

**IBM**

*Personal Computer  
Hardware Reference  
Library*

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**IBM RT PC  
6151 System Unit Hardware  
Maintenance and Service**

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

### **Federal Communications Commission (FCC) Statement**

**Warning:** This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

**Instructions to User:** Properly shielded and grounded cables and connectors must be used for connection to peripherals in order to meet FCC emission limits. Proper cables are available from IBM authorized dealers. IBM is not responsible for any radio or television interference caused by using other than recommended cables or by unauthorized modifications to this equipment. It is the responsibility of the user to correct such interference.

### **CAUTION:**

**This product is equipped with a 3-wire power cord and plug for the user's safety. Use this power cord in conjunction with a properly grounded electrical outlet to avoid electrical shock.**

## **Third Edition June 1988**

This is a major revision of the second edition of the IBM RT PC 6151 System Unit Hardware Maintenance and Service manual dated September 1986. This manual incorporates all maintenance information for the IBM 6151 up to the date of this edition. Changes are made periodically to the information herein; these changes will be incorporated in new editions of this publication.

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## Safety

This manual contains a "Safety Inspection Guide" on the following pages. The Safety Inspection Guide is used by the IBM Service Representative.

The IBM 6151 System Unit contains no hazardous voltages or safety grounds outside the power supply. The power supply is a sealed unit and is not field serviceable.

This manual contains DANGER notices on pages 4-24 and 4-25. The following pages contain translations of the DANGER notices and the following caution notice.

### **CAUTION**

**Before removing any cover or disconnecting any signal cable, set the power switches on the system unit and all attached devices to Off; then unplug all external power cables from the outlets.**

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## Safety Translations

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# DANISH

# ADVARSEL

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### Section 4

IBM RT PC Udskiftning og erstatning af batterier - FARE. Fare for brand, eksplosion og forbranding. Batteriet må ikke genoplades, skilles ad, udsættes for temperaturer over 100 grader; der må ikke loddes direkte på elementet, elementet må ikke forbrandes eller komme i forbindelse med vand.

Hold batteriet væk fra børn. Må kun udskiftes med IBM reservedel nr. 6299201 eller et batteri, der anbefales af Underwriters Laboratories, Inc. til brug i IBM 6151, og som er klassificeret derfra. Brug af et andet batteri kan medføre brand eller eksplosionsfare.

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**DUTCH**

**GEVAAR**

**Waarschuwing**

Schakel de systeemeenheid en alle randapparatuur uit en haal de netspanningsstekkers van de systeemeenheid en van alle randapparatuur uit de stopcontacten, voordat u een kap opent of een signaalkabel loshaalt.

**Section 4**

“Verwijdering en vervanging van IBM RT PC - batterijen - LET OP! Gevaar voor brand, ontploffing en ernstige brandwonden. Laad de batterijen niet opnieuw op, haal ze niet uit elkaar, verhit ze niet boven 100&degr.C, verbrand ze niet, stel de inhoud van de batterij niet bloot aan water en soldeer niets aan de batterijcel vast.

Houd de batterijen uit de buurt van kinderen. Gebruik bij vervanging IBM-batterijen bestelnummer 6299201 of batterijen die speciaal voor gebruik met de IBM 6151 zijn goedgekeurd door de Underwriters Laboratoires Inc. en waarop dat ook staat aangegeven. Als u andere batterijen gebruikt loopt u het risico dat er brand ontstaat of dat zich een ontploffing voordoet”

**Huomio**

Ennen minkään yhteyskaapelin tai kannen irrottamista, katkaise virta systeemyksiköstä ja kaikista siihen liitetystä laitteista; irroita sitten kaikki verkkojohdot pistorasioistaan.

