Supply	
Pressing power switch cannot turn off system.. (Only unplug power cord from electrical outlet can turn off system.)	See "Power Button Override < 4 sec" on page 1-17. Power switch cable assembly "Power Supply" on page 2-35. System board
Pressing power switch cannot turn on system..	Check the voltage selector on the power supply if it is off. Power switch cable assembly.

Table 2-3 Error Symptoms List	
Error Symptoms	Action/FRU
NOTE: To diagnose a problem, first find the error symptom in the 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.	
Executing software shutdown from Windows98 Start menu cannot turn off system. (Only pressing power switch can force system to turn off).	Load default settings. Reload software from Recovery CD.
No system power, or power supply fan is not running.	"Power Supply" on page 2-35. System board.
Other Problems	
Any other problems.	"Undetermined Problems" on page 2-40.

Troubleshooting

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. Also, the FRU parts are defined as replaced units and are not repaired in the field.

Measuring Voltages: Some 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 as the ground reference. Attach the black (ground) lead of meter to frame ground, except where specified otherwise.

Factory-Installed Storage 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. Take note of 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 that the BIOS Setup Utility has the startup sequence set with diskette, CD-ROM, and hard disk drives.

001 - START

Insert the diagnostics diskette into the diskette drive.

Power-off then power-on the system unit.

002 - DO ANY POST MESSAGES, ERROR CODES, BEEPS, OR SYMPTOMS OCCUR? (YES, READ AHEAD. NO, GO TO STEP 003)

Go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-8.

End.

003 -

Select **Utility** from the menu.

Select and execute **Tech Support Form** from the menu to generate a system configuration report.

Compare the system configuration list with the actual devices installed in system.

NOTE: If necessary, remove the cover and visually compare the devices installed in the system unit to those shown in the Tech Support Form.

004 - IF THE NUMBER OF DISKETTE, HARD DISK, OR CD-ROM DRIVE IS NOT CORRECT, READ AHEAD; OR GO TO STEP 005.

Check the cable installation of all disk drives.

Diskette drive should be connected to the system board connector J14. (See "Machine Type 2156 System Board Layout" on page 5-3).

IDE Primary Channel Master and Slave Drives in BIOS Setup should be connected to the system board connector J6.(see "Machine Type 2156 System Board Layout" on page 5-3.)

IDE Secondary Channel Master and Slave Drives in BIOS Setup should be connected to the system board connector J7. (Machine Type 2156 System Board Layout" on page 5-3)

NOTE: The CD-ROM drive that comes with system unit should be configured as IDE Secondary Channel Master device.

Check the hard disk and CD-ROM drives jumper settings. See "3.5-In. Hard Disk Drive Jumper Locations" on page 5-11 and "CD-ROM Drive" on page 2-30.

Check the voltages of all disk drive power connectors. See "Power Supply Cable Connector Specifications" on page 5-7.

Correct the parameter settings under Disk Drives in the BIOS Setup. See "Standard CMOS Setup" on page 1-12.

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

Load default settings.

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

End.

005 –

Select **Diagnostics** from the PC-Doctor diagnostics program main menu.

Select and execute **Floppy Disk Test** if you want to test the diskette drive.

Select and execute **Hard Disk Test** if you want to test the hard disk drive.

Select **Interactive Tests** from the PC-Doctor diagnostics program main menu, then select and execute **CD-ROM/DVD Test** if you want to test the CD-ROM drive.

If the diagnostics program did not detect a failure, but the system still displays a failure:

If an error or other symptom appears, go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-8.

If no error can be detected or the symptom is intermittent, go to "Undetermined Problems" on page 2-40.

End.

Factory-Installed Modem Card

001 - START

Power off the system unit.

In Windows 98 Device Manager, make sure that the modem is not configured with a conflicting COM port and IRQ setting.

Make sure that the communication software is configured with the correct COM and IRQ settings (same as COM port and IRQ as the modem).

Make sure that all communication parameters (baud rate, data, stop and parity bits) are properly configured and are identical on both sides.

Connect the phone line to the LINE port of the modem card.

NOTE: Check the outside phone line by connecting a working telephone to the telephone wall jack. Listen for a dial tone to ensure that the phone line is good.

002 -

Insert the diagnostics diskette into the diskette drive.

Power on the system unit.

Select **Diagnostics** menu,

Select **All Tests**, then execute **Modem** test.

003 - DOES THE MODEM PASS THE TEST? (YES, READ AHEAD. NO, GO TO STEP 004.)

Power off the system unit.

Remove all adapter cards.

Connect a hard disk drive with pre-loaded Windows 98.

Power on the system unit.

Perform the following steps under Windows 98.

NOTE: If an operating system other than Microsoft Windows 98 is installed, the program screens and icons may differ from these instructions.

1. Start Microsoft Windows 98.
2. Select the **Start** icon.
3. Select **Program**, then select **Accessories**, Hyper Terminal.
4. Select an **on-line service station**, dial and connect to it.

004 - CAN THE MODEM DIAL OUT AND CONNECT TO ANY BBS SUCCESSFULLY? (YES, READ AHEAD. NO, GO TO STEP 005.)

The modem adapter functions normally.

End.

005 -

Make sure that Windows 98 is properly installed, then power off the system unit.

Plug the modem adapter card into a different PCI slot.

Go to step 002.

If the error symptom still remains, replace the modem adapter card.

End.

Audio (Not Supported by Diagnostics Program)

NOTE: Audio tests for the sound card cannot be carried out in the PC Doctor DOS diagnostics program. It is, however, possible to carry out a dial tone test for the modem.

While performing this check, you may need to enter and exit Microsoft Windows 98 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 98, see the user's guide that came with the computer.

If an operating system other than Microsoft Windows 98 is installed, the program screens and icons may differ from these instructions.

001 - START

Power off the system unit.

Remove all adapter cards.

Connect a hard disk drive with pre-loaded Windows 98.

Power on the system unit.

Load default settings in setup (audio may be disabled).

002 - DO ANY POST MESSAGES, ERROR CODES, BEEPS, OR SYMPTOMS APPEAR? (YES, READ AHEAD. NO, GO TO STEP 003)

Go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-8.

End.

003 - DO ANY MESSAGES OR ERROR CODES DISPLAY AFTER POST COMPLETES BUT BEFORE MICROSOFT WINDOWS 98 STARTS? (YES, READ AHEAD. NO, GO TO STEP 004)

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

Make sure that Windows 98 is properly installed.

End.

004 -

Perform the following under Windows 98.

NOTE: If an operating system other than Microsoft Windows 98 is installed, the program screens and icons may differ from these instructions.

1. Start Microsoft Windows 98.
2. Select the **Start** icon.
3. Select **Settings**, then select **Control Panel**.
4. Select the **Sound** icon.
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.)

005 - IS THE PREVIEW BUTTON, OR ACTION IN OTHER SOFTWARE, SELECTABLE ON THE SCREEN (SHOWN IN BLACK AND NOT GRAY)? (YES, GO TO STEP 006. NO, READ AHEAD.)

Make sure that Windows 98 is properly installed.

Go to step 001.

006 -

Select the **Preview** button from the Sound window.

007 - DO YOU HEAR ANY SOUND FROM THE SPEAKER? (YES, READ AHEAD. NO, GO TO STEP 008.)

The audio feature is functioning normally. Click **Cancel** to close the dialog box. Exit Microsoft Windows 98.

If the symptom remains or has changed, go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-8.

End.

008 -

Make sure that the volume control is not turned low.

Make sure that the speaker and its adapter are not damaged.

Make sure that the speaker is plugged in speak-out jack. See "Machine Type 2156 System Board Layout" on page 5-3.

If the error cannot be resolved, replace the system board.

End.

CD-ROM Drive

001 - START

Insert the diagnostics diskette into the diskette drive and make sure that there is no CD in the CD-ROM drive.

Select **Interactive Tests** menu, then select and execute **CD-ROM Test**.

002 - DO YOU SEE A MESSAGE "NO CD-ROM DRIVE OR MSCDEX DEVICE DRIVER INSTALLED." ? (YES, READ AHEAD. NO, GO TO 003.)

Exit the diagnostics program and power off the system.

Check and make sure that the CD-ROM drive power cable and audio and data cables are not damaged and are connected properly.

Check and make sure that the CD-ROM drive driver is loaded correctly.

Load default settings.

003 - DO THE TESTS OF OPEN/CLOSE TRAY BY DIAGNOSTICS PROGRAM AND BY DEPRESSING CD-ROM DRIVE BUTTON WORK? (YES, READ AHEAD. NO, GO TO STEP 006.)

Load a known good data CD into the CD-ROM drive and try to read its content by typing DIR at DOS prompt.

004 - CAN A CD BE READ FROM THE CD-ROM DRIVE? (YES, THEN THE CD-ROM DRIVE FUNCTIONS NORMALLY. NO, READ AHEAD.)

Try reading the CD with a known good CD-ROM drive.

005 - IS THE CD STILL NOT READABLE? (YES, READ AHEAD. NO, GO TO STEP 006.)

Replace system board.

End.

006 -

Replace CD-ROM drive.

End.

Memory

001 - START

Power off the system unit.
Insert the diagnostics diskette into the diskette drive.
Make sure that all DIMMs are installed correctly.
Power on the system unit.
Take note of any messages, error codes, or symptoms.

002 - DO YOU RECEIVE POST MEMORY ERROR MESSAGE? (YES, READ AHEAD. NO, GO TO STEP 003)

Enter BIOS Setup Utility then reboot the system. Take note of any messages, error codes, or symptoms. If the error message remains, go to step 005.

003 -

Follow the screen instructions to run the **Memory test**.

004 - DOES THE MEMORY TEST COMPLETE WITHOUT AN ERROR? (YES, READ AHEAD. NO, GO TO STEP 005.)

The system memory is now functioning correctly. If you suspect an intermittent problem, run the **Memory test** again.
End.

005 -

Replace each DIMM, one at a time, with a known working DIMM of the same size and type.

If the problem does not appear, it means that the last DIMM replaced is defective. If all DIMMs on the system board have been replaced and the problem remains, replace system board.

Go to step 001.

NOTE: If on startup, there is no memory inserted on system board, you will hear 2-(repeatedly). (2:long beep)

Keyboard

001 - START

Power off the system unit and make sure that the keyboard plug is connected properly.

002 -

Insert the diagnostics diskette into the diskette drive and power on the system unit.

Select **Interactive Tests** menu, then execute **Keyboard** test.

003 - DOES THE KEYBOARD FUNCTION CORRECTLY? (YES, READ AHEAD. NO, GO TO STEP 004.)

Keyboard is functioning normally.

End.

004 - ARE THERE ANY STUCK KEYS OR ANY GRIME IN THE GAP OF KEYCAPS? (YES, READ AHEAD. NO, GO TO STEP 005.)

Power off the system unit. Carefully remove the grime and solve the stuck keys problem.

Go to step 001.

005 - ARE THERE ANY BROKEN PINS IN THE KEYBOARD PLUG? (YES, GO TO STEP 007. NO, READ AHEAD.)

Try with a known good keyboard.

006 - DOES THE ERROR SYMPTOM STILL REMAIN? (YES, READ AHEAD. NO, GO TO STEP 007.)

Replace the system board.

End.

007 -

Replace the keyboard.

End.

Mouse

NOTE: A sticking key button can cause the mouse to operate incorrectly. If you suspect this, go to "Keyboard" on page 2-32.

001 - START

Make sure that the mouse ball turns freely.

Make sure that the mouse plug connects properly.

002 -

Power off the system unit.

Insert the diagnostics diskette into the diskette drive.

Power on the system unit.

Select **Interactive Tests** menu, then execute **Mouse** test.

003 - DO YOU SEE THE MOUSE CURSOR IN THE DIAGNOSTICS PROGRAM? (YES, READ AHEAD. NO, GO TO STEP 011)

Test right (left) button and check if right (left) button works.

004 - DOES THE MOUSE BUTTON WORK? (YES, READ AHEAD. NO, GO TO STEP 007)

Test mouse cursor movement.

005 - DOES THE MOUSE MOVE SMOOTHLY AND KEEP X AND Y COORDINATES CHANGED? (YES, READ AHEAD. NO, GO TO STEP 006)

Mouse is functioning normally.

End.

006 -

Power off the system unit.

Open mouse bottom cover and clean track ball.

Go to step 002.

007

Power off the system unit.

Check the mouse plug.

008 - ARE THERE ANY BROKEN PINS IN THE MOUSE PLUG? (YES, GO TO STEP 010. NO, READ AHEAD.)

Try with a known good mouse.

009 - DO THE ERROR SYMPTOMS STILL REMAIN? (YES, READ AHEAD. NO, GO TO STEP 010.)

Replace the system board.

End

010 -

Replace the mouse.

End.

011 -

Exit diagnostics program.

Make sure that the mouse driver is properly installed.

Go to step 002.

Power Supply

001 - START

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 is set to the correct voltage.

Power on the system unit.

002 - DOES THE POWER SUPPLY FAN RUN? (YES, GO TO STEP 003. NO, GO TO STEP 004)

003 - DOES THE SYSTEM FAIL TO SHUT OFF WHEN THE ON/OFF SWITCH IS PRESSED? (YES, READ AHEAD. NO, GO TO STEP 005)

You might have a damaged on/off switch cable assembly.

Disconnect the on/off switch cable assembly connector from the power supply connector and take an ohm reading.

Go to step 007.

004 -

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.

Connect any one of the power connector to system board or drive as power load for driving up power supply.

Reconnect the power cord.

005 - DOES THE POWER SUPPLY FAN RUN? (YES, READ AHEAD. NO, GO TO STEP 009)

With the system powered on and the power supply fan running, check the voltages of the power supply connectors for the system board and all drive connectors, as shown in the following figures.

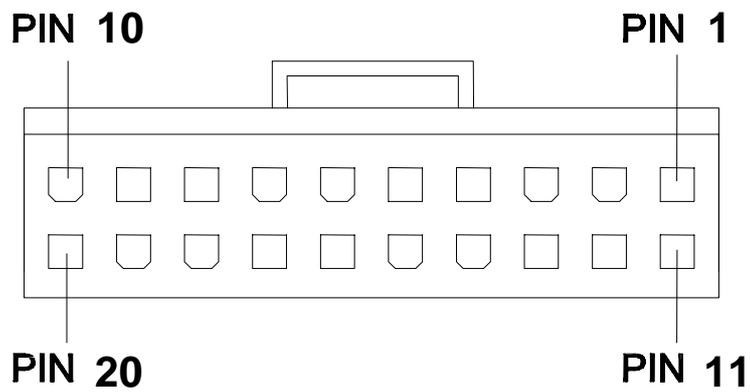


Figure 2-1 Power Supply Connectors (Bottom View)

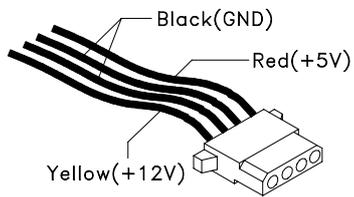


Figure 2-2 Hard Drive or CD-ROM End of Power Cable

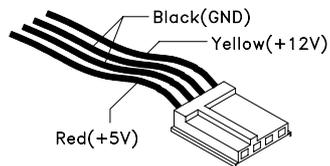


Figure 2-3 3.5-In. Diskette Drive End of Power Cable

**006 - ARE THE VOLTAGES CORRECT AND DOES THE FAN RUN?
(YES, READ AHEAD. NO, GO TO STEP 009)**

The power supply is working normally.

If you suspect the on/off switch cable assembly, see Step 003.

If the fan continues to run when all connectors are plugged back in, go to "Undetermined Problems" on page 2-40. If the fan stops running when a drive connector is plugged back in, go to "Start" on page 2-3.

**007 - DO YOU HAVE AN OHM READING WHEN THE SWITCH IS
PRESSED AND AN OPEN READING WHEN THE SWITCH IS
RELEASED? (YES, READ AHEAD. NO, GO TO STEP 008)**

Replace the on/off switch cable assembly.

008 -

Replace the system board.

End.

009 -

Replace the power supply.

End.

Monitor

First, set the system to VGA mode. To do this in Windows 98, press the **F8** function key during startup. Safe mode (VGA) will be set for Windows 98. Use the operating system's video setup to change the monitor resolution.

If the monitor type is set to the power saving mode, the screen remains black and the LED lights or flashes in amber color. When the monitor is turned on alone, or is turned on and connected to a powered-off system unit, the monitor LED blinks in amber color. Under the normal operating conditions, the LED lights in green color.

NOTE: Some monitors have a detachable system I/O signal cable between the monitor and the system unit. Check the line voltage, power cord, and continuity for the system I/O signal cable before replacing the monitor. See "Monitor Port Signals" on page 5-15 for pin identification.

001 - START

Power off the system unit and monitor.

Remove all adapter cards.

Make sure that the monitor I/O signal cable is properly connected to the system unit and monitor.

Make sure that the power cords are properly connected to the system unit and monitor, and that the line voltage is correct.

Make sure that the monitor contrast and brightness controls are not turned too low.

Make sure that the diagnostics diskette is in the diskette drive.

Power on the monitor, and wait 20 seconds.

Power on the system unit.

NOTE: If the monitor was not sold together with the system unit, you may need to refer to the service information provided with the monitor.

002 - IS THE SCREEN READABLE? (YES, READ AHEAD. NO, GO TO STEP 004)

NOTE: If the screen shows a blinking cursor with no memory count running, answer this question "No".

Select **Interactive Tests** from the Main Menu.

Select and execute **Video** test from the menu.

Follow the prompts and perform the video test.

Go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-8.

NOTE: You might have to adjust the monitor controls to obtain the best image.

003 - DOES THE MONITOR SUCCESSFULLY PASS ALL TESTS? (YES, READ AHEAD. NO, GO TO STEP 004)

You have successfully completed the video diagnostics tests. If the problem remains, go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-8.

End.

004 -

Power off the system unit.

Remove the hard disk drive system cable.

Power on the system unit.

005 - IS THE SCREEN READABLE?

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

End.

Undetermined Problems

If an error code is present, go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-8. If no error code is present, continue with this check. Check the power supply voltages (see "Power Supply Cable Connector Specifications" on page 5-7). 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):

Load default settings in setup.

Check all system board jumper positions and switch settings.

Check all adapter card jumper positions.

Check all device jumper positions.

Check all cables and connectors for proper installation.

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

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

Non-IBM devices

External devices

Any adapters

Modem card, if installed

CD-ROM drive

Diskette drive

Hard disk drive

DIMM

Processor

System board

4. Power on the system unit.
5. Repeat steps 1 through 4 until you find the failed device or adapter.
6. If software related, reload software from Recovery CD.

If the symptom changes, go to "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-8 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.

Diagnostic Aids

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Introduction

This section explains the diagnostic aids, power-on self test (POST) and diagnostics program (PC-Doctor), 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. Several items are tested during POST, but is for the most part transparent to the user.

POST checks the following:

- System Board
- Memory
- SVGA Controller
- Hard Disk Drive(s)
- Floppy Diskette Drive(s)
- Keyboard
- Mouse
- Parallel Port(s)
- Serial Port(s)
- CD-ROM Drive(s)
- Sound Controller

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

1. The IBM Aptiva logo will appear on center of the screen.
2. At this time one of two hot-keys may be used. The F1 key, as described on screen, will cause the system Setup Utility menu to appear. The F9 key will switch the graphical IBM logo screen to the traditional text-based system startup screen, which displays BIOS version and system memory tested. For Aptiva, the F9 key will only work after exiting BIOS Setup.
3. If an error is detected during POST, the IBM logo screen will automatically switch to the text-based screen and display the error message or code with a beep. Depending on the criticality of the POST error, the system may halt and/or display the message "Press F1 to go to the Setup or Enter to continue".

If this message appears, pressing the Enter key will allow the system to attempt to proceed despite the reported error; pressing F1 will cause the system Setup Utility menu to appear.

4. If no keyboard keys are pressed, and if POST is completed without errors, the system will then proceed with the loading of DOS or other operating system from diskette drive A or a hard disk drive or CD-ROM drive, depending on the options selected in the Setup Utility.

If any errors are detected by POST, there will be an error message accompanied with an error code shown on display screen and a beep. See "Index of Symptoms, Messages, Error Codes, or Beeps" on page 2-8 to find the most likely cause and countermeasure.

Diagnostics Tools

WARNING: This manual is intended to test the IBM Aptiva 2156 machine type only. Testing devices which are not included with the original product package, including other IBM products, prototype cards, or modifying hardware settings may give false errors and invalid system responses. The diagnostics not specifically made for this model may also report incorrect errors and information.

The diagnostics program comes on a CD (compact disk) along with this book. This version of PC-Doctor diagnostics program, developed by Watergate for IBM, is the primary method of testing the computer. You can use it to test the IBM components of the system and some external devices. The amount of time required to test components depends on the number of components installed and selected. The more devices you have attached to your system and selected in PC-Doctor, the longer the testing will take.

Using Diagnostics Program from Recovery CD

1. Insert the Aptiva recovery CD into the CD-ROM drive then restart computer.
2. Press F1 while POST to enter BIOS Setup menu. Select and enter "BIOS Features Setup", set "Boot Sequence to CD-ROM, A, C". Save and exit from BIOS Setup.
3. When screen prompts to install original software, type N to exit the installation program. Then type PCDR and press Enter to start the diagnostics program. Follow the instructions on the screen to operate the diagnostics program.

Diagnostics Program Features

Diagnostics program (PC-Doctor for DOS) includes the following features:

Main Menu Selections	Submenu Selections
Diagnostics	<ul style="list-style-type: none">• System Test• Memory Test• Hard Disk Test• Floppy Disk Test• All Tests
Interactive Tests	<ul style="list-style-type: none">• Keyboard• Video• Internal Speaker• Mouse• Joystick Test• Diskette• Printer Test• SCSI Test• CD-ROM/DVD Test• Stereo Speaker

Table 3-1 Diagnostics Program Main Menu Selections	
Hardware Info	<ul style="list-style-type: none"> • System Configuration • Memory Contents • IRQ and DMA Use • Device Drivers • COM and LPT Ports • Physical Disk Drives • Logical Disk Drives • VGA Information • Software Interrupts • SCSI Devices • I/O Use • IDE Drive Info • Network Information • PCMCIA Information • PCI Information • SMP Information • PNPISA Info • DMIBIOS Info
Utility	<ul style="list-style-type: none"> • File Editor • Surface Scan Hard Disk • Terminal • Tech Support Form • Battery Rundown • Select Language
Quit	<ul style="list-style-type: none"> • Exit Diags • Park HD • Reboot • Upgrade Now

Repair Information

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Removals and Replacements

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, DIMMs, 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.

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 the direction 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 failing FRU.

To replace a FRU, reverse the removal procedure and follow any notes that Pertain to replacement.

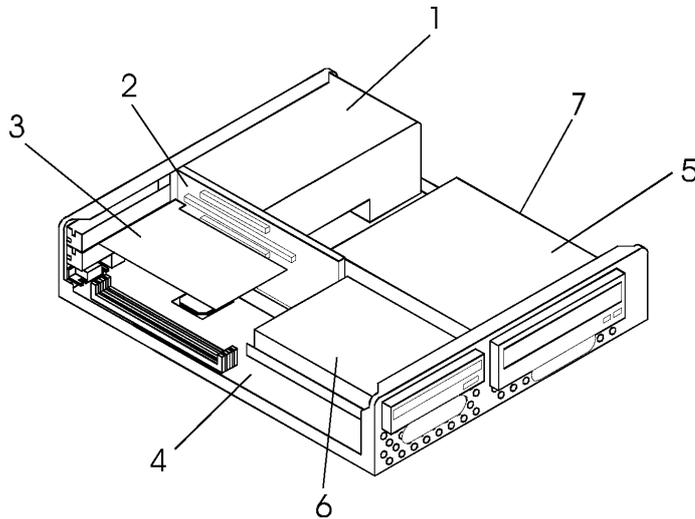
Before disconnecting any cables, note their location and orientation.

Reinstall any new FRUs with cabling in their original location.

Identifying the Parts of the System Unit

This computer system has 3 bays, each bay has an factory-installed drive in it. The devices are 3.5" Diskette, 32X CD-ROM drive and 3.2GB hard disk. Diskette drives in this unit use the standard diskette advanced technology (AT) Interface. Hard disk and CD-ROM drives in this unit use an integrated drive Electronics (IDE) AT interface. This computer supports the American National Standard Institute (ANSI) standard for AT attachment disk drives and CD-ROMs.

This system has 2 interface cards slots for adapter card expansion. One is the Peripheral Component Interconnect (PCI) interface, the other is the Industry Standard Architecture (ISA) / PCI shared slot. In the PCI/ISA shared slot. You are only allowed to insert one PCI or ISA adapter card into the PCI/ISA shared slot.



1. Power Supply
This is a 92.85-watt switching power supply.
2. IO slot
The riser card has 1 PCI and 1 PCI/ISA slot.
3. Modem card
This machine has a factory-installed Data/Fax card for data transmission
4. System board
5. CD-ROM Drive
This machine has a factory-installed 32X CDROM drive.
6. Floppy Diskette Drive
This machine has a factory-installed 3.5" 1.44MB Floppy drive.
7. Hard Disk Drive
This machine has a factory-installed 3.2GB or 4.2GB hard disk drive.
(Only the D1N and D1J models have 3.2GB hard disk drive, the other models have 4.2 GB hard drive)

Top Cover

To remove the top cover of this system unit:

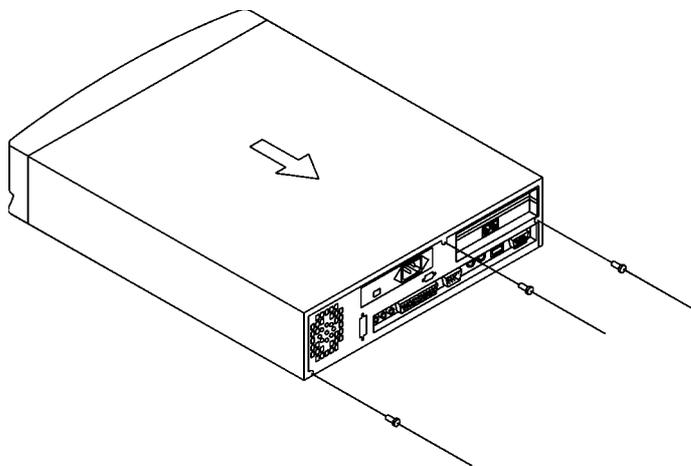
Remove the screws at the back of the desktop that secures the top cover.

Hold on the upper brim of the front covers, and pull it toward the back about 2 centimeters away.

Pick up the top cover upward and remove it completely.

Touch the bare metal frame of your computer unit to dissipate the static electricity from your body. Do not touch any component with a voltage warning label.

Disconnect the system unit power cord.



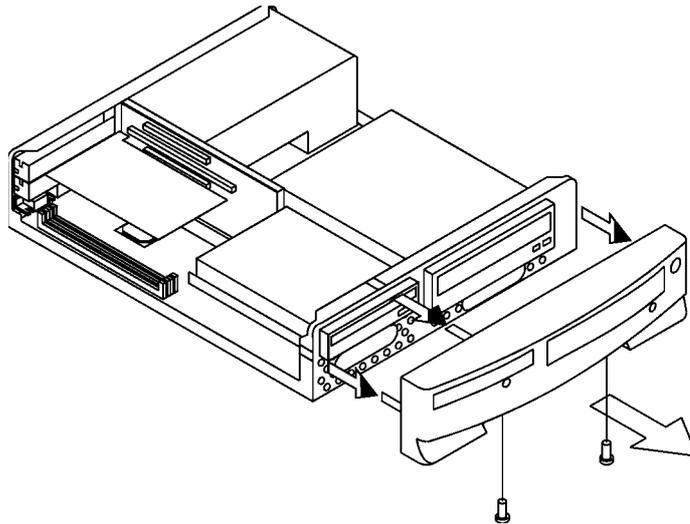
Front Bezel

To remove the front bezel, you must remove the top cover first.

Remove the two screws from the bottom of the cover

Uncouple the three undercuts with the system unit

Pull the front panel from the system unit

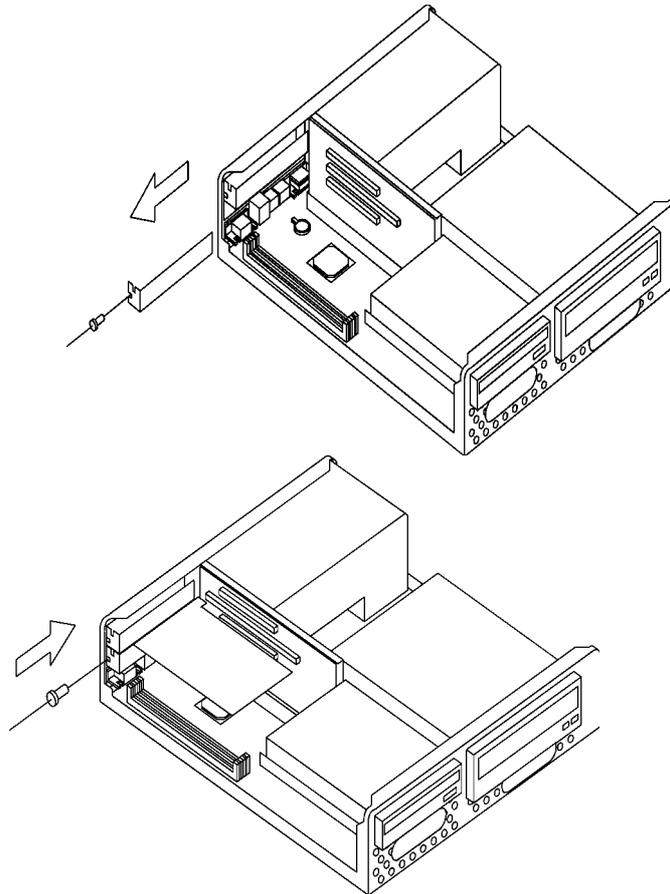


Adapter Cards

Installing Adapter Cards

Remove the screw that secures the adapter card slot cover. Then remove the slot cover.

Align and insert the adapter card into the adapter card connector. Secure the card with the screw that you removed in the first step. Reinstall all hardware and screws that you removed prior to the installation of the adapter card.



Removing Adapter Cards

Follow these steps to remove an adapter card:

Position the system unit so that the card is accessible to you.

If the adapter card has cables, disconnect them. Be sure to take note of where the Cable are connected. You will have to reconnect these cables when you reinstall the card.

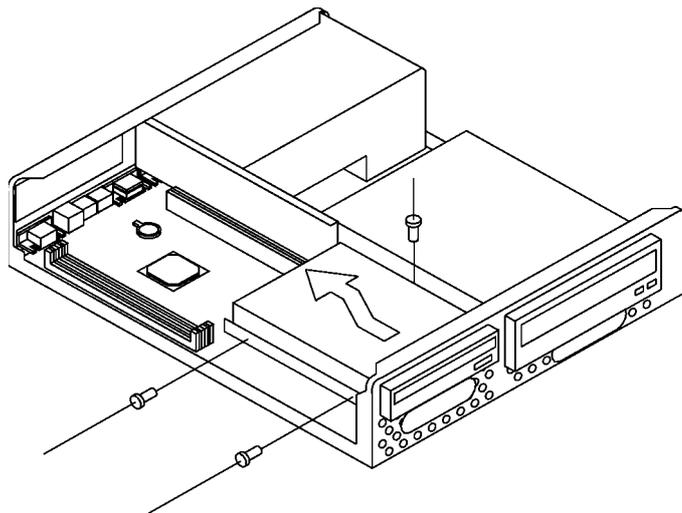
Firmly hold the adapter card and carefully pull it from the card connector.

If you are not reinstalling the card, reinstall all hardware and screws that were removed prior to the removal of the adapter card.

Diskette Drive

To remove the diskette drive or to change the system board component under the diskette drive bay:

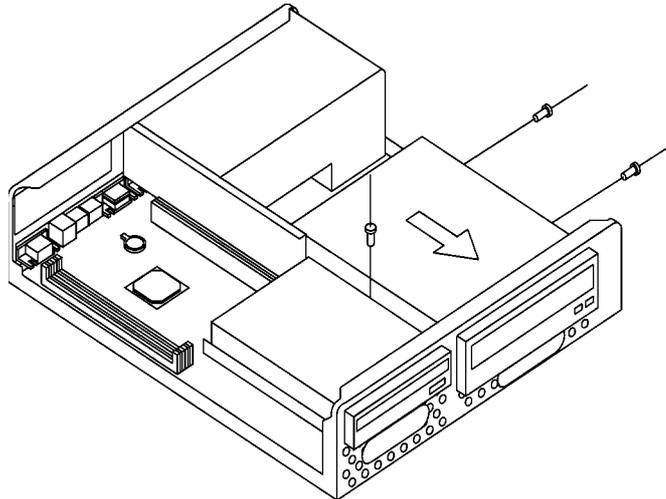
1. Disconnect the power and signal cables from the diskette drive.
2. Remove the three screws that secure the diskette drive.
3. Pull the diskette drive backward from the front of the unit and pick it up to remove it.



CD-ROM Drive

To remove CD-ROM Drive or replace the BIOS chip which is on the system board under the CD-ROM drive bay:

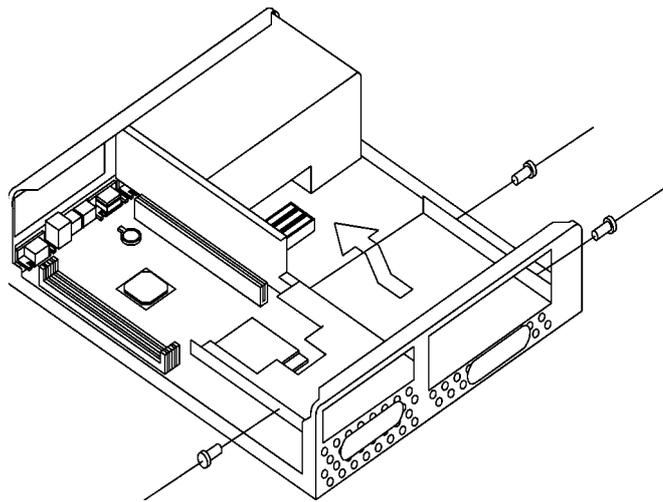
1. Disconnect the power and signal cables from the CD-ROM drive.
2. Removing the screws that secure the CD-ROM drive.



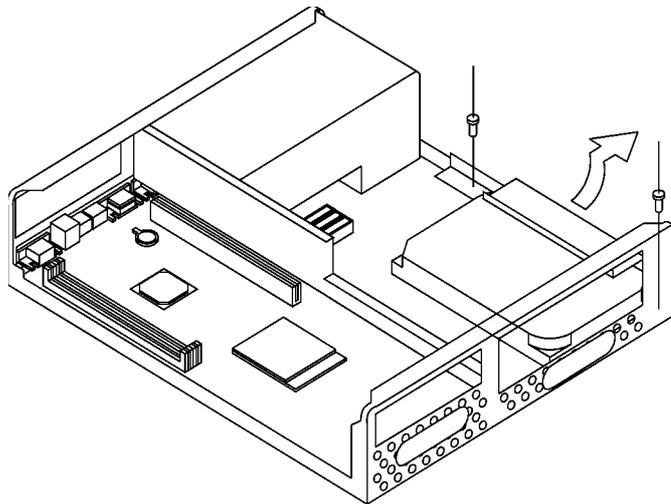
Hard Disk Drive

To remove or replace the hard disk drive:

1. Removing the diskette and CD-ROM drive. See “Removing the diskette drive” on page 4-9. See “Removing the CD-ROM drive” on page 4-10
2. Remove the three screws that secure the system metal frame and the bay holder, which holds the diskette and CD-ROM drive.



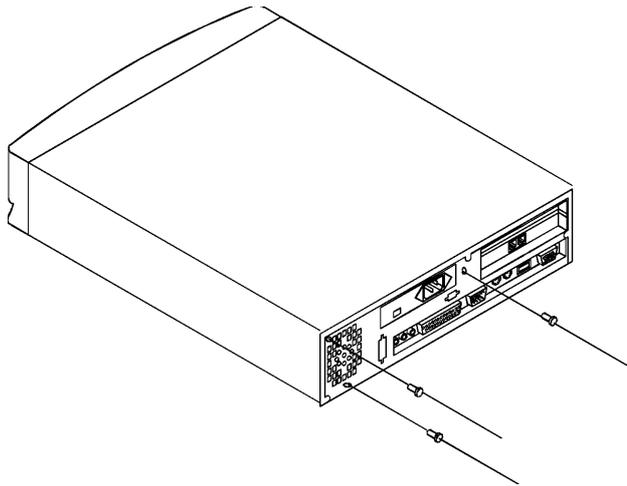
3. Grasp both sides of the bay holder. Push the bay holder forward the back of the system unit to uncouple it from the system metal frame.
4. Pick the bay holder upward and remove it completely
5. Disconnect the power and signal cables from the hard disk.
6. Remove the two screws that couple the hard disk bay with the system metal frame.



Power Supply

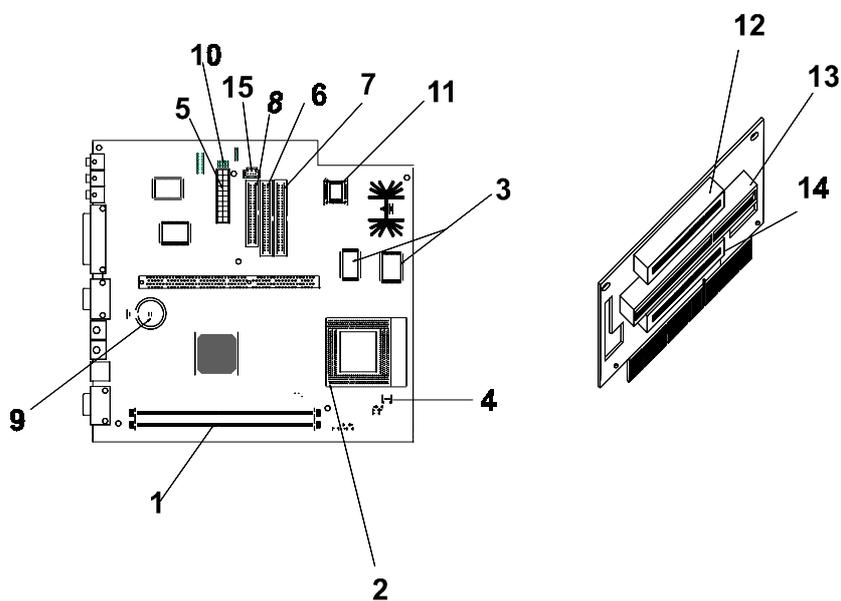
This system has a 92.85-watt switching power supply.

1. To remove the power supply. You must remove the top cover first.
2. Disconnect the power cable from the system board.
3. Remove the screws in the back that secure the power supply.



System Board

1. To remove the system board. You must remove the Diskette drive, CD-ROM drive and Power Supply.
- 2.Remove the screws that secure the system board.

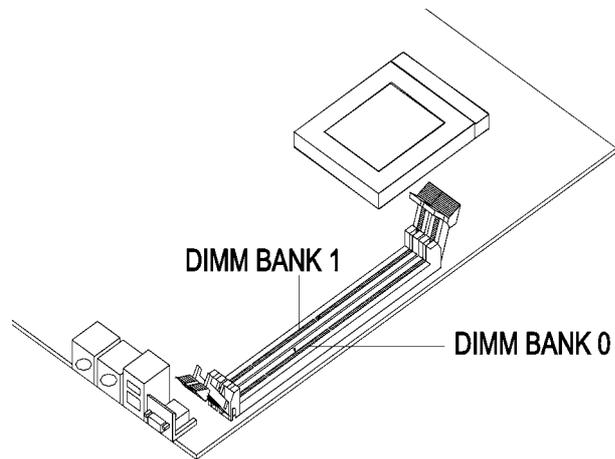


- | | |
|----------------------------|--|
| 1.DIMM | 9.System Battery |
| 2.CPU | 10.HDD Led, Power Led and Power switch Led Connector |
| 3.Level II Cache | 11.Flash ROM BIOS |
| 4.CPU Fan Connector | 12.CDROM signal Connector |
| 5.Power Supply Connector | 13.ISA Slot |
| 6.Primary IDE Connector | 14.PCI Slot |
| 7.Secondary IDE Connector | 15.CD-in Connector |
| 8.Diskette Drive Connector | |

Memory (DIMM)

Your System has 2 system memory module sockets, bank0 and bank1. These sockets hold dual in line memory modules (DIMM) that contains 3.3V signal or double-sided synchronous DRAM (SDRAM).

The maximum memory size is 256 MB total.



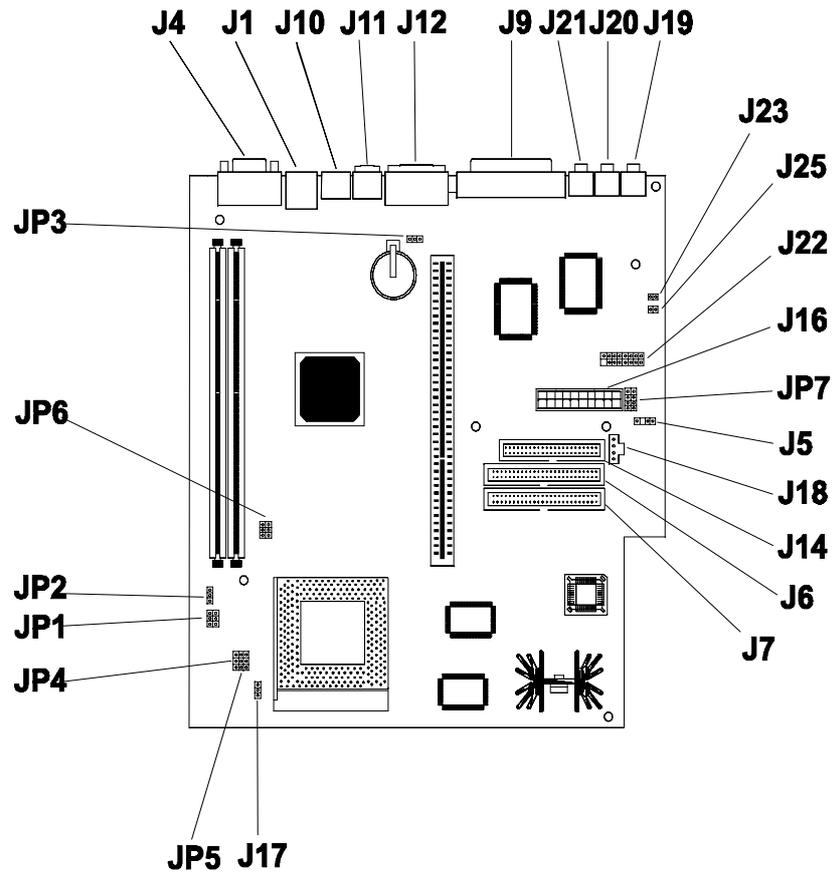
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Introduction

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 settings for the hard disk drive, CD-ROM (compact disc-read-only memory) drive, and the connector information for modem adapter card.

Machine Type 2156 System Board Layout



NOTE: The blackened pin of a jumper represents pin 1.

Figure 5-1 Machine Type 2156 System Board Jumpers and Connectors Locations.

2156 System Board Jumper Settings

Table 5-1 Machine Type 2156 System Board Jumper Settings			
Jumper/Settings		Function	
JP6 ICS9148F-25 Jumper connected 1-3 4-6 1-3 2-4 3-5 2-4		Bus Frequency(MHz) CPUCLK PCICLK 60 30 66 33 75 30	
CPU Core Clock Multiplier Jumper connected <u>JP2</u> <u>JP1</u> 1-3 4-6 1-2 1-3 2-4 1-2 3-5 2-4 1-2 3-5 4-6 1-2 1-3 4-6 2-3 1-3 2-4 2-3 3-5 2-4 2-3 3-5 4-6 2-3		CPU Clock Frequency Ratio 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5	
CPU Vi/o Vcore Voltage Jumper connected <u>JP4</u> <u>JP5</u> 3-5 2-4 1-3 2-4 1-3 2-4 1-3 2-4 1-3 2-4 1-3 4-6 1-3 2-4 3-5 2-4 3-5 4-6 3-5 2-4		Voltage 2.24 2.84 2.94 3.24 1.94	
JP3 CMOS data clear-up Jumper connected 1-2 2-3		Function Normal Clear	
JP7 Jumper connected to Front Panel 1-3 2-4-6 5-7		Indication Power Switch ACP LED HDD LED	

2156 Processor Type Jumper Settings

WARNING: You must verify the exact processor type before setting the processor type jumpers. The wrong processor type jumper setting may damage the CPU. The system only supports dual-voltage CPU.

CPU Types		AMD K6-2/333M CPU
JP1	1-3	O
	2-4	O
	3-5	X
	4-6	X
JP2	1-2	O
	2-3	X
JP4	1-3	O
	2-4	X
	3-5	X
	4-6	O
JP5	1-3	O
	2-4	O
	3-5	X
	4-6	X
JP6	1-3	X
	2-4	O
	3-5	O
	4-6	X

O – Jumper connected
X – Jumper opened

2156 System Board Connectors and Functions

Table 5-3 System Board Connector Functions	
Connector	Function
J4	VGA port
J1	USB port
J10	PS/2 keyboard port
J11	PS/2 mouse port
J12	COM1 port
J9	Printer Port
J21	Microphone-in port
J20	Stereo Line-in port
J19	Stereo Line-out port
J23	Internal Speaker connectors(R)
J25	Internal Speaker connectors(L)
J22	Game port
JP7	Power button(pins 1,3) ACP LED(pins 2,4,6) HDD LED(pins 5,7)
J5	Internal Buzzer(pins 1-2: active)
J16	ATX power connector
J18	CD-in connector
J6	HDD connector
J7	CD-ROM connector
J14	Floppy Disk Drive connector
J17	3-pin CPU fan connector

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 short the connector JP7 (with the switch cable disconnected from the connector on the system board) or use a connection (jumper) to short the black and green wires of the 20-pin connector on power supply.

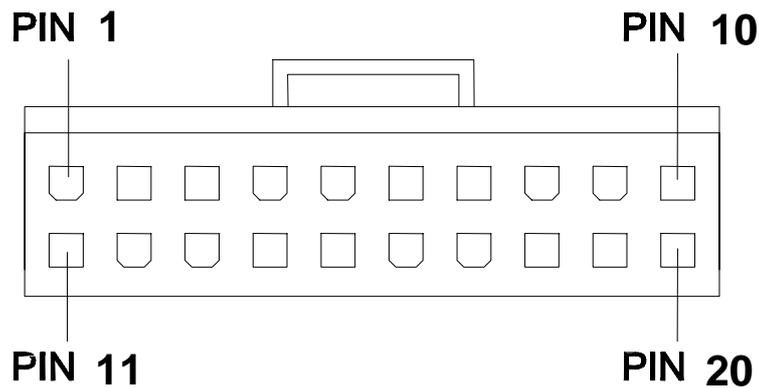


Figure 5-2 System Board Power Supply Connectors

Main Output Pin Assignment

Table 5-4 Main Output Pin Assignment		
Pin	Function	Color
1	EMPTY	EMPTY
2	EMPTY	EMPTY
3	COMMON	BLACK
4	+5Vdc	RED
5	COMMON	BLACK
6	+5Vdc	RED
7	COMMON	BLACK
8	POWER GOOD	GRAY
9	+5Vs	PURPLE
10	+12Vdc	YELLOW
11	EMPTY	EMPTY
12	-12Vdc	BLUE
13	COMMON	BLACK
14	P.S-on	GREEN
15	COMMON	BLACK
16	COMMON	BLACK
17	COMMON	BLACK
18	-5Vdc	WHITE
19	+5Vdc	RED
20	+5Vdc	RED

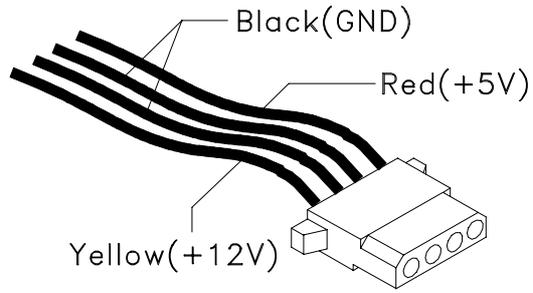


Figure 5-3 Hard Drive or CD-ROM Power Cable Connector

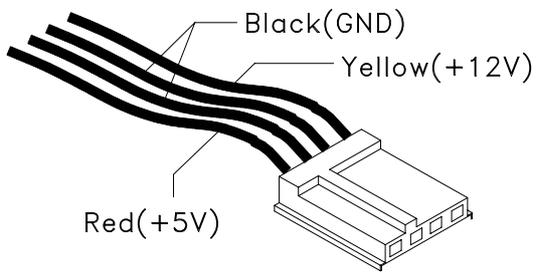


Figure 5-4 3.5-In. Diskette Drive Power Cable Connector

Factory-Installed Modem Card Layout

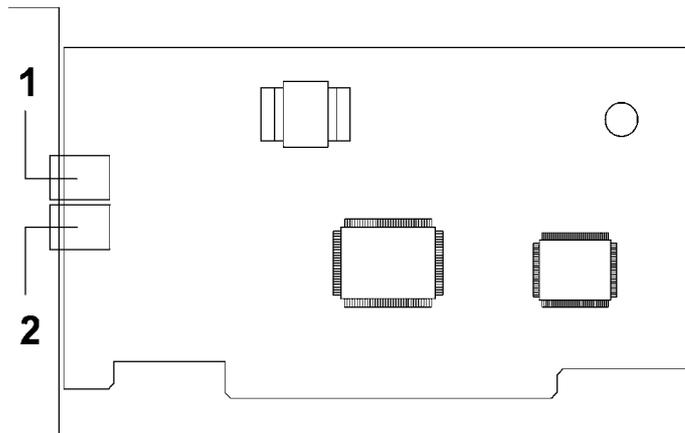


Figure 5-5 Factory-Installed Modem Card Layout

Factory-Installed Modem Card Connector Functions

Table 5-5 Factory-Installed Modem Card Connector Functions		
Item	Function	Connect to...
1	Telephone line-out Some modem adapters may come without this jack.	Telephone set
2	Telephone line-in	Telephone line

NOTE: Care should be taken while connecting the voice-in/speaker-out connector. The longer exposed end (approx. 15mm) of the cable should be connected to the modem card. The other end should be connected to the system board.

3.5-In. Hard Disk Drive Jumper Locations

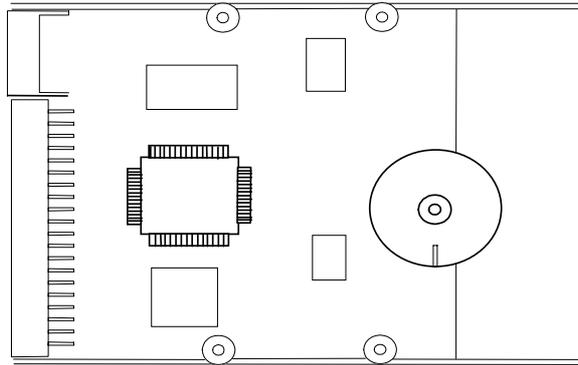


Figure 5-6 3.5-In. Hard Disk Jumper Locations

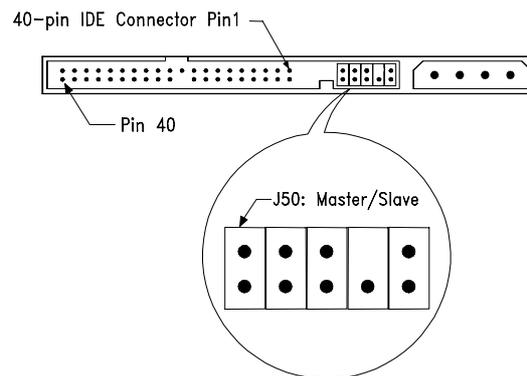


Figure 5-7 3.5-in Hard Disk Jumper Settings Locations

3.5-In. Hard Disk Drive Jumper Settings

The configuration of the following jumpers controls the drive's mode of operation:

Maxtor Hard Disk Drive

J50:Master/Slave	DESCRIPTION
On	Drive configured as a Master, or Drive configured as a Master, with an attached Slave
Off	Drive configured as a Slave.

CD-ROM Drive

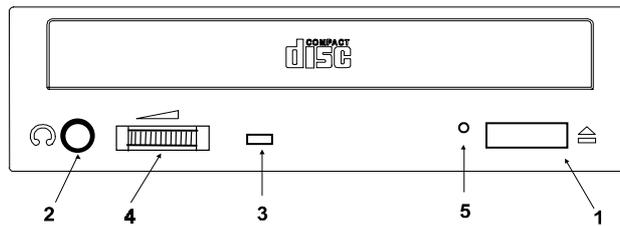


Figure 5-8 CD-ROM Front Panel

Item	Description
1	Load / eject button
2	Headphone jack
3	Power-on / busy indicator, lights up in green color while disc is set in ready state; lights up and flashes in amber color during data read or seek operation.
4	Headphone volume control
5	Emergency eject hole. See CD-ROM Emergency-exit below.

CD-ROM Emergency-exit

15mm Typical



If for any reason the tray does not eject automatically, insert and press an eject-bar inside the emergency eject hole to manually eject the tray. A straightened paper clip with a diameter of 1.2 mm (typical) can be used as an eject-bar.

NOTE: Make sure to turn off the power before manual disc eject operation.

CD-ROM Drive Rear Panel Connectors and Features

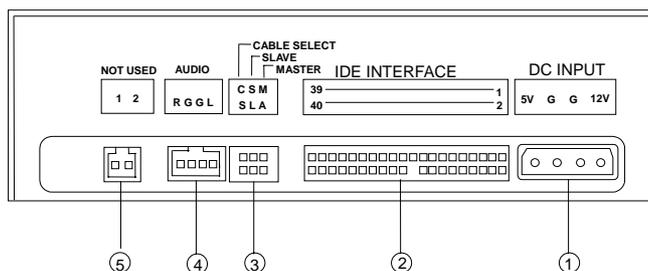


Figure 5-9 CD-ROM Rear Panel

Item	Function	Connect to...
1	Power supply connector	Power supply
2	Interface connector	System board (J7)
3	Configuration jumper. See Table 5-9.	--
4	Audio line out connector	System board (J18)
5	NOT USED	--

CD-ROM Drive Jumper Settings

CS	SL	MA	DESCRIPTION
--	--	On	Drive configured as a Master. (default)
--	On	--	Drive configured as a Slave.
On	--	--	Cable select

DIMM Configurations

The 2156 system board has two DIMM sockets. A maximum of 256KB memory may be installed.

You can install 16MB, 32MB, 64MB, or 128MB DIMM in any sockets and with any combinations.

System Board Connector Pin Signals

Monitor Port Signals

Pin	Signal Name	I/O	Pin	Signal Name	I/O
1	Red Video	O	9	+5 V dc	N/A
2	Green Video	O	10	Synch Ground	N/A
3	Blue Video	O	11	No Connection	N/A
4	No Connection	N/A	12	Monitor ID Bit 1	I
5	Synch Ground	N/A	13	Horizontal Synch	O
6	Red Ground	N/A	14	Vertical Synch	O
7	Green Ground	N/A	15	Monitor ID Bit 3	I
8	Blue Ground	N/A			

Serial Port Signals

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

Parallel Port Signals

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

Mouse Port Signals

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

Keyboard Port Signals

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

Diskette Drive Cable Connector Signals

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

IDE Cable Connector Signals

Pin	Signal Name	I/O	Pin	Signal Name	I/O
1	Host Reset	O	21	DMA Request	I
2	Ground	N/A	22	Ground	Power
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	N/A
9	Host Data 4	I/O	29	DMA Acknowledge	O
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	N/A
13	Host Data 2	I/O	33	Host A1	O
14	Host Data 13	I/O	34	No Connection	N/A
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	ACTIVE bar	I
20	No Connection	N/A	40	Ground	Power

Safety Inspection Guide

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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 necessary functions 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.

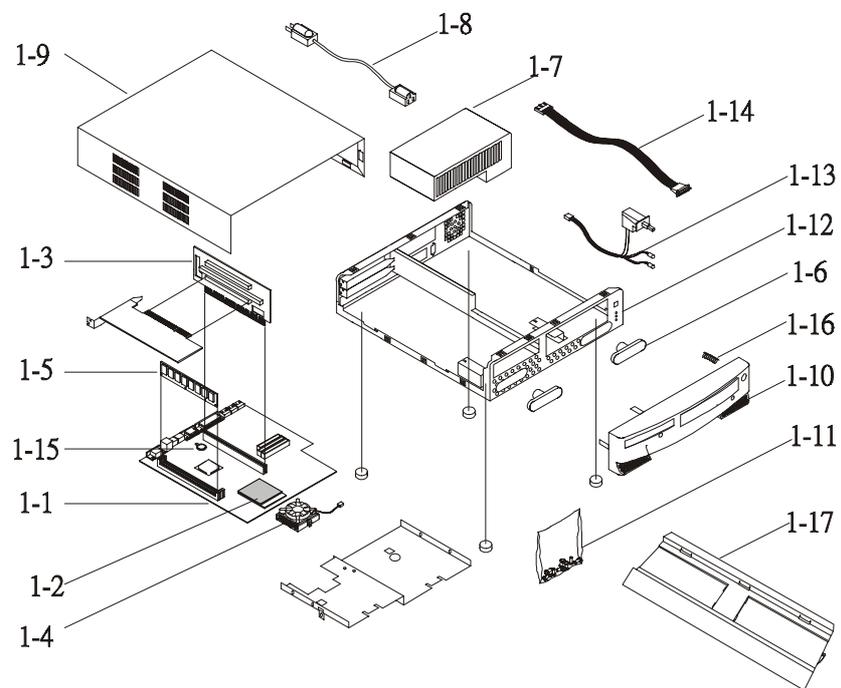
Check the following items:

- 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.

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Assembly 3 : Machine Type 2156 CD-ROM, Modem Card	7-6
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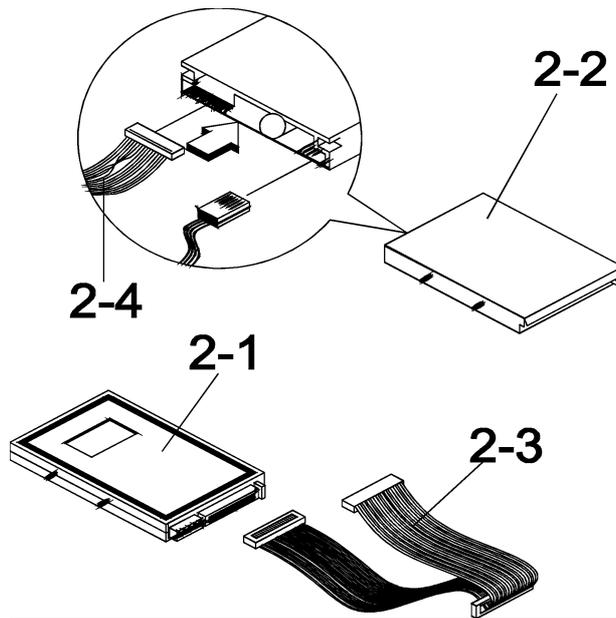
Assembly 1 : Machine Type 2156 System Unit



Asm-Index	FRU Number	Description
1-1	00K8750	Main Boards/Pro-860A, for model D1J and D1N only
1-1	36L9136	Main Boards/Pro-860B, for all the models except D1J and D1N
1-2	00K8487	CPU – IMD PR300 225/75MHZ, for models D1J and D1N only
1-2	36L9129	CPU -- AMD K2-2/333 MHz for all the models except D1J and D1N
1-3	00K8494	Riser Card
1-4	00K8486	CPU Cooler (Fansink)
1-5	00K8751	32MB Dimm
1-5	36L9135	64MB Dimm, for model 133 and model 143 only
1-6	00K8493	Speaker- 2 Watt, 8 Ohm Zeetek Internal w/cable
1-7	00K8492	Power Supply- 92.85W Delta
1-8	36L9014	Power Cord-CSA/UL 10A/125V Cordset US/CE
1-8	36L9015	Power Cord-T-Mark 10A/125V w/o adapter Japan
1-8	36L9141	Power Cord, 10/A 250V Hong Kong
1-8	36L9142	Power Cord, CCIB 10A/125W China
1-9	00K8497	Top Cover
1-10	00K8498	Front Bezel
1-11	00K8496	Screws Pack (3 Types) m3*0.5MM/#6-32*3/16"/#4 7.7MM+Washer)

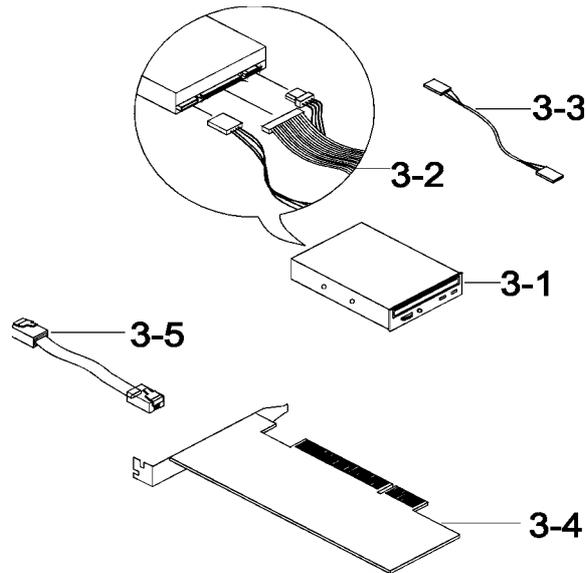
1-12	00K8491	Chassis
1-13	00K8495	Power Switch/Led Cable Asm
1-14	00K8188	Game Port Cable
1-15	36L9077	CMOS Backup Battery (CR2032) 3V
1-16	36L9137	Spring, Power Switch On-Off
1-17	36L9139	System Stand, Japan

Assembly 2 : Machine Type 2156 FDD, HDD Drive



Asm-Index	FRU Number	Description
2-1	00K8488	3.2 GB HDD, for models D1J and D1N only
2-1	36L9131	Seagate 4.2 GB HDD, for all models except D1J and D1N
2-2	00k8489	3.5" FDD, for models D1J and D1N only
2-2	36L9130	3.5" FDD, for all models except D1J and D1N
2-3	00K8184	HDD Cable
2-4	00K8185	FDD Cable

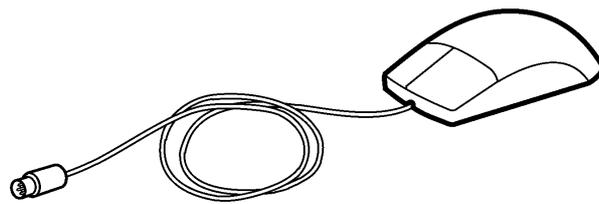
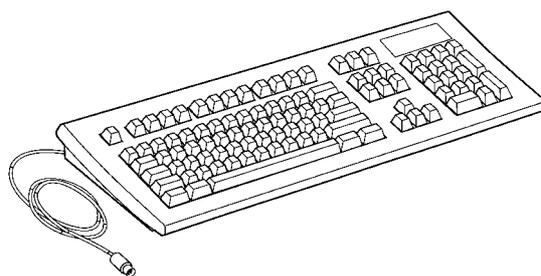
Assembly 3 : Machine Type 2156 CD-ROM, Modem Card



Asm-Index	FRU Number	Description
3-1	00K8490	32X CD-ROM Drive
3-2	00K8186	CD-ROM Cable
3-3	00K8189	CD-ROM Audio Cable
3-4	36L9045	Modem-56K US/Can GVC F1156 IV/R1A, for model D1N only
3-4	36L9047	Modem-56K Japan GVC F1156IV/R1A, for model D1J only
3-4	36L9132	Modem-56K US/CE GVC F1156IV/R3, for Model 140 only
3-4	36L9133	Modem-56K Japan GVC F1156IV/R3, for models 133 and 143 only

3-4	36L9134	Modem-56K China/Hong kong/Taiwan GVC F1156VI/R3, for models 144, 145 and 146 only
3-5	36L9016	Phone Cord, 7'

Assembly 4 : Machine Type 2156 Keyboard and Mouse



Asm-Index	FRU Number	Description
4-1	76H5080	Mouse-2 button Sleek Logitech M-S34
4-2	28L1823	Keyboard-PC Next A w/o palm rest - US English, for D1N only
4-2	28L1858	Keyboard-PC Next A w/o palm rest – Japan, for model D1J only
4-2	33L1154	Keyboard-Cameo lite w/o palm rest-US English/China, for model, for models 140 and 146 only
4-2	33L1187	Keyboard-Cameo lite w/o palm rest-Japan, for models 133 and 143 only
4-2	33L1188	Keyboard-Cameo lite w/o palm rest-Hong Kong/ Taiwan, for models 144 and 145 only

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Appendix B. 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/us/ibmhome/>

Aptiva Home Page

<http://www3.pc.ibm.com/support>

Aptiva Product Specifications and Support

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