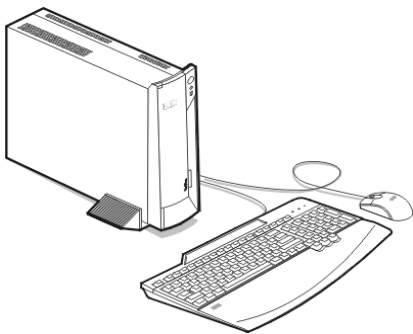




## **Hardware Maintenance Service for Service Level A**

Machine Types 6644, 6645 and 6646



**6644/6645/6646**

First Edition (May, 2000)

The following paragraph does not apply to any state or country where such provisions are inconsistent with local law: INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

References to IBM products, programs, or services do not imply that IBM intends to make them available outside the United States. This publication could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be made in later editions. IBM may make improvements and/or changes in the product(s) and/or the program(s) at any time. Address comments about this publication to IBM Corporation, Dept. E23/962-2, 455 Park Place, Lexington, KY 40511-1856, USA. Information you supply may be used by IBM without obligation. For copies of publications related to this product, call toll free 1-800-IBM-7282 in the Continental U.S.A. In Canada, call toll free 1-800-465-7999.

**© Copyright International Business Machines Corporation 2000.  
All rights reserved.**

Note to U.S. Government Users - Documentation related to restricted rights - Use, duplication or disclosure is subject to restrictions set forth in GSA ADP Schedule Contract with IBM Corp.

---

# Contents

<b>Contents</b> .....	<b>III</b>
<b>Notices</b> .....	<b>VII</b>
Safety Information .....	VIII
Laser Compliance Statement .....	XXX
Trademarks .....	XXXI
Preface .....	XXXII
<b>General Information</b> .....	<b>1</b>
Introduction .....	2
Product Overview .....	3
Processors (Machine Type 6644) .....	3
Processors (Machine Type 6645/6646) .....	3
Memory .....	3
External Ports.....	4
Hard Disk Drive .....	4
CD-ROM Drive .....	4
Multimedia.....	4
Video .....	4
Power Management .....	5
Power Supply .....	5
Internal Cabling .....	5
Keyboard.....	5
Mouse .....	5
Hardware Interfaces .....	6
CMOS Reset .....	7
Power-On Password .....	8
Flash (BIOS) Update Procedure .....	9
BIOS-contained Model Number and Serial Number .....	10
BIOS Configuration/Setup Utility .....	12
Working with the Setup Menus .....	12
Viewing System Information, and Product Data .....	15
Devices and I/O ports.....	16
Startup Options .....	19
Date and Time.....	21
System Security .....	21
Advanced Setup.....	24
Power Management .....	25
Specifications .....	27
Dimension (width x depth x height).....	27
Weight.....	27
Environment.....	27

Electrical input.....	27
Operating Requirements .....	28
<b>Check Procedures .....</b>	<b>29</b>
Introduction .....	30
Start .....	31
Index of Symptoms, Messages, Error Codes, or Beeps .....	36
Troubleshooting .....	55
Factory-Installed Storage Devices .....	55
Audio (Not Supported by Diagnostics Program) ..	59
CD-ROM Drive .....	62
Memory .....	64
Keyboard .....	65
Mouse .....	66
Power Supply .....	68
Monitor .....	70
Undetermined Problems .....	72
<b>Diagnostic Aids .....</b>	<b>75</b>
Introduction .....	76
Power-On Self Test .....	77
Diagnostic CD .....	79
Using the Diagnostic CD .....	79
Using Diagnostic Program from Recovery CD .....	80
Diagnostics Program Features.....	81
<b>Repair Information .....</b>	<b>83</b>
Removals and Replacements .....	84
Cover.....	85
Processor and Fansink .....	86
Memory (DIMM) .....	89
Adapter Card.....	90
Internal Speaker.....	91
USB Port .....	92
CD-ROM Drive .....	93
Hard Disk Drive .....	95
Power Supply .....	97
Power Button/Indicator LED and Cable .....	98
System Board.....	99
System Backup Battery.....	100
Handling ESD-Sensitive Parts .....	101
Software Recovery Procedure .....	102
<b>Parts/Test Point Locations .....</b>	<b>103</b>
Introduction .....	104

System Board Jumpers and Connectors .....	105
Power Supply Connectors and Voltages .....	107
Network Cards .....	109
3.5-In. Hard Disk Drive Jumper Settings .....	110
CD-ROM Drive .....	113
CD-ROM Drive Rear Panel Connectors and Jumpers .....	115
DIMM Configurations .....	116
System Board Connector Pin Signals .....	117
Monitor Port Signals .....	117
IDE Cable Connector Signals .....	117
<b>Safety Inspection Guide .....</b>	<b>119</b>
General Guidelines .....	120
<b>Parts Catalog .....</b>	<b>121</b>
Abbreviations .....	122
System Assembly .....	123
Assembly 1a: System Unit- Interior .....	123
Assembly 1b: System Unit - Exterior .....	126
Assembly 2: Hard Drive .....	127
Assembly 3: CD-ROM Drive .....	128
Assembly 4: Power Cord .....	129
Assembly 5: Keyboard and Mouse .....	131
<b>Appendix A. FRU Number List .....</b>	<b>133</b>
<b>Index .....</b>	<b>137</b>



---

## Notices

References in this publication to IBM products, programs, or services do not imply that IBM intends to make these available in all countries in which IBM operates. Any reference to an IBM product, program, or service is not intended to state or imply that only IBM's product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any of IBM's intellectual property rights, or other legally protectable rights, may be used instead of the IBM product, program, or service. References in this publication to IBM products, programs, or services are purely hardware-related and do not cover circumstances of software problems. Evaluation and verification of operation in conjunction with other products, program, or services, except those expressly designated by IBM are the user's responsibility.

IBM may have patents or pending patent applications covering subject matter in this document. The featuring of these patents, pending or otherwise, in this document does not give you any license to these patents. You can send license inquires, in writing, to the IBM director of Commercial Relations, IBM Corporation, Purchase, NY10577.

### Voltage Supply Switch Settings

Your IBM Personal Computer might have voltage switches, which must be set correctly for your voltage supply. If your monitor or system unit has a voltage switch, complete these steps to make sure each switch is set correctly:

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

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

### IMPORTANT:

When replacing the battery, use only IBM Part Number 33F8354 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 the battery as required by local ordinances or regulations.



**IMPORTANT:**

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.



**IMPORTANT:**

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.

<b>Para Conectar</b>	<b>Para Desconectar</b>
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 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。

## 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。

• 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。

• 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。





## **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.

<b>Connexion</b>	<b>Déconnexion</b>
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:**

Certaines 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:**

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.

<b>Kabel anschließen</b>	<b>Kabel lösen</b>
1. Alle Geräte ausschalten und Netzstecker ziehen.	1. Alle Geräte ausschalten.
2. Zuerst alle Kabel an Einheiten anschließen.	2. Zuerst Netzstecker von Steckdose lösen.
3. Signalkabel an Anschlußbuchsen anschließen.	3. Signalkabel von Anschlußbuchsen lösen.
4. Netzstecker an Steckdose anschließen.	4. Alle Kabel von Einheiten lösen.
5. Gerät einschalten.	



#### **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.



### **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.

<b>Per collegare</b>	<b>Per scollegare</b>
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.

**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.





**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.

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	연결해제하려면
1. 모든 스위치를 켜다.	1. 모든 스위치를 끄다.
2. 먼저 모든 케이블을 장치에 연결한다.	2. 먼저 모든 케이블을 장치에 제거한다.
3. 신호선을 콘센트에 연결한다.	3. 신호선을 콘센트에서 제거한다.
4. 전원을 콘센트에 연결한다.	4. 장치에서 모든 케이블을 제거한다.
5. 장치 스위치를 켜다.	

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.

다음을 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 2급 진공관(다이오드)이 들어 있습니다. 다음 사항을 명심하십시오.

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



## **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.

<b>Instrucciones de conexión</b>	<b>Instrucciones de desconexión</b>
1. Apague todos los componentes (OFF).	1. Encienda todos los componentes (ON).
2. En primer lugar, conecte todos los cables a los dispositivos.	2. En primer lugar, retire los cables de alimentación de las tomas.
3. Conecte los cables de señal a los receptáculos.	3. Retire los cables de señal de los receptáculos.
4. Conecte los cables de alimentación a las tomas.	4. Retire todos los cables de los dispositivos.
5. Encienda el dispositivo (ON).	

**IMPORTANT:**

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.

**IMPORTANT:**

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.



**IMPORTANT:**

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



The CD-ROM drive is certified in the U.S. to conform to the requirements of the Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J for Class 1 laser products.

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-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-ROM drive ensures that there is no exposure to laser radiation above a Class 1 level during normal operation, user maintenance, or servicing conditions.

---

## Trademarks

The following are trademarks of the IBM Corporation in the United States or other countries or both:

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

Intel, Pentium, MMX, EtherExpress, and LANDesk are trademarks or registered trademarks of Intel Corporation.

Microsoft, MS-DOS, Windows, and Windows NT are trademarks or registered trademarks of Microsoft Corporation.

Other company, product, and service names may be trademarks or service marks of others.

---

## Preface

This manual contains service information for the **6644/6645/6646 Service Level A (SL-A)** model of the IBM Personal Computer, worldwide. This manual is intended to be used as a stand-alone document to service machine type 6644/6645/6646 products. 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** provides step-by-step instructions that aid in locating the failing Field Replaceable Unit (FRU).

**Diagnostic Aids** explains 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.



---

# General Information

Introduction .....	2
Product Overview .....	3
Processors (Machine Type 6644) .....	3
Processors (Machine Type 6645/6646) .....	3
Memory .....	3
External Ports .....	4
Hard Disk Drive .....	4
CD-ROM Drive .....	4
Multimedia .....	4
Video .....	4
Power Management .....	5
Power Supply .....	5
Internal Cabling .....	5
Keyboard .....	5
Mouse .....	5
Hardware Interfaces .....	6
CMOS Reset .....	7
Power-On Password .....	8
Flash (BIOS) Update Procedure .....	9
BIOS-contained Model Number and Serial Number .....	10
BIOS Configuration/Setup Utility .....	12
Working with the Setup Menus .....	12
Viewing System Information, and Product Data .....	15
Devices and I/O ports .....	16
Start Options .....	19
Date and Time .....	21
System Security .....	21
Advanced Setup .....	24
Power Management .....	25
Specifications .....	27
Dimension (width x depth x height) .....	27
Weight .....	27
Environment .....	27
Electrical input .....	27
Operating Requirements .....	28

---

## **Introduction**

This chapter gives a general overview of the Machine Type 6644/6645/6646, describes the standard and optional features, and details functional and environmental specifications.

---

## Product Overview

Machine Types 6644, 6645, and 6646 have two low profile PCI slots. The 6644 system comes with the Intel Celeron processor family while the 6645 and 6646 comes with the Pentium III processor.

Listed below are 6644, 6645 and 6646 system features:

### Processors (Machine Type 6644)

- Processor in Flip Chip-Pin Grid Array (FC-PGA) package with integrated PBSRAM L2 cache (128KB)
- One of the following processors can be installed:
  - Celeron - 566 MHz internal, 66 MHz external.

### Processors (Machine Type 6645/6646)

#### Pentium III

- Processor in Flip Chip-Pin Grid Array (FC-PGA) package with integrated PBSRAM L2 cache (256K)
- One of the following processors can be installed:
  - Pentium III - 667/733/866 MHz internal, 133 MHz external

### Memory

- 128-KB Pipeline Burst Static RAM (PBSRAM) built-in Celeron processor for machine type 6644 and a 256-KB PBSRAM L2 cache built-in Pentium III processor for machine types 6645/6646.
- 168-pin Synchronous Dynamic Random Access Memory (SDRAM), Dual- in-line Memory Module (DIMM) sockets.
  - 2 memory sockets.
  - Supports 64-MB, 128-MB or 256-MB DIMM.
  - PC-100 (64-bit, non-ECC, 100MHz, 3.3volt) DIMMs with gold contacts (PC-133 memory running at 100 MHz)
  - Maximum memory is 512 MB.

## **External Ports**

- Video port (15-pin D-sub connector)
- Five USB ports (two USB ports located at the front bezel).
- Microphone-in jack
- Line-out jack
- Line-in jack
- RJ-45 connector

## **Hard Disk Drive**

- 3.5-in., 1-in. height IDE ATA-66 drive. (3.5-in may be in acoustic mounting bracket)
- 128 KB “look-ahead” cache memory inside the hard disk drive
- Average and minimum 12 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, 40X CD-ROM IDE/AT drive
- Read data and play audio from standard and mini CD-ROM and audio compact discs (audio CDs)

## **Multimedia**

- An internal single speaker with power connector

## **Video**

- Onboard video controller (Direct AGP, built-in Intel 810e chipset)

## **Power Management**

- Compliant to ACPI and supports Display Power Management Signaling (DPMS) monitor
- Software shutdown by Windows 2000
- System enters standby mode if any of following conditions are met:
  - Execute standby from Windows Start menu
  - Press system power button if it is configured to act as standby function.
  - System is idle and the standby timer set in the Windows Power Management Property elapses.

## **Power Supply**

- PC-98 compatible 95W ATX power supply
- Switchable high/low voltage selection

## **Internal Cabling**

- Two 40-pin ribbon cables for hard disk drive and CD-ROM drive.
- One 8-pin (6-wire) cable for hard disk, power LEDs and power switch.

## **Keyboard**

- Preferred USB or Rapid Access III USB keyboard with 1.8-m (5.8-ft.) cable

## **Mouse**

- 2 Button Sleek USB or ScrollPoint™ III USB 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 low profile PCI (Peripheral Component Interconnect) v2.1 compatible expansion slots that operates at 33 MHz bus speed.
Hard disk drives	Two PCI local bus Enhanced IDE v1.0 compatible hard disk drive interfaces that support: <ul style="list-style-type: none"><li>- PIO mode up to 5 mode</li><li>- DMA 32-bit access</li><li>- Ultra 66 Synchronous DMA (66M bytes/sec.).</li></ul>
CD/CD-R/W drive	5.25-in. high-performance, 40X CD-ROM or 4X2X24 CD-R/W 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.
Video	Physical interface is compatible with the IBM Personal System/2 (PS/2) VGA interface.
Ethernet	10/100 Mbps, Auto-negotiation for automatic speed selection PCI 32-bit bus master architecture provides high throughput with low CPU utilization
Audio	Compatible to Sound Blaster, Sound Blaster Pro and Windows Sound System
Pointing device	IBM USB-compatible mouse
Keyboard device	IBM USB-compatible keyboard
USB	Supports Universal HCI Specification for USB 1.0

---

## **CMOS Reset**

This system does not deny access to BIOS Setup Utility, if Administrative Password is not set. Execute “Load BIOS Default Settings” in BIOS Setup to clear the corrupted CMOS data. See “Loading Default Settings” on page 14.

---

## Power-On Password

A power-on password denies access to the system by an unauthorized user when the system is powered on. When a power-on password is active, the password prompt appears on the screen each time the system is powered on. The system starts after the proper password is entered. See “Power-On password” on page 22 for more information about how to change, remove and set password in BIOS Setup.

In some cases, you might be required to service a system with an active and unknown power-on password. To clear a password from the system, follow these steps.

1. Turn off system unit.
2. Unplug power cable from the electrical outlet.

**IMPORTANT:** Do not attempt these steps with the power cord plugged into the electrical outlet. The power supply maintains +5 Vdc of standby power when the power cord is plugged. System damage might result if the power cord is not unplugged during jumper setting.

3. Set JP7 to 2-3 position to clear BIOS setting as original manufacture setting. See “System Board Jumpers and Connectors” on page 105.
4. Plug power cable, turn on the system, and complete the BIOS clear procedure.
5. Turn off the system, unplug power cable from electrical outlet.
6. Set JP7 to the 1-2 position to enable password check process. See “System Board Jumpers and Connectors” on page 105.

**IMPORTANT:** To reinstall the password, the user must enter a password in the Setup Utility. If Enhanced Security is enabled and the password is forgotten, the system board must be replaced .



---

## Flash (BIOS) Update Procedure

**NOTE:** The flash update procedure will include entering the model number and serial number information in BIOS. The flash update procedure can be performed from a USB diskette drive, IDE CD-ROM drive, or a LS120 drive.

To run the Flash BIOS from a USB diskette drive or an IDE LS120 drive, do the following:

1. Prepare a diskette with the extracted files from LFJTxxA.EXE (xx is the revision level). You can get the latest Flash BIOS from the Web at <http://www.ibm.com/pc> and select support and then select computer type.
2. Be sure a properly running USB diskette drive or an IDE LS120 drive is connected to the computer and that the drive is selected when the computer is powered-on.
3. Insert the flash diskette into the USB diskette or LS120 drive A:.
4. Power-off the system and then, power-on the system to start the Flash BIOS.
5. Follow the utility instruction to complete the BIOS update procedure.
6. Wait for the update to complete.

**IMPORTANT:** Do not power-off the system while the BIOS is running, or the flash ROM will be destroyed.

7. Power-off system after the BIOS is completely updated.
8. For CD-ROM drive, insert the CD, power-off and then power-on the computer to start the Flash BIOS, then go to step 5.





---

## BIOS Configuration/Setup Utility

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

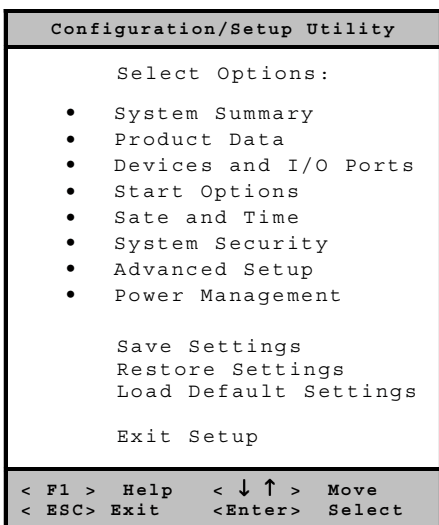
### Working with the Setup Menus

#### Starting the Configuration/Setup Utility

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

1. Turn on your monitor.
2. Press and hold F1.
3. Turn on the system unit.

If you have previously set a password, you are prompted to type in the password after you press the F1 key. Refer to the Configuration/Setup Utility Main Menu below.



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

<b>Keys</b>	<b>Function</b>
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.
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
F9	Press this key if you want to reload the current settings for a line
F10	Press this key if you want to load the factory default settings from the selected brackets.

## **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. Refer to the Configuration/Setup Utility help for details on the configurable parameters in each menu.

## Save Settings

After changing any parameter in the Setup Configuration setting, return to Configuration/Setup main menu and select Save Settings to save all the settings you have changed.

## Restore Settings

If you select this option, it will change the current settings to their previous values. Then, press Enter to continue.

## Loading Default Settings

The computer 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 lets you reload the original configuration at any time.

To load the default settings, follow these steps:

1. Use down-arrow key to select load default settings. A dialog box appears confirming 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 confirming if you want to save the 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 Setup Configuration.

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

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

## Exiting Setup

Press Esc to return to the Main Menu when you have finished viewing settings and making changes. 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 down-arrow key to select the option “Yes, save and exit the Setup Utility.”, then press Enter to save your changes and exit Setup.
  - If you do not want to save your changes, press the down-arrow key to select the option “No, exit the Setup Utility without saving.”, then press Enter to exit Setup without saving.
  - If you do not want to exit the setup utility, press the down-arrow key to select the option “No, return to the Setup Utility” then press Enter.

## Viewing System Information, and Product Data

To view general hardware information about your computer, select the System Summary option from the Setup main menu. The items displayed in the System Information menu are not configurable.

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, system board identifier, serial number, system UUID, and BIOS version and date, select the Product Data option from the Setup main menu. Like in the System Information menu, the items displayed are not configurable.

## **Devices and I/O ports**

If you install USB devices, video, IDE drives, audio, or network 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 Devices and I/O Ports from the main menu. The Devices and I/O Ports menu appears showing the USB boot device parameters.

### **USB Boot device**

The item Universal Serial Bus (USB) parameter displayed in the Devices and I/O Ports option is not configurable and the default setting is "Detected".

## **Video Setup**

### **Active Video**

This item displays the onboard video controller chipset information. It is not configurable.

### **Shared System Memory**

Set the amount of system memory (512 KB or 1 MB) to be reserved for the integrated video. Operating systems that use SVGA will dynamically allocate additional system memory for the integrated video. The integrated video requires a minimum of 512KB of shared system memory. POST will allocate 1 MB of shared video memory if no other video memory is detected.

### **Select Active Video**

The parameter allows you to select PCI or integrated. When the computer is started, it will select the video that is active. If the selected video is not available, the computer will select a default video. The default is set to "PCI".



## **Palette Snooping**

The default setting is “Disabled“. It is necessary to enable palette snooping if your system has a video multimedia adapter installed and incorrect colors are displayed on screen, and also your system has a PCI video adapter installed that supports palette snooping.

## **Video Interrupt**

This parameter allows you to select “Disabled” for the video interrupt if your video adapter does not require an interrupt and your system is having problems assigning interrupts to other adapters that need them. The default is set to “Enabled“.

## **IDE Drive Setup**

The Device and I/O Ports menu includes four IDE drive items that allow you to configure the hard disk drives and the CD/CD-R/W-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 Hard Disk Drive 0**

IDE Hard Disk Drive 0 is attached to IDE connector 1 on the system board. This is the hard disk that comes pre-installed with your computer.

- **Size:**  
It is not configurable. The BIOS will auto-detect the size from the hard disk drive.
- **IDE Performance:**  
The “High Performance“ mode allows IDE devices attached to the system board IDE controller to utilize any performance enhancement features the device may support. If an IDE device attached to the system board IDE controller does not function properly or causes other IDE devices attached to the same controller not to function properly, set this field to the “Compatible“ mode. This will allow other IDE hard disk drives or IDE devices which do not follow the ATA IDE specification to function properly. The default is set to “High Performance“.

- **IDE Read Prefetch:**  
The default setting is “Disabled”. Read prefetch can improve performance of your system. IDE CD-ROM devices and some operating systems may not work properly with this feature “Enabled”.

### **IDE Hard Disk Drive 1**

IDE Hard Disk Drive 1 (if installed) is attached to IDE connector 1 on the system board and is set as the slave device.

- **Size:**  
The default is set to “Not installed”.

### **IDE CD-ROM Drive 2**

IDE CD-ROM Drive 2 is attached to IDE connector 2 on the system board and a pre-installed CD-ROM drive is connected here.

- **IDE Performance:**  
The “High Performance” mode allows IDE devices attached to the system board IDE controller to utilize any performance enhancement features the device may support. If it does not function properly, set this field to the “Compatible” mode. The default is set to “High Performance”.

### **Audio Setup**

- **Audio Support:**  
This parameter enables or disables the onboard audio controller chipset. This item does not appear in the menu if there is no physical audio chipset on the system board. The default setting is Enabled.

## **Network Setup**

### **Alert on LAN**

When Enabled, the Alert on LAN feature allows POST errors, environmental Conditions, and operating system hang conditions to be reported to the Network Administrator. Alert on LAN is enabled by Alert on LAN application software. The parameter is not configurable and is set to “Disabled”.

### **Preboot Execution Environment Base Code**

This parameter allows you to enable or disable the Preboot Execution Environment (PXE) base code feature. Select whether to load the (PXE) Version 2.0 Base Code image when a PCI network device is detected. The Base Code may be needed to allow startup from some PCI network devices. The default setting is “Disabled”.

### **PCI Boot Entry Vector Startup**

The parameter allows you to select whether to allow PCI network devices which provide a Boot Entry Vector (BEV) to be added to the startup sequence. The default is set to “Enabled”.

## **Startup Options**

From the Setup main menu, select Start Options to view or change start-up configuration settings.

### **Startup Sequence**

The system can load the operating system from one of several devices. The startup sequence determines the order of bootable devices the system attempts to load the operating system from. When the previous startup boot device is set to disabled, the rest of following boot sequence will not be available to configure and the value will be “Disabled”.

### **Primary Startup Sequence**

The primary startup sequence is used when the system is powered on by the power switch. The startup sequence will be USB Boot Device, CD-ROM, Hard Disk 0, Network and Disabled.

## **Automatics Power-on Startup Sequence**

This item allows you to select enabled if you want to use a different startup sequence when your system is started using the Automatic Power-On features.

- **First Startup Device:**  
The default is set to Network.
- **Second Startup Device:**  
The default setting is Hard Disk 0.
- **Third Startup Device:**  
The default is Disabled.
- **Fourth Startup Device:**  
When the previous startup device is set to disabled, the fourth startup device will become un-configurable. The default value is “Disabled”.

## **Error Startup Sequence**

Select “Disabled” if you want to start Setup whenever a POST (Power-On Self Test) error occurs. Select other options such as Network, Primary, Automatic, or Disabled if you want to bypass Setup and use a different startup sequence when a POST error occurs. You will still be able to enter Setup using the F1 key or on the POST error menu. The default is set to “Network”.

## **Power-On Self Test**

When set to “Quick”, which is the default, this parameter allows the system to boot faster by skipping some power-on self-test (POST) routines.

## **Power-On Logos**

This parameter enables or disables to display the IBM logo function. When set to “Enabled”, which is the default, BIOS is in graphical mode and displays the IBM logo while booting. If it is set to Disable, the system will not display the logo on the screen.

## **Option Key Display**

This option controls the prompt of the system software option keys (such as the F1 and Esc keys) when the system is turned on. This may or may not affect the function of a specific key. Select “Enabled” to display the prompts.

## **Network Boot Prompt**

This option allows the user to boot from the Network by pressing F12 after the system is turned on. Pressing F12 will override the normal boot sequence. Select "Enabled" to display the F12 prompt.

## **Power-On Status**

This option controls the display of the memory count, system check points, and beeps when the system is turned on. Select "Enabled" to allow this information to be displayed. Select "Disabled" which is the default value to turn these off.

## **Virus Detection**

The system has a built-in virus detection program. The virus detection program runs at boot time, and can be enabled or disabled from this field. The default is set to "Disabled".

## **Date and Time**

From the Configuration/Setup main menu, select the Date and Time option to view or change the system clock from the Date and Time menu. If you want to change the system date, enter the date in the format shown on the screen.

If you change the time, enter the time in 24-hour format (hours, minutes, seconds). For example:

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

When setting date and time, press the up- or down-arrow key to highlight a field. The date and time are saved as you type it.

## **System Security**

### **Enhanced Security Enabled/Disabled**

Enhanced Security can be Enabled or Disabled only while flashing the system BIOS. Enhanced Security Enabled gives the highest level of protection of system resources by locking the Administrator password and startup sequence in the EEPROM. This level of security may not be desirable in networking environment.

## **Security Profile by Device**

### **IDE Controller**

All devices attached to the system board IDE controller can be disabled using this field. When disabled, IDE hard disk drives, IDE CD-ROM drives or any other devices attached to the system IDE controller will not appear in the system configuration.

### **Password to request before booting**

There are three options for the following selections. First, User, which is the Power-on password. Second, Administrator, which allows the system to boot from the device. Third, Not Required, which means a password is not required to boot from the device. This option may be desired if the operating system meets the security.

### **Remote Administration**

Select "Enabled" to allow remote administration, such as the POST/BIOS Update Utility, to be run from a remote system without requiring entry of your administrator password.

### **Power-On password**

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

If you set up a power-on 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.

### **Setting a Power-On Password**

1. Press F1 to Enter Configuration/Setup Utility.
2. From the Setup main menu, select System Security and then Power-On Password.
3. Highlight the Power-On Password parameter and press the Enter key to display the Power-On Password window.
4. Type a password consisting of up to seven characters, then press Enter.

5. Retype the password then press Enter.
6. Press Enter again to confirm the setting of the password. Pressing Esc aborts the password setting.  
After pressing Enter, the Power-On Password window disappears. The Power-On Password parameter automatically sets to Present.
7. Press Esc to return to Setup main menu.
8. Press Esc to exit Setup and reboot the system.  
Answer Yes when prompted to save settings.

The next time you turn on the system, you will be prompted to enter your Power-On Password. If you press F1 during POST to enter Setup, you must key in the password as well.

If you were not able to set a password after performing the above procedure, or should you encounter any error message when setting a password, refer to “Power-On Password” on page 8 about how to set the hardware jumper to clear password check.

### **Changing the Power-On Password**

1. Enter Setup.
2. Key in your current password when prompted.
3. From the Setup main menu, select System Security, then Power-On Password Options.
4. Type in a new password then press Enter.
5. Retype the new password then press Enter.
6. Press down-arrow key to highlight Change Power-On Password again to confirm changing the password.
7. Press Esc twice to return to the Setup main menu.
8. Press Save Settings to save the password and press Exit to exit Setup menu, and then reboot the system.

If you change your mind and decide not to change your password, just answer No when return to CMOS settings to reset the Power-On Password.

### **Delete Power-On Password**

1. Enter Setup and select System Security Options, then Power-On password Options.
2. Press the up- or down arrow key to select “Delete

Power-On Password”.

3. Press Esc to return to Setup main menu.
4. Select Save Settings and Exit Setup to save and exit Setup and reboot the system.

## **Administrator Password**

For the basic administrator password setting, follow the same rule with Power-On Password to set up, change, or delete a password.

### **Require Administrator Password when flashing**

If it is set to No, the Administrator password will not be required when updating the system software. The default setting is “Yes”.

### **Power-On Password Changeable by User**

This parameter enables you to change or not to change the Power-On Password with the administrator password set. The default is “No”.

### **Require Power-On Password on Warm boot**

When set to “Yes”, the Power-On Password will be required whenever the system is restarted. If you select No, the Power-On Password will only be required when the system is started with a cold boot.

## **Adapter ROM Security**

If set to “Yes”, the keyboard will be locked during adapter ROM initialization. This can be used in conjunction with an Administrator password to prevent the use of adapter ROM based utilities. The default is set to “No”.

## **Asset ID**

This enables wireless RF communication for Asset ID. The default is “Disabled”.

## **Advanced Setup**

**IMPORTANT:** Items on the following menus control advanced hardware features. If they are configured incorrectly, the system might malfunction.



## **PCI Control**

### **PCI Parity**

The parameter allows you to enable or disable parity checking of data across the PCI bus. Some adapters do not generate parity and will require this option set to disable. The default is set to “Enabled”.

### **Plug and Play Control**

#### **Plug and Play Operating System**

Select “Yes”, if you are experiencing POST errors numbered 185x and your system will be booting a Plug and Play compliant operating system.

The 185x errors are caused by the system being unable to configure all adapters and devices in the system because of conflicting resource assignments. Selecting “Yes” allows the configuration of Plug and Play devices not required for booting to be performed by the operating system, which can better manage the resource assignments of Plug and Play adapters and devices. The default is “No”.

### **Processor Control**

It will indicate the Intel processor ID number and microcode revision date. This information is not configurable.

## **Power Management**

### **Wake on LAN**

Select “Enabled” to allow your system to power-on in response to LAN wake up requests if the network adapter in your system supports this feature. The default is set to “Disabled”

### **Startup Sequence**

When the Wake on LAN is set to “Enabled”, Startup Sequence will become configurable. Select the start-up sequence you want to use for this type of power-on event. If you select “Automatic”, make sure that the Automatic Power-On Start-up Sequence is set to “Enabled”; otherwise the system will use the “Primary” startup sequence.

## **ACPI BIOS IRQ**

This field controls what IRQ the Advanced Configuration and Power Interface (ACPI) will use. This should only be changed to resolve a conflict with an ISA Legacy adapter.

---

## **Specifications**

### **Dimension (width x depth x height)**

- System unit: 88mm x 305 mm x 392 mm

### **Weight**

- System unit: 6.3 kg (14 lb)

### **Environment**

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

### **Electrical input**

- Input voltage for system unit (Sine-wave input is required)
- Low Range: 90 Vac to 132 Vac
- High Range: 180 Vac to 264 Vac

---

## Operating Requirements

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

The system units come with a voltage selector switch, allowing selection of voltage 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.

The required power input for the monitor (Not included with some models) shipped with the system unit is auto-sensing type and does not require any voltage switch adjustment.

---

# Check Procedures

Introduction .....	30
Start .....	31
Index of Symptoms, Messages, Error Codes, or Beeps .....	36
Troubleshooting .....	55
Factory-Installed Storage Devices .....	55
Audio (Not Supported by Diagnostics Program) ..	59
CD-ROM Drive .....	62
Memory .....	64
Keyboard .....	65
Mouse .....	66
Power Supply .....	68
Monitor .....	70
Undetermined Problems .....	72

---

## 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 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 CD 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 - Run Normal Test” in PC-Doctor diagnostics program).

**NOTE:** The diagnostic program diskette can be created from the Recovery CD if the user has a USB diskette drive attached.

The diagnostic program diskette should be used ONLY with **6644/6645/6646 Service Level A (SL-A)** IBM Personal Computers. Do not use this diskette on other models.

POST error codes and error messages are displayed on the screen after the IBM logo. Meanwhile, error beeps could be issued to help diagnose system problem. Please refer to “Index of Symptoms, Messages, Error Codes, or Beeps” on page 36 for additional help.

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

**NOTE:** If the check procedures instruct you to replace a FRU and the error message 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 hard disk drive contains pre-loaded software. Refer to “Software Recovery Procedure” on page 102, to reinstall the original software. Be sure to reload the software on the primary hard disk drive (Drive C) when replacing it.

**IMPORTANT:** The drives in the system you are

servicing may have been rearranged, or the drive startup sequence has changed. Be extremely careful during write operations, such as copying, saving, or formatting. Data or programs can be overwritten if you select an incorrect drive. **Ask the customer to back up any additional software from the hard disk drive before you reload the software.**

**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.

### **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 “Fast POST Mode” in BIOS Setup.
- To disable or reset the power-on password, see “Power-On Password” on page 8.
- Disconnect all external cables and devices from the system unit, except for the keyboard, mouse, and monitor.
- Power off the system unit (unplug the power cord) before moving it or when replacing FRUs.



- Remove all adapter cards, except for the factory-installed adapter cards.
- Disconnect all drives except:
  - Hard disk drive
  - IBM factory-installed devices (such as a CD-ROM drive)
- Ensure that all power cords and cables are connected properly.
- Ensure 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 117 for pin identification.

- Ensure correct monitor refresh rate.
- Note any symptoms, messages, error codes, or beeps.
- Make sure that there are no CD in the drives.

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

- Insert diagnostics CD in the CD-ROM drive or the the diagnostic diskette in a USB attached diskette drive.

**003 - DOES SYSTEM LOAD THE DIAGNOSTICS PROGRAM ? (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 36.
- End.

**005 -**

- If the keyboard responds incorrectly, go to “Keyboard” on page 65.
- If monitor problems appear, such as jittering, shifting, or being out of focus, go to “Monitor” on page 70.

**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 **Run Normal Test**.
  - Go to step 008.

**007 -**

- The system configuration report shows only those devices supported by the diagnostics CD.
- If a device is missing from the list and is not factory installed, refer to the service manual provided for that device.

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

- If the Diagnostics \ Run Normal Test 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 “Parts/Test Point Locations” on page 103.
  - Run the Diagnostics \ Run Normal Test again.

- If an error or other symptom is displayed, go to “Index of Symptoms, Messages, Error Codes, or Beeps” on page 36.
- If no error can be detected or the symptom is intermittent, go to “Undetermined Problems” on page 72.
- 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 36.
- If there is no error symptom or the error symptom is intermittent, go to “Undetermined Problems” on page 72.

---

## 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, begin the diagnosis from the first failure that appeared. 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 48.

**IMPORTANT:** When you have deemed it necessary to replace a FRU, and have done so, you must run a total system check 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 Run Normal Test 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. “Date and Time” on page 21.

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 CD.

**IMPORTANT:** 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 their possible causes. Table 2-2 lists BIOS beeps and 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 31.

If you are unable to correct the problem using these two index tables, go to “Undetermined Problems” on page 72.

**NOTE:**

1. If an error message and incorrect audio response occur, diagnose the error message first.
2. If you cannot run the diagnostics program tests but did receive a POST error code and message, use “Table 2-1 POST Error Codes and Messages List” on page 38 to diagnose system problems.
3. If you cannot run the diagnostics program tests but did receive a POST error beeps, use See “Table 2-2 BIOS Error Beeps List” on page 45 to diagnose system problems.
4. If you did not receive any error message, look for a description of your error symptoms in “Table 2-3 Error Symptoms List” on page 48.

**IMPORTANT:** 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.

5. 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 72.

Table 2-1 POST Error Codes and Messages List

**NOTE:** To diagnose a problem, first find the BIOS error messages or codes 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.

<b>BIOS Error Codes, Messages</b>	<b>Action/FRU</b>
0101 Timer Tick Interrupt Error 0102 Timer 2 Test Error	Enter BIOS Setup and load the default settings. RTC Battery. System Board.
0103 Processor Speed Set Too High	Enter BIOS setting to load default settings: 1. Proper speed for processor. Speed should be a multiple of the original processor. Reset the jumper. See "Power-On Password" on page 8. Processor.
0106 Diskette Controller Error	System board
0114 Option ROM checksum	Adapter card System board
0129 L1 Cache Error	Processor System board
0131 POST Detected a Planar Voltage is Out of Range	System board
0135 Processor Fan Error	Re-connect processor fan cable. System board
0136 Hardfile Fan Error	System board
0151 Real Time Clock Error 0161 Real Time Clock Battery Error	Enter BIOS Setup and load the default settings. RTC Battery. System Board.

Table 2-1 POST Error Codes and Messages List

**NOTE:** To diagnose a problem, first find the BIOS error messages or codes 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.

<b>BIOS Error Codes, Messages</b>	<b>Action/FRU</b>
0162 Invalid Configuration Information	Re-connect the cables. Adapter card Drives Power supply System board
0163 Time of Day not set	Ensure the time set in BIOS Setup is correct.
0164 Memory Size Does Not Match CMOS	Enter BIOS Setup and load the default settings. DIMMs System board
0166 Boot Block Checksum Error	BIOS version. BIOS ROM
0167 No Processor Update Found Error	Enter BIOS setting to load default settings: 1. Proper speed for processor. Speed should be a multiple of the original processor. Reset the jumper. See "Power-On password" on page 22. Processor
0168 ALert-on-LAN is Inoperative	Enter BIOS Setup and load the default settings. Adapter card System board
0175 Bad EEPROM CRC #1	System board
0176 System Tampered	Enter BIOS Setup and load the default settings. System board
0177 Inventory Violation	System board

Table 2-1 POST Error Codes and Messages List

**NOTE:** To diagnose a problem, first find the BIOS error messages or codes 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.

<b>BIOS Error Codes, Messages</b>	<b>Action/FRU</b>
0183 PAP is Required	Enter Administrator password
0184 Asset control Antenna not Detected	Enter new password
0186 Secure Data can Not be Recovered	System board
0187 Bootseq and Administrator Password Cleared	Clear Administrator password System board
0190 System Tampered Reset	If the code does not clear, replace the system board.
0191 Security Hardware Reset 0192 Security Hardware Tamper Detected 0193 Security Hardware Removed	Enter Administrator password Check Setup System board
0194 RFID Antenna Removed 0195 RFID Antenna Installed	Information for the system administrator Error can be cleared in Setup Antenna System board
0201 Memory Error	DIMMs I/O channel memory System board



Table 2-1 POST Error Codes and Messages List

**NOTE:** To diagnose a problem, first find the BIOS error messages or codes 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.

BIOS Error Codes, Messages	Action/FRU
0203 ECC Memory Required 0204 Memory Test Failed	DIMMs System board
0205 Memory Conflict Error	System board
0206 Memory Configuration Error 0207 Memory Continuity Error	Reconnect Memory DIMMs System board
0229 L2 Cache Error	Processor System board
0262 DRAM Parity Configuration	Enter BIOS and load default settings. DIMM System board
0301 Keyboard Error 0303 Keyboard Controller Error	Re-connect keyboard. Enter BIOS and load default settings. Keyboard System Board
0604 Diskette Drive Error 0605 Diskette Unlocked Problem 0662 Diskette Drive Configuration	Reconnect diskette drive Diskette drive System board
0762 Coprocessor Configuration	Enter BIOS and load default settings. System board
1762 Hard Disk Configuration	Hard disk drive System board

Table 2-1 POST Error Codes and Messages List

**NOTE:** To diagnose a problem, first find the BIOS error messages or codes 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.

<b>BIOS Error Codes, Messages</b>	<b>Action/FRU</b>
1780 Fixed Disk Configuration Error	Reconnect hard disk cables. Hard disk drive System board
1780 Fixed Disk 0 Error 1780 Fixed Disk Error 1781 Fixed Disk 1 Error 1782 Fixed Disk 2 Error 1783 Fixed Disk 3 Error	Reconnect hard disk cables Enter BIOS setting to load default settings: 1. Proper speed for processor. Speed should be a multiple of the original processor. Hard disk drive System board
1800 No More IRQs available 1880 No More IRQs available	Run Setup, verify PCI Run Diagnostics PCI adapter card
1801 No More Room for Option ROM 1881 No More Room for Option ROM	Check Setup Run Diagnostics Adapter Cards Make sure BIOS is at latest level System board
1802 No More I/O Space Available 1882 No More I/O Space Available	Check Setup Run Diagnostics Adapter Cards Make sure BIOS is at latest level System board

Table 2-1 POST Error Codes and Messages List

**NOTE:** To diagnose a problem, first find the BIOS error messages or codes 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.

<b>BIOS Error Codes, Messages</b>	<b>Action/FRU</b>
1803 No More Memory (above 1 MB) available 1883 No More Memory (above 1 MB) available	Check Setup Run Diagnostics Adapter Cards Make sure BIOS is at latest level System board
1804 No More Memory (below 1 MB) available 1884 No More Memory (below 1 MB) available	Check Setup Run Diagnostics Adapter Cards Make sure BIOS is at latest level System board
1805 Checksum Error or 0 Size Option ROM 1885 Checksum Error or 0 Size Option ROM	Check Setup Run Diagnostics Adapter Cards Make sure BIOS is at latest level System board
1962 No Boot Device Found	Reconnect all the cables Devices Power supply System board
2400 Display Adapter Error	Video adapter System board
2462 Video Configuration	Optional video memory System board Monitor

Table 2-1 POST Error Codes and Messages List

**NOTE:** To diagnose a problem, first find the BIOS error messages or codes 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.

<b>BIOS Error Codes, Messages</b>	<b>Action/FRU</b>
5962 IDE CD-ROM Configuration	CD-ROM drive connectors/ cables/jumpers CD-ROM drive Power supply System board
8601 Pointing Device Error	Re-connect keyboard and mouse. Enter BIOS Setup and load default settings. USB mouse USB keyboard System board
8603 Pointing Device has been Removed	Pointing device (mouse) System board

Table 2-2 BIOS Error Beeps List

**NOTE:** To diagnose a problem, first find the BIOS error 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.

BIOS Error Beeps	Action/FRU
1-1-3 CMOS Write/ Read Error	Enter BIOS Setup and load the default settings. CMOS battery. System board.
1-1-4 BIOS ROM Checksum Error	Enter BIOS Setup and load the default settings. CMOS battery. System board.
1-2-1 Programmable Interval Timer Test Error	Enter BIOS Setup and load the default settings. System board.
1-2-2 DMA initialization Error	Enter BIOS Setup and load the default settings. System board.
1-2-3 DMA Page Register Write/ Read Test Error	Enter BIOS Setup and load the default settings. System board.
1-2-4 RAM Refresh Verification Error	Enter BIOS Setup and load the default settings. System board.
1-3-1 1st 64K RAM Test Error	Insert the memory modules in the DIMM sockets properly, then reboot the system. Memory module. See the "Step 005" of "Memory" on page 64 to replace memory module. System board

Table 2-2 BIOS Error Beeps List

**NOTE:** To diagnose a problem, first find the BIOS error 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.

BIOS Error Beeps	Action/FRU
1-3-2 1st 64K RAM Parity Test Error	Insert the memory modules in the DIMM sockets properly, then reboot the system.  Memory module. See the "Step 005" of "Memory" on page 64 to replace memory module.  System board
1-3-2 Wrong Data Gets From DIMM's SPD	Insert the memory modules in the DIMM sockets properly, then reboot the system.  DIMM. System board.
1-3-2 Incorrect DRAM Type	DIMM
2-1-1 Slave DMA Register Test In-Progress or Error	Hard disk drive System board
2-1-2 Master DMA Register Test In-Progress or Error	Hard disk drive System board
2-1-3 Master Interrupt Mask Register Test Error	Hard disk drive System board
2-1-4 Slave Interrupt Mask Register Test Failure	Hard disk drive System board
2-2-2 Keyboard Controller Test Error	System board
2-3-2 Screen Memory Test In-Progress or Error	Enter BIOS Setup and load the default settings. System board.

Table 2-2 BIOS Error Beeps List

**NOTE:** To diagnose a problem, first find the BIOS error 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.

BIOS Error Beeps	Action/FRU
2-3-3 Screen Retrace Tests In-Progress or Error	Enter BIOS Setup and load the default settings. System board.
3-1-1 Timer Tick Interrupt Test Error	Enter BIOS Setup and load the default settings. System board.
3-1-2 Interval Timer Channel 2 Test Error	Enter BIOS Setup and load the default settings. System board.
3-1-4 Time-Of-Day Clock Test Error	Enter BIOS Setup and load the default settings. System board.
3-2-4 Comparing CMOs Memory Size Against Actual	Enter BIOS Setup and load the default settings. System board.
3-3-1 Memory Size Mismatch Occurred.	Insert the memory modules in the DIMM sockets properly, then reboot the system. Memory module. See the “Step 005” of “Memory” on page 64 to replace memory module. System board

Table 2-3 Error Symptoms List

**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.

Error Symptoms	Action/FRU
<b>Processor / Processor Fan</b>	
<b>NOTE:</b> 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.	
Processor fan does not run but power supply fan runs.	Ensure that the system is not in power saving mode and the "Stop CPU clock in sleep state" is not set to Yes. See "Power Management" on page 5. With the system power on, measure the voltage of processor fan connector FN1. Its reading should be +12Vdc. See "System Board Jumpers and Connectors" on page 105. Processor fan. System board.
Processor test failed.	Processor. System board.
<b>System Board and Memory</b>	
<b>NOTE:</b> Ensure that the memory modules are installed properly and the contact leads are clean before diagnosing any system problems.	
Memory test failed.	See "Memory" on page 64. System board
Incorrect memory size shown or repeated during POST.	Insert the memory modules in the DIMM sockets properly, then reboot the system. Memory module. See the "Step 005" of "Memory" on page 64 to replace memory module. System board.



Table 2-3 Error Symptoms List (Continued)

**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.

Error Symptoms	Action/FRU
System works but fails to enter power saving mode when the Power Management Mode is set to [Enabled], and power saving timer set in BIOS has elapsed.	Enter BIOS Setup and load default settings. In Windows 2000, check settings in Power Management Property of Control Panel. Reload software from Recovery CD.
System hangs before system boot.	See "Index of Symptoms, Messages, Error Codes, or Beeps" on page 36. See "Undetermined Problems" on page 72
System hangs after system boot.	Execute a system test ("Diagnostics/Run Normal Test" 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 72.
Blinking cursor only; system does not work.	See "Start" on page 31. Diskette/IDE drive connection/cables Diskette/IDE disk drives See "Undetermined Problems" on page 72 System board
<b>Hard Disk Drive</b>	
<b>NOTE:</b> 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.	Enter BIOS Setup and Load default settings. Hard disk drive cable. Hard disk drive. System board.

Table 2-3 Error Symptoms List (Continued)

**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.

Error Symptoms	Action/FRU
Hard disk drive format error.	Enter BIOS Setup and Load default settings. Hard disk drive cable. Hard disk drive. System board.
Hard disk drive write error.	Enter BIOS Setup and Load default settings. Hard disk drive.
Hard disk drive LED fails to light, but system operates normally.	With the system power on, measure the voltage of hard disk LED connector CNN1. The reading should be: <u>CNN1</u> <u>HDD Idle/ Active</u>  pin-8            +5 Vdc / -- pin-7            +5 Vdc / 0 Vdc  See "System Board Jumpers and Connectors" on page 105. Hard drive LED cable.
<b>CD-ROM Drive</b>	
<b>NOTE:</b> Ensure 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.	
CD-ROM drive LED flashes for more than 30 seconds before LED shut off. Software asks to reinstall disc. Software displays a reading CD error.	CD may have dirt or foreign material on it. Check with a known good disc. CD is not inserted properly. CD is damaged.
CD-ROM drive LED doesn't come on but works normally.	CD-ROM drive

Table 2-3 Error Symptoms List (Continued)

**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.

Error Symptoms	Action/FRU
<p>CD-ROM drive cannot load or eject when the system is turned on and its eject button is pressed and held.</p>	<p>See “CD-ROM Emergency-exit &lt;option 1&gt;” on page 114 and “CD-ROM Emergency-exit &lt;option 2&gt;” on page 114.</p> <p>Disconnect all cables from CD-ROM drive except power cable, then press eject button to try to unload the disk.</p> <p>CD-ROM drive power. 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.</p> <p>Ensure that the CD-ROM driver is installed properly. See “CD-ROM Drive” on page 62.</p> <p>CD-ROM drive.</p>
<p>CD-ROM drive can play audio CD but no sound output.</p>	<p>Ensure that the headphone jack of the CD-ROM has an output, then check if the audio cable from CD-ROM drive to system board CN12 is connected properly. See “System Board Jumpers and Connectors” on page 105.</p> <p>Turn up the sound volume.</p> <p>Speaker power/connection/cable.</p> <p>CD-ROM drive.</p>

Table 2-3 Error Symptoms List (Continued)

**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.

Error Symptoms	Action/FRU
<b>Real-Time Clock</b>	
Real-time clock is inaccurate.	Ensure that the information in the Date and Time of BIOS Setup is set correctly. See "Date and Time" on page 21. Load default settings. CMOS battery. System board
<b>Video and Monitor</b>	
Video memory test failed. Video adapter failed.	Remove all non factory-installed cards. Load default settings (if screen is readable). System board
Display problem: - Incorrect colors - No high intensity - Missing, broken, or incorrect characters - Blank monitor(dark) - Blank monitor(bright) - Distorted image - Unreadable monitor - Other monitor problems	Monitor 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 70. Load default settings (if screen is readable). System board
<b>USB Ports</b>	
<p><b>NOTE:</b> Execute "Load BIOS Default Settings" in BIOS Setup to confirm ports presence before diagnosing any USB ports problems. Remove all external USB hubs.</p>	

Table 2-3 Error Symptoms List (Continued)

**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.

Error Symptoms	Action/FRU
USB device failed.	Ensure that the USB device is properly installed. Refer to the service manual for the USB device. USB device. USB device cable. System board.
USB device problems.	Refer to the service manual for the USB device.
<b>Diagnostic Program</b>	
Diagnostics programs cannot be executed.	Reboot the system from the diagnostics diskette. Load default settings. Diagnostics diskette. Memory module. System board.
Missing diagnostics file(s).	Diagnostics diskette.
<b>Keyboard</b>	
Some or all keys on keyboard do not work.	"Keyboard" on page 65.
<b>Power Supply</b>	
Pressing power switch does not turn off the system. (Only unplug power cord from electrical outlet can turn off system.)	Power switch cable assembly "Power Supply" on page 68
Pressing power switch does not turn on system.	Ensure the power override switch (situated at the back of the machine, just above the connector for the power cable) is not set to off. Power switch cable assembly.

Table 2-3 Error Symptoms List (Continued)

**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.

<b>Error Symptoms</b>	<b>Action/FRU</b>
Executing software shutdown from Windows2000 Start menu does not turn off the system. (Only pressing power switch can turn off the system).	Load default settings. Reload software from Recovery CD.
No system power, or power supply fan is not running.	"Power Supply" on page 68 System board.
<b>Other Problems</b>	
Any other problems.	See "Undetermined Problems" on page 72

---

## 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 CD from the CD-ROM drive, make sure that the BIOS Setup Utility has the startup sequence set with CD ROM and hard disk drives.

### **001 - START**

- Insert the diagnostics program CD into the CD-ROM 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 36.
- 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 HARD DISK OR CD-ROM DRIVE IS NOT CORRECT, READ AHEAD; OR GO TO STEP 005.**

- Check the cable installation of all disk drives. (See “System Board Jumpers and Connectors” on page 105)
  - IDE Primary Channel Master and Slave Drives should be connected to the system board connector CN8.
  - IDE Secondary Channel Master and Slave Drives should be connected to the system board connector CN7.



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

- Check all power supply voltages, switch, and jumper settings before you replace the system board. (See “System Board Jumpers and Connectors” on page 105.)
- Check the power supply voltages if you have a “system no-power” condition. See “Power Supply Connectors and Voltages” on page 107.
- Check the hard disk and CD-ROM drives jumper settings. See “3.5-In. Hard Disk Drive Jumper Settings” on page 110. Check the voltages of all disk drive power connectors. See “Power Supply Connectors and Voltages” on page 107.
- Correct the parameter settings under IDE Drives in the BIOS Setup. See “Hard Disk Drive” on page 4.
  - In the BIOS Setup, check that the correct drive size is set for the flagged drive shown in the System Information. See “Viewing System Information, and Product Data” on page 15.
- Enter BIOS Setup and 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 Fixed Disks Test if you want to test hard disk drive.
- Select CD-ROM/DVD Drive from the main program menu to test the CD-ROM drive.

- If an error or other symptom appears, go to “Index of Symptoms, Messages, Error Codes, or Beeps” on page 36.
- If no error can be detected or the symptom is intermittent, go to “Undetermined Problems” on page 72 .
- End.

---

## **Audio (Not Supported by Diagnostics Program)**

**IMPORTANT:** While performing this check, you may need to enter and exit Microsoft Windows 2000 several times. When instructed to select an icon or button, double click on the item with the mouse.

**NOTE:** For more information about using Microsoft Windows 2000, see the user's guide that comes with the computer.

If an operating system other than Microsoft Windows 2000 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 2000.
- 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 36.
- End.

### **003 - DO ANY MESSAGES OR ERROR CODES DISPLAY AFTER POST COMPLETES BUT BEFORE MICROSOFT WINDOWS 2000 STARTS? (YES, READ AHEAD. NO, GO TO STEP 004)**

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

- Ensure that Windows 2000 is properly installed.
- End.

### **004 -**

- Perform the following under Windows 2000.

**NOTE:** If an operating system other than Microsoft Windows 2000 is installed, the program screens and icons may differ from these instructions.

1. Start Microsoft Windows 2000.
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.)**

- Ensure that Windows 2000 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 2000.
- If the symptom remains or has changed, go to “Index of Symptoms, Messages, Error Codes, or Beeps” on page 36.
- 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 “System Board Jumpers and Connectors” on page 105.
- If the error cannot be resolved, replace the system board.
- End.

---

## CD-ROM Drive

**IMPORTANT:** For the diagnostics procedure of CD-ROM drive, use an external USB diskette drive to load the diagnostics program from the diskette.

### 001 - START

- Insert the diagnostics diskette into the USB diskette drive and ensure 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 ensure that the CD-ROM drive power cable and audio and data cables are not damaged and are connected properly.
- Check and ensure 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 CD into the CD-ROM drive.
- Ensure 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 the DIMM that the memory test calls out and then re-run memory test.
- If all DIMMs on the system board, have been replaced and the problem remains, replace system board.
- Go to step 001.



---

# Keyboard

## **001 - START**

- Power off system unit and ensure the keyboard plug is connected properly.

## **002 -**

- Insert the diagnostics CD into the CD-ROM 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

### 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 CD into the CD-ROM 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 functioned 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.
- Ensure that the mouse driver is properly installed.
- Go to step 002.

---

## Power Supply

### 001 - START

- Power off (unplug) the system unit. Check the power cord for continuity. Replace if necessary.
- Check for the correct line voltage from the power outlet, and verify that the voltage selector switch (if present) is set 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.

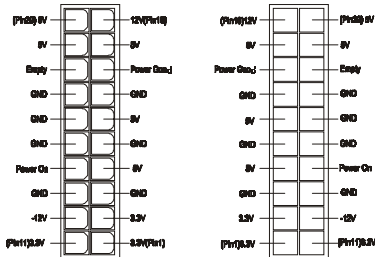
### 004 -

- 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 and turn on the power supply.

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

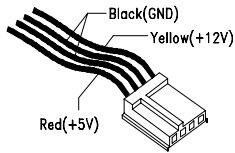
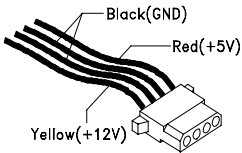
- With the system powered on and the power supply fan running, check the voltages of the power supply connectors for the system board and all drive connectors, as shown in the following figures.

## 20-pin power connector



IDE power connector

LS120 power connector



### **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 See “Undetermined Problems” on page 72.
- If the fan stops running when a drive connector is plugged back in, go to “Start” on page 31.

### **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 2000, depress the F8 function key during startup. Safe mode (VGA) will be set for Windows 2000. Use the operating system's video setup to change the monitor resolution.

**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 117 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 CD is in the CD-ROM drive.
- Power on the monitor, and wait 20 seconds.
- Power on the system unit.

**NOTE:** 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 36.

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

**003 - DOES THE MONITOR SUCCESSFULLY PASS Run Normal Test? (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 36
- End.

**004 -**

- Power off the system unit.
- Remove the hard disk drive system cable.
- Power on the system unit.

**005 - IS THE SCREEN STILL NOT READABLE?**

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

---

## Undetermined Problems

If an error code, error message or error beeps is present, go to “Index of Symptoms, Messages, Error Codes, or Beeps” on page 36. 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 48. If you still cannot solve the problem, continue with this check:

1. Check the power supply voltages (See “Power Supply Connectors and Voltages” on page 107). If the voltages are correct, return here and continue with the following steps:
2. Power off the system unit.
3. Perform the following checks, one by one, until you have isolated the problem FRU (refer to “Parts/ Test Point Locations” on page 103 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.
4. If the jumpers, switch, and voltage settings are correct, continue with the following steps:
  - Remove or disconnect the following, one at a time:
    - Non-IBM devices
    - External devices
    - Any adapter card (modem card or video card, if installed)
    - CD-ROM drive
    - Hard disk drive
    - DIMM
    - Processor
    - System board
5. Power on the system unit.
6. Repeat steps 2 through 5 until you find the failing device or adapter.
7. If software related, reload software from Recovery CD.



8. If the symptom changes, go to “Index of Symptoms, Messages, Error Codes, or Beeps” on page 36 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

Introduction .....	76
Power-On Self Test .....	77
Diagnostic CD .....	79
Using the Diagnostic CD .....	79
Using Diagnostic Program from Recovery CD .....	80
Diagnostics Program Features .....	81

---

## **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
- VGA Controller
- Hard Disk Drive(s)
- Keyboard
- Mouse
- CD-ROM Drive(s)
- Sound Controller\*

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

1. The IBM logo will appear on the screen.
2. At this time one of two hot-keys may be used. The F1 key 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. 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 enter 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 Windows 2000 or other operating system from a hard disk drive or CD-ROM drive, depending on the Start options selected in the BIOS 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” to find the most likely cause and action.

---

## Diagnostic CD

**IMPORTANT:** This manual is intended to test the IBM 6644/6645/6646 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.

**NOTE:** Diagnostics will be included on the Recovery CD 1.

This version of PC-Doctor diagnostics program, developed by PC Doctor 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.

**NOTE:** The diagnostics program for Type 6644/6645/6646 are the same.

### Using the Diagnostic CD

1. Power-off the system unit.
2. Insert diagnostic CD in drive A.
3. Power-on the system unit.

**NOTE:** Do not press F1 during POST. If any POST errors appear after POST, make a note of the errors.

4. DOS should load. During boot, verify that each driver loads successfully. For drivers that do not load successfully, verify that the device driver is associated with it and is installed properly.
5. Diagnostics program (PC-Doctor) will load, then follow the screen instructions to operate.

**NOTE:** You will not be able to use the USB mouse with the DOS diagnostics. Use the keyboard to work with the diagnostic menus.

## **Using Diagnostic Program from Recovery CD**

1. Insert the recovery CD into the CD-ROM drive then restart computer.
2. Depress F1 while POST to enter BIOS Setup menu. Select and enter "Startup Options", set the first priority of boot sequence to CD-ROM. Save and exit from BIOS Setup.
3. When screen displays IBM Recovery Program menu, choose "Run Diagnostics" to execute diagnostic program.
4. Follow the instructions on the screen to operate the diagnostics program.



## Diagnostics Program Features

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

Table 3- 1 Diagnostic Program Main Menu Selections

<b>Main Menu Selections</b>	<b>Submenu Selections</b>
Diagnostics	<ul style="list-style-type: none"><li>• Run Normal Test</li><li>• Run Quick Test</li><li>• CPU/Coprocessor</li><li>• System Board</li><li>• Fixed Disks</li><li>• Other Devices</li><li>• CD-ROM Drive</li><li>• Memory Test-Full</li><li>• Memory Test-Quick</li></ul>
Interactive Tests	<ul style="list-style-type: none"><li>• Keyboard</li><li>• Video</li><li>• Internal Speaker</li><li>• Mouse</li><li>• Printer Test</li><li>• CD-ROM Test</li><li>• Stereo Speaker</li><li>• Action Test</li></ul>
Hardware Info	<ul style="list-style-type: none"><li>• System Configuration</li><li>• Memory Contents</li><li>• IRQ and DMA Use</li><li>• Device Drivers</li><li>• COM and LPT Ports</li><li>• Physical Disk Drives</li><li>• Logical Disk Drives</li></ul>

Table 3- 1 Diagnostic Program Main Menu Selections  
(Continued)

Main Menu Selections	Submenu Selections
Hardware Info	<ul style="list-style-type: none"> <li>• VGA Information</li> <li>• Software Interrupts</li> <li>• SCSI Devices</li> <li>• I/O Use</li> <li>• IDE Drive Info</li> <li>• PCI Information</li> <li>• PNPIISA Information</li> <li>• SMBIOS Information</li> <li>• DIMM/RIMM info</li> </ul>
Utility	<ul style="list-style-type: none"> <li>• Run External Test</li> <li>• Surface Scan Hard Disk</li> <li>• Benchmark System</li> <li>• DOS Shell</li> <li>• Tech. Support Form</li> <li>• Select Languages</li> <li>• View Test Log</li> <li>• Print Log</li> <li>• Save Log</li> <li>• View Stored Results</li> </ul>
Quit	<ul style="list-style-type: none"> <li>• Exit Diags</li> <li>• Park HD</li> <li>• Reboot</li> <li>• About</li> </ul>

---

## Repair Information

Removals and Replacements .....	84
Cover .....	85
Processor and Fansink .....	86
Memory (DIMM) .....	89
Adapter Card .....	90
Internal Speaker .....	91
USB Port .....	92
CD-ROM Drive .....	93
Hard Disk Drive .....	95
Power Supply .....	97
Power Button/Indicator LED and Cable .....	98
System Board .....	99
System Backup Battery .....	100
Handling ESD-Sensitive Parts .....	101
Software Recovery Procedure .....	102

---

## 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).

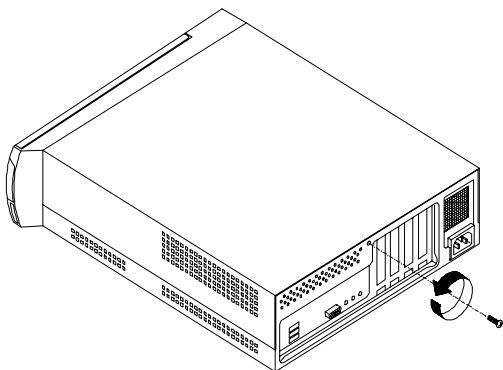
When other FRUs must be removed prior to removing the failing FRU, they are listed at the top of the page. Go to the removal procedure for each FRU listed, remove the FRU, and then continue with the removal of the failing FRU.

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

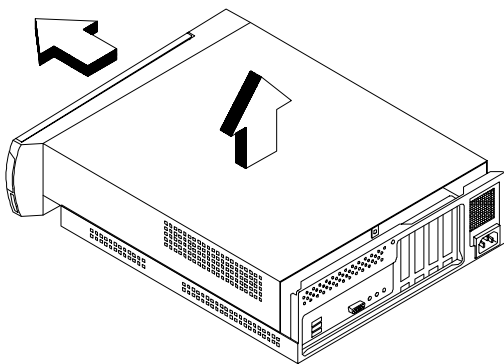
Before disconnecting any cables, note their location and orientation. Reinstall any new FRUs with cabling in their original location.

## Cover

- Remove the screw from the top cover.



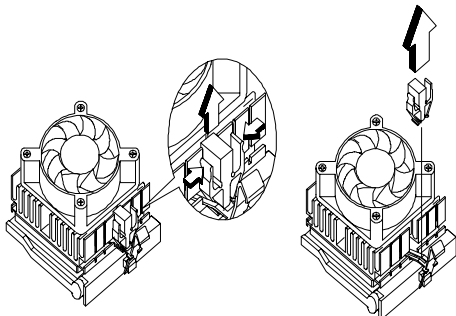
- Push the top cover forward and pull it away from the system.



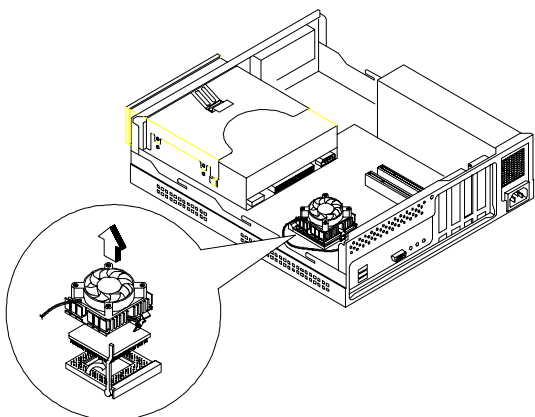
## Processor and Fansink

**IMPORTANT:** Processors are sensitive to static discharge.

- Disconnect the fansink cable from the system board.
- Grasp the tabs of the fansink stopper and squeeze before pulling it upward.

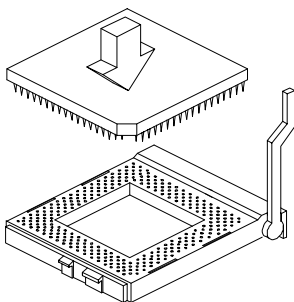


- Press the fansink clasp to release the lock on both sides.
- Remove the fansink by pressing the release tab (rectangular end) and lifting it up from the Processor.
- Pull up the ZIF socket release lever.
- Lift the processor out of the socket.

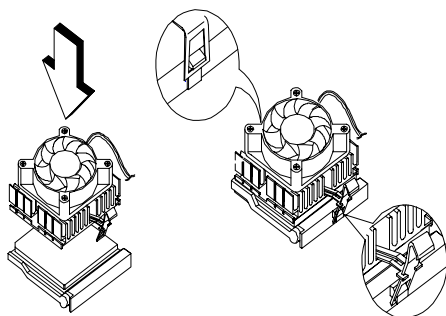


**NOTE:** Installing the processor

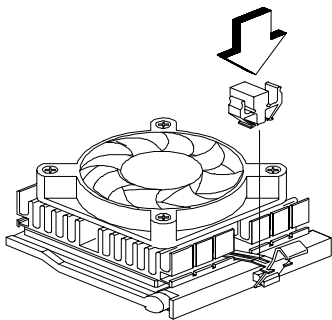
- Place the ZIF socket release lever to the release (up) position.
- Insert the new processor, matching the notched corner of the processor with the pin 1 indicator on the socket.



- Push down the lever to lock the processor to the socket.
- Place the processor heat sink fan over the processor.
- Insert one side of fan brace onto the ZIF socket
- Secure by latching the other side to the ZIF socket.
- Reconnect the processor fan sink cable to the connector FN1 on the system board.



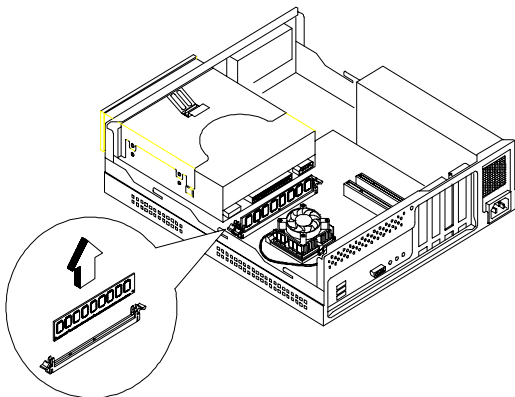
- Replace the fansink stopper.





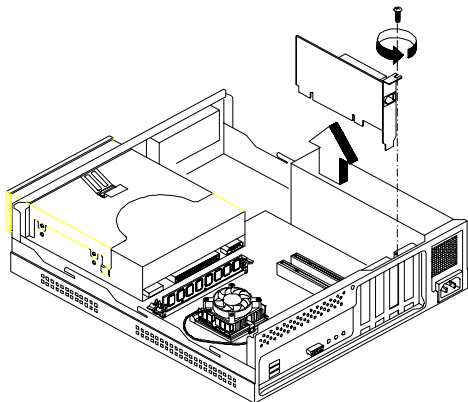
## Memory (DIMM)

- To release the memory module, press down and out on the levers on both sides of the DIMM socket, and then lift the memory module away.



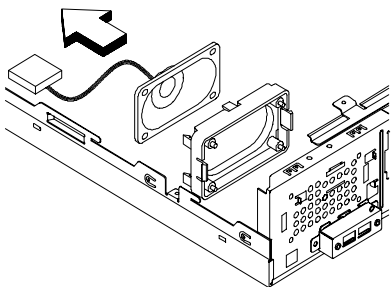
## Adapter Card

- To remove the adapter card, remove the screw as shown, then lift up the adapter card from the system unit.



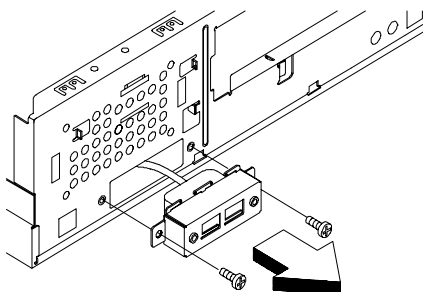
## Internal Speaker

- Cut the tie cable to release the cables.
- Disconnect the internal speaker cable from the system board.
- To remove the internal speaker, push the left latch rightward then remove the internal speaker from the system carefully.

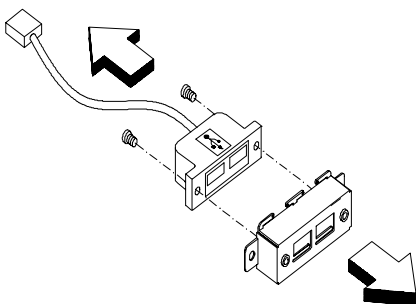


## USB Port

- Disconnect the front USB port cable from the system board.
- Remove the two screws from the front USB port bracket as shown.

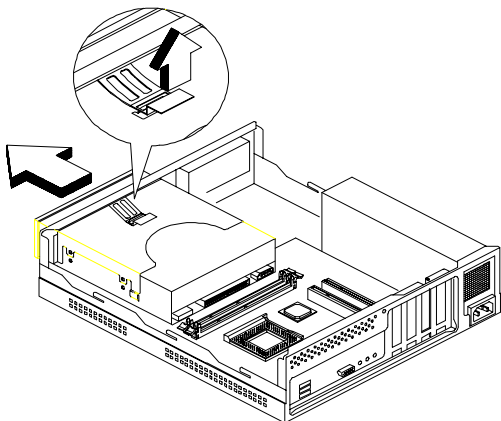


- Remove the front USB port from the unit.
- Remove the two screws from the front USB port then detach the bracket from the front USB port.

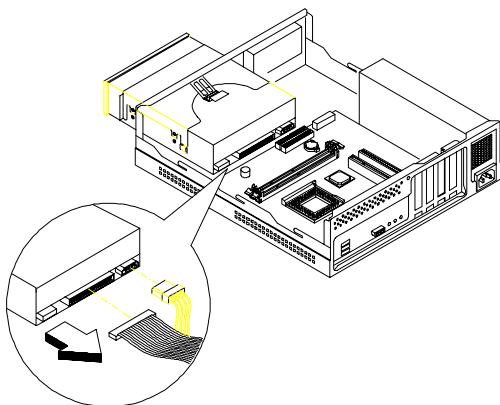


## CD-ROM Drive

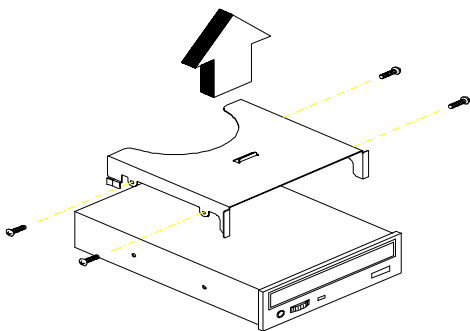
- To remove the CD-ROM drive, first pull the latch upward then push the CD-ROM drive forward.



- Disconnect the audio cable, CD-ROM cable, and power connector from the CD-ROM drive.
- Remove the CD-ROM drive from the unit.

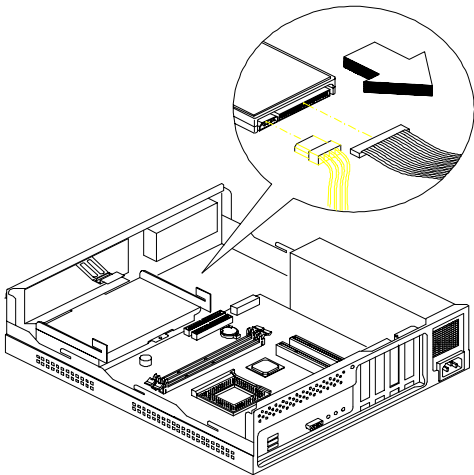


- Remove four screws from the CD-ROM bracket, and then remove the bracket from the CD-ROM drive.

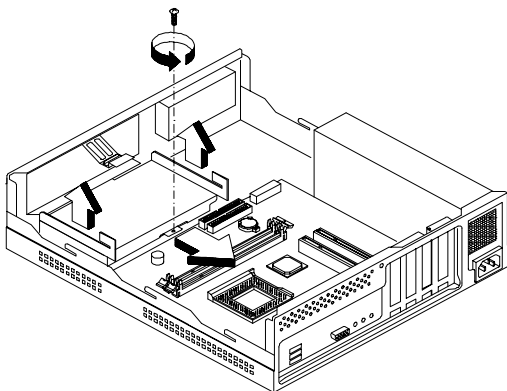


## Hard Disk Drive

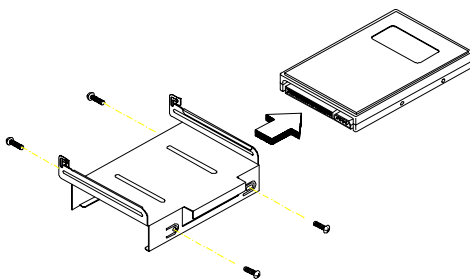
- Disconnect the power connector from the hard disk drive.
- Disconnect the hard disk drive cable and remove it from the hard disk drive.



- To remove the hard disk drive, remove the screw from the hard disk drive bracket, and push the hard disk drive rightward and forward then pull it upward.



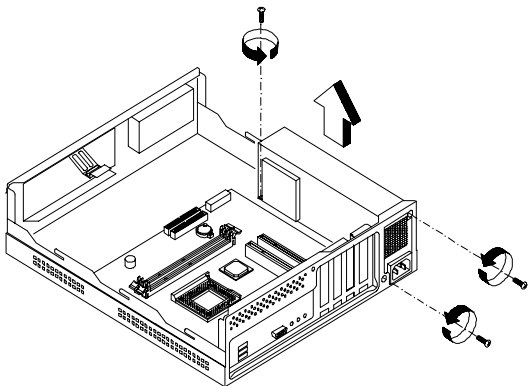
- Remove four screws from the hard disk drive bracket then remove the hard disk drive from the hard disk drive bracket.





## Power Supply

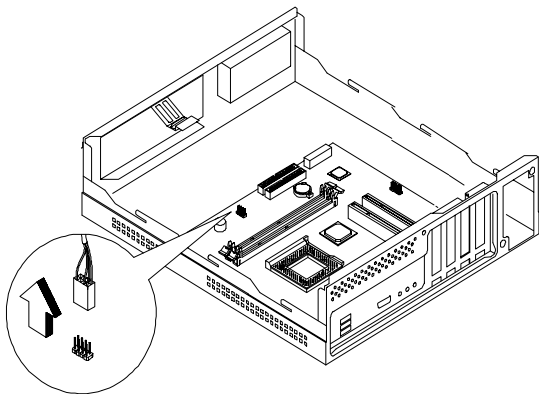
- Disconnect the power supply connector from the system board.
- Remove the three screws from the chassis as shown here.



- Remove the power supply from the chassis.

## Power Button/Indicator LED and Cable

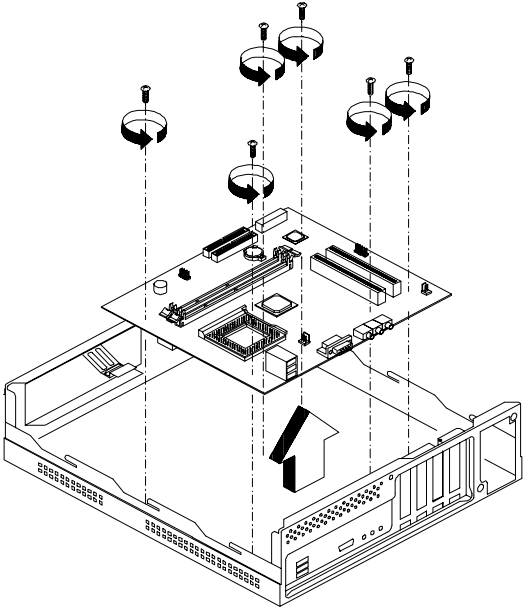
- Disconnect the LED/power switch cable from the system board.



- Remove two LEDs from the chassis gently.
- Push two latches to remove the power switch from the chassis carefully.
- Remove the cable from the clasps on the chassis and then remove the cable from the chassis.

## System Board

- Remove the six screws as shown then remove the system board from the chassis.

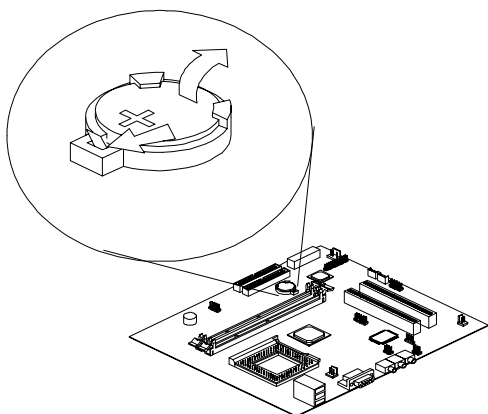


## System Backup Battery

**IMPORTANT:** All BIOS configuration settings will be lost when the backup battery is removed!

**ATTENTION:** Be careful when removing the backup battery. If the metal lever is damaged or broken, the system board must be replaced.

- Gently pull the metal lever away from the backup battery.
- Lift the backup battery out.



**IMPORTANT:** Make sure to insert the battery with the positive side facing up. A plus(+) sign indicates the positive side.

- If you replace the system battery, you need to reset the system date and time. You can perform this task from the Windows 2000 desktop or from the Configuration/Setup Utility. To reset the system date and time in the Configuration/Setup Utility, select the Date and Time option from the Main Menu.

---

## Handling ESD-Sensitive Parts

Many electronic parts are sensitive to electrostatic discharge (ESD). To prevent damage when working with ESD-sensitive parts, observe the following instructions. Do these in addition to taking all the usual precautions, such as switching off the power and unplugging the power cord.

- Keep the ESD-sensitive part in its original shipping container (or special ESD bag) until you are ready to install the part.
- Make the fewest possible movements with your body to prevent an increase of static electricity from clothing fibers, carpets, and furniture.
- Put the ESD wrist strap on your wrist. Ensure the machine is turned off. Connect the wrist strap to the serial bracket mounting screw. This discharges any static electricity in your body to the machine frame.
- Hold the ESD-sensitive part by its edge connector shroud (cover). Do not touch its pins. If you are removing a plug-able module, use the correct tools.
- Do not place the ESD-sensitive part on the machine cover or on a metal table. If you need to put down the ESD-sensitive part for any reason, put it into its original container.
- Machine covers and metal tables are electrical grounds. They increase the risk of damage because they make a discharge path from your body through the ESD-sensitive part. (Large metal objects can be discharge paths without being grounded.)
- Prevent ESD-sensitive parts from being accidentally touched by other persons. Reinstall machine covers when you are not working on the machine.
- If possible, keep all ESD-sensitive parts in a grounded metal cabinet.
- Be extra careful when working with ESD-sensitive parts while cold-weather heating is being used. Low humidity increases static electricity.

---

## Software Recovery Procedure

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

To recover the original software on the hard disk drive, use the following procedures:

1. Insert the recovery CD into the CD-ROM drive then restart computer.
2. Depress F1 while POST to enter BIOS Setup menu. Select and enter "Startup Options", set the first priority of boot sequence to CD-ROM. Save and exit from BIOS Setup.
3. After system boots from recovery CD, you will be prompted with an "IBM Product Recovery Program" menu, follow the instructions on the screen to operate the software recovery procedure.

---

## Parts/Test Point Locations

Introduction .....	104
System Board Jumpers and Connectors .....	105
Power Supply Connectors and Voltages .....	107
Network Cards .....	109
3.5-In. Hard Disk Drive Jumper Settings .....	110
CD-ROM Drive .....	113
CD-ROM Drive Rear Panel Connectors and Jumpers .....	115
DIMM Configurations .....	116
System Board Connector Pin Signals .....	117
Monitor Port Signals .....	117
IDE Cable Connector Signals .....	117

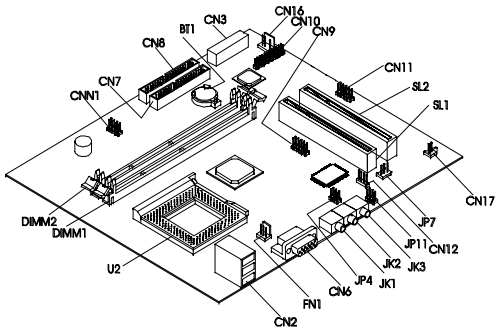
---

## **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, and the connector information for modem adapter card.



# System Board Jumpers and Connectors



**NOTE:** The whitened pin of a jumper represents pin 1.

## System Board Jumper Settings

Jumper/Settings	Function
JP11, JP4 - Reserved 1-3, 2-4 3-5, 4-6	AMP Select:--Reserved
JP7 Boot Block CMOS Clear 1-2 2-3	Clear function  *Default Clear CMOS/Boot Block Recovery

## System Board Connector Functions

Connector	Function	Connect to...
CN2	Rear Universal Serial Bus (USB) connector	USB device
CN3	ATX Power Supply Connector	Power supply
CN6	CRT VGA connector	Monitor
CN7	IDE 2	CD-ROM
CN8	IDE 1	Hard Disk Drive
CN9	Test Serial Debug PORT	
CN10	POV connector	POV board
CN11	Front Universal Serial Bus (USB) connector	USB device
CN12	CD- audio input connector	CD-ROM
CN16	RFID connector	RFID Antenna
CN17	Internal Speaker	Internal Speaker
U2	CPU connector	processor
FN1	CPU Fan connector	processor Fan
BT1	System Battery connector	System battery
JK1	Microphone in port	Microphone
JK2	Line in port	Audio signal input
JK3	Line out port	Speaker
DIMM1 DIMM2	System memory module connectors	Memory
SL1 SL2	PCI Slot	Adapter Card
CNN1	Power Button, Power LED and HDD LED	Power Button HDD LED
JP4	Amplifier Select	
JP11	Amplifier Select	
JP7	Boot Block / CMOS Clear	

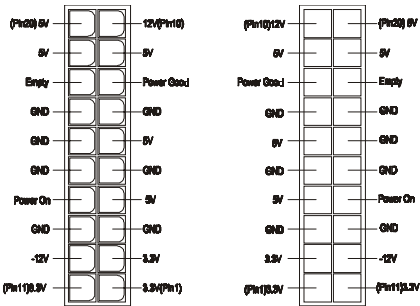
**NOTE:** The white corner of the jumper block represents pin 1.

# Power Supply Connectors and Voltages

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 CN 3 (pin13-14) (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..

20-pin Power Connector



Pin-hole side view

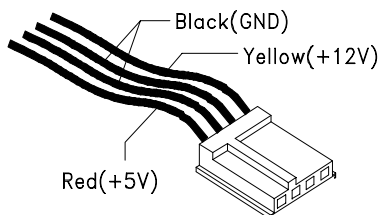
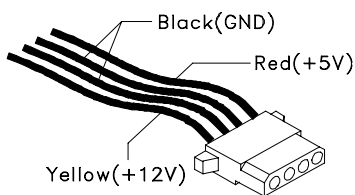
Cable side view

## Power Supply Output Pin Assignment

Pin	Voltage	Cable Color
1	+3.3Vdc	Orange
2	+3.3Vdc	Orange
3	Ground	Black
4	+5Vdc	Red
5	Ground	Black
6	+5Vdc	Red
7	Ground	Black
8	Power Good	Gray
9	+5Vdc	Purple
10	+12Vdc	Yellow
11	+3.3Vdc	Orange
12	-12Vdc	Blue
13	Ground	Black

## Power Supply Output Pin Assignment (Continued)

Pin	Voltage	Cable Color
14	+5Vdc	Green
15	Ground	Black
16	Ground	Black
17	Ground	Black
18	no connect	no connect
19	+5Vdc	Red
20	+5Vdc	Red

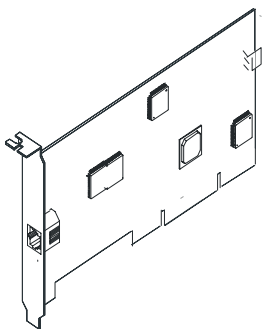


---

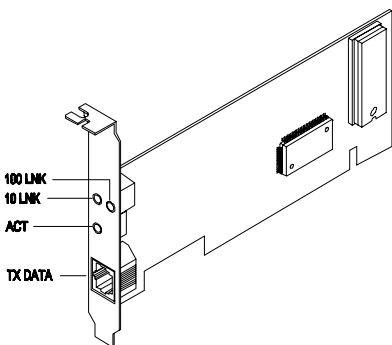
## Network Cards

The RJ-45 connector is used.

Intel



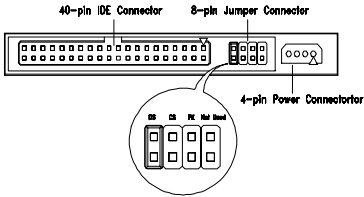
Accton



**NOTE:** While transferring the data, "Act" LED emits light to indicate a ready state and the link indicators "10 Link" or "100 Link" specifies the current line transmission speed. Depending on the 10Base-T/100Base-T connections to unshielded twisted-pair(10Base-T, UTP) or unshielded twisted-pair(100Base-T, Catagory 5), the transmission speed will be auto-detected.

---

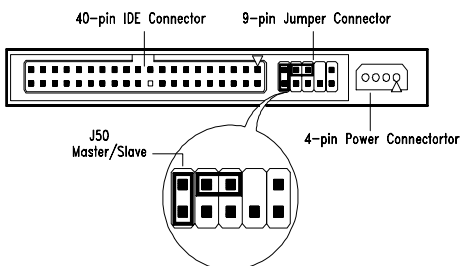
## 3.5-In. Hard Disk Drive Jumper Settings



### 3.5-In Quantum Fireball Series Hard Disk

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

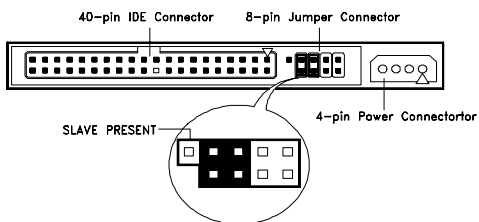
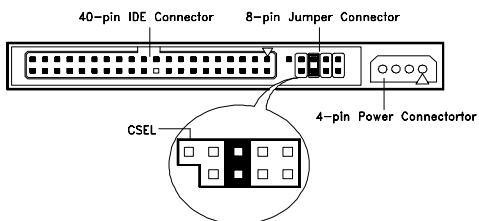
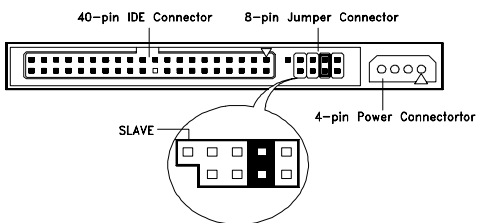
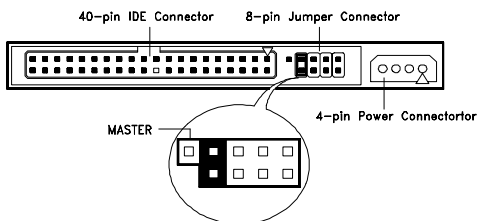
- DS - Drive Select (For Master only)
- CS - Cable Select
- PK - Park, used as a place to store a jumper



### 3.5-In Maxtor Hard Disk

#### 3.5-In Maxtor Hard Disk Drive Jumper Settings

J50	Description
On	Drive configured as a Master or Drive configured as a Master, with an attached Slave
Off	Drive configured as a Slave.



### 3.5-In Fujitsu Hard Disk

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

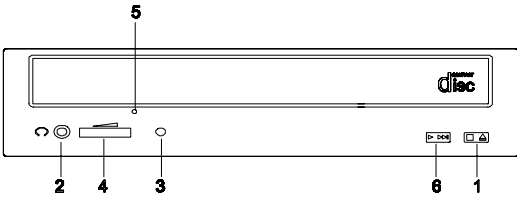
- Master
- Slave
- CSEL - Cable Select
- Slave Present



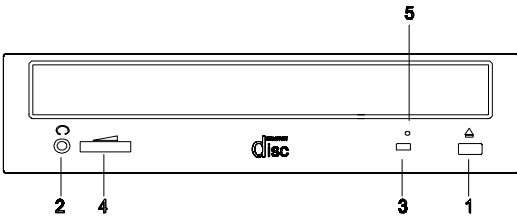
# CD-ROM Drive

**ATTENTION:** Either <option 1> or <option 2> CD-ROM drive may come with your machine. Their front panel buttons, indicators and emergency eject method may be different.

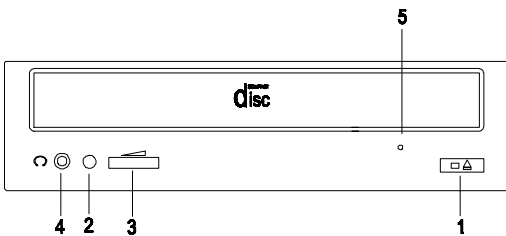
Lite-on



LG



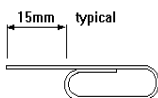
BTC



## CD-ROM Front Panel Introduction

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 <option 1> below. Disc tray and emergency eject See CD-ROM Emergency-exit <option 2> below.
6	Audio Play / Skip track control button

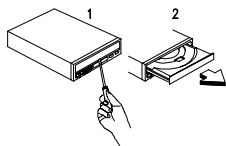
### CD-ROM Emergency-exit <option 1>



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.

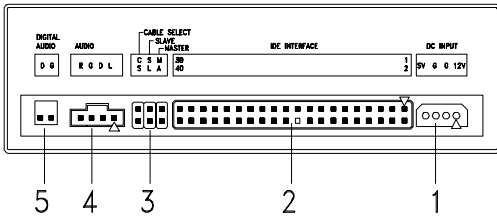
**ATTENTION:** Make sure to turn off the power before manual disc eject operation.

### CD-ROM Emergency-exit <option 2>



Locate the bottom edge of the disc tray. Gently pry the disk tray open with a screwdriver. When the disc tray opens, simply remove the disc from the CD-ROM drive.

# CD-ROM Drive Rear Panel Connectors and Jumpers



**NOTE:** CD-ROM drives may come with item no. 5 (digital audio output) connectors.

## CD-ROM Drive Rear Panel Connectors and Jumpers

Item	Function	Connect to...																
1	Power supply connector	Power supply																
2	Interface connector	System board CN7: IDE 2																
3	Configuration jumper. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>CS</th> <th>SL</th> <th>MA</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>--</td> <td>--</td> <td>On</td> <td>Master (default).</td> </tr> <tr> <td>--</td> <td>On</td> <td>--</td> <td>Slave.</td> </tr> <tr> <td>On</td> <td>--</td> <td>--</td> <td>Cable select</td> </tr> </tbody> </table>	CS	SL	MA	Description	--	--	On	Master (default).	--	On	--	Slave.	On	--	--	Cable select	--
CS	SL	MA	Description															
--	--	On	Master (default).															
--	On	--	Slave.															
On	--	--	Cable select															
4	Audio line out connector	System board.																
5	Digital audio output	--																

---

## DIMM Configurations

The 6644/6645/6646 system board has two DIMM sockets. A maximum of 512MB memory may be installed. You can install 64MB, 128MB or 256MB PC-100 DIMM in any sockets and with any combinations.

**NOTE:** Some system boards require that DIMM socket number one be occupied. If after installing memory the system does not boot successfully and both DIMM sockets are not occupied, switch the DIMM to the unoccupied socket and reboot the system.

## 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	
2	Green Video	O	10	Synch Ground	
3	Blue Video	O	11	Monitor ID Bit 0	
4	Monitor ID Bit 2	I	12	SDA	I
5	Synch Ground		13	Horizontal Synch	O
6	Red Ground		14	Vertical Synch	O
7	Green Ground		15	SCL	I
8	Blue Ground				

### IDE Cable Connector Signals

Pin	Signal Name	I/O	Pin	Signal Name	I/O
1	Host Reset	O	21	No Connection	
2	Ground		22	Ground	
3	Host Data 7	I/O	23	Host IOW	O
4	Host Data 8	I/O	24	Ground	Power
5	Host Data 6	I/O	25	Host IOR	O
6	Host Data 9	I/O	26	Ground	Power
7	Host Data 5	I/O	27	I/O Channel Ready	I
8	Host Data 10	I/O	28	No Connection	
9	Host Data 4	I/O	29	No Connection	
10	Host Data 11	I/O	30	Ground	Power
11	Host Data 3	I/O	31	Host IRQ	I
12	Host Data 12	I/O	32	No Connection	

<b>Pin</b>	<b>Signal Name</b>	<b>I/O</b>	<b>Pin</b>	<b>Signal Name</b>	<b>I/O</b>
13	Host Data 2	I/O	33	Host A1	O
14	Host Data 13	I/O	34	No Connection	
15	Host Data 1	I/O	35	Host A0	O
16	Host Data 14	I/O	36	Host A2	O
17	Host Data 0	I/O	37	Host CS0	O
18	Host Data 15	I/O	38	Host CS1	O
19	Ground	Power	39	ACTIVE bar	I
20	No Connection		40	Ground	Power

---

# Safety Inspection Guide

General Guidelines ..... 120

---

## 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 service supplements outlining feature/model changes, along with the machine history, should be reviewed.

Check the following items:

- Damaged, missing, or changed parts, especially in the area of the On/Off switch and the power supply.
- Damaged, missing, or changed covers.
- Possible safety exposure from any non-IBM attachments.



---

# Parts Catalog

Abbreviations .....	122
System Assembly .....	123
Assembly 1a: System Unit- Interior .....	123
Assembly 1b: System Unit - Exterior .....	126
Assembly 2: Hard Drive .....	127
Assembly 3: CD-ROM Drive .....	128
Assembly 4: Power Cord .....	129
Assembly 5: Keyboard and Mouse .....	131

---

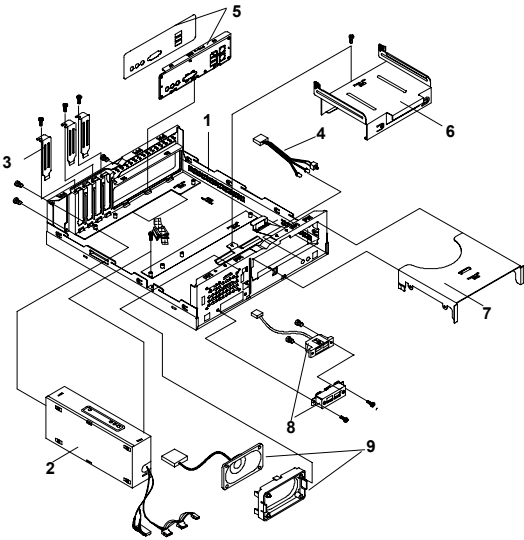
## Abbreviations

In this chapter, the following abbreviations are used to identify country and language version:

Country	Language Version
AT	Austria
AU	Australia
BD	Belgium - Dutch
BF	Belgium - French
CA	Canada
CE	Canada - English
CF	Canada - French
CN	China
DK	Denmark - Danish
FI	Finland - Finish
FR	France
GE	Germany
HK	Hong Kong
IT	Italy
JP	Japan
LS	LA-Spanish
ND	Netherlands - Dutch
NL	Netherlands - Dutch
NO	Norway - Norwegian
SF	Swiss - French
SG	Swiss - German
SP	Spain
SW	Sweden - Swedish
TW	Taiwan
UK	United Kingdom
US	United States
SZ	Switzerland

# System Assembly

## Assembly 1a: System Unit- Interior

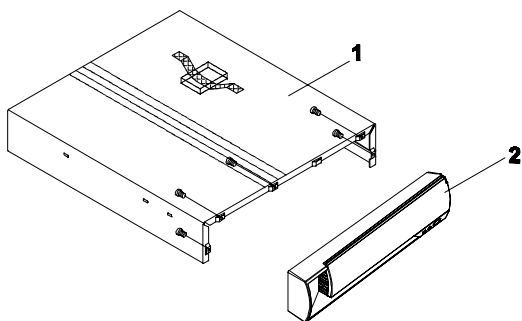


Asm-Index	FRU Number	Description	Model 6644	Model 6645	Model 6646
1a-1	19K2671	Chassis (w/o power supply )	X	X	X
1a-2	19K2663	95W Power Supply (Desk-top)	X	X	X
1a-3	19K2672	Port Bracket LP/PCI	X	X	X
1a-4	19K2674	Power Switch Cable Assembly	X	X	X
1a-5	19K2673	Planar I/O Port EMC Shield (includes label)	X	X	X
1a-6	19K2669	HDD DASH (Holder) Bracket	X	X	X
1a-7	19K2670	CD-ROM DASH (Holder) Bracket	X	X	X

<b>Asm-Index</b>	<b>FRU Number</b>	<b>Description</b>	<b>Model 6644</b>	<b>Model 6645</b>	<b>Model 6646</b>
1a-8	19K2677	Cable Asm, Front USB Port	X	X	X
1a-9	19K2665	Internal, Single Speaker (Includes Cable)	X	X	X
1a-NS	09N3329	S55F, Flex ATX - Intel 810E	X	X	
1a-NS	19K3514	S55F, Flex ATX - Intel 810E, w/ POV Card			X
1a-NS	09N3346	Intel 370, FCPGA, Celeron 566-66 128K	X		
1a-NS	09N3348	Intel 370, FCPGA, PIII 667-133 256K		X	
1a-NS	09N3349	Intel 370, FCPGA, PIII 733-133 256K		X	
1a-NS	09N3350	Intel 370, FCPGA, PIII 866-133 256K			X
1a-NS	09N3345	Fansink, Supports Celeron and Pentium III Processors, FCPGA	X	X	X
1a-NS	09N3351	64MB module (PC133)	X		
1a-NS	09N3352	128MB module (PC133)		X	X
1a-NS	19K3519	Intel LP Ethernet Card (Lake Clark 2.4)	X	X	X
1a-NS	19K3517	C2/Intrusion Switch Cable Asm			X
1a-NS	19K3518	RF ID Antenna			X
1a-NS	19K3516	Keylock Asm			X
1a-NS	19K2667	Door (Main Bezel)	X	X	X

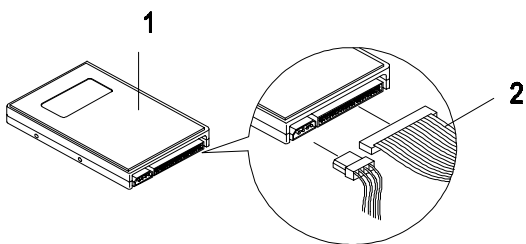
<b>Asm-Index</b>	<b>FRU Number</b>	<b>Description</b>	<b>Model 6644</b>	<b>Model 6645</b>	<b>Model 6646</b>
1a-NS	19K2668	Bezel Blank, (CD-ROM Insert)	X	X	X
1a-NS	01K4278	CMOS Backup Battery (CR2032)	X	X	X
1a-NS	19K2682	Screw Pack	X	X	X
1a-NS	19K2683	System Stand	X	X	X
1a-NS	19K2684	Rubber Feet (4)	X	X	X

## Assembly 1b: System Unit - Exterior



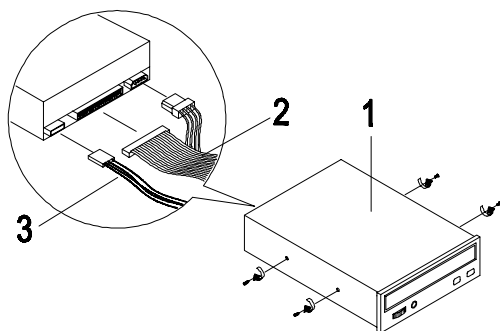
Asm-Index	FRU Number	Description	Model 6644	Model 6645	Model 6646
1b-1	19K2666	Top Cover	X	X	X
1b-2	19K3546	Main Bezel	X	X	X

## Assembly 2: Hard Drive



Asm-Index	FRU Number	Description	Model 6644	Model 6645	Model 6646
2-1	09N3353	10GB HDD, 3.5", 5400RPM	X	X	
2-1	09N3355	20GB HDD, 3.5", 5400RPM		X	X
2-2	19K2679	HDD Cable	X	X	X

## Assembly 3: CD-ROM Drive



Asm-Index	FRU Number	Description	Model 6644	Model 6645	Model 6646
3-1	00N8329	40X CD-ROM, Black Bezel		X	X
3-2	19K2680	CD-ROM Cable	X	X	X
3-3	19K2676	Audio Cable, CD-ROM	X	X	X

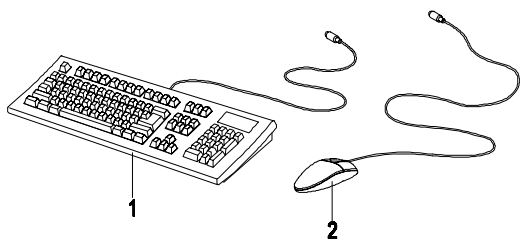


## Assembly 4: Power Cord

Asm-Index	FRU Number	Description	Model 6644	Model 6645	Model 6646
4-NS	6952301	Power Cord US, LA (Lo Volt), Canada, Mexico, Peru, Colombia, Ecuador, Venezuela, Bolivia, Panama, El Salvador, Honduras, Nicaragua, Dominican Republic, Guatemala, Taiwan, Saudi Arabia, Thailand	X	X	X
4-NS	36L8879	Power Cord APU Countries		X	X
4-NS	14F0032	Power Cord UK/ HK/Singapore/ United Arab Emirate (Dubai)	X	X	X
4-NS	13F9978	Power Cord (Euro) France, Germany, Sweden, Norway, Netherlands, Finland, Belgium, Bosnia, Croatia, Egypt, Greece, Hungary, Poland, Portugal, Romania, Slovenia, Spain, Sweden, Turkey, LA (HI Volt)	X	X	X
4-NS	14F0050	Power Cord Swiss	X	X	X

<b>Asm-Index</b>	<b>FRU Number</b>	<b>Description</b>	<b>Model 6644</b>	<b>Model 6645</b>	<b>Model 6646</b>
4-NS	13F9996	Power Cord Denmark	X	X	X
4-NS	14F0068	Power Cord Italy,Chile	X	X	X
4-NS	13F9939	Power Cord ANZ		X	X
4-NS	14F0086	Power Cord Israel	X	X	X
4-NS	14F0014	Power Cord South Africa	X	X	X

## Assembly 5: Keyboard and Mouse



Asm-Index	FRU Number	Description	Model 6644	Model 6645	Model 6646
5-1	09N5590	106 US English 103P US/CAN/ANZ/ China	X	X	X
5-1	09N5591	107 Arabic 253	X	X	X
5-1	09N5592	107 Belgian/ French 120	X	X	X
5-1	09N5593	107 Belgian/UK 120	X	X	X
5-1	09N5594	107 Bulgarian 442	X	X	X
5-1	09N5596	107 Czech 243	X	X	X
5-1	09N5597	107 Danish 159	X	X	X
5-1	09N5598	107 Dutch 143	X	X	X
5-1	09N5599	107 French 189	X	X	X
5-1	09N5601	107 French Canadian 58 (Commercial)	X	X	X
5-1	09N5602	107 German 129	X	X	X
5-1	09N5603	107 Greek 319	X	X	X
5-1	09N5604	107 Hebrew 212	X	X	X
5-1	09N5605	107 Hungarian 208	X	X	X
5-1	09N5606	107 Iceland 197	X	X	X
5-1	09N5607	107 Italy 142	X	X	X

<b>Asm-Index</b>	<b>FRU Number</b>	<b>Description</b>	<b>Model 6644</b>	<b>Model 6645</b>	<b>Model 6646</b>
5-1	09N5610	107 LA Spanish 171		X	X
5-1	09N5611	107 Norwegian 155	X	X	X
5-1	09N5612	107 Polish 214	X	X	X
5-1	09N5613	107 Portugese 163	X	X	X
5-1	09N5614	107 Romanian 446	X	X	X
5-1	09N5615	107 Russian 443	X	X	X
5-1	09N5616	107 Russian/Cy 441	X	X	X
5-1	09N5617	107 Serbian/ Cyrilic 118	X	X	X
5-1	09N5618	107 Slovak 245	X	X	X
5-1	09N5619	107 Spanish 172	X	X	X
5-1	09N5620	107 Swedish/ Finn 153	X	X	X
5-1	09N5621	107 Swiss, F/G 150		X	X
5-1	09N5622	106 Thailand 191		X	X
5-1	09N5623	107 Turkish 440	X	X	X
5-1	09N5624	107 Turkish 179	X	X	X
5-1	09N5625	107 UK English 166	X	X	X
5-1	09N5627	107 Yugoslav/ Latin 234		X	
5-2	09N5527	Scrollpoint III (SP 3), USB, Black	X	X	X

---

## Appendix A. FRU Number List

<b>FRU Number</b>	<b>Asm-Index</b>	<b>Page</b>
00N8329	3-1	128
01K4278	1a-NS	125
09N3329	1a-NS	124
09N3345	1a-NS	124
09N3346	1a-NS	124
09N3348	1a-NS	124
09N3349	1a-NS	124
09N3350	1a-NS	124
09N3351	1a-NS	124
09N3352	1a-NS	124
09N3353	2-1	127
09N3355	2-1	127
09N5527	5-2	132
09N5590	5-1	131
09N5591	5-1	131
09N5592	5-1	131
09N5593	5-1	131
09N5594	5-1	131
09N5596	5-1	131
09N5597	5-1	131
09N5598	5-1	131
09N5599	5-1	131
09N5601	5-1	131
09N5602	5-1	131
09N5603	5-1	131
09N5604	5-1	131
09N5605	5-1	131
09N5606	5-1	131
09N5607	5-1	131
09N5610	5-1	132
09N5611	5-1	132
09N5612	5-1	132
09N5613	5-1	132
09N5614	5-1	132

<b>FRU Number</b>	<b>Asm-Index</b>	<b>Page</b>
09N5615	5-1	132
09N5616	5-1	132
09N5617	5-1	132
09N5618	5-1	132
09N5619	5-1	132
09N5620	5-1	132
09N5621	5-1	132
09N5622	5-1	132
09N5623	5-1	132
09N5624	5-1	132
09N5625	5-1	132
09N5627	5-1	132
13F9939	4-NS	130
13F9978	4-NS	129
13F9996	4-NS	130
14F0014	4-NS	130
14F0032	4-NS	129
14F0050	4-NS	129
14F0068	4-NS	130
14F0086	4-NS	130
19K2663	1a-2	123
19K2665	1a-9	124
19K2666	1b-1	126
19K2667	1a-NS	124
19K2668	1a-NS	125
19K2669	1a-6	123
19K2670	1a-7	123
19K2671	1a-1	123
19K2672	1a-3	123
19K2673	1a-5	123
19K2674	1a-4	123
19K2676	3-3	128
19K2677	1a-8	124
19K2679	2-2	127
19K2680	3-2	128
19K2682	1a-NS	125

<b>FRU Number</b>	<b>Asm-Index</b>	<b>Page</b>
19K2683	1a-NS	125
19K2684	1a-NS	125
19K3514	1a-NS	124
19K3516	1a-NS	124
19K3517	1a-NS	124
19K3518	1a-NS	124
19K3519	1a-NS	124
19K3546	1b-2	126
36L8879	4-NS	129
6952301	4-NS	129





---

# Index

## A

Audio

    Check Procedure, 59

Audio Setup 18

## B

BIOS

    Flash Update Procedure, 9

    Model Number and Serial Number, 10

BIOS Setup Utility 12

    Date and Time 21

    Disk Drives, 16

    Main Menu, 12

    System Information, 15

## C

CD-ROM Drive

    113

    Check Procedure, 62

    Connectors and Jumpers, 115

    Emergency-exit , 114

    Emergency-exitl , 114

    Front Panel , 114

CD-ROM Drive, 4

Check Procedures, 30

CMOS Reset, 7

## D

Dimension, 27

## E

Electrical input, 27

Environment, 27

Error Beeps, 30, 36

Error Codes and Messages List, 38

Error Codes, 30, 36

Error Messages, 36

Error Symptoms List 48

Error Symptoms, 36

ESD 101

External Ports 4

## **H**

Hard Disk Drive

    3.5-In. Jumper Settings, 110

    Cable Connector Signals, 117

Hard Disk Drive, 4

Hardware Interfaces, 6

## **I**

IDE Cable Connector Signals 117

IDE Drive Setup 17

Internal Cabling, 5

## **K**

Keyboard 5

    Check Procedure, 65

## **M**

Memory 3

    Check Procedure, 64

    DIMM Configurations, 116

Monitor

    Check Procedure, 70

    Port Signals, 117

Mouse

    Check Procedure, 66

Mouse, 5

Multimedia 4

## **O**

Operating Requirements 28

## **P**

Password

    Changing, 23

    Removing, 23

    Setting, 22

Password, 8

PBSRAM 3

Pentium III 3

Port Signals

    Monitor 117

POST, 36, 77

Power consumption, 27

Power Management, 5

Power Supply

- Check Procedure, 68
- Connector Pin Assignment 107
- Connectors and Voltages, 107
- Power Supply Connectors and Voltages 107
- Power Supply, 5
- Processors (Machine Type 6644) 3
- Processors (Machine Type 6645/6646) 3

## **R**

- Removals and Replacements 84
  - ESD-Sensitive Parts, 101

## **S**

- Safety Information VIII
- Startup Options 19
- System Board
  - Connectors, 106
  - Jumper Settings, 105
- System Unit 123
  - Exterior 126
- System Unit- Exterior 126

## **T**

- Troubleshooting, 55

## **U**

- Undetermined Problems
  - Check Procedure, 72
- USB Boot device 16

## **V**

- Video 4
- Video Setup 16
- Voltage Supply
  - Switch Settings, VII

## **W**

- Weight, 27





Printed in U.S.A.

International Business Machines Corporation  
Old Orchard Road,  
Armonk, New York 10504

Part Number: 06P1788

Pub Number: S06P-1788-00

## Free Manuals Download Website

<http://myh66.com>

<http://usermanuals.us>

<http://www.somanuals.com>

<http://www.4manuals.cc>

<http://www.manual-lib.com>

<http://www.404manual.com>

<http://www.luxmanual.com>

<http://aubethermostatmanual.com>

Golf course search by state

<http://golfingnear.com>

Email search by domain

<http://emailbydomain.com>

Auto manuals search

<http://auto.somanuals.com>

TV manuals search

<http://tv.somanuals.com>