FRONT

PICTURE 1

Part Number 04G3394
Form Number S85F-1676-02

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 (October 1991)

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1.0 General Checkout

Familiarize yourself with the model-specific *Hardware Maintenance Reference* pamphlet and the following information before starting with step 1.

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

Running Automatic Configuration

Warning: Running Automatic Configuration may alter customized configuration settings. Note the current settings using **View configuration**. If the configuration was customized, restore it to the customized settings after service is complete.

Diagnosing Combined FRUs: If an adapter or device consists of more than one FRU, an error code may 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.

If you are instructed to replace either the processor board or the system board, and the first board that you replaced does not correct the problem, then replace the other board (processor or system) and reinstall the original board.

Using 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 there is not an error code on the screen, see if the error symptom is listed in the Symptom-To-FRU Index. If the symptom is not listed, diagnose the POST error code displayed on the information panel.

```
+---+
¦001¦
+---+
```
- Power-off the system and all external devices.
- Verify the power-on password is inactive.
- Check all cables and power cords.
- Make sure there are no diskettes in the drives.
- Power-on all external devices.
- Power-on the system.

  Note: If you get a POST error code, press the pause key (while the
          error code is on the screen). Write down any error codes that
          are displayed, then press F1 to continue. If the test stops and
          you cannot continue, go to "Symptom-to-FRU Index" in topic 14.0.

ARE ANY EXTERNAL SCSI DEVICES ATTACHED TO THE SYSTEM?
Yes No
```
 ¦    ¦
 ¦    +---+
 ¦    ¦002¦
 ¦    +---+
 ¦    Go to Step 005.
 ¦
+---+
¦003¦
+---+
```
DID THE POWER-GOOD LIGHT ON ALL OF THE EXTERNAL DEVICES COME ON?
Yes No
```
 ¦    ¦
 ¦    +---+
 ¦    ¦004¦
 ¦    +---+
 ¦    Go to the external devices service pamphlet.
 ¦
 ¦
 ¦
+---+
¦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 and verify that the "Enable" and "Disable" settings
  are correct.  (For more information, go to "Enable and Disable Settings"
  in topic 5.0.)  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 14.0.  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¦
 ¦    +---+
 ¦    Continue with Step 014.
 ¦
+---+
¦013¦
+---+
Go to "Symptom-to-FRU Index" in topic 14.0.
------------------------------------------------------------------------

+---+
¦014¦
+---+
- Press Ctrl+Alt+Del.  When the curser moves to the upper right, press
  Ctrl+Alt+Ins and check for the following responses:
  1.  One or two short beeps.
  2.  Readable instructions or the Main Menu.
DID YOU RECEIVE THE RESPONSES LISTED PREVIOUSLY?
Yes  No
 ¦    ¦
 ¦    +---+
 ¦    ¦015¦
 ¦    +---+
 ¦    Go to "Symptom-to-FRU Index" in topic 14.0.
 ¦    - 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, then press Ctrl+A and run system checkout.
- If the test stops and you cannot continue, go to "Undetermined Problem"
  in topic 4.0.


  Notes:

  1.  If the system has incorrect keyboard responses, go to "Keyboard" in
      topic 11.0.
  2.  If the printer has incorrect responses, go to "Printer" in
      topic 8.0.
  3.  If the information panel has missing or distorted digits, go to
      "Symptom-to-FRU Index" in topic 14.0.
  4.  If the display has problems such as jittering, rolling, shifting, or
      being out-of-focus, go to "Display Self-Test" in topic 7.0.
  5.  If a minimum of 896KB of memory is not active, the diagnostic tests
      cannot be loaded.
```

IS THE LIST OF INSTALLED DEVICES CORRECT?

Note: Memory, 487SX (option), and processor board cache (256KB) will not
       be listed.


```
Yes  No
 ¦    ¦
 ¦   +---+
 ¦   ¦017¦
 ¦   +---+
 ¦   Go to "Installed Devices List" in topic 2.0.
 ¦
+---+
¦018¦
+---+
```
- Run the advanced diagnostic tests.
DID THE TESTS IDENTIFY A FAILURE?

Note: If the test stops and you cannot continue, replace the last device
       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 14.0.
 ¦
 ¦   You may have an intermittent problem:
 ¦        Check for damaged cables or connectors.
 ¦        Reseat all adapters, drives, and modules.
 ¦        Check the system fans.
 ¦        Start an error log and run the tests multiple times.
 ¦
+---+
¦020¦
+---+
```
Follow the action described on the screen. If that does not correct the
problem go to "Symptom-to-FRU Index" in topic 14.0.

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     Corporation.

2.0 Installed Devices List

If an adapter or device is missing from the list, you might have one of
the following conditions:
    The fixed disk drive (hard disk drive) (or Reference Diskette) does
    not contain the module of code required to support that device.
    The missing device is an unrecognizable adapter.
    The missing device requires an additional diskette or service manual.
    The missing device is defective.
    An adapter is defective.

Subtopics
2.1 Device Type
2.2 SCSI Devices
2.3 Non-SCSI Devices

2.1 Device Type

Run **Automatic Configuration** (see "Running Automatic Configuration" in
topic 1.0 before continuing) and determine which type of device, SCSI or
non-SCSI, is missing from the Installed Devices List (in Advanced
Diagnostics), then continue with the following steps. (If SCSI and
non-SCSI devices both are missing, go to "Undetermined Problem" in
topic 4.0.)

2.2 SCSI Devices

The adapter supporting the missing device may be defective. If more than
one SCSI adapter is installed, isolate them one at a time.
1. Power-off the system and disconnect any 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 run **Automatic Configuration** (see "Running
    Automatic Configuration" in topic 1.0 before continuing). If the
    adapter is not on the Installed Devices List (in Advanced
    Diagnostics), the adapter is defective. If the adapter is on the
    list, run the adapter diagnostic tests.
4. If the adapter fails the tests, replace the cable. If the adapter
    passes the tests, a different adapter may 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.

2.3 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.

3.0 Power-On Password

To service a system with a power-on password:
1. Move the system board jumper J16, to connect the center pin and the
    pin on the opposite end of the connector (see the figure on page
    12.0).
2. Power-on the system.

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

4.0 Undetermined Problem

You are here because the diagnostic tests did not identify which adapter
or device failed. Do not isolate FRUs that are known to be good.

If the power-on light is not on, verify (with power off) that the
voltage-select switch is in the correct position. Then check the power
supply voltages. If the voltages are not correct, replace the power
supply. If the voltages and switch setting are correct, do the following:
1. Power-off the system.
2. Remove or disconnect one of the following:

    Note: Minimum operating requirements are one *pair* of 1MB kits (type 1
             systems) or one 2MB kit (type 2 systems), the processor board,
             and the default drive 6.

        Non-IBM devices
        Modem, printer, mouse, or other device
        Any adapter (except the Processor Board)
        Processor board cache option (256KB)
        487SX math coprocessor option
        Hard-disk or diskette drive
        Memory-module kits.
3. Power-on the system.
4. If the problem remains, repeat steps 1 through 3 until you find the
    failing adapter or device.
5. If all adapters and devices have been removed and the problem remains,
    suspect the system board, processor board, then the power supply.

5.0 Enable and Disable Settings

To check the settings, select **Set and View SCSI Device Configuration** from
the Set Configuration menu and see if any Presence Error Reporting devices
are listed (not all devices report). Set devices connected to the system
to "Enabled." Set devices listed but *not connected* to "Disabled." Press
F5 to make changes then press F10 to save the changes.

For more information, see "Presence Test" in the *Diagnostic Information
for Micro Channel Computers* pamphlet.

6.0 Power Supply Voltages / Fans

While shorting pins 1 and 2 together, read the voltages on the other pins.
If the voltages are incorrect, replace the power supply.

V dc Minimum	V dc Maximum	-Lead Pin	+Lead Pin
+3.7	+ 6.2	5	3
+9.0	+15.0	5	4
− 9.0	− 15.0	5	7
+3.7	+ 6.2	B	D
+9.0	+15.0	B	A

PICTURE 2

In addition to the power supply fan, some systems require a fan on the
system access cover. Excess heat will cause intermittent failures. If
the power supply fan failed, replace the power supply. To determine if
the system access cover fan failed, do the following:

1. Check for 12 V dc (±1.4 V dc) at the two fan cable assembly pins on
    the system base.
        If the voltage is correct, check for 1300 ohms (±10%) resistance
        between the fan terminals.
        If the resistance is incorrect, replace the fan.
        If the resistance is correct, check the spring clip connections.
        If the connections are good, there is not a fan problem.
2. If the voltage is incorrect, unplug the fan cable assembly from
    connector J28 on the system board and check the cable assembly for
    continuity (see the figure on page 12.0).
        If the cable has continuity, replace the system board.
        If the cable does not have continuity, replace it.

7.0 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.

The screen should be white with a black margin, as described below
(shading may occur near the edges).
    8503, 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, or bottom, or both.
    8507, 8508: 2-20 mm (0.08-0.79 in.) wide on the top, or bottom, or
    both.

If the screen does not meet the test specifications, replace the display.
If it meets the test specifications, replace the display adapter.

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

8.0 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 do not detect a failure, replace the
printer cable. If the problem remains, replace the system board.

9.0 IML / IPL

You are here because you have an Initial Machine Loading (IML) or an
Initial Program Loading (IPL) problem resulting in one of the following
symptoms:
    You have an I999XXXX error
    The system was powered-on without a POST error, but the operating
    system does not work or the system starts up in BASIC.

Verify that the system has a valid Selectable Startup Sequence. To do
this:
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
    (drive 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 the next step. If the default drive is
    not in the startup sequence, follow the instructions on the screen,
    then continue with the next step.
4. Power-off the system, remove the Reference Diskette, then power-on the
    system. If the "F1" (Insert Diskette) icon appears on the screen,
    continue with the next step. If the "Not OK" icon appears on the
    screen, go to step 6.
5. Change the startup sequence to include a device that has an operating
    system, then go to step 8. The system didn't detect an operating
    system on any of the devices in the startup sequence.
6. Restart the system from the Reference Diskette. Select **Update System
    Programs** from the Main Menu and wait for the program to complete
    running.
7. Power-off the system, remove the Reference Diskette and continue with
    the next step.
8. Power-on the system, check for the normal power-up sequence and then
    Run the Advanced Diagnostic tests. If the problem still exists, go
    back to the "Symptom-to-FRU Index" in topic 14.0.

Note: If the startup sequence was customized, restore it to the
        customized settings after service is complete.

10.0 Processor Board

You are here because the system has the following symptoms:
    No beep
    No message on the display
    Fan runs
    Power-on light is on.

Remove the adapters (except the processor board), the memory-module kits,
and the processor-board cache option (256KB) one at a time, until you find
the failing adapter. If all adapters have been removed and the problem
remains, replace the processor board. If the problem still remains,
replace the system board.

11.0 Keyboard
1. Power-off the system.
2. Disconnect the cable from the keyboard.
3. Power-on the system and check the connector for the voltages shown.
    All voltages are ± 5%.

    PICTURE 3

    If the voltages are correct, replace the keyboard.

    If the voltages are not correct, suspect the keyboard cable, then the
    system board.

12.0 Memory

Use the system board figure below to locate the memory-module kit
connectors B1 to A4.

PICTURE 4

Note: Power-off the system before removing or replacing memory.

Type 1 systems run only interleaved memory configurations.

Type 2 systems run interleaved, noninterleaved, or a combination of both
configurations. The processor board that is installed determines which
type of memory (type 1 or type 2) is supported. Use the FRU number on the
processor board or the submodel code from **Display Revision Levels** to
determine which processor board is installed.

To view the submodel code, go to the Main Menu and select **Display Revision
Levels**. Make note of the submodel code displayed on the screen.

The following figure converts the submodel code (and FRU number) to the
system memory type.

Submodel Code	FRU Number	System Memory Type
14	64F0201	Type 1
16	64F0198	Type 1
2C	92F0065	Type 1
2E	92F0049	Type 1
2A	92F0048	Type 1
58	92F0079	Type 2
5A	92F0079	Type 2

Subtopics
12.1 Memory (Type 1 Systems)
12.2 Memory (Type 2 Systems)

12.1 Memory (Type 1 Systems)

Notes:

1. Only interleaved memory is supported. Interleaved memory-module kits
    operate in pairs (for example A1 and B1, A2 and B2). Each pair must
    be the same memory size and speed. Total system memory capacity is
    64MB. Minimum operating requirement is one *pair* of 1MB kits.

2. Running customer diagnostic tests will deallocate defective memory.
    After you replace defective memory, run the advanced diagnostic memory
    test or the replacement memory might not be recognized.

Run the advanced memory diagnostic test. If the test does not indicate
which memory-module kit failed, continue with the following process.

Note: If a screen message appears asking if you have replaced a specific
        memory module, suspect that *it* is the failing module.

Subtopics
12.1.1 Finding the Failing Memory

12.1.1 Finding the Failing Memory

Test the kits by removing, testing and replacing them, one at a time
(within each matched pair), until you find the kit that caused the
failure. Reinstall each kit in the same connector from which it was
removed. If the problem remains, replace the processor board.

12.2 Memory (Type 2 Systems)

Notes:

1. Interleaved and noninterleaved memory is supported. If the kits are
    installed in matched pairs (for example A1 and B1, A2 and B2) of the
    same memory size and speed, the kits will automatically run in
    interleaved mode. Any other configuration is supported, but will run
    in the less-efficient noninterleaved mode. Total system memory
    capacity is 64MB. Minimum operating requirements is one 2MB kit.

2. Running customer diagnostics will deallocate defective memory. After
    you replace defective memory, run the advanced diagnostic memory test
    or the replacement memory might not be recognized.

Run the advanced memory diagnostic test. If the test does not indicate
which memory-module kit failed, continue with the following process.

Note: If a screen message appears asking if you have replaced a specific
    memory module, suspect that *it* is the failing module.

Subtopics
12.2.1 Finding the Failing Memory

12.2.1 Finding the Failing Memory

Test the kits by removing, testing and replacing them, one at a time
(within each matched pair), until you find the kit that caused the
failure. Reinstall each kit in the same connector from which it was
removed. If the problem remains, replace the processor board.

Note: If the kits are installed in a noninterleaved configuration, you
can remove and replace them in *any* order.

13.0 Processor Board and Reference Diskette Matrix

There are two types of Model 95 Reference Diskettes (labeled 1 or 2). The
processor board installed in the system determines which one to use. You
can use any of the following methods to identify the type of processor
board installed and the Reference Diskette Required:

Display Revision Levels: Go to the Main Menu and select **Display Revision
Levels**. Note the submodel code displayed on the screen (this screen is
also available to the customer).

FRU Number: Read the FRU number printed near the card-edge of the
processor board.

Upgrade Label: Check the system for an additional label next to the front
serial number. If the system is upgraded with a *different* processor
board, an upgrade label (marked P1 - P6) is added.

Use the following matrix to identify which processor board is installed
and which Reference Diskette is required.

Submodel Code Number	Processor Board FRU Number and Description	Upgrade Label Number	Reference Diskette Type Required
2E	92F0049 486/20	- -	1
2A	64F0201 486/25	P1	1
14	64F0198 486/33	P2	1
16	92F0048 486/50	P3	1
2C	92F0065 487SX/20	P4	1
58	92F0079 486SX/25	P5	2
5A *	92F0079 486SX/25	P6 *	2

* Also requires a 487SX processor (FRU 92F0100).

Note: For a layout of the processor board, see "Processor Board" in the
Hardware Maintenance Reference manual.

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14.0 Symptom-to-FRU Index

Error symptoms and the FRUs that might be responsible for the failure are
listed in the "Symptom-To-FRU index." The most-likely failing FRU is
listed first. If you are unable to correct the problem using this index,
go to "Undetermined Problem" in topic 4.0.

If the system displays an error message and gives an incorrect audio
response, start with the FRUs listed for that error message. An "X" in an
error message can be any number.

Note: 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.

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 versus non-SCSI errors.

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

```
            Shorter POST Messages
            +--------------------+
            ¦    ¦    ¦     ¦     ¦
   +------------------++-------------------+
   ¦  0 ¦  0 ¦  0 ¦  0 ¦¦  0 ¦  0 ¦  0 ¦  0 ¦
   +------------------++-------------------+
     ¦    ¦    ¦    ¦    ¦    ¦     ¦    ¦
  Reserved ¦    ¦     ¦    ¦     ¦   Size (SCSI)
           +---------+   ¦    ¦   Slot Number (SCSI)
           Device Code   ¦   Logical Unit Number (SCSI)
                       ID (SCSI)
```
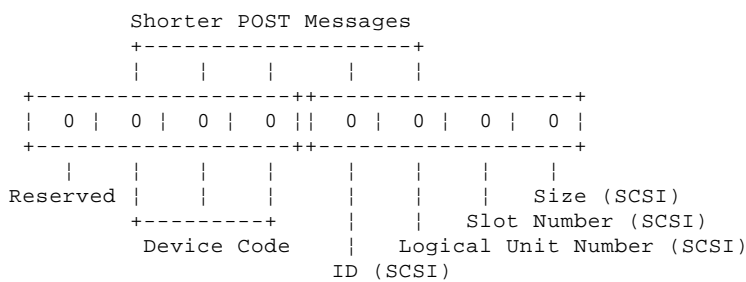
All SCSI devices must be set to a different SCSI ID. Duplicate SCSI ID
settings can generate a false error message. Use the SCSI ID to determine
whether the error message is coming from an internal or an external
device.

Note: If you are instructed to replace either the processor board or the
system board, and the first board that you replaced does not
correct the problem, then replace the other board (processor or
system) and reinstall the original board.

Subtopics
14.1 No-Beep Symptoms
14.2 Beep Symptoms
14.3 SCSI Tape Drive Symptoms
14.4 Miscellaneous Symptoms
14.5 Numeric Error Codes

14.1 No-Beep Symptoms

Symptom/Error	FRU / Action
No beep, power-on light does not light, and fan does not run. (See "Undetermined Problem" in topic 4.0 before replacing any FRUs.)	**Power Supply** Processor Board System Board Any device or adapter
No beep, fan runs, and a 000**215**XX on the information panel. (See "Memory" in topic 12.0 before replacing any FRUs.)	**System Board Memory** Processor Board System Board
No beep, fan runs, and a 000**171**XX on the information panel.	**System Board**
No beep, fan runs, power- on light lights, system stops during POST with a message on the display. (See "Undetermined Problem" in topic 4.0 before replacing any FRUs.)	**System Board** Processor Board Power Supply
No beep, fan runs, power- on light lights, system stops during POST with no message on the display, or an unreadable display. (See "Processor Board" in topic 10.0 before replacing any FRUs.)	**Processor Board** System Board Power Supply
No beep, fan runs, power- on light lights, memory count and blinking curser continuously loops.	**Processor Board Cache**
No beep and system is otherwise functional (See "Undetermined Problem" in topic 4.0 before replacing any FRUs.)	**Speaker** System Board

14.2 Beep Symptoms

+---+
| **Symptom/Error** | **FRU / Action** |
+-------------------------------------+-------------------------------------+
Operating system does not work, or	
the system starts up in BASIC.	**Default SCSI Hard Disk Drive**
(See "IML / IPL" in topic 9.0	
before replacing any FRUs.)	
+-------------------------------------+-------------------------------------+
One long and two short beeps	
(See "Display Self-Test" in	**Display Adapter**
topic 7.0 before replacing any	System Board
FRUs.)	Display
+-------------------------------------+-------------------------------------+
One or two short beeps and a blank	
or unreadable display or a	**Display Adapter**
blinking curser	System Board
(See "Display Self-Test" in	Display
topic 7.0 before replacing any	
FRUs.)	
+-------------------------------------+-------------------------------------+
Continuous beep	
(See "Undetermined Problem" in	**Power Supply**
topic 4.0 before replacing any	System Board
FRUs.)	
+-------------------------------------+-------------------------------------+
Repeating short beeps	
(See "Undetermined Problem" in	**Power Supply**
topic 4.0 before replacing any	System Board
FRUs.)	Keyboard (stuck key)
+---+

14.3 SCSI Tape Drive Symptoms

```
+-----------------------------------------------------------------------+
¦ Symptom/Error                   ¦ FRU / Action                        ¦
+---------------------------------+-------------------------------------¦
¦ The tape is automatically ejected¦                                    ¦
¦ from the Drive.                 ¦ Tape Cassette                        ¦
¦                                 ¦ Drive                                ¦
¦                                 ¦                                      ¦
+---------------------------------+-------------------------------------¦
¦ The tape sticks or breaks in the¦                                     ¦
¦ drive.                          ¦ Tape Cassette                        ¦
¦ (Verify that the tapes used meet¦                                      ¦
¦ ANSI standard X3B5.)            ¦                                      ¦
+-----------------------------------------------------------------------+
```

```
+-----------------------------------------------------------------------+
¦ Symptom/Error                   ¦ FRU / Action                        ¦
+---------------------------------+-------------------------------------¦
¦ The tape is automatically ejected¦                                    ¦
¦ from the Drive.                 ¦ Tape Cassette                        ¦
¦                                 ¦ Drive                                ¦
¦                                 ¦                                      ¦
+---------------------------------+-------------------------------------¦
¦ The tape sticks or breaks in the¦                                     ¦
¦ drive.                          ¦                                      ¦
```

14.4 Miscellaneous Symptoms

Symptom/Error	FRU / Action
Program loads from the hard disk drive, or a non-system or disk error (with the Reference Diskette in drive A).	**Diskette Drive** System Board Power Supply
Information-Panel Display fails	**System Board** Information-Panel Assembly Power Supply
Display screen changes colors	**Display**
Power-on light does not light and fan runs	**Information-Panel Assembly** System Board Power Supply
IML image has been updated and the insert-diskette icon appears on display and a **I99900**XX on the information panel.	Verify an operating system has been loaded onto the default hard disk drive.
Memory count displayed does not match memory installed. (See "Memory" in topic 12.0 before replacing any FRUs.)	**System Board Memory**
One or more keys do not work and system is otherwise functional	**Keyboard** Keyboard Cable System Board
Intermittent Failures (See "Undetermined Problem" in topic 4.0 before replacing any FRUs.)	**Power Supply** System Fans Any device or adapter
System will not power-off	**Information-Panel Assembly** System Board Power Supply

14.5 Numeric Error Codes

Symptom/Error	FRU / Action
000**102**XX, 000**104**XX	**Processor Board** System Board
000**103**XX (If a 20-MHz board is installed, and the processor is not a 487SX, verify that the jumper is in positions 2 and 3.) (487SX is indicated on the processor.)	**Processor Board** System Board
000**107**XX, 000**110**XX (See "Memory" in topic 12.0 before replacing any FRUs.)	**System Board Memory** System Board
000**112**XX, 000**113**XX 000**114**XX	**Any adapter** System Board
000**118**XX (See "Memory" in topic 12.0 before replacing any FRUs.)	**System Board Memory**
000**161**XX	**Battery**
000**163**XX, 000**164**XX, 000**165**XX, 000**169**XX, (If setting configuration does not solve the problem, see "Installed Devices List" in topic 2.0 before replacing any FRUs.)	**Set Configuration/Features** System Board
000**166**XX	**Any adapter**
000**173**XX (Verify the "Enable and Disable Settings" in topic 5.0 are correct before replacing any FRUs.)	**Any Device**
000**174**XX (If Automatic configuration does not solve the problem, run Advanced Diagnostics.)	**Set Configuration/Features** System Board
000**194**XX (See"Memory" in topic 12.0 before replacing any FRUs.)	**System Board** System Board Memory
0001**XX**XX (not listed above)	**Processor Board** System Board
0002**0X**XX (See "Memory" in topic 12.0 before replacing any FRUs.)	**System Board Memory**
000**210**XX, 000**211**XX	**Processor Board** System Board Memory
000**215**XX, 000**216**XX, 000**225**XX, 000**226**XX, 000**240**XX, 000**255**XX (See "Memory" in topic 12.0 before replacing any FRUs.)	**System Board Memory** System Board
000**252**XX, (Intermittent error. Run advanced memory diagnostics in loop mode before replacing any FRUs.)	**System Board**
000**295**XX, 000**296**XX (See "Memory" in topic 12.0 before replacing any FRUs.)	**System Board Memory** System Board

Error Code	FRU
000**298**XX (See "Memory" in topic 12.0 before replacing any FRUs.)	**System Board** System Board Memory
000**30X**XX	**Keyboard** Keyboard Cable System Board
000**401**XX	**System Board**
000**602**XX	**Defective Diskette**
000**6XX**XX	**Diskette Drive** System Board Power Supply
000**7XX**XX	**Processor Board** (Math Coprocessor)
00**1102**XX, 00**1106**XX	**System Board** Any serial device
00**1107**XX	**Communications Cable** System Board
00**1108**XX, 00**1109**XX	**System Board** Any serial device
00**11XX**XX (not listed above)	**System Board**
00**1202**XX, 00**1206**XX	**Dual Async Adapter/A** Any serial device
00**1207**XX	**Communications Cable** Dual Async Adapter/A
00**1208**XX, 00**1209**XX	**Dual Async Adapter/A** Any serial device
00**12XX**XX (not listed above)	**Dual Async Adapter/A** System Board
00**14XX**XX (See "Printer" in topic 8.0 before replacing any FRUs.)	**Printer** System Board
00**4611**XX, 00**4630**XX	**Multiport/2 Interface Board** Multiport/2 Adapter
00**4612**XX, 00**4613**XX, 00**4640**XX,00**4641**XX	**Memory Module Package** Multiport/2 Adapter
00**4650**XX	**Multiport Interface Cable**

00**46XX**XX	**Multiport/2 Adapter** Multiport/2 Interface Board Memory Module Package
00**75XX**XX (See "Display Self-Test" in topic 7.0 before replacing any FRUs.)	**Display Adapter** System Board Video-Memory Module Display
00**86XX**XX	**System Board** Pointing Device
00**96XX**XX	**SCSI Adapter (with cache)** Any SCSI Device System Board
0**10002**XX, 0**10006**XX	**Multiprotocol Adapter/A** Any serial device
0**10007**XX	**Communications cable** Multiprotocol Adapter/A
0**10008**XX, 0**10009**XX	**Multiprotocol Adapter/A** Any serial device
0**100XX**XX (not listed above)	**Multiprotocol Adapter/A** System Board
0**10102**XX, 0**10106**XX, 0**10108**XX, 0**10109**XX	**Modem Adapter/A** Any serial device
0**101XX**XX (not listed above)	**Modem Adapter/A** System Board
0**107XX**XX	**5.25-Inch Diskette Drive** 5.25-Inch Diskette Adapter/A
0**112XX**XX	**SCSI Adapter (without cache)** Any SCSI Device System Board
0**12917**XX (If a 20-MHz board is installed, and the processor is a 487SX, verify that the jumper is in positions 1 and 2.) (487SX is indicated on the processor.)	**Processor Board**
0**129XX**XX (not listed above)	**Processor Board Cache (256KB)** Processor Board System Board
0**141XX**XX	**Realtime Interface** **Coprocessor Portmaster** **Adapter/A**

```
¦ 0147XXXX, 0148XXXX            ¦                                     ¦
¦                              ¦ Video-Memory Module                 ¦
¦                              ¦ System Board                        ¦
¦                              ¦                                     ¦
+------------------------------+-------------------------------------¦
¦ 0152XXXX                     ¦                                     ¦
¦                              ¦ XGA Display adapter/A               ¦
¦                              ¦ Video-Memory Module                 ¦
¦                              ¦ System Board                        ¦
¦                              ¦                                     ¦
¦                              ¦                                     ¦
+------------------------------+-------------------------------------¦
¦ 0164XXXX                     ¦                                     ¦
¦                              ¦ 120MB Internal Tape Drive           ¦
¦                              ¦ Diskette Cable                      ¦
¦                              ¦ System Board                        ¦
¦                              ¦                                     ¦
¦                              ¦                                     ¦
+------------------------------+-------------------------------------¦
¦ 0165XXXX                     ¦                                     ¦
¦                              ¦ 6157 Streaming-Tape Drive           ¦
¦                              ¦ 6157 Tape-Attachment Adapter        ¦
¦                              ¦                                     ¦
+------------------------------+-------------------------------------¦
¦ 0166XXXX, 0167XXXX           ¦                                     ¦
¦ (For diagnostic              ¦ Token-Ring Network Adapter/A        ¦
¦ information refer            ¦ System Board                        ¦
¦ to the Token-Ring           ¦                                     ¦
¦ Network Adapter/A            ¦                                     ¦
¦ service Information.)        ¦                                     ¦
+------------------------------+-------------------------------------¦
¦ 0200XXXX                     ¦                                     ¦
¦                              ¦ Image Adapter/A                     ¦
¦                              ¦ Video-Memory Module                 ¦
¦                              ¦ System Board                        ¦
¦                              ¦                                     ¦
+------------------------------+-------------------------------------¦
¦ 0208XXXX                     ¦                                     ¦
¦ (Verify there are            ¦ Any SCSI Device                     ¦
¦ no duplicate SCSI            ¦                                     ¦
¦ ID settings.)               ¦                                     ¦
+------------------------------+-------------------------------------¦
¦                              ¦                                     ¦
¦ 0210XXXA                     ¦ SCSI Hard Disk Drive (60MB)         ¦
¦ 0210XXXB                     ¦ SCSI Hard Disk Drive (80MB)         ¦
¦ 0210XXXC                     ¦ SCSI Hard Disk Drive (120MB)        ¦
¦ 0210XXXD                     ¦ SCSI Hard Disk Drive (160MB)        ¦
¦ 0210XXXE                     ¦ SCSI Hard Disk Drive (320MB)        ¦
¦ 0210XXXF                     ¦ SCSI Hard Disk Drive (400MB)        ¦
¦ 0210XXXG                     ¦ SCSI Hard Disk Drive (40MB)         ¦
¦ 0210XXXH                     ¦ SCSI Hard Disk Drive (Size          ¦
¦ 0210XXXU                     ¦ Undetermined)                       ¦
¦ (If the failing device is    ¦ SCSI Adapter                        ¦
¦ an external device, go to     ¦ SCSI Cable                          ¦
¦ the external devices         ¦                                     ¦
¦ service pamphlet.)           ¦                                     ¦
¦                              ¦                                     ¦
+------------------------------+-------------------------------------¦
¦ 0211XXXX                     ¦                                     ¦
¦ (If the failing device is    ¦ SCSI Tape Drive                     ¦
¦ an external device, go to     ¦ SCSI Adapter                        ¦
¦ the external devices         ¦ SCSI Cable                          ¦
¦ service pamphlet.)           ¦                                     ¦
+------------------------------+-------------------------------------¦
¦ 0215XXXX                     ¦                                     ¦
¦ (If the failing device is    ¦ SCSI CD-ROM Drive                   ¦
¦ an external device, go to     ¦ SCSI Adapter                        ¦
¦ the external devices         ¦ SCSI Cable                          ¦
¦ service pamphlet.)           ¦                                     ¦
+------------------------------+-------------------------------------¦
¦ 0217XXXX                     ¦                                     ¦
¦ (If the failing device is    ¦ SCSI Rewritable Optical Drive       ¦
¦ an external device, go to     ¦ SCSI Adapter                        ¦
¦ the external devices         ¦ SCSI Cable                          ¦
¦ service pamphlet.)           ¦                                     ¦
+------------------------------+-------------------------------------¦
¦ I99900XX                     ¦                                     ¦
¦ (Before replacing any FRUs, go to ¦ Default SCSI Hard Disk Drive   ¦
¦ "IML / IPL" in topic 9.0.)   ¦ SCSI Adapter                        ¦
¦                              ¦ SCSI Cable                          ¦
¦                              ¦                                     ¦
+------------------------------+-------------------------------------+
```

Supplemental Symptom-to-FRU Index:

15.0 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

Subtopics
15.1 Example of a Parts List

15.1 Example of a Parts List

Index   System Unit

32	Cover	90X9288
3	Front Bezel/Logo (R)	72X8502
	Miscellaneous Hardware Kit (AR)	72X8580
	Knob Assembly, Hard Disk	
	Drive Support Structure	
	Knob	
	Washer	

16.0 System Overview

PICTURE 5

16.0 System Overview

PICTURE 5

17.0 System Overview (continued)

PICTURE 6

18.0 Parts

Index   System Unit Exterior

Index	Part	Number	
01	Access Cover	33F8427	
02	Rear Bezel	33F8419	
04	Pedestal with Plate	64F0215	
05	Drive Support Structure	33F8421	
	Ground spring (for 33F8421)	33F6853	
08	Drive Retainer	33F8424	
09	Front Bezel	64F4137	
10	DASD Bezel D1	64F4136	
11	DASD Bezel D	33F8425	
12	DASD Bezel E	33F8425	
	5.25-Inch Diskette Drive Bezel	64F4103	
	5.25 Framing Bezel	33F8459	
	CD-ROM Drive Bezel	64F0138	
13	Diskette Drive Blank Bezel (Bezel B)	33F8437	
14	3.5-Inch Diskette Drive Bezel A) (AR)		33F8426
	3.5-Inch Device Filler bezel	64F4149	
15	Information Panel Bezel	33F8423	
18	Base Frame (R)	33F8417	
	Keylock Assembly	33F8433	
	Misc. Parts Kit	33F8435	

System Unit Interior

Index	Part	Number
03	Power Supply	15F6636
	Ground Strap (for 15F6636)	33F8418
16	Information Panel Assembly	33F8434
	Information Panel kit	33F8442
19	System Board (without memory)	33F5717
	Battery	33F8354
17	Diskette Drive (AR) (See Diskette Drive)	
25	Diskette Drive Signal Cable	33F8430
06	Hard Disk Drive Mounting Tray (AR)	64F0141
07	Hard Disk Drive (AR) (See Hard Disk Drive)	
23	SCSI Signal Cable	33F8436
24	Drive Power Cable (See Hard Disk Drive)	
20	SCSI Adapter (See Hard Disk Drive)	
	Processor Board (See Processor Board)	
22	System-Board Memory-Module kit	
	(See Options and Adapters)	
26	Information Panel Cable	33F8429
	Speaker	33F8444
	Access Cover Fan	64F4115
27	Power Cable (for 64F4115)	64F4120
	Adapter Retainer (with thumb screws)	92F0099

Index   Power Cords

Index	Part	Number
	Display Power Cord, for:	
28	Colombia, U.S., Venezuela	68X3071
	System Unit Power Cord, for:	
29	Colombia, U.S., Venezuela	62X1045
	System Unit Power Cord, for:	
30	Hong Kong, Singapore, U.K.	14F0033
	System Unit Power Cord, for:	
31	France, Germany, Spain	13F9979
	System Unit Power Cord, for:	
32	Italy	14F0069
	System Unit Power Cord, for:	
33	Australia, New Zealand	13F9940

Diskette Drive

Part	Number
1.44MB Drive (AR)	64F0162
Drive Slide	64F0156
Drive Signal Cable	33F8430
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
1.2MB Internal Drive (with rails)	64F4102
1.2MB Rail kit (for 64F4102)	85F0041
Slide kit (for 64F4102)	85F0040

Hard Disk Drive (SCSI)

Part	Number
40MB Drive (AR)	56F8866
60MB Drive (AR)	6128296
80MB Drive (AR)	56F8854
120MB Drive (AR)	6128298
160MB Drive (AR)	56F8851

```
            320MB Drive (AR)                    85F0011
            400MB Drive (AR)                    85F0012
            Drive Mounting Tray (AR)            64F0141
            Option Device Mounting Guide (AR)   33F8441
            SCSI Adapter (with cache) (AR)      85F0000
            SCSI Adapter (without cache) (AR)   85F0002
            Terminator, External (for 85F0000)  33F8464
            Terminator, Internal (for 85F0000)  34F0025
            Terminator, Internal (for 85F0002)  57F2870
            SCSI Signal Cable                   33F8436
            Power Cable (single)                33F8431
            Power Cable (dual) (AR)             34F0014
```

Processor Board (with Connector for L2 Cache)

```
            80486 (25 MHz single socket)        64F0201
            80486 (33 MHz single socket)        64F0198
            256KB L2 Cache (17ns) (for 25,33 MHz)         64F0199
            80486 (50 MHz single socket)        92F0048
            256KB L2 Cache (12ns) (for 92F0048) 92F0050
```

Processor Board (without connector for L2 Cache)

```
 80487SX (20 MHz single socket)     92F0065
 80486 (20 MHz single socket)       92F0049
 80486SX (25 MHz dual sockets)      92F0079
 80487SX Microprocessor (for 92F0079)   92F0100
```

CD-ROM Drive

```
 Internal CD-ROM Drive              81F7930
 Terminator Kit (for 81F7930)       59F3530
 Ground spring (for 81F7930)        85F0067
 Rail Kit                           34F0041
 Headphones                         59F3655
 Cleaning Kit                       59F3562
    Cleaning Disk
    Test Disk
    Disc Caddy
```

SCSI Tape Drive

```
 Internal SCSI Tape Drive (with rails)  85F0055
 External SCSI Tape Drive           02G7402
 Rail Kit (for 85F0055)             34F0041
 Framing Bezel (for 85F0055)        64F4138
 Media Kit                          59F3907
    Cleaning Tape
    Blank Tape
 Cleaning Tape                      21F8593
 Blank Tape (Qty. 5)                21F8595
```

Options and Adapters

```
 Realtime Interface Coprocessor
  Portmaster Adapter/A              53F2603
    512KB Memory Module Package     53F2656
    1MB Memory Module Package       53F2660
    2MB Memory Module Package       53F2664
 300/1200 Modem Adapter/A           34F0006
 Communications Cable (for 34F0006) 8285985
 300/1200/2400 Modem Adapter/A      65X1253
 Communications Cable (for 65X1253) 94X1540
 Baseband Card                      72X8102
 Baseband Cable                     72X8107
 Broadband Card                     72X8106
 3270 Connection                    74F3464
 36/38 Emulation Adapter            69X6281
 6157 Tape Adapter                  92X1459
 XGA Display Adapter/A              75X5886
 Video Memory Module (for 75X5886)  75X5894
 Image Adapter/A                    07F2508
 Video-Memory Module (512K)
 (for 07F2508)                      07F4401
```

Options and Adapters (continued)

```
 Video-Memory Module (1MB)
 (for 07F2508)                      07F4403
 Dual Async Adapter/A               34F0008
 Multiprotocol Adapter/A            90X8995
 Realtime Interface CoProcessor
 Multiport/2                        09F1888
```

```
   8-port RS232-C Electrical
Interface Board                         91F7974
   4-port RS232-C Electrical
Interface Board                         91F7976
   4+4-port RS232-C RS422-A Electrical
Interface Board                         91F7966
   512KB Memory Module Package          16F2267
Interface Cable (for 09F1888)          00F5524
Screen Reader Keypad                    1393515
Screen Reader Keypad Cable             72X8537
Token-Ring Busmaster Adapter/A         74F4149
Token-Ring Network Adapter/A           83X7488
Token-Ring Adapter/A RPL Module        83X9180
Token-Ring 16/4 Adapter/A              16F1144
Token-Ring 16/4 Adapter/A RPL Module   53F7747
SCSI Adapter (with cache) (AR)         85F0000
Terminator, External (for 85F0000)     33F8464
Terminator, Internal (for 85F0000)     34F0025
SCSI Adapter (without cache) (AR)      85F0002
Terminator, Internal (for 85F0002)     57F2870
5.25-Inch External Diskette Adapter/A
(1.2MB or 360KB)                        15F7996
3.5-Inch 127MB Rewritable Optical Drive 85F0015
Drive Bezel (for 85F0015)              85F0018
Drive mounting Tray (for 85F0015)      85F0023
Objective Lens Cleaning Cartridge (for 85F0015)        85F0043
Prism Lens Cleaning Cartridge (for 85F0015) 85F0054
System-Board Memory-Module Kits
    1MB (85ns) (type 1 systems only)   90X8624
    2MB (85ns) (type 1 systems only)   92F0104
    2MB (70ns)                         92F0102
    2MB (80ns)                         92F0103
    4MB (70ns)                         92F0105
    4MB (80ns)                         87F9980
    8MB (70ns)                         64F3606
    8MB (80ns)                         64F3607
```

Keyboards/Mouse

```
 Belgian                                1392012
 Canadian French                        1392011
 Danish                                 1392005
 Dutch                                  1392013
 French                                 1392000
 German 1392001
 Italian                                1392002
 Norwegian                              1392007
 Portuguese                             1392008
 Spanish                                1392003
 Spanish/Latin                          1392015
 Swedish                                1392009
 Swiss/French/German                    1392010
 U.K. English                           1392004
 U.S. English                           1392090
 Cable                                  72X8537
 Mouse  61X8923
   Mouse Ball and Pop-Off Retainer      33F8461
   Mouse Ball and Twist-Off Retainer    33F8462
```

Tools and Miscellaneous

```
 Tri-Connector Wrap Plug                72X8546
 Wrap Plug
 (for 6157 Tape Attachment Adapter      59X4115
 Wrap Plug
 (for Token-Ring Network Adapter/A      6165899
 Wrap Plug (for Real-time 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)             6110464
```

8503 Monochrome Display (with tilt / swivel stand)

```
 110/120 Vac                            68X3045
 220/240 Vac (N Hemisphere)             68X3046
 220/240 Vac (S Hemisphere)             72X7878
 Tilt/Swivel Stand                      68X3061
```

8506 Monochrome Display (with tilt / swivel stand)
```
 110/120 or 220/240 Vac                      39F8087
 110/120 or 220/240 Vac (N Hemisphere)       39F8088
 110/120 or 220/240 Vac (S Hemisphere)       39F8089
```

8507 Monochrome Display (with tilt / swivel stand)
```
 110/120 or 220/240 Vac (Universal)          6247808
```

8508 Monochrome Display (with tilt / swivel stand)
```
 110/120 or 220/240 Vac                      6247838
 110/120 or 220/240 Vac (N Hemisphere)       39F8067
 110/120 or 220/240 Vac (S Hemisphere)       39F8068
```

8512 Color Display (without tilt / swivel stand)
```
 110/120 Vac                                 61X8924
 220/240 Vac (N Hemisphere)                  61X8928
 220/240 Vac (S Hemisphere)                  61X8927
 Tilt/Swivel Stand                           61X8925
```

8513 Color Display (with tilt / swivel stand)
```
 110/120 Vac                                 68X3088
 220/240 Vac (N Hemisphere)                  72X7870
 220/240 Vac (S Hemisphere)                  72X7877
 Tilt/Swivel Stand                           68X3061
```

8514 Color Display (without tilt / swivel stand)
```
 110/120 Vac                                 75X5945
 220/240 Vac (N Hemisphere)                  75X5946
 220/240 Vac (S Hemisphere)                  75X5947
 Tilt/Swivel Stand                           75X5907
```

8515 Color Display (with tilt / swivel stand)
```
 Model 001 (90/137 Vac (U.S. and Canada) with
  tilt / swivel and packaging set            38F3911
 Model 002 (90/265 Vac, Universal voltage) with
  tilt / swivel and packaging set            38F3912
 Model A01 (90 Vac) with
  tilt / swivel and packaging set            38F3913
 Shipping material:                          16F0188
    Box
    Front cushion
    Rear cushion
 Power cable, 1.8 (6 ft), U.S.               38F3968
```

Supplemental Parts Catalog:

```
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```