Sivu 4-24

IBM RT PC:n pariston poisto ja vaihto - VAARA

Tulipalon, räjähdysten ja vakavien palovammojen vaara. Älä lataa paristoa uudelleen, pura sitä, kuumenna sitä lämpötilaan yli 100°deg. C, juota paristoa kiinni, hävitä sitä polttamalla tai anna sen kastua. Pidä paristo poissa lasten ulottuvilta. Vaihda käytetyn pariston tilalle vain paristo, jonka IBM-tilausnumero on 6299201 tai joka on hyväksytty käytettäväksi IBM 6151 -koneen kanssa. Muunlaisten paristojen käyttö saattaa aiheuttaa tulipalon tai räjähdysten vaaran.

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# FRENCH

# DANGER

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**Attention!**

Avant de retirer le carter de protection ou de débrancher les câbles de signalisation:

- Mettre en position hors tension tous les interrupteurs de l'unité et des périphériques.
- Débrancher tous les cordons d'alimentation de leur prise murale.

Page 4-24, 4-25

Retrait et remplacement de la pile de l'IBM RT PC - DANGER - Tenir hors de portée des enfants.

Ne pas recharger, démonter ou souder. Ne pas exposer la pile à une température excédant 100 C. Ne pas la mettre au feu ni à l'eau.

Risques d'incendie, d'explosion ou de brûlure grave.

N'utiliser sur l'IBM RT PC que les piles IBM Nr. 6299201 ou celles dont la classification "pour IBM 6151" est clairement spécifiée par des laboratoires agréés.

L'utilisation de toute autre pile présente un risque d'incendie ou d'explosion.

**Achtung**

Vor dem Entfernen von Verkleidungen oder dem Trennen von Signalkabeln Netzschalter der Systemeinheit und aller angeschlossenen Geräte ausschalten. Dann alle Netzkabel aus den Netzsteckdosen ziehen.

Seiten 4-24 und 4-25

Ausbau und Einbau der Batterie beim IBM RT PC - Gefahr.

Feuer-, Explosions- und Verbrennungsgefahr. Zelle nicht laden, zerrlegen, ueber 100 Grad C erhitzen, keine Loetstelle direkt an der Zelle anbringen, Zelle nicht verbrennen oder den Inhalt mit Wasser in Beruehrung bringen.

Kindersicher aufbewahren. Als Ersatz ausschliesslich IBM Original-Batterien verwenden. Bei Verwendung anderer Batterien besteht Feuer- und Explosionsgefahr.



**Attenzione**

Prima di togliere qualsiasi coperchio o scollegare qualsiasi cavo di segnale, spegnere gli interruttori di alimentazione dell'unità di sistema e di tutti i dispositivi collegati; scollegare poi dalle prese di corrente tutti i cavi di alimentazione esterni.

pagg. 4-24 e 4-25

Rimozione e sostituzione della batteria del PC RT IBM - PERICOLO.

Rischio di gravi ustioni, esplosione ed incendio. Non caricare, disassemblare o riscaldare ad una temperatura superiore ai 100 gradi, non effettuare saldature direttamente sull'elemento, incenerire o metterne il contenuto a diretto contatto con l'acqua. Tenere lontano dalla portata dei bambini. Usare un ricambio IBM (numero parte 6299201), oppure una batteria specificatamente consigliata dalla Underwriters Laboratories, Inc. per il 6151 IBM e verificare che tale classificazione sia espressamente indicata. L'utilizzo di una qualsiasi altra batteria può rappresentare un rischio di incendio o esplosione.

**注意：**

カバーを取り外したり、信号ケーブルを切り離したりする場合には、必ずシステム装置の電源スイッチとすべての接続装置の電源スイッチをオフにしてから、すべての外部電源ケーブルをコンセントから抜いてください。

**危険注意**

火災、爆発、および重いやけどの危険があります。バッテリーを再充電する、分解する、 $100^{\circ}\text{C}$ 以上に熱する、バッテリー内容物を水にさらす等のことは決して行なわないでください。子供は近づけないでください。IBM部品番号6299201か、あるいは、Underwriters Laboratories, Inc. によって、IBM6151用に使用されると明確に指定され、そのような指定がしるされているバッテリーのみと交換するようにしてください。他のバッテリーを使用方法と、火災や爆発の危険があります。

**Advarsel**

Før du tar av dekselet eller trekker ut signalkabler, må du slå av nettbryterne på systemenheten og alle tilkoblede enheter (AV, Off eller O) og trekke ut alle nettkablene fra stikkontaktene.

Kapitell 4: "Bytte av batterier - FARE. På grunn av brann- og eksplosjonsfare må batteriene ikke lades opp, tas fra hverandre, brennes eller utsettes for sterk varme. Oppbevar batteriene utilgjengelig for barn. Bruk bare IBMs batterier med delnummer 6299201. Bruk av feil type batteri kan forårsake brann eller eksplosjon"

## **Cuidado**

Antes de remover qualquer tampa ou de desligar qualquer cabo de sinal coloque os interruptores de corrente eléctrica da unidade do sistema e de todos os dispositivos a ela ligados na posição de desligado (off) e desligue das tomadas todos os cabos externos de corrente eléctrica.

Seccão 4

Páginas 4 a 24

**PERIGO** - Ao retirar e substituir a bateria IBM RT PC pode haver perigo de incêndio explosão e queimaduras graves. Não recarregue, desmonte, aqueça a mais de 100 graus - C, solde directamente à célula, incinere ou deite o conteúdo na água. Mantenha afastada das crianças. Substitua apenas por uma bateria IBM P/N 6299201 ou por uma bateria especificamente designada pelos Underwriters Laboratories, Inc. para ser usada com o IBM 6151.

A utilização de outro tipo de bateria pode representar risco de fogo ou explosão.

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**SPANISH****PELIGRO****Precaucion**

Antes de quitar cualquier cubierta o desconectar cualquier cable de se al, coloque los interruptores de alimentaci n en la unidad del sistema y en todos los dispositivos conectados en posici n de APAGADO; desenchufe entonces todos los cables externos de alimentaci n de las tomas de corriente.

Pag. 4-24, 4-25

**PELIGRO**

Riesgo de fuego, explosi n y quemaduras graves. No recargue, ni desmonte, ni exponga a temperaturas superiores a 100  C, ni suelde directamente en la bater a, ni queme, ni ponga en contacto con el agua el contenido de la bater a. Mant ngala fuera del alcance de los ni os. Sustit yala  nicamente por la pieza IBM N 6299201 o por una bater a espec ficamente clasificada por Underwriters Laboratoires, Inc. para utilizarse en el IBM 6151 y que est  marcada indicando dicha clasificaci n. La utilizaci n de otra bater a puede presentar riesgo de fuego o de explosi n.

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# SWEDISH

# VARNING

## **Varning**

Innan du tar bort någon kåpa eller lossar någon signalkabel måste du slå från strömbrytarna på systemenheten och alla anslutna enheter samt lossa alla nätkablar från sina uttag.

På sidorna 4-24 och 4-25

**VARNING** - Brand- och explosionsrisk. Batteriet får ej laddas, tas isär, utsätts för temperatur över 100 grader eller brännas. Lödning direkt på batteriet får ej ske. Batteriets innchåll får ej komma i kontakt med vatten. Förvaras oåtkomligt för barn. Byt endast mot batteri med IBM beställningsnummer 6299201. Användning av annat batteri kan medföra risk för brand eller explosion.

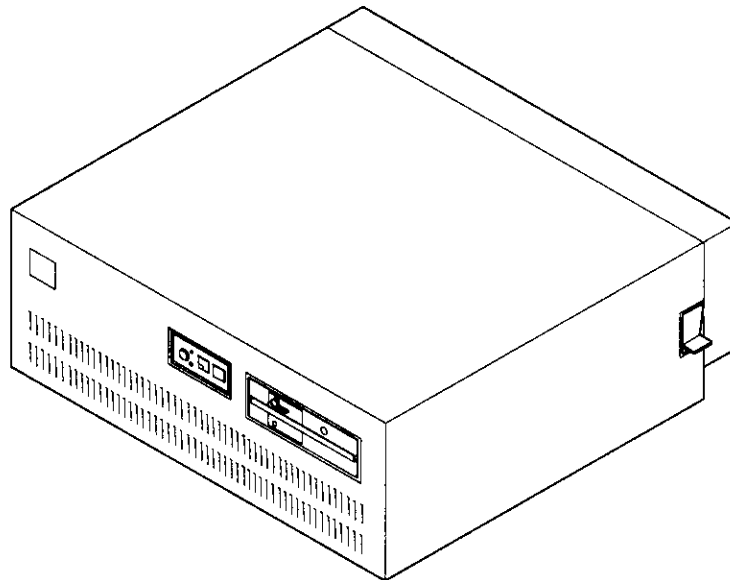
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## Safety Inspection Guide

Use this guide to identify unsafe conditions. Use good judgment to identify potential safety hazards not covered by this guide. If unsafe conditions are present, determine how serious the hazards are and whether you should continue before correcting the problem.

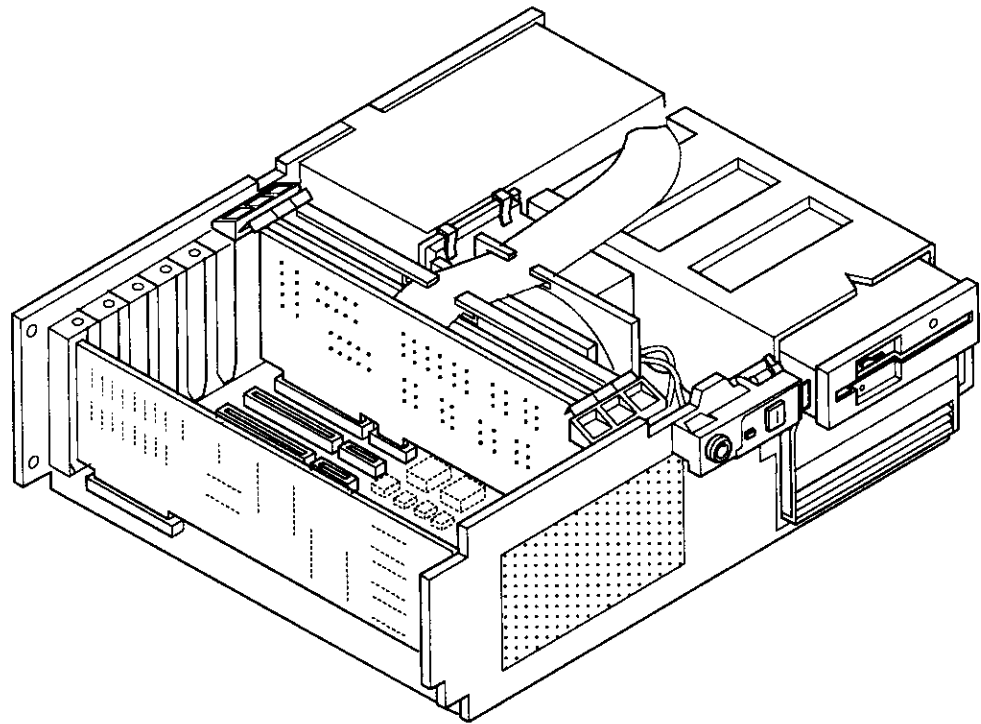
Do the following checks:

1. Check the covers for damage or alterations that expose the internal parts of the system unit or for sharp edges.
2. Check the covers for proper fit to the system unit. They should be in place and secure.



AJZB001

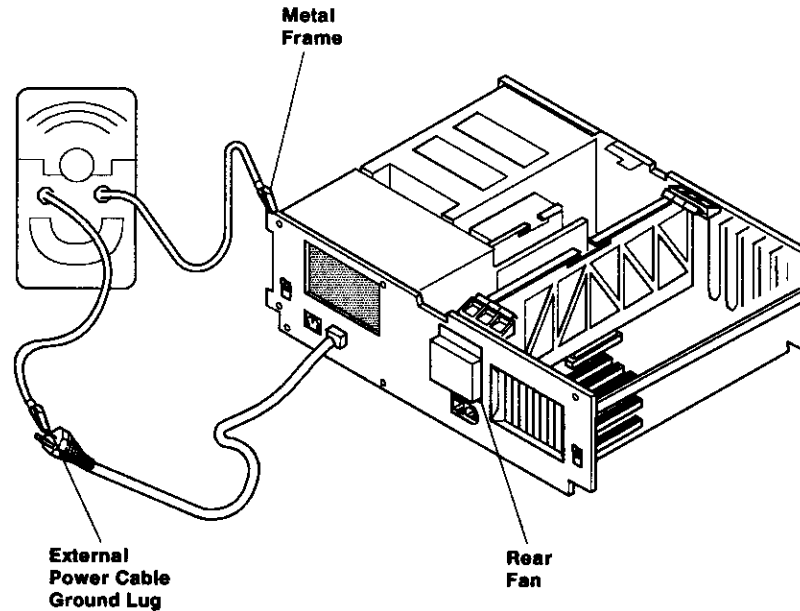
- 
3. Set the power switch on the system unit to Off.
  4. Remove the rear cover. If needed, see Section 4.
  5. Remove the top cover. If needed, see Section 4.
  6. Check for alterations or attachments. If there are any, check for obvious safety hazards such as broken wires, sharp edges, or broken insulation.
  7. Check the internal cables for damage.
  8. Check for dirt, water, and any other contamination within the system unit.
- 



AJZB014



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9. Check the voltage label on the rear of the system unit to ensure it matches the voltage at your outlet.
  10. Check the external power cable for damage.
  11. With the external power cable connected to the system unit, check for less than 0.1 ohm resistance between the ground lug on the external power cable plug and the metal frame.
  12. Install the top cover. If needed, see Section 4.
  13. Install the rear cover. If needed, see Section 4.
- 



AJZB008



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## About This Book

This manual provides service information about the IBM 6151 System Unit, adapters, and attached devices that do not have their own service information. This manual does not contain service information about attached printing and plotting devices.

Users of this manual should have training on the IBM 6151 System Unit.

This manual is divided into sections to make the information easier to find. A three or four-digit code is used in the page numbering of some sections to make future updating easier.

Section 1, "System Description" contains a brief description of the system unit, keyboard, and display.

Section 2, "Diagnostics" contains descriptions of the diagnostic programs, utilities, and the service request number.

Section 3, "Problem Isolation Charts" contains the service procedures used to isolate failures to a field-replaceable unit.

Section 4, "Removal and Replacement Procedures" contains the locations, removal procedures, and replacement procedures. These procedures may direct you to another section for specific details such as switch settings, jumper settings, or terminator resistor settings.

Section 5, "Base System Unit" contains a description, specifications, cabling diagrams, a data flow diagram, and parts information for the base components of the system unit.

Section 6, "System Memory Options" contains a description, specifications, and parts information for each system memory option.

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Section 7, "Diskette Drive" contains a description, specifications, terminator resistor setting, and parts information for the diskette drive.

Section 8, "Fixed-Disk Drives" contains a description, specifications, terminator resistor settings, and parts information for the fixed-disk drives.

Section 9, "Adapters" contains a description, specifications, switch or jumper settings, and parts information for each adapter used in the system unit.

Section 10, "User Input Devices" contains a description, specifications, a removal procedure, a replacement procedure, and parts information for each type device used to input data or commands.

Section 11, "Displays" contains a description, specifications, control adjustment procedures, and parts information for each IBM display used with the IBM 6151 System Unit.

Section 12, "Tape Drive" contains a description, specifications, and parts information for the tape drive used with the IBM 6151 System Unit.

Appendix A, "Tool Requirements" contains descriptions of the tools needed to service the IBM 6151 System Unit.

Appendix B, "SRA to FRU Cross-Reference List" contains a list of each Service Repair Action (SRA) number and the part number and part name of the field-replaceable unit it represents.

Appendix C, "Error Log Information" provides an overview of the Error Log reports, commands, and command examples.

A Reader's Comment Form and Book Evaluation Form are provided at the back of this book. Use the Reader's Comment Form at any time to give IBM information that may improve the book. After you become familiar with the book, use the Book Evaluation Form to give IBM specific feedback about the book.

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## Related Publications

- *IBM RT PC Guide to Operations* describes the IBM 6150 and IBM 6151 System Units, the displays, keyboard, and other devices that can be attached. This guide also includes procedures for operating the hardware and moving the IBM RT PC System.
- *IBM RT PC User Setup Guide* provides instructions for setting up and connecting devices to the system units. This book also gives procedures for testing the setup. (*Packaged with IBM RT PC Options Installation*)
- *IBM RT PC Options Installation* provides instructions for choosing the correct switch settings, installing optional adapters, installing fixed-disk drives, and installing diskette drives in the IBM 6150 and IBM 6151 System Units. (*Packaged with IBM RT PC User Setup Guide*)
- *IBM RT PC Problem Determination Guide* provides instructions for running diagnostic routines to locate and identify hardware problems. A problem determination guide for software and diskettes containing the IBM RT PC diagnostic routines are included.
- *IBM RT PC Hardware Technical Reference* is a two-volume set. Volume I describes how the system unit operates, including I/O interfaces, serial ports, memory interfaces, and CPU interface instructions. Volume II describes adapter interfaces for optional devices and communications and includes information about IBM Personal Computer family options and the adapters supported by the IBM RT PC System. (*Available optionally*)
- *IBM 6157 Streaming Tape Drive Setup and Operating Instructions* provides instructions for setting up and operating the IBM 6157 Streaming Tape Drive. This manual also describes procedures for cleaning the recording head of the tape drive and handling tape cartridges.

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- *Setup Instructions for the IBM PC Network Short, Medium, and Long Distance Kits* provides instructions for setting up and connecting the short, medium, and long distance expanders.
  - *Setup Instructions for the IBM PC Network Transformer and Translator Unit* provides instructions for setting up and connecting the transformer and translator.
  - *IBM RT PC 6192 Expansion Unit Hardware Maintenance and Service* provides removal procedures, replacement procedures, parts information, and problem isolation charts.
  - *IBM 6156 Portable Disk Drive Hardware Maintenance and Service* provides removal procedures, replacement procedures, parts information, and product specifications.

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- To order from your IBM representative, use Order Number SBOF-1827.
- To order from your IBM authorized RT PC dealer, use Part Number 22F9804.

A binder and wrap plugs are included with the order.

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## Section 1. System Description

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## About This Section

This section contains a brief description of the three units that make up the basic IBM RT Personal Computer® System. These descriptions are for the minimum system. Your system may contain devices that are not described in this section. For service information on a particular device, see the section for that type of device.

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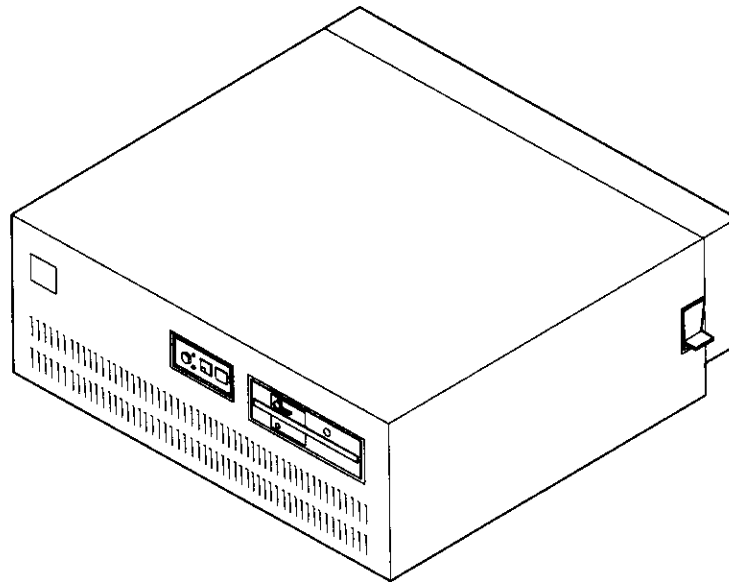
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## Introduction

The IBM RT PC 6151 System is a table-top system consisting of a system unit, display, and keyboard. Your system may contain other devices such as printers and communication devices.

## System Unit

The IBM 6151 System Unit contains the processor, optional floating-point board, system memory, power supply, fixed-disk drive, diskette drive, and the adapters for the keyboard, display, fixed-disk drive, diskette drive, mouse, printers, plotters, tape drive, and communication devices.

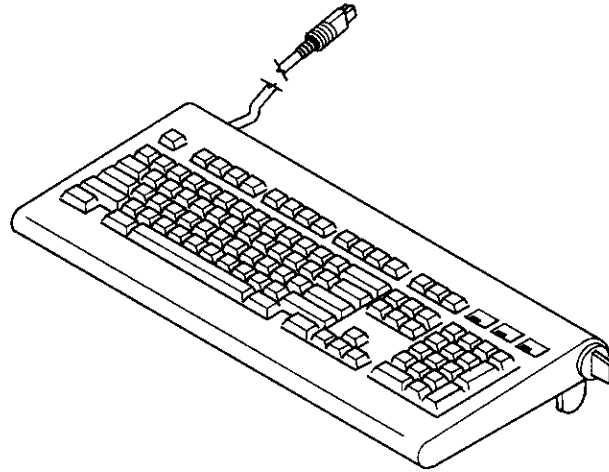


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## Keyboard

The keyboard is shipped with the system unit. The keyboard adapter is built into the system board. The keyboard attaches to the keyboard connector on the rear panel of the system unit.

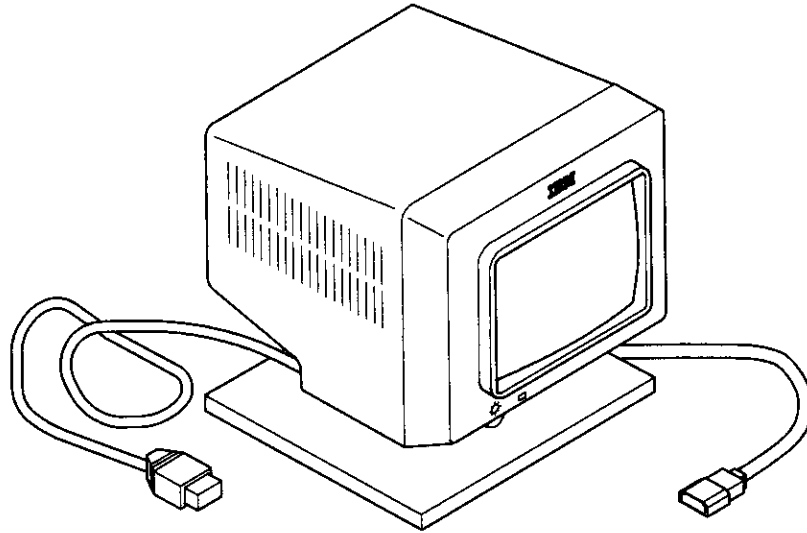


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## Display

Several types of display devices can be attached to the system unit. An adapter that is compatible with both the system unit and the display device must be installed in the system unit.



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