

FRONT

PICTURE 1

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EDITION Edition Notice
Safety Information

Refer to the *Hardware Maintenance Reference General Information* pamphlet in this manual for the following safety information:

- General Safety*
- Electrical Safety.*

First Edition (March 1990)

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IBM
Personal System/2.

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8.0 Safety Grounds

1.0 Product Description

The features of the IBM (*) Personal System/2 (*) Model 30 286 are:

- Security: cover lock (optional) and power-on password
- System board:
 - 10-MHz 80286 Microprocessor
 - 80287 Math Coprocessor connector
 - Complementary metal-oxide semiconductor random access memory (CMOS RAM)
 - 512KB (KB=1024 bytes) random access memory (RAM), can be expanded to 4MB (MB=1,048,576 bytes)
 - Video graphics array (VGA)
 - Three expansion slots
 - Serial port
 - Parallel port
 - Keyboard connector
 - Pointing-device connector
 - Display connector
 - Fixed-disk-drive connector
 - Diskette-drive connector.
- Power supply:
 - Manually switchable to the 100-125 Vac or the 200-240 Vac range
 - 50 or 60 Hz
 - 90 watts.
- Battery (to keep CMOS RAM active when power is off)
- 84/85-key or 101/102-key keyboard
- Fixed disk drives supported (see "Fixed Disk Drives" in topic 2.3).

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Subtopics

1.1 Security

1.2 System-Board Features

1.1 Security

Subtopics

1.1.1 Cover Lock

1.1.2 Power-On Password

1.1.1 Cover Lock

If a cover lock is installed, it is on the right of the system unit and can be unlocked with the user's key.

If the keys for the cover lock are lost, a new cover lock assembly can be ordered (see the parts section in the *Hardware Maintenance Service* pamphlet for the system you are servicing). The new assembly contains two keys.

1.1.2 Power-On Password

A power-on password denies access to the system when the system is powered-on. To service a system with an active and *unknown* power-on password, power-off the system and, do the following:

- Locate the password override connector (J13) on the system board. See "Locations" for the actual position of the connector on the system board.
- Note the position of the connector. If the connector covers the first and second pins, move it so that it covers the second and third pins. If the connector covers the second and third pins, move it so that it covers the first and second pins. To move the connector, lift it straight up.

Note: Once you have moved the connector to the new position, leave it in that position until the next time you need to reset the password.

To reactivate the power-on password, the user must start the system with the Starter Diskette inserted, select the **Set features** option, and follow the instructions.

1.2 System-Board Features

The major features of the system board are:

- 80286 Microprocessor
- CMOS RAM
- VGA
- Serial port
- Parallel port
- Keyboard connector
- Pointing-device connector.

Subtopics

- 1.2.1 Microprocessor
- 1.2.2 CMOS RAM
- 1.2.3 VGA
- 1.2.4 Serial Port
- 1.2.5 Parallel Port
- 1.2.6 Keyboard Connector and Pointing-Device Connector

1.2.1 *Microprocessor*

The microprocessor interprets and carries out instructions. The 80286 Microprocessor is a 16-bit processor and operates in two modes: real-address mode and virtual address (protected) mode. The microprocessor speed is 10 MHz.

1.2.2 CMOS RAM

The CMOS RAM provides 64 bytes of storage. The real-time clock uses 14 bytes to track the date, time, and battery level.

The data stored in CMOS RAM is kept active by the battery when the system is powered-off. If the stored data is lost due to a depleted or removed battery, the data can be restored by starting the Starter Diskette to allow the automatic configuration program to run. The data also can be restored by using the restore configuration program on the user's backup copy of the Starter Diskette.

1.2.3 VGA

The VGA is a graphics controller on the system board. The VGA supports color and monochrome analog direct-drive displays in a variety of modes, including alphanumeric text mode and all-points-addressable (APA) graphics mode.

The VGA supports a maximum of 720-by-400 picture elements (PELs) in the text mode and a maximum of 640-by-480 PELs in graphics mode. The VGA can support 256 colors or 64 shades of gray at one time. Composite video is not supported.

1.2.4 Serial Port

The serial port is fully programmable and supports asynchronous communications. The 25-pin, D-shell connector provides the signals to drive a device with a standard 25-contact, RS-232 connector. The connected device is identified by the system configuration as either COM1 or COM2.

If an option adapter with a serial port is installed in the system, it should be set to COM2.

1.2.5 Parallel Port

The parallel port allows the attachment of devices that accept eight bits of parallel data at standard transistor-transistor-logic (TTL) levels. The port has a 25-pin, D-shell connector and is designed primarily for printers. However, the port can be used as a general input/output port for any device or application that matches its input/output capabilities. When option adapters with additional parallel ports are installed, the system can support two different devices, each addressed separately as LPT1 or LPT2.

1.2.6 Keyboard Connector and Pointing-Device Connector

The two 6-pin connectors in the rear of the system board are for connecting a keyboard and a pointing device (mouse). The keyboard connector is marked with a "1" molded into the back panel; the pointing-device connector is marked with a "2." The interface logic is the same for both.

2.0 *Option Compatibility*

Subtopics

- 2.1 Incompatible Adapters
- 2.2 Drive and Diskette Compatibility
- 2.3 Fixed Disk Drives
- 2.4 Terminators

2.1 Incompatible Adapters

Certain adapters are not compatible when used in the same system. If one of the following adapters is installed, the other adapters listed cannot be installed in the same system unit:

- 3278 - 3279 Emulation Adapter
- Speech Adapter.

Problems can occur in the system when adapters share the same interrupt level. Check the adapter interrupt levels to ensure that they do not conflict. If the adapters have selectable interrupt levels, verify that the jumpers on the adapters are not set for the same level.

Some adapters are not supported by the Model 30 286. Supported option adapters for the Model 30 286 are listed in the parts section in the *Hardware Maintenance Service* pamphlet for the system you are servicing.

2.2 Drive and Diskette Compatibility

The following provides information concerning the identification of diskette drives.

Diskette Drive	Identifying Mark
3.5 Inch - 720KB	None
3.5 Inch - 1.44MB	1.44 on the Eject Button

The following addresses the compatibility of diskettes to diskette drives.

Diskette Capacity	720KB Drive	1.44MB Drive
1.0MB	Read/Write	Read/Write
2.0MB	Not Compatible	Read/Write

Note: For additional information, see "Diskette Drives and Diskettes" in the *IBM Personal System/2 Hardware Maintenance Reference General Information* pamphlet in this manual.

2.3 Fixed Disk Drives

Several fixed disk drives are available for PS/2 systems. The fixed-disk drive and fixed-disk-drive interface must be the same. For example, an ST506 adapter must be used with an ST506 drive. See the parts section in the *Hardware Maintenance Service* pamphlet for the model you are servicing for supported fixed disk drives.

2.4 Terminators

Terminators are not required by the drives used in the Model 30 286.

3.0 *Operating Requirements*

This section describes the operations that occur from the time the system is powered-on until the minimum operating requirements have been met.

Subtopics

- 3.1 Power Supply
- 3.2 Power-On Self-Test (POST)
- 3.3 System Memory

3.1 Power Supply

The manually-switchable power supply must be switched to either the 100-125 Vac or the 200-240 Vac range *before* the power cord is plugged into an outlet. The ac input is converted to dc outputs that supply the system with the proper operating voltages.

When the system is powered-off for five seconds or more and then powered-on, the power supply generates a 'power good' signal that resets system logic. The presence of the 'power good' signal indicates that the power supply is operating properly and that the minimum under-voltage sense levels have been established. This means that all system-board power requirements have been met.

Output (Vdc)	Minimum Under-Voltage Sense Level (Vdc)
+ 5.0	+ 4.5
- 5.0	- 4.3
+12.0	+10.8
-12.0	-10.2

Once the minimum under-voltage sense levels are established and the 'power good' signal has risen to its active level, all system board power requirements have been met and the power-on self-test begins.

3.2 Power-On Self-Test (POST)

The POST is initiated automatically each time the system power is turned on.

The POST is a series of system checks and initializations that verify the correct operation of the system unit. The POST tests only those areas that allow the system to be operational enough to run advanced diagnostics. The POST can detect two types of errors: critical and noncritical.

Critical errors prevent the system from operating or can cause incorrect results that are apparent to the user. Examples of critical errors include microprocessor or interrupt-controller errors. If the POST detects a critical error, the microprocessor attempts to display the error and all testing stops.

Noncritical errors cause incorrect results that might not be apparent to the user. An example of a noncritical error would be a serial communications failure. If the POST detects a noncritical error, all testing stops and the microprocessor attempts to display the error. Pressing the F1 key allows testing to continue.

When the Advanced Diagnostics Diskette is in drive A, and a noncritical error is detected, the system displays the POST error message along with a message generated from the Advanced Diagnostics Diskette. The Advanced Diagnostics Diskette message instructs the user to take a specific action to correct the error.

After a successful POST, one short beep occurs. Control is then given to a BIOS routine called the system bootstrap loader. The bootstrap loader attempts to load an operating system or a program from either a diskette or the fixed disk drive. If neither is present in the system, the Insert Diskette icon is displayed (see the *IBM Personal System/2 Non Micro Channel Diagnostics* pamphlet in this manual). This icon indicates that a diskette should be inserted into drive A. After the diskette is inserted, press the F1 key to resume operation. If the F1 key is pressed when no diskette is in the diskette drive, the IBM Cassette BASIC screen appears.

3.3 *System Memory*

Subtopics

3.3.1 System-Board Memory

3.3.2 Memory-Expansion Adapters

3.3.1 System-Board Memory

The Model 30 286 system board has at least 512KB RAM installed at the time of shipment. This memory consists of two 256KB memory packs. The system-board memory can be expanded to 1MB RAM by the addition of two 256KB memory packs.

System-board memory can be expanded to 2MB or 4MB by removing all of the 256KB memory packs from the system board and installing *either* two or four 1MB memory packs (256KB memory packs cannot be mixed with 1MB memory packs). Some memory-expansion adapters may limit the amount of memory that can be installed on the system.

3.3.2 Memory-Expansion Adapters

An optional memory adapter, the IBM PS/2 Multifunction Adapter, is available to extend the capabilities of the Model 30 286. Two 256K memory packs must remain on the system board. One or two of these adapters can be installed on the system board. These adapters can add 15.5MB of memory. If two of these adapters are installed, the combined memory cannot exceed 15.5MB. When memory-expansion adapters are installed, the system can support 16MB of memory. For other supported options, see the parts section in the *Hardware Maintenance Service* pamphlet for the model you are servicing.

4.0 Specifications

Size

- Width: 406 mm (16 in.)
- Depth: 398 mm (15.7 in.)
- Height: 102 mm (4 in.).

Weight

7.4 kg (16.5 lb).

Environment

- Temperature:
 - Power on: 15.6° to 32.2°C (60° to 90°F)
 - Power off: 10° to 43°C (50° to 110°F).
- Humidity:
 - Power on: 8% to 80%
 - Power off: 20% to 80%.
- Maximum altitude: 2134 m (7000 ft).

Heat Output

683 British thermal units (BTUs) per hour (200 watts per hour).

Electrical

- Input voltage (Sinewave input is required)
 - Low Range:
 - Minimum: 90 Vac
 - Maximum: 137 Vac.
 - High Range:
 - Minimum: 180 Vac
 - Maximum: 259 Vac.
- Input kilovolt-amperes (kVA)
 - Minimum Configuration (as shipped from IBM): Approximately .05 kVA
 - Maximum Configuration: Approximately .15 kVA.

5.0 Special Tools

The following special tools are required to service the Model 30 286.

Volt-Ohm Meter

A meter similar to the Triplet Model 310. (1)

Wrap Plug

The Tri-Connector wrap plug (IBM part 72X8546) is used during advanced diagnostic tests of serial and parallel ports.

PICTURE 2

Note: Existing wrap plugs (IBM part 8529228 and IBM part 8529280), also can be used.

(1) Manufactured by Triplet Corporation, Bluffton, Ohio 45817,
U.S.A.

6.0 Removals and Replacements

The arrows in the removals and replacements show the direction of movement to remove a FRU, to turn a screw, or to press a tab to release a FRU. The arrows are marked in numeric order to show the correct sequence of removal.

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

To replace a FRU, reverse the removal procedure and follow any notes that pertain to replacement. See "Locations" for internal cable connection and arrangement information.

CAUTION:

Before removing any field replaceable unit (FRU), power-off the system, unplug all power cords from their electrical outlets, and disconnect any interconnecting cables.

Warning: The system board, adapters, memory modules, and the math coprocessor are sensitive to, and can be damaged by, electrostatic discharge. Establish personal grounding by touching a ground point with one hand before touching these units.

Note: An electrostatic discharge (ESD) strap may be used to establish personal grounding.

Subtopics

- 6.1 1000 Cover
- 6.2 1010 Rear Cover
- 6.3 1015 Drives, Diskette and Fixed Disk
- 6.4 1020 Adapters
- 6.5 1025 Bus Adapter
- 6.6 1030 Cover Lock Assembly
- 6.7 1035 Power Supply
- 6.8 1040 Memory-Module Pack
- 6.9 1045 Math Coprocessor
- 6.10 1050 System Board
- 6.11 1055 Front Bezel
- 6.12 1060 Power Switch and Link
- 6.13 1065 Drive Cradle
- 6.14 1070 Clock Module
- 6.15 1075 Diskette-Drive Cable
- 6.16 1080 Fixed-Disk-Drive Cable
- 6.17 1085 System-Board Video Cable

6.1 1000 Cover

CAUTION:

Before removing any field replaceable unit (FRU), power-off the system, unplug all power cords from their electrical outlets, and disconnect any interconnecting cables.

Note: Unlock the cover and loosen the cover screws 1.

PICTURE 3

6.2 1010 Rear Cover

□ Cover (1000)

PICTURE 4

6.3 1015 Drives, Diskette and Fixed Disk

Warning: Improper shipping and handling can result in permanent loss of all data and formatting on the fixed disk drive. Have the user back up all information on the fixed disk drive.

Cover (1000)

Note: Before a fixed disk drive is removed, run the Advanced Diagnostics Diskette to park the heads.

PICTURE 5

PICTURE 6

6.4 1020 Adapters

Cover (1000)

Note: New option installations may require the plastic inserts 1 on the rear panel to be removed.

PICTURE 7

Note: When installing a three-quarter length adapter, position the sliding support bracket to support the adapter.

PICTURE 8

6.5 1025 Bus Adapter

□ Adapters (1020)

PICTURE 9

6.6 1030 Cover Lock Assembly

PICTURE 10

6.7 1035 Power Supply

- Cover (1000)
- Rear cover (1010)
- Bus adapter (1025) (remove the bus-adapter support only).

PICTURE 11

6.8 1040 Memory-Module Pack

- Bus adapter (1025) (remove the bus-adapter support only)

PICTURE 12

6.9 1045 Math Coprocessor

- Cover (1000)
- Adapters (1020)
- Bus adapter (1025).

Warning: Remove the math coprocessor carefully. Do not bend the pins when removing the math coprocessor. The math coprocessor can be damaged by electrostatic discharge, prying between the module and connector, or prying between the connector and system board. Establish personal grounding by touching a ground point with one hand before touching the math coprocessor.

Note: Align the notch on the math coprocessor toward the rear of the system unit.

PICTURE 13

6.10 1050 System Board

- Adapters (1020)
- Bus adapter (1025)
- Memory packs (1040)
- Math coprocessor (1045).

Note: Disconnect all cables from the system board.

PICTURE 14

6.11 1055 Front Bezel

□ Drives, diskette, and fixed disk (1015)

PICTURE 15

6.12 1060 Power Switch and Link

- Drives, diskette, and fixed disk (1015)
- Front bezel (1055).

PICTURE 16

6.13 1065 Drive Cradle

- Cover (1000)
- Adapters (1020)
- Drives, diskette, and fixed disk (1015)
- Front bezel (1055).

PICTURE 17

6.14 1070 Clock Module

Warning: Remove the clock module carefully. Do not bend the pins when removing the clock module. The clock module can be damaged by electrostatic discharge, prying between the module and connector, or prying between the connector and system board.

- Cover (1000)
- Adapters (1020).

Note: Align the white dot on the module toward the rear of the system unit.

PICTURE 18

6.15 1075 Diskette-Drive Cable

- Adapters (1020)
- Bus adapter (1025).

6.16 1080 Fixed-Disk-Drive Cable

- Unplug P11 from J11 on the system board.
- Unplug the cable from the fixed disk drive.

6.17 1085 System-Board Video Cable

- Bus adapter (1025) (remove the bus-adapter support only).
- Remove two mounting screws and nuts from the back panel display connector.
- Unplug the cable from the video connector (J4) on the system board.

7.0 Locations

Subtopics

- 7.1 Front View
- 7.2 Rear View
- 7.3 Interior View
- 7.4 System Board
- 7.5 Diskette-Drive (1/2-High) Cable
- 7.6 Diskette-Drive (1/3-High) Cable
- 7.7 Fixed-Disk-Drive Cable

7.1 Front View

- 1 Diskette drive A
- 2 Diskette-eject button
- 3 Fixed disk drive or diskette drive B
- 4 Power switch
- 5 Serial number
- 6 Cover lock.

PICTURE 19

7.2 Rear View

- 1 Power selector
- 2 Power connector
- 3 Display connector
- 4 Keyboard connector
- 5 Pointing-device connector
- 6 Serial port
- 7 Parallel port
- 8 Expansion slots.

PICTURE 20

7.3 Interior View

- 1 Bus adapter
- 2 Expansion slots
- 3 Bus-adapter support
- 4 Power supply
- 5 Drive cradle
- 6 Cover-lock assembly
- 7 Power switch
- 8 Fixed disk drive (also can be diskette drive B)
- 9 Diskette drive A
- 10 Front bezel
- 11 System board.

PICTURE 21

7.4 System Board

- 1 Parallel port (J3)
- 2 Serial port (J5)
- 3 Bus-adapter connector (J6)
- 4 Pointing-device connector (J1)
- 5 Keyboard connector (J2)
- 6 Memory packs (J9)
- 7 Optional memory packs (J10)
- 8 Fixed-disk connector (J11)
- 9 Power-supply connector (J7)
- 10 Power-supply connector (J14)
- 11 Display connector (J4)
- 12 Password-override connector (J13)
- 13 80286 Microprocessor connector (ZM36)
- 14 Clock module connector (ZM35)
- 15 Math coprocessor (ZM1)
- 16 Diskette-drive connector (J12).

PICTURE 22

7.5 Diskette-Drive (1/2-High) Cable

- 1 System board
- 2 Drive A
- 3 Drive B.

PICTURE 23

- 1 System board
- 2 Drive A.

PICTURE 24

7.6 Diskette-Drive (1/3-High) Cable

- 1 System board
- 2 Drive A
- 3 Drive B.

Note: Pins 35 to 40 on the system-board end of the diskette-drive cables are not used.

PICTURE 25

- 1 System board
- 2 Drive A.

PICTURE 26

7.7 Fixed-Disk-Drive Cable

- 1 System board
- 2 Drive C.

PICTURE 27

8.0 Safety Grounds

- 1 Primary ground
- 2 Chassis ground.

PICTURE 28

Notes: