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.

CONTENTS Table of Contents

1.0 Product Description

The features of the IBM (*) Personal System/2 (*) Model 25 are:

- Security: keylock on models with fixed disk drives
- System board:
  - 8-MHz 8086 Microprocessor
  - Math-coprocessor socket
  - 512KB (KB=1024 bytes) random access memory (RAM)
  - Sockets for 128KB memory expansion
  - Two expansion slots
  - Serial port
  - Parallel port
  - Keyboard connector
  - Pointing-device connector
  - Display connector
  - Fixed-disk-drive connector
  - Diskette-drive connector
  - Earphone connector.
- Power supply:
  - Manually switchable to the 100-125 Vac or the 200-240 Vac range
  - 50 or 60 Hz
  - 90 watts (monochrome model)
  - 113 watts (color model).
- 84/85-key or 101/102-key keyboard
- Integrated analog color or monochrome display
- 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 Keylock
1.1.2 Power-On Password

1.1.1 Keylock

If a keylock is installed, it is on the fixed-disk bezel on the front of the system unit and can be unlocked with the user's key.

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

1.1.2 Power-On Password

A power-on password is not used in the Model 25.

1.2 System-Board Features

The major features of the system board are:

- 8086 Microprocessor
- Serial port
- Parallel port
- Keyboard connector
- Pointing-device connector
- Display connector
- Earphone connector.

Subtopics
1.2.1 Microprocessor
1.2.2 Serial Port
1.2.3 Parallel Port
1.2.4 Keyboard Connector and Pointing-Device Connector
1.2.5 Display Connector
1.2.6 Earphone Connector

1.2.1 Microprocessor

The microprocessor interprets and carries out instructions. The 8086 Microprocessor is a 16-bit microprocessor with a 16-bit external bus. The microprocessor speed is 8 MHz.

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

1.2.3 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 adapters with additional parallel ports are installed, the system can support two different devices, each addressed separately as LPT1 or LPT2.

1.2.4 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.

1.2.5 Display Connector

The 14-pin connector supports either a 31.5-kHz analog color or monochrome display.

1.2.6 Earphone Connector

An earphone plugged into this connector silences the speaker and allows the sound to be heard through the earphones.

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:

- Synchronous Data Link Control (SDLC)
- Alternate Binary Synchronous Communications (Alt BSC)
- 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 25. Supported adapters are listed in the parts section of the *Hardware Maintenance Service* pamphlet for the system you are servicing.

Warning: The Model 25 system supports the installation of only one full-size adapter. A second adapter must be eight inches in length or smaller. The full-size adapter must be installed in the bottom expansion slot only or the adapter can be damaged when closing the system unit.

2.2 Drive and Diskette Compatibility

Use only double-sided, high capacity (2HC) 1MB 3.5-inch diskettes in the diskette drives.

The following provides information concerning the identification of diskette drives.

Diskette Drive	**Identifying Mark on Eject Button**
3.5 Inch - 720KB	None

The following addresses the compatibility of diskettes to diskette drives.

Diskette Capacity	**720KB Drive**
1.0MB	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. For supported fixed disk drives see the parts section in the *Hardware Maintenance Service* pamphlet for the system you are servicing.

2.4 Terminators

Terminators are not required by the drives used in the Model 25.

3.0 Operating Requirements

This section describes the operations that occur from the time the system is powered-on until the minimum operating requirements are 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	+ 3.2
- 5.0	- 2.4
+12.0	+10.5
-12.0	- 8.6

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
3.3.3 Memory Errors

3.3.1 System-Board Memory

The Model 25 system board has 512KB of memory consisting of two banks of 256KB memory module packages plugged into the system board. The system board has sockets for an additional 128KB of memory to bring the total system memory capacity to 640KB.

3.3.2 Memory-Expansion Adapters

Memory-expansion adapters cannot be used with the Model 25, with the following exception: the 2MB Expanded Memory Adapter, can be used when the Model 25 is part of an IBM 3270 Workstation that uses the IBM 3270 Workstation Program Versions 1.0 and 1.1. For other supported options, see the parts section in the *Hardware Maintenance Service* pamphlet for the system you are servicing.

3.3.3 Memory Errors

If an error occurs in the optional 128KB of memory on the system board, the system read-only memory basic input/output system (ROM BIOS) remaps the memory during POST. This allows the system to complete the POST using the system-board 512KB of memory. The error message **205-Memory Error** appears, and the system will operate with less total memory.

4.0 Specifications

Size

- Width: 319 mm (12.5 in.)
- Depth: 375 mm (14.7 in.)
- Height: 384 mm (15.1 in.).

Weight

- Minimum configuration (monochrome): 12.7 kg (28 lb)
- Maximum configuration (color): 16.8 kg (37 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

- Monochrome system: 307 British thermal units (BTUs) per hour (90 watts per hour)
- Color system: 386 British thermal units (BTUs) per hour (113 watts per hour).

Electrical

- Input voltage (Sinewave input is required)
  - Low Range:
    - Minimum: 90 Vac
    - Maximum: 137 Vac.
  - High Range:
    - Minimum: 180 Vac
    - Maximum: 265 Vac.
- Input kilovolt-amperes (kVA)
  - Minimum Configuration (as shipped from IBM): Approximately .11 kVA
  - Maximum Configuration: Approximately .28 kVA.

5.0 Special Tools

The following special tools are required to service the Model 25.

Volt-Ohm Meter

A meter similar to the Triplett 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), can be used.

Module Puller

The module puller is used to remove memory modules from the system board.

PICTURE 3

(1) Manufactured by Triplett 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

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: If a keylock is installed, turn the key to the unlocked position, and remove the key. Damage to the key or keylock occurs if the keylock is locked and the key is removed forcibly.

PICTURE 4

6.2 1010 Top, Side, and Rear Cover

- Cover **(1000)**
- Base frame assembly **(1065)**.

Note: Do not remove secondary FRUs listed in the base frame assembly **(1065)**. Unplug from the system board all display assembly cables.

PICTURE 5

PICTURE 6

6.3 1015 Diskette Drives

□ Tilt assembly **(1060)**

Note: Place the shipping insert into the drive. Remove the screws (2) from the **front** hole of each two hole set in the side, and one from the bottom 2.

PICTURE 7

6.4 1017 Fixed Disk Drive (Integrated Adapter)

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.

- Tilt assembly **(1060)**
- Base frame assembly **(1065)**.

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

Do not remove secondary FRUs listed in base frame assembly **(1065)**. Unplug from the system board all display assembly cables.

Before installing a new drive, remove and discard its bottom rail, if present.

PICTURE 8

6.5 1018 Fixed Disk Drive with Adapter

- Tilt assembly **(1060)**
- Base frame assembly **(1065)**.

Note: It is not necessary to use the Advanced Diagnostics Diskette to prepare the fixed disk drive for moving.

Do not remove secondary FRUs listed in the base frame assembly **(1065)**. Unplug from the system board all display-assembly cables.

1. Remove the three cables from the adapter 1.

2. Remove the screws (2) from the **front** hole of each two hole set in the side, and one from the bottom 2.

3. Slide the fixed disk drive out the front while feeding the cables down through the base frame assembly 3.

4. Remove the fixed-disk-drive adapter (Adapters **(1020)**).

PICTURE 9

6.6 1020 Adapters

PICTURE 10

6.7 1025 Bus Adapter and Support

- Adapters **(1020)**

PICTURE 11

6.8 1035 Display Assembly

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.

DANGER

This unit contains electrical shock hazards; do not attempt to remove the display assembly cover.

- Cover **(1000)**
- Top, side, and rear cover **(1010)**
- Front bezel **(1055)** (Do not remove the diskette drive and blank bezels **(1070)**).

PICTURE 12

6.9 1040 Memory Modules and Packages

- Cover **(1000)**
- Top, side and rear cover **(1010)**
- Adapters **(1020)**.

PICTURE 13

6.10 1045 Math Coprocessor and 8086 Microprocessor

- Cover **(1000)**
- Top, side and rear cover **(1010)**
- Adapters **(1020)**
- Bus adapter and support **(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 board.

1 Math coprocessor
2 8086 Microprocessor.

PICTURE 14

6.11 1050 System Board

- Adapters **(1020)**
- Bus adapter and support **(1025)**
- Memory modules and packages **(1040)**
- Math coprocessor and 8086 Microprocessor **(1045)**.

Note: Disconnect all cables from the system board.

PICTURE 15

Note: When installing the system board, do not tighten screws until the bus adapter and support is installed.

6.12 1055 Front Bezel

- Top, side, and rear cover **(1010)**
- Diskette drive and blank bezels **(1070)**
- Fixed-disk-drive bezel and keylock **(1073)**.

PICTURE 16

6.13 1060 Tilt Assembly

PICTURE 17

6.14 1065 Base Frame Assembly

- Diskette drives **(1015)**
- Fixed disk drive **(1017)**
- Diskette-drive cable **(1075)**
- System board **(1050)**.

Note: Squeeze and twist the plastic retainer 1.

PICTURE 18

6.15 1070 Diskette Drive and Blank Bezels

- Base frame assembly **(1065)**

Note: Do not remove secondary FRUs listed in the base frame assembly **(1065)**. Unplug from the system board all display-assembly cables.

PICTURE 19

6.16 1073 Fixed-Disk-Drive Bezel and Keylock

- Base frame assembly **(1065)**

Note: Do not remove secondary FRUs listed in the base frame assembly **(1065)**. Unplug from the system board all display-assembly cables.

PICTURE 20

6.17 1075 Diskette-Drive Cable

- Tilt assembly **(1060)**.
- Unplug P12 from J12 on the system board.
- Feed cable into base frame assembly.
- Unplug cable from the diskette drive(s).

6.18 1077 Fixed-Disk-Drive Cable

- Tilt assembly **(1060)**.
- Unplug P11 from J11 on the system board.
- Feed cable into base frame assembly.
- Unplug cable from the fixed disk drive.

Note: If the fixed disk drive is connected to an adapter, unplug the cables from the adapter and remove the drive before disconnecting the cables.

7.0 Locations

Subtopics

7.1 Front View

1 Display
2 Diskette drive A
3 Diskette-eject button
4 Display-brightness control
5 Diskette drive B or fixed disk drive C
6 Display-contrast control
7 Keylock
8 Power switch
9 Power-on indicator.

PICTURE 21

7.2 Rear View

1 Tilt handle
2 Voltage-selector switch
3 Power connector
4 Earphone connector
5 Keyboard connector
6 Pointing-device connector
7 Serial port
8 Parallel port
9 Expansion slots.

PICTURE 22

7.3 Interior View (Part 1 of 2)

1 Top, side, and rear cover
2 Front bezel
3 Diskette drive B or fixed disk drive C
4 Diskette, fixed disk drive, or blank bezel
5 Diskette-drive bezel
6 Diskette drive
7 Display assembly.

PICTURE 23

7.4 Interior View (Part 2 of 2)

8 Feature-card retainer
9 Base-to-cover plastic retainer
10 Fixed-disk-drive cable
11 Tilt assembly
12 Diskette-drive cable
13 Base frame assembly
14 System board
15 Bus adapter
16 Bus-adapter support.

PICTURE 24

7.5 System Board - Type 1

1 Parallel port (J3)
2 Serial port (J5)
3 Pointing-device connector (J1)
4 Keyboard connector (J2)
5 Earphone connector
6 Keylock connector (J10)
7 Bus-adapter connector (J6)
8 Fixed-disk-drive connector (J11)
9 Fan connector (J8)
10 Power connector (J7)
11 Display connector (J4)
12 Memory-module package 1
13 512KB memory (J9)
14 Memory-module package 2
15 Optional memory module ZM2
16 Optional memory module U34
17 Optional memory module U35
18 Optional memory module U22
19 Optional memory module U16
20 Optional memory module ZM1
21 8086 Microprocessor
22 Math coprocessor
23 Diskette connector (J12).

PICTURE 25

7.6 System Board - Type 2

1 Parallel port (J3)
2 Serial port (J5)
3 Pointing-device connector (J1)
4 Keyboard connector (J2)
5 Earphone connector
6 Keylock connector (J10)
7 Bus-adapter connector (J6)
8 Fixed-disk-drive connector (J11)
9 Fan connector (J8)
10 Power connector (J7)
11 Display connector (J4)
12 Memory-module package 1
13 512KB memory (J9)
14 Memory-module package 2
15 Optional memory module U35
16 Optional memory module U34
17 Optional memory module U22
18 Optional memory module U16
19 Optional memory module ZM2
20 Optional memory module ZM1
21 8086 Microprocessor
22 Math coprocessor
23 Diskette connector (J12).

PICTURE 26

7.7 Diskette-Drive Cable

1 System board
2 Drive A
3 Drive B.

PICTURE 27

7.8 Fixed-Disk-Drive Cable

1 System board
2 Fixed disk drive.

PICTURE 28

8.0 Safety Grounds

1 Primary ground
2 Chassis ground.

PICTURE 29

Notes: