

FRONT

PICTURE 1

February 25, 1992

This pamphlet contains a Symptom-to-FRU Index, procedures for isolating problems to a FRU, and a parts listing for the IBM Personal System/2 Models 56 SX, 56 LS, 56 SLC and 56 SLC LS.

This pamphlet is intended to be used with the IBM Personal System/2 *Hardware Maintenance Reference* manual (part number 15F2190, form number S15F-2190-00, SBOF-3989) and the IBM Personal System/2 *Hardware Maintenance Service* manual (part number 15F2200, form number S15F-2200-00, SBOF-3988).

Part Number 10G6003

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FRONT_1 Safety Information

Refer to the *Hardware Maintenance Service General Information* pamphlet for the following information:

- General Safety
- Electrical Safety
- Safety Inspection Guide.

Third Edition (February 1992)

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1.0 General Checkout

The diagnostic tests are intended to test *only* IBM (*) products. Non-IBM products, prototype cards, or modified options can give false errors and invalid system responses.

Warning: Verify the drive arrangement and drive startup sequence before servicing. Write operations such as copying, saving, or formatting can overwrite data or programs if you select an incorrect drive.

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Subtopics

- 1.1 How to Diagnose Combined FRUs
- 1.2 How to Use Error Messages
- 1.3 How to Disable the Power-on Password

1.1 How to Diagnose Combined FRUs

If an adapter or device consists of more than one FRU, an error code might be caused by any of the FRUs. Before replacing the adapter or device, remove the FRUs, one by one, to see if the symptoms change.

1.2 How to Use Error Messages

Use the error codes displayed on the screen to diagnose failures. If more than one error code is displayed, diagnose the first error code first. The cause of the first error code can cause false error codes to be displayed. If no error code is displayed, see if the error symptom is listed in the "Symptom-to-FRU Index" in topic 13.0.

IMPORTANT:

- If a workstation without a hard disk drive (fixed disk drive) is used as a LAN workstation, make sure the backup copy of the Reference Diskette is loaded in the server by the LAN administrator.
- When using Customer Carry in Repair for the Model 56 LS or the Model 56 SLC LS, the diagnostic program must be loaded from a diskette drive by connecting a cable (FRU 07G2857) and one of the following:
 - 1.44MB diskette drive (FRU 85F0050)
 - 2.88MB diskette drive (FRU 64F4148).

1.3 How to Disable the Power-on Password

To disable the power-on password, move the J18 (or J7) jumper on the system board to the unused position. (See "Power-On Password" in topic 2.0 for more information.)

+----+
|001|
+----+

- If the workstation is a medialess system, make the Reference Diskette Image available at the file server for the workstation.
- Power-off the system and all external devices.
- Check all cables and power cords.
- Make sure there are no diskettes in the drives.
- Set all display controls to the middle position.
- Power-on all external devices.
- Power-on the system.
- Watch the screen for a power-on self-test (POST) error code.

Write down any error codes that are displayed. (You can press Pause when an error code occurs to hold the error code on the screen. Press F1 to continue.)

If the test stops and you cannot continue, go to "Symptom-to-FRU Index" in topic 13.0.

ARE ANY EXTERNAL SCSI DEVICES ATTACHED TO THE SYSTEM?

Yes No

| |
| |
| +----+
| |002|
| +----+
| Go to Step 005.
|

+----+
|003|
+----+

DID THE POWER-GOOD LIGHT FOR ALL OF THE EXTERNAL SCSI DEVICES COME ON?

Yes No

| |
| +----+
| |004|
| +----+
| Go to the external devices service documentation.
|

+----+
|005|
+----+

DID YOU RECEIVE A POST ERROR CODE?

Yes No

| |
| +----+
| |006|
| +----+
| Go to Step 014.
|

+----+
|007|
+----+

IS THE FIRST POST ERROR CODE WITHIN THE RANGE OF 02080000 190I TO 02410000 190I?

Yes No

| |
| +----+
| |008|
| +----+
| Go to Step 014.
|

+----+
|009|
+----+

- Restart the system programs from:

- The Reference Diskette image, if you have a medialess system
- The System Partition, if you have a hard disk drive
- The Reference Diskette or the backup copy of the System Partition, if you have a diskette drive.

- Verify that the "Enable" and "Disable" settings are correct. (For more information, go to "SCSI Device Settings" in topic 6.0.) If you receive a warning on the screen regarding the "Keep" and "Remove" settings, follow the instructions on the screen before continuing.

DID YOU HAVE TO CORRECT ANY OF THE ENABLE AND DISABLE SETTINGS?

Yes No

| |
| +---+
| |010|
| +---+

Go to "Symptom-to-FRU Index" in topic 13.0. Before replacing any SCSI devices, verify there are no duplicate SCSI ID settings.

+---+

|011|

+---+

- Restart the system.

DID THE POST ERROR REMAIN?

Yes No

| |
| +---+
| |012|
| +---+

Go to Step 014.

+---+

|013|

+---+

Go to "Symptom-to-FRU Index" in topic 13.0.

+---+

|014|

+---+

- If the workstation is a medialess system and the current Reference Diskette image is available at the file server, press and hold **Ctrl+Alt**, then press **Del**. Release the keys.

- If the system programs are available on the hard disk drive, press and hold **Ctrl+Alt**, then press **Del** to restart the workstation. Release the keys. Closely watch the flashing cursor in the top-left corner of the screen. When the cursor moves to the top-right corner of the screen, press and hold **Ctrl+Alt**, then press **Ins**. Release the keys.

- Check for the following responses:

1. One or more beeps.
2. Readable instructions or the Main Menu.

Note: If the problem occurred during the remote Initial Program Load (IPL), replace the Network Adapter.

DID YOU RECEIVE BOTH RESPONSES?

Yes No

| |
| +---+
| |015|
| +---+

Go to the "Symptom-to-FRU Index" in topic 13.0.

- or -

If that does not correct the problem, go to "Undetermined Problem" in topic 4.0.

+---+

|016|

+---+

- If you are not at the Main Menu, follow the instructions on the screen to advance to the Main Menu. Press **Ctrl+A** and run system checkout.

- If you are unable to advance to the Main Menu, go to "Undetermined Problem" in topic 4.0.

Notes:

1. If the system has incorrect keyboard responses, go to "Keyboard" in topic 9.0.
2. If the printer has incorrect printer responses, go to "Printer" in topic 7.0.
3. If the image on the display is out of focus, jittering, rolling, shifting, or has unreadable characters, go to "Display" in topic 8.0.
4. If a minimum of 896KB of memory is not active, the diagnostic tests cannot be loaded.

IS THE LIST OF INSTALLED DEVICES CORRECT?

Note: System memory and the cached processor option are not considered devices.

Yes No

|
+----+
| 017 |
+----+

Go to "Installed Devices List" in topic 3.0. If that does not correct the problem, go to "Undetermined Problem" in topic 4.0.

+----+
| 018 |
+----+

- Run the advanced diagnostic tests.

DID THE TESTS IDENTIFY A FAILURE?

Note: If the tests start but do not complete and you cannot continue, replace the device that was being tested.

Yes No

|
+----+
| 019 |
+----+

Note: If you noticed an error symptom or if you received any POST error codes when the system was powered-on, go to "Symptom-to-FRU Index" in topic 13.0.

You may have an intermittent problem:

- Check for damaged cables or connectors.
- Reseat all adapters, drives, and modules.
- Check the power supply fan for proper operation.
- Start an error log and run the tests multiple times.
- Check the power supply voltages. (See "Power Supply" in topic 5.0.)

+----+
| 020 |
+----+

Follow the instructions on the screen. If that does not correct the problem, go to the "Symptom-to-FRU Index" in topic 13.0.

2.0 Power-On Password

To service a system with an active, unknown power-on password, do the following:

1. Power-off the system.
2. Remove the system unit by sliding it out of the cover.
3. Move the jumper on system-board connector J18 (or J7) to connect the center pin and the pin on the opposite end of the connector. J18 (or J7) is located toward the rear of the system board and to the right of the bus adapter connector.
4. Power-on the system.

The system detects the change and removes the password. You need not move the jumper back to its original position.

To reactivate the password, the user must start the system programs, select **Set features** from the Main Menu, then select **Set password and unattended start mode**, and follow the instructions on the screen.

3.0 Installed Devices List

At the start of the customer or advanced diagnostic tests, an installed devices list is displayed. Normally, all adapters and devices installed in a system are listed.

- If the list contains an adapter or device that is not installed, go to "Undetermined Problem" in topic 4.0.
- If an adapter or device that *is* installed is missing from the list, you have one of the following conditions:
 - The System Partition on the hard disk drive or the Reference Diskette you are using does not contain the code (contained on an option diskette) required to support that device.
 - The SCSI interface on the system board might have failed.
 - The device missing from the list is an unrecognizable drive or adapter.
 - The device missing from the list requires an additional diskette or service manual.
 - The device missing from the list is defective.
 - An adapter is defective.
 - The power supply voltage is incorrect. (See "Power Supply" in topic 5.0.)

If the adapter is on the list, run the adapter diagnostic tests.

Subtopics

3.1 Device Type

3.1 Device Type

Warning: A customized setup configuration (other than default settings) might have been set on the system you are servicing. Selecting **Run automatic configuration** might alter those settings. Note the current configuration settings (using the **View configuration** option) and verify that the same settings are in place when service is complete. (For more information about configuration, refer to the *Hardware Maintenance Reference* manual.)

Select **Run automatic configuration** and determine which type of device, SCSI or non-SCSI, is missing from the Installed Devices List, then continue. (If both SCSI and non-SCSI devices are missing, go to "Undetermined Problem" in topic 4.0.)

Subtopics

3.1.1 SCSI Devices

3.1.2 Non-SCSI Devices

3.1.1 SCSI Devices

The adapter supporting the missing device might be defective. If more than one SCSI adapter is installed, isolate them one at a time.

1. Power-off the system and disconnect all internal and external SCSI devices from the SCSI adapter (except the default hard disk drive).
2. Terminate the adapter, as required.
3. Power-on the system and select **Run automatic configuration**. If the adapter is not on the Installed Devices List in advanced diagnostic tests, the adapter is defective. If the adapter is on the list, run the adapter diagnostic tests.
4. If the adapter fails the tests, replace it. If the adapter passes the tests, a different adapter might be defective.
5. Reconnect the devices to the adapter, then terminate the adapter, as required.
6. Go to "Undetermined Problem" in topic 4.0 to find the problem.

3.1.2 Non-SCSI Devices

Replace the missing device.

Note: If the number of diskette drives shown on the list is incorrect, an error can occur during the tests. Restart the system, select **View configuration** from the Set Configuration menu, and verify that the drive information is correct, then continue testing.

4.0 Undetermined Problem

Use the following procedure when the diagnostic tests do not identify the failing FRU.

Check the power supply (see "Power Supply" in topic 5.0). If the power supply is operating correctly, return here and continue with the following procedure.

1. Power-off the system.
2. Remove or disconnect one of the following adapters or devices: (Do not remove FRUs that are known to be good.)

Notes:

- a. Minimum operating requirements are 1MB of system memory and the default hard disk drive (SCSI ID 6).
 - b. If the workstation is a medialess system, the default hard disk drive (SCSI ID 6) is not required.
 - Non-IBM devices
 - Modem, printer, mouse, or other external device
 - Any adapter (see note on next page)
 - Any type of drive
 - Memory module kits
 - Bus adapter
 - Math coprocessor (if installed)
 - Cached processor option (if installed).
3. Power-on the system and run system checkout (see Step 014 in topic 1.3). Do not reconfigure the system. If diagnostic tests cannot be loaded from the hard disk drive, load and run the tests from the Reference Diskette. Test only those adapters and devices still attached to the system.
 4. If the symptom remains, repeat steps 1 through 3 until you find the failing FRU or until all FRUs have been removed.
 5. If all FRUs listed have been removed and the problem remains, replace the system board. If the problem still remains, replace the bus adapter.

Note: If the problem goes away when you remove an adapter from the bus adapter, and replacing that adapter does not correct the problem, replace the system board. If the problem remains, replace the bus adapter.

5.0 Power Supply

If the power-good light is not on, and if the power-supply fan is not running, check the power cord for proper installation and continuity.

If the power cord is OK, either the power supply is defective or another component is defective. To verify that the power supply is operating correctly, do the following:

1. Power-off the system and disconnect the system power cord.
2. Remove all power supply connectors (power supply connector P1, P2, and drive connectors 1 and 2) from the system board and drives.
3. Connect a meter to the pins on the system board that correspond to pins 4 and 6 on power supply connector P2 (see page 5.2), and check for the following conditions:
 - When the power switch is on, there should be continuity between the pins.
 - When the power switch is off, there should not be continuity between the pins.

If neither of these conditions occur, replace the control assembly (including the power switch).

If the power switch is working properly, remove a meter and continue with the next step.

4. At power supply connector P2, short pin 4 to pin 6 (see "Power Supply Connector P2" in topic 5.2).
5. Connect the system power cord.
6. Check the power supply voltages using the figures on the next page.

Subtopics

- 5.1 Power Supply Connector P1
- 5.2 Power Supply Connector P2
- 5.3 Drive Connectors 1 and 2

5.1 Power Supply Connector P1

PICTURE 2

Pin	Signal	V dc Min.	V dc Max.
1, 2	+5 volts	+4.8	+5.25
3, 4	Ground		

5.2 Power Supply Connector P2

PICTURE 3

Pin	Signal	V dc Min.	V dc Max.
1, 2	+12 volts	+11.52	+12.6
3	Power Good		
4	On/Off Signal		
5	-12 volts	-10.92	-13.2
6	Ground		
7	-5 volts	- 4.75	- 5.5

5.3 Drive Connectors 1 and 2

PICTURE 4

Pin	Signal	V dc Min.	V dc Max.
1	+12 volts	+11.52	+12.6
2, 3	Ground		
4	+5 volts	+ 4.8	+ 5.25

If any of the voltages are not correct, replace the power supply. If all voltages are correct, the power supply is functioning properly. Another system component might be causing the power supply to shut off. Return to the procedure that sent you here and continue. (If you have completed that procedure, go to "Undetermined Problem" in topic 4.0.)

6.0 SCSI Device Settings

To verify that the SCSI presence-error-reporting device "Enable" and "Disable" settings are correct, select **Set and view SCSI device configuration** from the Set Configuration Menu and determine if there are any "Presence Error Reporting" devices listed. The settings must be as follows:

- Devices connected to the system must be set to "Enabled"
- Devices listed but not connected must be set to "Disabled".

Note: Some SCSI devices do not use the enable or disable settings.

Change the settings by pressing F5, then save them by pressing F10.

7.0 Printer

1. Make sure the printer is properly connected and powered-on.
2. Run the printer self test.

If the printer self test does not run correctly, the problem is in the printer. Refer to the printer service manual.

If the printer self test runs correctly, install a wrap plug on the parallel port and run the advanced diagnostic tests to determine which FRU failed.

If the advanced diagnostic tests (with the wrap plug installed) do not detect a failure, replace the printer cable. If that does not correct the problem, do one of the following:

- If the printer is attached to the parallel port on the system board, replace the system board.
- If the printer is attached to the parallel port on an adapter, replace FRUs, in the following order, until the problem goes away:
 1. Adapter
 2. System board
 3. Bus adapter.

8.0 Display

If the screen is rolling, replace the display assembly. If that does not correct the problem, replace FRUs in the following order until the problem goes away:

1. Display adapter (if used)
2. System board
3. Bus adapter (if display adapter is used).

If the screen is not rolling, do the following to run the display self-test:

1. Power-off the system unit and display.
2. Disconnect the display signal cable.
3. Power-on the display.
4. Turn the contrast to its maximum position.
5. Turn the brightness control to the center detent position.

Check for the following conditions:

- The screen should be white or light gray, with a black margin as described below:
 - 8503, 8504, 8512, 8513, 8514, 8515:** 2-20 mm (0.08-0.79 in.) wide on one or both sides
 - 8506:** 2-50 mm (0.08-1.97 in.) wide on the top, bottom, or both
 - 8507, 8508:** 2-20 mm (0.08-0.79 in.) wide on the top, bottom, or both.
- The contrast and brightness controls should vary the screen intensity.

If the display adapter does not meet these specifications, replace the display. If it meets the specifications, replace FRUs, in the following order, until the problem goes away:

Note: Certain adapter failures can cause video problems. Before replacing any FRUs, remove any option adapters to see if the problem disappears.

1. Display adapter (if used)
2. System board
3. Bus adapter (if display adapter is used)
4. Display.

|
+---+
|010|
+---+

The cached processor option is not the cause of the problem. Test the system without the option to determine the problem. (If you are instructed to replace the system board, do so.)

11.0 Memory

Use the following procedure when you suspect a problem with the system memory. Power-off the system before you remove or replace parts.

Notes:

1. The amount of usable memory will be less than the amount of installed memory. (The system software and some functions, such as video and SCSI, use some of the memory space.) The difference between the usable memory and the installed memory is most noticeable when the installed memory is greater than 12MB.
2. The customer diagnostics will deallocate defective memory. After you replace defective memory, run the advanced diagnostic memory test to restore the memory to the system configuration.

A 000110XX error indicates a system-board parity-check error.

1. Remove memory module kits, one at a time, until the problem goes away. When the problem goes away, either the system board or the memory module kit you last removed is defective.
2. Install a known-good kit of the same type into the same connector.
 - If the problem goes away, the memory module kit you replaced is defective.
 - If the problem remains, the system board is defective.
 - If the problem remains after all memory module kits have been removed, replace the system board.

A 00020XXX or 00021XXX error indicates a failing system-board memory module kit; a 000225XX or 000226XX error indicates that a memory module kit is the wrong type or is installed in the wrong slot. If the error message does not indicate the location of the failing kit, follow the procedure for a 000110XX error.

Subtopics

11.1 Interleaved Memory Configurations

11.1 Interleaved Memory Configurations

The memory controller supports interleaved memory when the installed memory module kits of the same size and speed are installed as shown in the following table.

MEM 1	MEM 2	MEM 3
2MB	Empty	Empty
2MB	2MB	Empty
2MB	2MB	2MB*
4MB	4MB	Empty
4MB	4MB	4MB*
* The memory in MEM3 does not operate as interleaved memory.		

During the memory tests, an "i" will appear next to the test when an interleaved memory configuration is being tested.

Note: Interleaved memory is not supported when memory is disabled.

12.0 Ethernet Network Adapter

If one of the following error codes appears on the screen, follow the instructions described for the error code.

□ 00640200-00641700

- Replace the Ethernet Network Adapter and run the diagnostic tests to verify the fix.
- If the problem still remains, replace the adapter with the original one and replace the system board.

□ 0064XX00 (other than the above)

An adapter problem might exist. To verify proper operation of the adapter, do the following:

1. Terminate the Ethernet Network Adapter using one of the following:

- For an Attachment Unit Interface (AUI) cable connection: disconnect the AUI cable from the Ethernet Network Adapter and install the AUI wrap plug (IBM part number 85F0036).
- For a twisted pair cable connection: attach the network cable to an isolated concentrator with no traffic.

2. Run the system checkout.

- If the error remains, replace the Ethernet Network Adapter.
- If the tests complete satisfactorily, contact the LAN administrator for further assistance (a network problem might exist).

13.0 Symptom-to-FRU Index

The Symptom-to-FRU Index lists error symptoms and possible causes. The most likely cause is listed first. Always begin with "General Checkout" in topic 1.0. This index can also help you decide which FRUs to have available when servicing a system.

If you are unable to correct the problem using this index, go to "Undetermined Problem" in topic 4.0.

IMPORTANT:

1. If you have both an error message and an incorrect audio response, diagnose the error message first.
2. If you cannot run the advanced diagnostic tests, but did receive a POST error message, diagnose the POST error message.
3. If you did not receive an error message, look for a description of the error symptoms in the first part of this index.
4. Check all power supply voltages before you replace the system board. (See "Power Supply" in topic 5.0.)
5. If an error message is not listed, there is a device installed that requires an additional diskette or service manual. Refer to the diskette or service manual for that device.
6. If a cached processor option is installed in the Model 56 SX or the Model 56 LS, go to "Cached Processor Option" in topic 10.0 before you replace the system board.

How to Read POST Error Messages

POST error messages are displayed on the screen as three, four, five, or eight digits. The error messages that can be displayed as shorter POST messages are highlighted in this index. Some digits will represent different information for SCSI errors than for non-SCSI errors.

The following example shows which digits display the shorter POST error messages and defines the SCSI information in an eight-digit error message.

Shorter POST Messages							
+	-----	+					
+	-----	+					
	0		0		0		0
	0		0		0		0
+	-----	+					
							Size (SCSI)
							Slot Number (SCSI)
							(Slot 0 = System Board)
							Logical Unit Number (SCSI)
Information							SCSI ID

Each SCSI device must be set to a different SCSI ID. Duplicate SCSI ID settings can generate a false error message. Use the SCSI ID to determine whether the error message is coming from an internal or an external device.

In the following index, an "X" in an error message can be any number.

Subtopics

- 13.1 No-Beep Symptoms
- 13.2 Beep Symptoms
- 13.3 Miscellaneous Symptoms
- 13.4 Numeric Error Codes
- 13.5 I999XXXX Error Codes

13.1 No-Beep Symptoms

Symptom/Error	FRU/Action
No beep, power-good light does not come on, and fan does not run. (See "Undetermined Problem" in topic 4.0 before replacing any FRUs.)	Power Supply Control Assembly System Board Any Device or Adapter Bus Adapter
No beep, fan runs, and 000215XX is displayed. (See "Memory" in topic 11.0 before replacing any FRUs.)	Memory Module Kit System Board
No beep, fan runs, power-good light is on, and system stops during POST with a message displayed. (See "Undetermined Problem" in topic 4.0 before replacing any FRUs.)	System Board Power Supply
No beep and the system is otherwise functional.	Control Assembly System Board
No beep, fan runs, power-good light is on, and system stops during POST with no message displayed. (See "Undetermined Problem" in topic 4.0 before replacing any FRUs.)	System Board Any Device or Adapter Bus Adapter

13.2 Beep Symptoms

Symptom/Error	FRU/Action
One long and one short beep. (See "Display" in topic 8.0 before replacing any FRUs.)	Display Adapter (if used) System Board Bus Adapter
One long and two short beeps. (See "Display" in topic 8.0 before replacing any FRUs.)	Display Adapter (if used) System Board Video-Memory Module Bus Adapter
One or two beeps and a blank or unreadable display, or a blinking cursor. (See "Display" in topic 8.0 before replacing any FRUs.)	Display Adapter (if used) System Board Video-Memory Module Display Bus Adapter
Continuous beep.	System Board
Repeating short beeps.	Keyboard (Stuck Key) System Board

13.3 Miscellaneous Symptoms

Symptom/Error	FRU/Action
Program-load error during remote IPL from the file server.	Network Adapter
Program loads from the hard disk drive or a non-system disk or disk error (with the Reference Diskette in drive A).	Diskette Drive System Board Power Supply Reference Diskette
Display screen changes colors.	Display System Board Video-Memory Module
The System Partition has been updated and the Display and F1 prompts appear on the screen.	Verify that an operating system has been loaded onto the primary hard disk drive.
One or more keys do not work and the system is otherwise functional. (See "Keyboard" in topic 9.0 before replacing any FRUs.)	Keyboard Keyboard Cable System Board
Power-good light does not come on, fan runs, and system is functional.	Control Assembly
Power-good light does not come on, fan runs, and system is not functional.	System Board
Intermittent Failures. (See "Undetermined Problem" in topic 4.0 before replacing any FRUs.)	Power Supply Power Supply Fans Any Device or Adapter
System cannot be powered-off.	Control Assembly System Board Power Supply
LED for hard disk drive stays on.	Hard Disk Drive System Board
LED for hard disk drive not working, but system is completely functional.	Control Assembly System Board
Unable to start Reference Diskette.	Diskette Drive System Board Diskette Drive Cable Reference Diskette

13.4 Numeric Error Codes

Symptom/Error	FRU/Action
00010200, 00010300, 00010400, 00010700	System Board
00010800	System Board Any Adapter Bus Adapter
000110000 (See "Memory" in topic 11.0 before replacing any FRUs.)	Memory Module Kit System Board
000113XX	Any Adapter System Board Any Drive
000114XX	Any Adapter Bus Adapter
000118XX	Memory Module Kit
000161XX	Battery System Board Bus Adapter
00016300, 00016400, 00016500 (If setting configuration does not solve the problem, see "Installed Devices List" in topic 3.0.)	Set Configuration/Features System Board
000166XX	Any Adapter
000169XX Processor configuration error. (Verify that the processor configuration information is correct before replacing any FRUs.)	Cached Processor Option System Board
000171XX	Battery System Board Bus Adapter
000172XX	System Board
000173XX (Verify that the "Enable," "Disable" settings are correct before replacing any FRUs. See "SCSI Device Settings" in topic 6.0.)	Any Device System Board Bus Adapter
000174XX (If Automatic Configuration does not solve the problem, run advanced diagnostic tests.)	Set Configuration/Features
000181XX (The system requires a network adapter for remote IPL or a hard disk drive ID of 6 LUN 0, for IML; neither of these were detected.)	Run Auto Configuration Network Adapter Hard Disk Drive System Board
000194XX	System Board Memory Module Kit
0001XXXX (Not listed above)	System Board Any Adapter Bus Adapter
0002XXXX (See "Memory" in topic 11.0 before replacing any FRUs.)	Memory Module Kit System Board Bus Adapter
00030XXX	Keyboard System Board Keyboard Cable

IBM PS/2 Model 56 SX and 56 SLC HMS
Numeric Error Codes

000401XX	System Board
000601XX	Defective Diskette System Board
000602XX	Defective Diskette
000604XX Unsupported drive or cable.	Diskette Drive System Board Diskette Drive Cable
000662XX Wrong drive type installed.	Diskette Drive System Board Diskette Drive Cable
0006XXXX (Not listed above)	Diskette Drive System Board Diskette Drive Cable
0007XXXX	Math Coprocessor System Board
00110200, 00110600	System Board Any Serial Device
00110700	Communications Cable System Board
0011XX00 (Not listed above) Check the power supply voltages before replacing the system board. (See "Power Supply" in topic 5.0.)	System Board
001207XX	Communications Cable Dual Async Adapter/A
00129020 (IBM386 SLC cache error)	Cached Processor Option (if used) System Board
0012XXXX (Not listed above)	Dual Async Adapter/A System Board Any Serial Device
0014XX00 (See "Printer" in topic 7.0 before replacing any FRUs.)	Printer System Board
00180300	System Board
00240100 (See "Display" in topic 8.0 before replacing any FRUs.)	Display System Board Video-Memory Module
00241000	System Board
0037XXXX (See "Undetermined Problem" in topic 4.0 before replacing any FRUs.)	System Board Hard Disk Drive Hard Disk Drive Cable
004611XX, 004630XX	Multiport/2 Interface Board Multiport/2 Adapter
004612XX, 004613XX, 004640XX, 004641XX	Memory Module Package Multiport/2 Adapter
00465000	Multiport Interface Cable
0046XXXX	Multiport/2 Adapter Multiport/2 Interface Board Memory Module Package
0064XXXX	See "Ethernet Network Adapter" in topic 12.0.
0074XXXX	Display Adapter 8514/A System Board Bus Adapter
0075XXXX (See "Display" in topic 8.0 before replacing any FRUs.)	Display Adapter (if used) System Board

IBM PS/2 Model 56 SX and 56 SLC HMS
Numeric Error Codes

	Video-Memory Module Display
00860100, 00860200	Pointing Device (Mouse) System Board
00860300	System Board
00860400	System Board Pointing Device (Mouse)
0096XXXX	SCSI Adapter (with Cache) Any SCSI Device System Board
010007XX	Communications Cable Multiprotocol Adapter/A
0100XXXX (Not listed above)	Multiprotocol Adapter/A System Board Bus Adapter
0101XXXX (Not listed above)	Modem Adapter/A System Board Any Serial Device
0107XXXX	5.25-inch External Diskette Drive 5.25-inch Diskette Drive Adapter/A
0112XXXX	SCSI Adapter (without Cache) Any SCSI Device
0129XXXX	Cached Processor Option (if used) System Board
0137XXXX	System Board
0141XXXX	Realtime Interface Coprocessor Portmaster (*) Adapter/A
01471000	System Board
0147XXXX	System Board Video-Memory Module
0148XXXX	System Board Video-Memory Module
0152XXXX	XGA (*) Display Adapter/A Video-Memory Module System Board
Symptom/Error	FRU/Action
0164XXXX	120MB Internal Tape Drive Diskette Cable System Board
016500XX	6157 Tape Attachment Adapter
016520XX	6157 Streaming Tape Drive
016540XX	6157 Streaming Tape Drive 6157 Tape Attachment Adapter
0166XXXX, 0167XXXX (For diagnostic information, refer to the Token-Ring Network Adapter/A service Information.)	Token-Ring Network Adapter/A System Board Bus Adapter

IBM PS/2 Model 56 SX and 56 SLC HMS
Numeric Error Codes

<p>0200XXXX</p>	<p>Image Adapter/A Video-Memory Module System Board</p>
<p>0208XXXX (Verify that there are no duplicate SCSI ID settings.)</p>	<p>Any SCSI Device</p>
<p>0210XXXA (60MB) 0210XXXB (80MB) 0210XXXC (120MB) 0210XXXD (160MB) 0210XXXE (320MB) 0210XXXF (400MB) 0210XXXU (Size undetermined) (If the failing device is an external device, go to the external devices service pamphlet.)</p>	<p>SCSI Hard Disk Drive SCSI Adapter (if used) System Board SCSI Cable</p>
<p>0215XXXX (If the failing device is an external device, go to the external devices service documentation.)</p>	<p>SCSI CD-ROM Drive SCSI Cable SCSI Adapter (if used)</p>
<p>I999XXXX (See "I999XXXX Error Codes" in topic 13.5 before replacing any FRUs.)</p>	<p>Default Hard Disk Drive SCSI Adapter (if used) System Board</p>

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13.5 I999XXXX Error Codes

You are here because the system has an I999XXXX error code displayed. Most of these errors can be corrected without replacing any FRUs. These errors can be caused by any of the following conditions:

- Invalid startup sequence (default hard disk drive of SCSI ID 6 is not in the startup sequence)
- Operating system not found in startup sequence
- System Partition not found on default drive
- Hardware failure.

Find your error symptom in the table below. Before you replace any FRUs, verify that the selectable startup sequence is valid (see page 13.5).

Symptom/Error	FRU/Action
I999001X,I999002X I999003X,I999004X I999005X,I999006X I999007X,I999009X (The actions for these errors are valid only when running the system from the Hard Disk Drive.)	Update the System Programs using the Reference Diskette. (See "Updating the System Programs.")
I99900X1,I99900X2 I99900X3,I99900X4 I99900X6,I99900X7 I99900X9 (The actions for these errors are valid only when running the system from the Reference Diskette.)	Restart the system from the Reference Diskette. If the same error code appears, try the new Reference Diskette.
I99900X5 (Reference Diskette recovery prevented)	Power-off the system, toggle the power-on password jumper, then power-on the system.
I9990302 (No operating system found on the default hard disk drive of SCSI ID 6.)	Install an operating system.
I9990303 The initial machine load (IML) code did not load from the System Partition.	Update the System Programs using the Reference Diskette. (See "Updating the System Programs.")
I9990304 (No startup device with the ASCII console.)	Restart the system with a diskette containing an operating system.
I9990401 (Unauthorized access. Clear the power-on password before replacing any FRUs.)	System Board
I9990401,I9990602 I9990302,I9990600 I9990607,I9990609	System Board

Verifying the Selectable Startup Sequence

1. Start the system from the Reference Diskette and select **Set features** from the Main Menu.
2. Select **Set startup sequence** and see if the *default* hard disk drive (SCSI ID 6) is in the startup sequence. If you receive an error message, follow the instructions on the screen, then return here.
3. If the default drive is in the startup sequence, exit from the screen and the Main Menu, then go to step 2 under "Testing the Default Hard Disk Drive." If the default drive is *not* in the startup sequence, follow the instructions on the screen, then go to "Testing the Default Hard Disk Drive."

Notes:

1. A medialess system does not require the hard disk drive (SCSI ID 6) is in the startup sequence.

14.0 How To Use This Parts Catalog

INDEX REFERENCE NUMBERS: Refer to the illustrations for index reference numbers listed in the left margin of the parts listing.

SIMILAR ASSEMBLIES: If two assemblies contain a majority of identical parts, they are broken down on the same list. Parts peculiar to one or the other of the assemblies are listed separately and identified by description.

AR: (As Required) indicates that the quantity is not the same for all machines.

R: (Restricted) indicates that the part has a restricted availability.

INDENTURE: The indenture is marked by a series of dots located before the parts description. The indenture indicates the relationship of a part to the next higher assembly. For example:

Indenture Relationship of Parts

- (No dot) Main Assembly
- (One dot) □ Detail parts of a main assembly
- (One dot) □ Subassembly of the main assembly
- (Two dot) □ □ Detail part of a one-dot
 subassembly
- (Two dot) □ □ Subassembly of a one-dot
 subassembly

15.0 System Overview

PICTURE 6

16.0 Parts

Index System Unit

1	Top Cover Assembly (without lock)	79F3448	
2	Power Supply	79F3443	
3	Cover Screw (Thumb screw)	79F3463	
4	Rear Panel	79F7208	
5	Base Frame Assembly (exchange basis only)	79F7212	
6	Control Assembly	95F6018	
7	□ Bus Adapter Support	79F7213	
8	□ Speaker Assembly	79F3447	
9	□ Power Switch Button	79F3460	
12	Adapter Card Guide	79F7218	
13	Cable Shield, Control Assembly	95F5607	
14	System Board 20 MHz (without memory):		
	□ (for Model 56 SX, Model 56 LS)	79F7211	
	□ (for Model 56 SLC, Model 56 SLC LS)		85F0298
	Memory Module Kits:		
	□ 2MB (70ns)	92F0102	
	□ 4MB (70ns)	92F0105	
	□ 8MB (70ns)	64F3606	
15	Bus Adapter (with battery)	79F7210	
	□ Battery	33F8354	
16	Retainer Plate	07G2858	
17	3.5-inch Diskette Drive Bezel (1/3 High)		85F0093
	5.25-inch Blank Bezel (1/3 High)	79F3450	
	5.25-inch Blank Bezel (1/2 High)	85F0091	
	5.25-inch Diskette Drive Bezel (1/2 High)		85F0068
18	Cover Lock Assembly	92F0003	
	□ Pawl (Required for 92F0003)	79F3459	
19	Front Cover Logo (R):		
	□ Model 56 SX	79F7216	
	□ Model 56 LS	79F7217	
	□ Model 56 SLC	06G6606	
	□ Model 56 SLC LS	06G6607	
	Floor Stand	79F3458	
	Miscellaneous Parts Kit:	79F7209	
	□ Screw (Qty 6)		
	□ Feet (Qty 4)		
	□ Adapter Slot Cover (Qty 3)		
	□ Slot Cover Screw (Qty 3)		
	Power Cord (U.S.)	62X1045	
	Cable Cover	79F3462	
	SCSI Terminator	57F2870	

Index Hard Disk Drive

10	40MB Hard Disk Drive (SCSI)	56F8866	
	60MB Hard Disk Drive (SCSI)	6128296	
	80MB Hard Disk Drive (SCSI)	56F8854	
	120MB Hard Disk Drive (SCSI)	6128298	
	160MB Hard Disk Drive (SCSI)	56F8851	
	320MB Hard Disk Drive (SCSI)	85F0011	
	400MB Hard Disk Drive (SCSI)	85F0012	
	Hard Disk Drive Cable	79F7214	

Index Internal Diskette Drives

11	1.44MB 3.5-inch Assembly	85F0050	
	2.88MB 3.5-inch Assembly	64F4148	
	3.5-inch Diskette Drive Tray	85F0097	
	1.2MB 5.25-inch Drive	64F4102	
	Rail Kit (for 64F4102)	85F0041	
	□ Left and Right Rails		
	□ Four Screws		
	Diskette Drive Cable	07G2857	

External Diskette Drives

	5.25-Inch Diskette Drive:		
	□ 360KB External (4869-001)	72X6759	
	□ 360KB External (4869-501)	72X6768	
	□ 1.2MB External (4869-002)	15F7993	
	□ 1.2MB External (4869-502)	15F7994	

CD-ROM

	Internal CD-ROM Drive	81F7930	
	Terminator Kit (for 81F7930)	59F3530	
	Internal CD-ROM II Drive	92F0084	
	Terminator Kit (for 92F0084)	92F0082	
	Rail Kit (for 81F7930 and 92F0084)	85F0009	
	□ Left and Right Rails		

<input type="checkbox"/> Four Screws		
Drive Bezel Assembly (for 81F7930 and 92F0084)		85F0008
Headphones	59F3655	
Cleaning Kit	59F3562	
<input type="checkbox"/> Cleaning Disk		
<input type="checkbox"/> Test Disk		
<input type="checkbox"/> Disc Caddy		

Processor Option

Cached Processor Option (IBM386 SLC)		
Use with system board 79F7211	92F0078	

Note: When you replace the system board in a system with a cached processor option, remove the math coprocessor socket from the 11 by 11 connector on the new system board.

Options and Adapters

300/1200 Modem Adapter/A	34F0006	
Communications Cable (for 34F0006)	8285985	
300/1200/2400 Modem Adapter/A	65X1253	
Communications Cable (for 65X1253)	94X1540	
3270 Connection	74F3464	
6157 Tape Adapter	92X1459	
IBM PS/2 (*) Adapter/A for Ethernet Networks		64F0217
IBM PS/2 Adapter/A		
for Ethernet Twisted-Pair Networks	92F0046	
Baseband Card	72X8102	
Baseband Cable	72X8107	
Broadband Card	72X8106	
Image Adapter/A	07F2508	
Video-Memory Module (512K) (for 07F2508)	07F4401	
Video-Memory Module (1MB) (for 07F2508)	07F4402	
M-Audio Capture/Playback Adapter/A	95F1256	
XGA Display Adapter/A	96F7654	
Video-Memory Module (for 96F7654)	75X5894	
Dual Async Adapter/A	34F0008	
Pageprinter Adapter	75X8213	
Realtime Interface Coprocessor		
Portmaster Adapter/A	53F2603	
<input type="checkbox"/> 512KB Memory Module Package	53F2656	
<input type="checkbox"/> 1MB Memory Module Package	53F2660	
<input type="checkbox"/> 2MB Memory Module Package	53F2664	
<input type="checkbox"/> RS232-C Interface Board	53F2612	
<input type="checkbox"/> RS422-A Interface Board	53F2615	
Multiprotocol Adapter/A	90X8995	
Printer Accessory Kit	1183003	
Token-Ring Network Adapter/A	83X7488	
Token-Ring Adapter/A RIPL Module	83X9180	
Token-Ring 16/4 Adapter/A (with RIPL Module)		74F9415
Token-Ring 16/4 Busmaster Adapter/A	74F4149	
Realtime Interface Coprocessor		
Multiport/2	09F1888	
<input type="checkbox"/> 8-port RS232-C Electrical Interface Board	91F7974	
<input type="checkbox"/> 4-port RS232-C Electrical Interface Board	91F7976	
<input type="checkbox"/> 4+4-port RS232-C RS422-A Electrical Interface Board	91F7966	
<input type="checkbox"/> 512KB Memory Module Package Multiprotocol Interface Cable (for 09F1888)	16F2267	
Screen Reader Keypad	1393515	
Screen Reader Keypad Cable	72X8537	
Card Kits		
<input type="checkbox"/> High Speed for 3118 System (AR)	65X1900	
<input type="checkbox"/> High Speed for 3117 System (AR)	65X1920	

Options and Adapters (continued)

SCSI Adapter (with cache) (AR)	85F0000	
SCSI Adapter (without cache) (AR)	85F0002	
SCSI Internal Cable	64F4127	
Terminator, External (for 85F0000)	33F8464	
Terminator, Internal (for 85F0000)	34F0025	
Terminator, Internal (for 85F0002)	57F2870	
5.25-inch Drive Diskette Adapter/A (360KB/1.2MB)	15F7996	

Keyboard Cable and Mouse

Keyboard Cable	72X8537	
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Parts

Mouse	61X8923
Mouse Ball and Pop-Off Retainer	33F8461
Mouse Ball and Twist-Off Retainer	33F8462

Enhanced Keyboards (101/102 Key)

Arabic	1391490
Belgian	1391414
Canadian French	1392011
Cyrillic	1393866
Danish	1391407
Dutch	1391511
French	1391402
German	1391403
Greek	1393285
Hebrew	1391408
Italian	1393395
Latin American Spanish	1392015
Norwegian	1391409
Portuguese	1391410
Russian/Cyrillic	1395622
Spanish	1391405
Swedish/Finnish	1391411
Swiss	1391412
Swiss/French	1395881
Swiss/German	1395882
Turkish	1393286
U.K. English	1391406
U.S. English (E/ME/A use only)	1396790
U.S. English	1392090
Yugoslavian	1393669

Space-Saving Keyboards (84/85 Key)

Canadian French	1396046
Spanish/Latin	1396047
U.S. English	1393290
Cable Assembly, External	1393082

Host-Connected Keyboards (122 Key)

Austrian/German	1396902
Belgian	1396903
Canadian French	1397051
Cyrillic	1396916
Danish	1396904
Dutch	1396905
French	1396990
Greek	1396917
Icelandic	1396919
Italian	1396908
Latin American Spanish	1397052
Norwegian	1396909
Portuguese	1396910
Spanish	1396911
Swedish/Finnish	1396906
Swiss/French	1396912
Swiss/German	1396913
Turkish	1396921
U.K. English	1396914
U.S. English (E/ME/A use only)	1397025
U.S. English	1397050
Yugoslavian	1396920

8503 Monochrome Display (with Tilt /Swivel Stand)

110/120 V ac	68X3045
220/240 V ac (Northern Hemisphere)	68X3046
220/240 V ac (Southern Hemisphere)	72X7878
Tilt /Swivel Stand	68X3061

8504 Monochrome Display (with Tilt /Swivel Stand)

110/120 or 220/240 V ac (Universal Model)	44F9807
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8506 Monochrome Display (with Tilt /Swivel Stand)

110/125 V ac (US/Canada)	39F8087
110/125 or 200/240 V ac (Northern Hemisphere)	39F8088
110/125 or 220/240 V ac (Southern Hemisphere)	39F8089

8507 Monochrome Display (with Tilt /Swivel Stand)

110/120 or 220/240 V ac (Universal Model) 6247808

8512 Color Display (without Tilt /Swivel Stand)

110/120 V ac 61X8924
 220/240 V ac (Northern Hemisphere) 61X8928
 220/240 V ac (Southern Hemisphere) 61X8927
 Tilt /Swivel Stand 61X8925

8513 Color Display (with Tilt /Swivel Stand)

110/120 V ac 68X3088
 220/240 V ac (Northern Hemisphere) 72X7870
 220/240 V ac (Southern Hemisphere) 72X7877
 Tilt /Swivel Stand 68X3061

8514 Color Display (without Tilt /Swivel Stand)

110/120 V ac 75X5945
 220/240 V ac (Northern Hemisphere) 75X5946
 220/240 V ac (Southern Hemisphere) 75X5947
 Tilt /Swivel Stand 75X5907

8515 Color Display (with Tilt /Swivel Stand)

Model 001 (90/137 V ac, U.S. and Canada) with
 Tilt /Swivel and packaging set 38F3911
 Model 002 (90/265 V ac, Universal voltage) with
 Tilt /Swivel and packaging set 38F3912
 Model A01 (90 V ac) with
 Tilt /Swivel and packaging set 38F3913
 Shipping material: 16F0188
 Box
 Front cushion
 Rear cushion
 Power cable, 1.8 m (6 ft), U.S. 38F3968
 Alternative to part number 38F3968 above 6952301

8516 Color Display

Model 001 44F9759
 Model 002 70F9129
 Model 004 70F9132

8518 Color Display

Refer to the Model 8518 *Hardware Maintenance Service* for part and service information.

Tools and Miscellaneous

Tri-Connector Wrap Plug 72X8546
 Ethernet Wrap Plug 85F0036
 Ethernet T-Connector 84F8207
 50-ohm BNC Terminator (2 required) 85F0037
 Wrap Plug 59X4115
 Wrap Plug
 (for Token-Ring Network Adapter/A 6165899
 Wrap Plug (for Realtime Interface
 Co-Processor Multiport/2) 78-pin 16F2478
 Wrap Plug (for Multiport Interface Cable)
 Direct Connect 25-pin, ports 0 and 1 6425494
 Wrap Plug (for Multiport Interface
 Cable) Direct Connect 25-pin, ports 2
 through 7 09F1799
 Plastic Envelope (For Wrap Plug) 6138013
 Data Migration Facility 61X8936
 Key Cap Removal (keyboard) Tool 6110464
 Fixed-Disk-Drive Removal Tool 64F4126
 Video Memory Removal Tool 79X5893
 Video Memory Insertion Tool 07F2518
 Field Packaging Group 74F8998

Power Cords

PICTURE 7

Warning: Use the power cord certified for your country.

+-----+

IBM PS/2 Model 56 SX and 56 SLC HMS
Parts

Index		
1	Power Cord, Display, for: Colombia, U.S., Venezuela	68X3071
1	Power Cord, System Unit, for: Colombia, U.S., Venezuela	62X1045
2	Power Cord, System Unit, for: Hong Kong, Singapore, U.K.	14F0033
3	Power Cord, System Unit, for: France, Germany, Spain	13F9979
4	Power Cord, System Unit, for: Chile, Italy	14F0069
5	Power Cord, System Unit, for: Australia, New Guinea, New Zealand, Papua	13F9940
6	Power Cord, System Unit, for: Denmark	13F9997
7	Power Cord, System Unit, for: Israel	14F0087
8	Power Cord, System Unit, for: Bangladesh, Pakistan, South Africa, Sri Lanka	14F0015
9	Power Cord, System Unit, for: Switzerland	14F0051
10	Power Cord, System Unit, for: Thailand	1838574

Supplemental Parts Numbers:



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