FRONT

PICTURE 1

March 21, 1990

Part Number 64F3993

Form Number S64F-3993-00

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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CONTENTS Table of Contents

1.0 Product Description

The IBM (*) Personal System/2 (*) Model 70 computers use the IBM Micro
Channel (*) architecture. The features of the various types of Model 70
are:

    Security: cover lock and power-on password
    System board:
    -   16-, 20-, or 25-MHz 80386 Microprocessor (Model 70 386)
    -   25 MHz 80486 Microprocessor (Model 70 486)
    -   80387 Math Coprocessor connector
    -   Minimum of 1MB (MB = 1,048,576 bytes) random access memory (RAM)
    -   64 bytes of complementary metal-oxide semiconductor random access
        memory (CMOS RAM)
    -   Read-only memory basic input/output system (ROM BIOS)
    -   Video graphics array (VGA)
    -   Three expansion slots:
        -   Two 16-bit expansion slots
        -   One 16-bit slot with auxiliary video-connector extension
    -   Serial port
    -   Parallel port
    -   Diskette-drive controller
    -   Keyboard connector
    -   Pointing-device connector
    -   Display connector
    -   Fixed-disk-drive connector.
    Power supply:
    -   Automatically switches 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)
    Speaker
    101/102-key keyboard
    Fixed disk drives supported (see "Fixed Disk Drives" in topic 2.2).

Note: System board memory-module kits selected for use must have the same
      operating speed as the system-board microprocessor.

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    the International Business Machines Corporation.

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

The cover lock is on the back 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* for the
system you are servicing). The new assembly contains two keys. Use one
of the new keys, along with a pair of pliers, to force the old cover lock
open.

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 *one* of the following depending on
which battery and speaker assembly is installed:

    If the assembly has pins, short pins 2 and 3 together.
    If the assembly has no pins, insert a meter lead into connector 1 and
    short the other end of the lead to frame ground.

With the assembly shorted, power-on the system. This deactivates the
power-on password. Remove the short after the power-on self-test (POST)
is finished.

To reactivate the power-on password, start the system with the Reference
Diskette in drive A, select the **Set features** option, and follow the
instructions.

PICTURE 2

1.2 System-Board Features

The major features of the system board are:

    80386 or 80486 Microprocessor
    CMOS RAM
    ROM BIOS
    VGA
    Serial port
    Parallel port
    Diskette-drive controller
    Keyboard connector
    Pointing-device connector.

Subtopics
1.2.1 Microprocessor
1.2.2 CMOS RAM and CMOS RAM Extension
1.2.3 ROM BIOS
1.2.4 VGA
1.2.5 Serial Port
1.2.6 Parallel Port
1.2.7 Diskette-Drive Controller
1.2.8 Keyboard Connector and Pointing-Device Connector

1.2.1 Microprocessor

The microprocessor interprets and carries out instructions. The 80386 and
80486 Microprocessors are 32-bit processors and operate in three modes:
real-address mode, virtual-address (protected) mode, or virtual 8086 mode.
The 80386 Microprocessor speed is 16, 20, or 25 MHz depending on the
model. The 80486 Microprocessor includes a math coprocessor, memory
cache, and a cache controller. The 80486 Microprocessor speed is 25 MHz.

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The 80386 Microprocessor speed is 16, 20, or 25 MHz depending on the
model. The 80486 Microprocessor includes a math coprocessor, memory
cache, and a cache controller. The 80486 Microprocessor speed is 25 MHz.

1.2.2 CMOS RAM and CMOS RAM Extension

The CMOS RAM provides 64 bytes of storage. The first 50 bytes are used to
store system-configuration and security information. The real-time clock
uses the remaining 14 bytes to track the date, time, and battery level. A
2KB (KB = 1024 bytes) CMOS RAM extension stores additional configuration
and system-status information.

The data stored in the CMOS RAM and CMOS RAM extension 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 using one
of the following methods:

    If the user has a customized configuration that uses settings other
    than the default, run the restore configuration program on the user's
    backup copy of the Reference Diskette.

    If the configuration uses the default settings, run the automatic
    configuration program on the Reference Diskette.

1.2.3 ROM BIOS

ROM BIOS contains the instructions and routines that control the keyboard,
diskette drives, fixed disk drive, displays, and other major input/output
devices in the system. Some adapters have their own ROM modules
containing extended BIOS routines that work with the system board ROM
BIOS. The routines for performing the power-on self-test (POST) are also
contained in the ROM BIOS.

1.2.4 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 640-by-480 PELs in the graphics mode. The VGA can support
256 colors or 64 shades of gray at one time. Composite video is not
supported.

One expansion slot on the system board extends farther to the rear of the
system board than the others. This extended expansion slot accommodates
video adapters that are designed to interface with the system-board VGA.
Some of these adapters have a display connector of their own. The
extended expansion slot also supports all adapters designed to be
installed in the shorter slots.

1.2.5 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
SERIAL 1 or SERIAL 2.

If adapters with serial ports are installed in the system, they can be
configured from SERIAL 1 to SERIAL 8.

Note: Conflicts occur when using multiple communication lines if two or
more lines are addressed the same. Select the **Set configuration**
option on the Reference Diskette. Select **View configuration** to
verify that no lines are addressed the same.

1.2.6 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 an input/output port for any
device or application that matches the input/output capabilities of the
port. When adapters with additional parallel ports are installed, the
system can support three different devices, each addressed separately as
PARALLEL 1, PARALLEL 2, or PARALLEL 3.

Note: Conflicts occur when two or more devices have the same address.
Select the **Set configuration** option on the Reference Diskette.
Select **View configuration** to verify that no lines are addressed the
same.

1.2.7 Diskette-Drive Controller

The controller is on the system board. Signals to and from the diskette
drive are transferred through the 56-pin connector (slot 4) on the system
board.

1.2.7 Diskette-Drive Controller

The controller is on the system board. Signals to and from the diskette
drive are transferred through the 56-pin connector (slot 4) on the system
board.

1.2.8 Keyboard Connector and Pointing-Device Connector

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

2.0 Option Compatibility

The Model 70 uses some adapters designed for IBM Personal System/2 Models
50, 60, and 80. All supported 16-bit adapters operate in any system-board
expansion slot. For supported options, see the parts section in the
Hardware Maintenance Service pamphlet for the system you are servicing.

Subtopics
2.1 Drive and Diskette Compatibility
2.2 Fixed Disk Drives
2.3 Terminators

2.1 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 -       ¦ 1.44 on the Eject ¦
¦ 1.44MB           ¦ Button            ¦
+-----------------+-------------------¦
¦                 ¦                   ¦
+-------------------------------------+
```

The following addresses the compatibility of diskettes to diskette drives.

```
+-------------------------------------------+
¦ Diskette   ¦ 720KB            ¦ 1.44MB      ¦
¦ Capacity   ¦ Drive            ¦ Drive       ¦
+-----------+------------------+------------¦
¦ 1.0MB      ¦ Read/Write       ¦ Read/Write  ¦
+-----------+------------------+------------¦
¦ 2.0MB      ¦ Not Compatible   ¦ Read/Write  ¦
+-----------+------------------+------------¦
¦           ¦                  ¦            ¦
+-------------------------------------------+
```

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

2.2 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
enhanced small device interface (ESDI) adapter must be used with an ESDI
drive. For supported fixed disk drives, see the parts section in the
Hardware Maintenance Service pamphlet for the system you are servicing.

The Model 70 uses fixed disk drives that automatically position the
read/write heads in nondata areas when the system is powered-off.

2.3 Terminators

Diskette Drives: do not use or require terminators.

ESDI and ST506 Fixed Disk Drives: do not use or require terminators.

SCSI Fixed Disk Drives: one or more cables are used to connect the
fixed-disk adapters to the fixed disk drives. For each cable used, the
last drive on the cable must have a terminator.

The location, quantity, and appearance of the terminator may vary from
drive to drive. An identification label or tag (usually "T-RES") is
attached to the terminator for easy identification.

Note: For additional information, see "SCSI Devices" in the "Options and
          Adapters (Micro Channel)" section of this manual.

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 power supply automatically switches to either the 100-125 Vac or the
200-240 Vac range. The ac input is converted to dc outputs that supply
the system with proper operating voltages.

When the system is powered-off for 10 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      ¦ Minimum Under-Voltage    ¦
¦ (Vdc)       ¦ Sense Level (Vdc)        ¦
+------------+---------------------------¦
¦ + 5.0       ¦ + 4.5                    ¦
+------------+---------------------------¦
¦ +12.0       ¦ +10.8                    ¦
+------------+---------------------------¦
¦ -12.0       ¦ -10.2                    ¦
+------------+---------------------------¦
¦             ¦                          ¦
+----------------------------------------+
```

The 'power good' signal turns on the green power-good light on the front
of the system. If the green light is not on, the power supply is not
functioning properly.

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 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 displays an error code. Pressing the
F1 key allows testing to continue.

When the Reference 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 Reference Diskette. The Reference 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 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

The Model 70 has either a 1MB or a 2MB memory-module kit installed at the
time of shipment. Additional memory-module kits can be installed on the
system board. The 16- and 20-MHz system-board memory capacity is 6MB (2MB
in each of the three connectors). The 25-MHz system-board memory capacity
is 8MB (2MB in each of the four connectors).

When memory-expansion adapters are installed, the system can support 16MB
of memory.

3.3.2 Memory-Expansion Adapters

Memory adapters can be installed in each of the 32-bit expansion slots
even though the system board is not fully populated. The system can
support up to 16MB of memory.

3.3.3 *Memory Requirements and Limitations*

The system board *does not* have to be fully populated before
memory-expansion adapters can be installed, and a memory-expansion adapter
does not have to be filled to capacity before another memory-expansion
adapter can be installed.

When memory is added or removed from the system, run the set configuration
program on the Reference Diskette.

3.3.4 Memory Errors

The Model 70 allocates memory in 1MB blocks, except for the first 1MB of
system-board memory. For this block, the following occurs:

   If the POST detects an error in the first 512KB of system-board
   memory, the first 1MB block of system-board memory is deactivated and
   the following occurs:

   -   If an additional 1MB block of system-board memory is installed,
       the addresses assigned to the deactivated block are reassigned to
       the second block of system-board memory. This is only true for
       the first two 1MB blocks of system-board memory. After the first
       two blocks, an error code is displayed.

   -   If additional system-board memory is not installed, no address
       reassignment occurs and an error code is displayed.

   -   The first 512KB of memory address space cannot be assigned to
       adapter memory.

If the POST detects a memory error in any memory after the first 512KB of
system-board memory, the 1MB block of memory is not deactivated and an
error code is displayed. In this event, the customer-level diagnostics
program can be run to deactivate the 1MB block and reassign the addresses.
This program is on the Reference Diskette supplied with the system.

After the addresses are reassigned, the defective block is ignored by POST
during subsequent power-ons.

PICTURE 3

If errors occur one at a time, the system deactivates 1MB blocks of
memory. However, if two errors occur at the same time on the same 80386
Memory Expansion Kit, the programs on the Reference Diskette cannot be
loaded and an error message is displayed.

4.0 Specifications

Size

    Width: 360 mm (14.1 in.)
    Depth: 410 mm (16.5 in.)
    Height: 140 mm (5.5 in.).

Weight

    Minimum configuration: 9 kg (20 lb)
    Maximum configuration: 11 kg (24 lb).

Environment

    Temperature:
    -   Power on: 16° to 32°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

    751 British thermal units (BTUs) per hour (220 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 .13
        kVA
    -   Maximum Configuration: Approximately .32 kVA.

5.0 Special Tools

The following special tools are required to service the Model 70.

Volt-Ohm Meter

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

Snap Tool

This tool (IBM part number 72X8547) is used to pull up the snaps that hold the support structure in place. A modified tool (IBM part number 57F2859) replaces part number 72X8547 in some 25-MHz systems. The modified tool is used to pull up the support-structure snaps and also to separate the processor board from the system board.

The tool is stored in the system unit in front of the battery and speaker assembly.

PICTURE 4

Wrap Plug

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

The Tri-Connector wrap plug replaces the following:

    (IBM part 8529228) Printer Adapter wrap plug
    (IBM part 8286126) Serial Port wrap plug
    (IBM part 8529280) Communications Adapter wrap plug
    (IBM part 62X1083) Communications wrap plug 25-pin
    (IBM part 62X1084) Communications wrap plug 9-pin.

PICTURE 5

 (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 the 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 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 1005 Cover
6.2 1007 Cover Lock
6.3 1010 Battery and Speaker Assembly
6.4 1020 Adapters
6.5 1030 Diskette Drives, Fixed Disk Drives, and Bus Adapter
6.6 1035 Support Structure
6.7 1040 Power Supply
6.8 1045 Math Coprocessor (16-MHz and 20-MHz Systems)
6.9 1045 Math Coprocessor (25-MHz Model 70 386 System)
6.10 1050 Memory-Module Kits (16-MHz and 20-MHz Systems)
6.11 1050 Memory-Module Kits (25-MHz Systems)
6.12 1052 Processor Board (25-MHz Systems)
6.13 1055 System Board

6.1 1005 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.

PICTURE 6

6.2 1007 Cover Lock

Cover **(1005)**

PICTURE 7

6.3 1010 Battery and Speaker Assembly

CAUTION:
The lithium battery presents a fire, explosion, or severe burn risk. Do
not recharge it, remove the polarized connector from it, disassemble it,
heat it above 100°C (212°F), incinerate it, or expose its cell contents to
water. Dispose of the battery as required by local ordinances or
regulations. When replacing the battery, use only Part No. 72X8498. Use
of another battery could result in ignition or explosion of the battery.
Replacement batteries can be ordered from IBM Authorized Dealers.

Warning: To avoid accidentally discharging the battery, remove it before
disconnecting the battery and speaker assembly cable. Connect the cable
before replacing the battery.

   Cover **(1005)**

Note: The speaker wires and connector shown in the figure are not present
      on all systems. If present, disconnect the connector from the
      system board before removing the assembly.

PICTURE 8

6.4 1020 Adapters

Cover **(1005)**
Disconnect any cables attached to the adapter.

Note: Before replacing an adapter, note the locations of the adapter and
cables. When replacing an adapter, install the replacement adapter
in the same slot as the adapter that was removed.

Stored configuration information depends on the location of the
adapter. If the replacement adapter is installed in a different
location, run the set configuration program on the user's Reference
Diskette to reset the system-configuration information.

PICTURE 9

6.5 1030 Diskette Drives, Fixed Disk Drives, and Bus 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.

    Cover **(1005)**

                        PICTURE 10

6.6 1035 Support Structure

Cover **(1005)**
Battery and speaker assembly **(1010)**
Diskette drives, fixed disk, and bus adapter **(1030)**.

PICTURE 11

6.7 1040 Power Supply

    Cover **(1005)**
    Diskette drive B **(1030).**

PICTURE 12

6.8 1045 Math Coprocessor (16-MHz and 20-MHz Systems)

    Cover **(1005)**
    Battery and speaker assembly **(1010)**
    Adapters **(1020)**
    Diskette drives, fixed disk, and bus adapter **(1030)**
    Support structure **(1035)**.

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 the system board. Establish personal
grounding by touching a ground point with one hand before touching the
math coprocessor.

Notes:

1. The beveled corner of the coprocessor must be oriented as shown. The
    1 points to the beveled corner.

2. The 16-MHz system uses the 16-MHz 80387 Math Coprocessor; the 20-MHz
    system uses the 20-MHz 80387 Math Coprocessor.

PICTURE 13

6.9 1045 Math Coprocessor (25-MHz Model 70 386 System)

Cover **(1005)**
Diskette drive B **(1030).**

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 the system board. Establish personal
grounding by touching a ground point with one hand before touching the
math coprocessor.

Notes:

1. Use the white outline around the math-coprocessor socket to position
    the coprocessor. (Match the beveled corner of the coprocessor 1 to
    the beveled corner of the outline.)

2. This system uses the 25-MHz 80387 Math Coprocessor.

PICTURE 14

6.10 1050 Memory-Module Kits (16-MHz and 20-MHz Systems)

Cover **(1005)**
Battery and speaker assembly **(1010)**
Adapters **(1020)**
Diskette drives, fixed disk, and bus adapter **(1030)**
Support structure **(1035).**

PICTURE 15

6.11 1050 Memory-Module Kits (25-MHz Systems)

Cover **(1005)**
Battery and speaker assembly **(1010)**
Any adapter **(1020)** that might hinder removal and replacement of the
memory-module kits
Diskette drives, fixed disk, and bus adapter **(1030)**
Support structure **(1035).**

Note: Remove memory-module kits beginning with the rightmost connector
and work to the left.

PICTURE 16

6.12 1052 Processor Board (25-MHz Systems)

Warning: Carefully remove and install the processor board. When
installing, make sure the connector is firmly seated in the system-board
connector.

    Cover **(1005)**
    Battery and speaker assembly **(1010)**
    Diskette drives, fixed disk, and bus adapter **(1030)**
    Support structure **(1035)**
    Power supply **(1040)**
    Math coprocessor, if installed (Model 70 386 only) **(1045)**.

Note: When a new processor board is installed, run the restore
       configuration program on the user's Reference Diskette to restore
       the time, date, and configuration information.

                        PICTURE 17

6.13 1055 System Board

    Cover **(1005)**
    Battery and speaker assembly **(1010)**
    Adapters **(1020)**
    Diskette drives, fixed disk, and bus adapter **(1030)**
    Support structure **(1035)**
    Power supply **(1040)**
    Math coprocessor, if installed (Model 70 386 only) **(1045)**
    Memory-module kits **(1050)**
    Processor board (25-MHz systems only) **(1052).**

Note: When a new processor board is installed, run the restore
      configuration program on the user's Reference Diskette to restore
      the time, date, and configuration information.

                        PICTURE 18

7.0 Locations

7.1 Front View

    1 Diskette-drive in-use light
    2 Power-good light
    3 Power switch
    4 Serial number
    5 Fixed-disk-drive in-use light
    6 Diskette eject button.

PICTURE 19

7.2 Rear View

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

PICTURE 20

7.2 Rear View

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

7.3 Interior View

    1 Battery and speaker assembly
    2 Fixed-disk and diskette-drive bus adapter
    3 Fixed disk drive
    4 Support structure
    5 Power supply and fan assembly
    6 Diskette drives.

PICTURE 21

    1 Battery and speaker assembly
    2 Fixed-disk and diskette-drive bus adapter
    3 Fixed disk drive
    4 Support structure
    5 Power supply and fan assembly
    6 Diskette drives.

7.4 *System Board, Full Size (16-MHz and 20-MHz Systems)*

```
1   Battery and speaker assembly connector
2   80387 Math Coprocessor connector
3   Expansion slot 1 (16-bit)
4   Expansion slot 2 (32-bit)
5   Expansion slot 3 (32-bit)
6   Fixed-disk and diskette-drive bus-adapter connector
7   Memory-module kit, connector position 3
8   Memory-module kit, connector position 2
9   Memory-module kit, connector position 1.
```

PICTURE 22

7.4 *System Board, Full Size (16-MHz and 20-MHz Systems)*

```
1   Battery and speaker assembly connector
2   80387 Math Coprocessor connector
3   Expansion slot 1 (16-bit)
4   Expansion slot 2 (32-bit)
5   Expansion slot 3 (32-bit)
6   Fixed-disk and diskette-drive bus-adapter connector
7   Memory-module kit, connector position 3
8   Memory-module kit, connector position 2
9   Memory-module kit, connector position 1.
```

7.5 System Board, Reduced Size (16-MHz and 20-MHz Systems)

    1 Battery and speaker assembly connector
    2 Expansion slot 1 (16-bit)
    3 Expansion slot 2 (32-bit)
    4 Expansion slot 3 (32-bit)
    5 80387 Math Coprocessor connector
    6 Fixed-disk and diskette-drive bus-adapter connector
    7 Memory-module kit, connector position 1
    8 Memory-module kit, connector position 2
    9 Memory-module kit, connector position 3.

PICTURE 23

7.6 System Board (25-MHz Systems)

```
 1  Battery and speaker assembly connector
 2  Fixed-disk and diskette-drive bus-adapter connector
 3  Expansion slot 1 (16-bit)
 4  Expansion slot 2 (32-bit)
 5  Expansion slot 3 (32-bit)
 6  80387 Math Coprocessor connector (Model 70 386 only)
 7  Memory-module kit, connector position 4
 8  Memory-module kit, connector position 3
 9  Memory-module kit, connector position 2
10  Memory-module kit, connector position 1.
```

PICTURE 24

8.0 Safety Grounds

    1 Power supply
    2 Screw connection
    3 Chassis ground
    4 Primary ground.

PICTURE 25

Notes: