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## IBM 5162 and 5170 Service Summary

This summary contains a Symptom-to-FRU Part Index for FRU part isolation and a partial parts listing for these machine types.

This Service Summary card is not required to service the 5162 and 5170. It has been made available as a convenience to the servicer.

**Important:** 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.

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SA38-0035-00

SA38003500



## MAP 0100: General Checkout

001

- Check all cables and power cords.
- If you cannot load a diagnostic diskette, go to the Symptom Index.
- Load the advanced diagnostic diskette and check for the following responses:
  1. Memory test
  2. One or two short beeps
  3. First diagnostic menu.

Are all three responses correct?

Yes No

002

Go to the Symptom Index.

003

Is the installed devices list correct?

Yes No

004

Go to Installed Devices.

005

- Run the diagnostic tests.

Are the tests successful?

Yes No

006

Go to the Symptom Index.

007

You may have an intermittent problem.

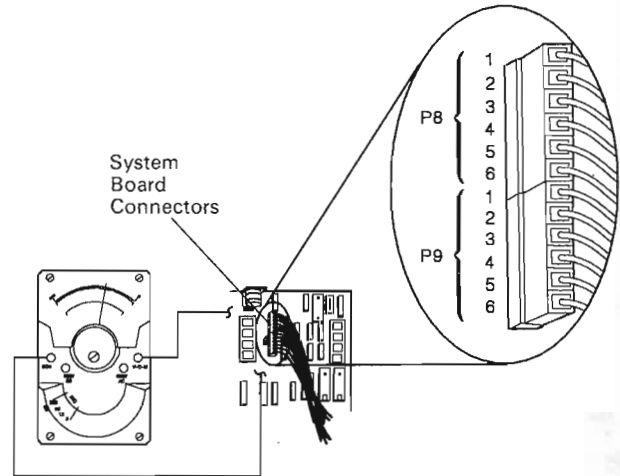
1. Check for damaged cables and connectors.
2. Reseat all adapters, drives, and modules.
3. Start an error log and run the tests multiple times.

### Undetermined Problem

1. Power off the system.
2. Remove or disconnect the following adapters and devices one at a time:
  - a. Non-IBM Devices
  - b. External Modem, Printer, or Mouse
  - c. Math Coprocessor
  - d. Any Adapter
  - e. Diskette Drive Cable
  - f. Fixed Disk Cable.
3. Power on the system.
4. Repeat the previous steps until you find the failing adapter or device.

If the power-on indicator for the display is not glowing, then replace the display. If the power supply fan is not running, then replace the power supply. If all adapters

and devices have been removed and the problem remains, check the power supply output voltages. If the output voltages are good, replace the system board.



LEX40177

Figure 1. System Power Supply

Voltage Connectors			
Min V DC	Max V DC	-Lead	+Lead
+4.8	+5.25	P8-5	P9-4
+4.6	+5.5	P9-3	P8-6
+11.5	+12.6	P9-1	P8-3
+10.9	+13.2	P8-4	P9-2

Figure 2. Correct Voltage at Connectors

### Memory Error Isolation

This hint is to help diagnose memory and/or parity check errors if memory bank and bit position are not found during either the power-on self test (POST) or memory diagnostics.

Read each step of the following instructions before beginning:

1. Set the system unit's power switch to off.
2. Remove all installed memory expansion adapters.
3. Set the system unit's power switch to on.
4. Do the Setup program.  
(Ensure that the memory size is correctly set.)
5. Repeat the diagnostic test that failed.

**Note:** If the diagnostic test passes on bare system memory configuration, you may have a memory failure on one of your memory expansion adapters.

6. Set the system unit's power switch to off.
7. Install one memory expansion adapter at a time to test.

**Note:** If you have a 128Kb Memory Expansion Adapter, install it first.

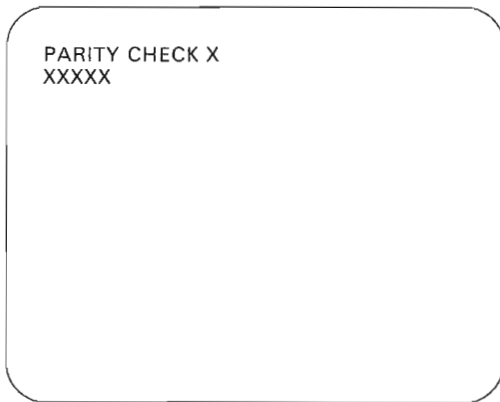
8. Set the system unit's power switch to on.
9. Do the Setup program. (Ensure that the memory size is correctly set.)
10. Repeat the diagnostic test that failed.

When a memory error is present and location cannot be isolated, it is best to break down the system's memory in sections to locate the most probable point of origin.

### Parity Checks

Parity check 1 indicates a system board parity error. Parity check 2 indicates a memory expansion adapter parity error.

If the memory test ended without returning a 10-character error message, the message may be a parity check message, as in Figure 3.



LEX40167

Figure 3. Parity Checks

### MAP 0110: Parity Check X (5-Character Code) 5170 AT Memory Errors

001

Is the first character of the error code a 0, 1, 2, or 3?  
Yes No

002

Is it 4 to 7?  
Yes No

003

(Step 003 continues)

003 (continued)

Is it 8 or 9?

Yes No

004

Go to "MAP 0120: Parity Check X (10-Character Code)."

005

Replace the 18 memory modules in the 128Kb Memory Expansion Adapter.

006

Replace bank 1.

007

Replace bank 0.

### MAP 0120: Parity Check X (10-Character Code)

001

Are the first 2 characters of the error code 01 to 07?

Yes No

002

Are they 08 or 09?

Yes No

003

See 5170 chapter in the *Personal Computer Family Service Information Manual*.

004

See Figure 5, 128Kb Memory Expansion Adapter

005

See Figure 4, System Board.

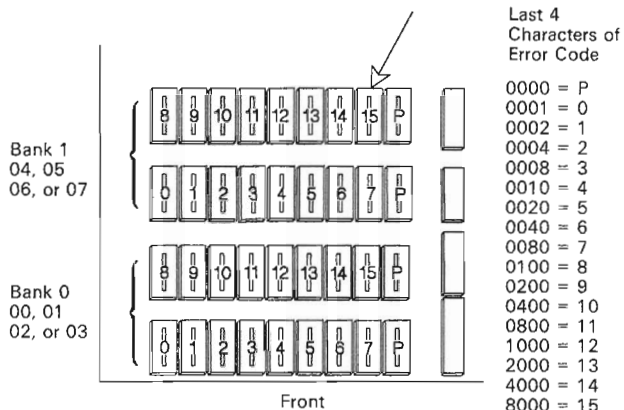


Figure 4. System Board (Top View)

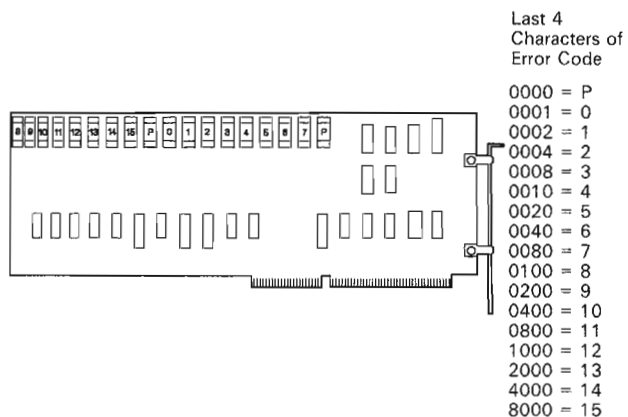


Figure 5. Failing Module Location

### MAP 0130: 5162 XT/286 Memory Errors

001

Are the first 2 characters of the error code 00 to 07?

Yes No

002

Are they 08 or 09?

Yes No

003

See Figure 8.

004

See Figure 7.

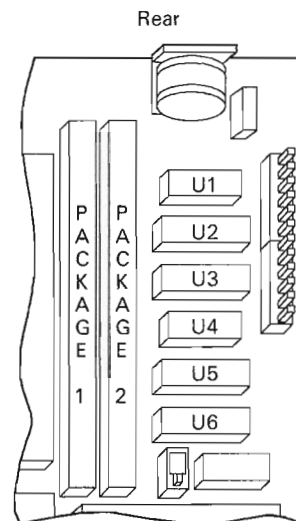
005

See Figure 6.

The last 4 characters of the error code (XXXXXX XXXX) indicate the failing memory module package.

- Refer to Figure 6 and find the failing memory module package identified by the error code.

Last 4 Characters of Error Code	Replace Memory Module Package
0000	1 & 2
XXXX	1 & 2
00XX	1
XX00	2



LEX43114

Figure 6. System Board Memory Module Package

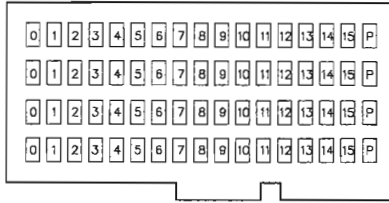
The first 2 characters of the error code (XXXXXX XXXX) indicate the bank with the failing memory module. The last 4 characters (XXXXXX XXXX) indicate the failing memory module.

- Refer to Figure 7 and find the failing memory module identified by the error code.

Last 4 Characters of Error Code
0000 = P
0001 = 0
0002 = 1
0004 = 2
0008 = 3
0010 = 4
0020 = 5
0040 = 6
0080 = 7
0100 = 8
0200 = 9
0400 = 10
0800 = 11
1000 = 12
2000 = 13
4000 = 14
8000 = 15

BANK

3  
2  
1  
0



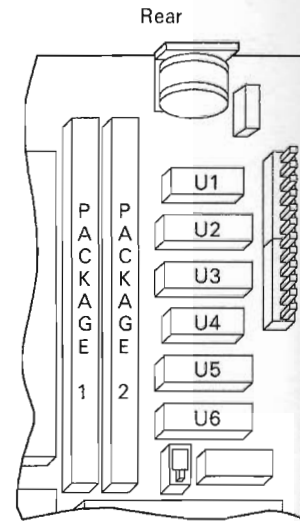
LEX43112

1st Two Digits of Error Code	Failing Bank	Switch Setting of Failing 512Kb/2Mb Option
10 11 12 13 14 15 16 17	0	12345678
18 19 1A 1B 1C 1D 1E 1F	1	↑↑↑↓↑↑↑↑
20 21 22 23 24 25 26 27	2	↑↑↑↓↑↑↑↑
28 29 2A 2B 2C 2D 2E 2F	3	↑↑↑↓↑↑↑↑
30 31 32 33 34 35 36 37	0	12345678
38 39 3A 3B 3C 3D 3E 3F	1	↑↑↑↓↑↑↑↑
40 41 42 43 44 45 46 47	2	↑↑↑↓↑↑↑↑
48 49 4A 4B 4C 4D 4E 4F	3	↑↑↑↓↑↑↑↑
50 51 52 53 54 55 56 57	0	12345678
58 59 5A 5B 5C 5D 5E 5F	1	↑↑↑↓↑↑↑↑
60 61 62 63 64 65 66 67	2	↑↑↑↓↑↑↑↑
68 69 6A 6B 6C 6D 6E 6F	3	↑↑↑↓↑↑↑↑
70 71 72 73 74 75 76 77	0	12345678
78 79 7A 7B 7C 7D 7E 7F	1	↑↑↑↓↑↑↑↑
80 81 82 83 84 85 86 87	2	↑↑↑↓↑↑↑↑
88 89 8A 8B 8C 8D 8E 8F	3	↑↑↑↓↑↑↑↑

LEX43116

Figure 7. Failing Module Location

Last 4 Characters of Error Code	Replace
0000 =	Module U1 & U4
000X =	Module U6
00X0 =	Module U5
0X00 =	Module U3
X000 =	Module U2



LEX43115

Figure 8. System Board Memory Module Package

### MAP 0140: Printer Isolation

001

Make sure the printer is properly connected and powered on.

Did the printer self test work correctly?

Yes No

002

Replace or repair the printer.

003

Did the parallel port pass the diagnostic test with the wrap plug installed?

Yes No

004

Replace the system board or parallel adapter.

005

Replace the printer cable, then replace or repair the printer.

## Installed Devices

If an adapter or device is missing from the installed devices list, replace that adapter or device.

If an adapter is shown on the installed devices list and is not present in the system, remove the adapter from the list. If the error remains, replace the system board.

## Symptom Index

The Symptom Index lists error symptoms and the causes that could be responsible. The most likely cause is listed first. Use this index to help you decide which FRUs you should have available when servicing the system.

**Important:** To determine what is actually failing, always begin with "MAP 0000: Start" in the appropriate *Hardware Maintenance Service* (HMS) manual, if you are using the advanced diagnostic diskette.

If the system displays an error message and gives an incorrect audio response, the most likely causes are those listed for the error message. An X in an error message can be any number.

Symptom/Error	Possible Causes
No beep or continuous beep or repeating short beep	<ul style="list-style-type: none"><li>• Power Supply</li><li>• System Board</li><li>• Diskette Drive*</li></ul> <p>* Defective options can create abnormal demands on the power supply or system board. Remove options and check for a change in symptom. Also check externally attached devices.</p>
1 long and 1 short beep	<ul style="list-style-type: none"><li>• System Board</li><li>• Power Supply</li></ul>
1 long and 2 short beeps	<ul style="list-style-type: none"><li>• Monochrome Display/Parallel Printer Adapter</li><li>• Color/Graphics Monitor Adapter</li><li>• System Board</li><li>• Power Supply</li></ul>
1 short beep and a blank or incorrect display	<ul style="list-style-type: none"><li>• Monochrome Display/Parallel Printer Adapter or</li><li>• Color/Graphics Monitor Adapter</li><li>• Power Supply</li></ul>

Symptom/Error	Possible Causes
5XX Display (Color/Graphics)	<ul style="list-style-type: none"> <li>• Color/Graphics Monitor Adapter</li> <li>• Light Pen (OEM)</li> </ul>
6XX Diskette	<ul style="list-style-type: none"> <li>• Diskette Drive</li> <li>• Diskette Drive Adapter</li> <li>• Diskette Signal Cable</li> <li>• System Board</li> <li>• Power Supply</li> </ul> <p><b>Note:</b> A 608 error message indicates a problem with your advanced diagnostic diskette. Use your backup advanced diagnostic diskette.</p>
7XX Math Coprocessor	<ul style="list-style-type: none"> <li>• Math Coprocessor</li> <li>• System Board</li> <li>• Power Supply</li> </ul>
9XX Serial/Parallel Adapter, Parallel Port	<ul style="list-style-type: none"> <li>• Serial/Parallel Adapter</li> <li>• System Board</li> <li>• Power Supply</li> </ul>
10XX Alternate Serial/Parallel Adapter, Parallel Port	<ul style="list-style-type: none"> <li>• Serial/Parallel Adapter</li> <li>• System Board</li> <li>• Power Supply</li> </ul>
11XX Serial/Parallel Adapter, Serial Port	<ul style="list-style-type: none"> <li>• Serial/Parallel Adapter</li> <li>• System Board</li> <li>• Power Supply</li> </ul>
12XX Alternate Serial/Parallel Adapter, Serial Port	<ul style="list-style-type: none"> <li>• Serial/Parallel Adapter</li> <li>• System Board</li> <li>• Power Supply</li> </ul>
130X Game Control	<ul style="list-style-type: none"> <li>• Game Control Adapter</li> <li>• System Board</li> <li>• Power Supply</li> </ul> <p><b>Note:</b> Customer joysticks may be defective.</p>
140X Printer	<ul style="list-style-type: none"> <li>• Parallel Printer Adapter or Monochrome Display/Parallel Printer Adapter (whichever adapter printer is connected to)</li> <li>• Printer Attachment Cable</li> <li>• System Board</li> <li>• Power Supply</li> </ul>

Symptom/Error	Possible Causes
1 short beep and Personal Computer BASIC statement	<ul style="list-style-type: none"> <li>• Diskette Drive</li> <li>• Diskette Signal Cable</li> <li>• Diskette Drive Adapter</li> <li>• System Board</li> <li>• Power Supply</li> </ul>
02X Power	<ul style="list-style-type: none"> <li>• Power Supply</li> <li>• Diskette Drive*</li> <li>• System Board</li> <li>• Diskette Signal Cable</li> </ul> <p>* Defective options can create abnormal demands on the power supply or system board. Remove options and check for a change in symptom. Also check externally attached devices.</p>
1XX or 01XX System Board	<ul style="list-style-type: none"> <li>• System Board</li> <li>• Battery</li> </ul> <p><b>Note:</b> Error message 16X does not mean a hardware failure exists. It means something is wrong with the system unit configuration. Verify that switch settings match installed devices.</p>
20X or XXXXXX XXXXXX XXXX 20X	<ul style="list-style-type: none"> <li>• Memory Module (decode error message for exact location)</li> <li>• System Board</li> <li>• 128Kb Memory Option</li> <li>• 512Kb Memory Option</li> </ul> <p><b>Note:</b> Verify system board switch settings for correct memory size.</p>
30X or XX301 Keyboard	<ul style="list-style-type: none"> <li>• Keyboard</li> <li>• Keyboard Interface Cable</li> <li>• Keyboard Enhancement Card or Cable.</li> </ul>
4XX Display (Monochrome)	<ul style="list-style-type: none"> <li>• Monochrome Display/Parallel Printer Adapter</li> <li>• System Board</li> <li>• Power Supply</li> </ul>

Symptom/Error	Possible Causes
15XX SDLC Communications Adapter	<ul style="list-style-type: none"> <li>• SDLC Communications Adapter</li> <li>• IBM Communications Adapter Cable</li> <li>• Power Supply</li> <li>• System Board</li> </ul> <p><b>Note:</b> SDLC card uses 12V. Check for 12V DC at the power supply.</p>
17XX Fixed Disk Drive	<ul style="list-style-type: none"> <li>• Fixed Disk Drive</li> <li>• Fixed Disk Drive Adapter</li> <li>• Fixed Disk Cable</li> <li>• Power Supply</li> <li>• Expansion Unit Board</li> </ul>
20XX Binary Synchronous Communications Adapter (BSC)	<ul style="list-style-type: none"> <li>• BSC Communications Adapter</li> <li>• IBM Communications Adapter Cable</li> <li>• Power Supply</li> <li>• System Board</li> </ul> <p><b>Note:</b> BSC card uses 12V. Check for 12V DC at the power supply.</p>
21XX Alternate Binary Synchronous Communications Adapter (BSC)	<ul style="list-style-type: none"> <li>• BSC Communications Adapter</li> <li>• IBM Communications Adapter Cable</li> <li>• Power Supply</li> <li>• System Board</li> </ul> <p><b>Note:</b> BSC card uses 12V. Check for 12V DC at the power supply.</p>
22XX Cluster Adapter	<ul style="list-style-type: none"> <li>• Cluster Adapter</li> <li>• System Board</li> <li>• Power Supply</li> </ul> <p><b>Note:</b> Cluster adapter card uses +5V DC at the power supply.</p>
23XX Plasma Monitor Adapter	<ul style="list-style-type: none"> <li>• Plasma Monitor Adapter</li> </ul>
24XX Enhanced Graphics Adapter	<ul style="list-style-type: none"> <li>• Enhanced Graphics Adapter</li> <li>• System Board</li> </ul>

Symptom/Error	Possible Causes
2601 to 2699 2720 to 2798 2799	<ul style="list-style-type: none"> <li>• PC/370-M2 Card (Memory Card)</li> <li>• PC/370-P2 Card (Processor Card)</li> <li>• Diskette Error</li> </ul>
28XX 3278/79 Emulation	<ul style="list-style-type: none"> <li>• 3278/79 Emulation Card</li> <li>• DFCA Card</li> </ul>
29XX Color Printer	<ul style="list-style-type: none"> <li>• Parallel Printer Adapter or Monochrome Display/Parallel Printer Adapter (whichever adapter printer is connected to)</li> <li>• Printer Attachment Cable</li> <li>• System Board</li> <li>• Power Supply</li> </ul>
30XX Network Adapter	<ul style="list-style-type: none"> <li>• Network Adapter</li> <li>• System Board</li> <li>• Network Translator</li> <li>• Power Supply</li> </ul>
31XX Alternate Network Adapter	<ul style="list-style-type: none"> <li>• Network Adapter</li> <li>• System Board</li> <li>• Network Translator</li> <li>• Power Supply</li> <li>• Coaxial Cable</li> </ul>
32XX Display Adapter Card	<ul style="list-style-type: none"> <li>• Display Adapter Card</li> <li>• Programmed Symbols Adapter Card</li> <li>• All-Points-Addressable Adapter Card</li> <li>• Extended Graphics Adapter Card</li> <li>• Top Card Connector</li> </ul>
All other 35XX numbers except 3500	<ul style="list-style-type: none"> <li>• Adapter</li> </ul>
3504	<ul style="list-style-type: none"> <li>• Adapter connected on the twinaxial cable during offline test</li> <li>• Adapter</li> </ul>
3508	<ul style="list-style-type: none"> <li>• Work station address in use by another work station</li> <li>• Diagnostic diskette from another IBM PC was used</li> <li>• Adapter</li> </ul>



Symptom/Error	Possible Causes
3509, 3599	<ul style="list-style-type: none"> <li>Diagnostic program failing (recreate adapter integrated diagnostic diskette on blank diskette).</li> </ul>
3540	<ul style="list-style-type: none"> <li>Work station address invalid, not configured at the controller</li> <li>Twinaxial cable not connected, or is failing</li> <li>Diagnostic diskette from another IBM PC was used</li> <li>Adapter</li> </ul>
3588 Enhanced Display Station Emulation Adapter	<ul style="list-style-type: none"> <li>Feature not installed</li> <li>Device I/O address switches set incorrectly</li> <li>Adapter</li> </ul>
36XX GPIB Adapter (General Purpose Interface Bus)	<ul style="list-style-type: none"> <li>GPIB Adapter</li> <li>System Board</li> </ul>
38XX Data Acquisition	<ul style="list-style-type: none"> <li>Data Acquisition and Control Adapter</li> <li>System Board</li> </ul>
39XX Professional Graphics Controller	<ul style="list-style-type: none"> <li>Professional Graphics Adapter</li> <li>System Board</li> </ul>
44XX Display Attachment Unit	<ul style="list-style-type: none"> <li>5278 Display Attachment Unit and 5279 Display</li> <li>5378 Display Attachment Unit and 5379 Display</li> </ul>
(3270 PC/G and GX AT® Based)	<ul style="list-style-type: none"> <li>Display/Mouse/Tablet Adapter Card</li> <li>EMA Extended Memory Adapter Card</li> </ul>
45XX IEEE Interface Adapter Card	<ul style="list-style-type: none"> <li>IEEE Interface Adapter Card (IEEE-488)</li> </ul>
56XX Financial Communication System	<ul style="list-style-type: none"> <li>FCS Input Option</li> <li>FCS Output Option</li> <li>FCS Security Option</li> </ul>
71XX Voice Communication Adapter	<ul style="list-style-type: none"> <li>Voice Communication Adapter</li> <li>Voice Communication Cable</li> <li>System Board</li> <li>Power Supply</li> </ul>
7601	<ul style="list-style-type: none"> <li>Personal Pageprinter Adapter</li> </ul>

Symptom/Error	Possible Causes
7602	<ul style="list-style-type: none"> <li>Personal Pageprinter Adapter</li> </ul>
7603	<ul style="list-style-type: none"> <li>Personal Pageprinter</li> </ul>
7604	<ul style="list-style-type: none"> <li>Personal Pageprinter Cable</li> </ul>
7801	<ul style="list-style-type: none"> <li>High Speed Adapter</li> </ul>
7901	<ul style="list-style-type: none"> <li>3117 Scanner Adapter</li> </ul>
790X	<ul style="list-style-type: none"> <li>See 3117 HMS</li> </ul>
166XX Primary Token-Ring Network PC Adapter	<ul style="list-style-type: none"> <li>16600 indicates good primary adapter</li> <li>Other codes indicate failure</li> </ul>
167XX Alternate Primary Token-Ring Network PC Adapter	<ul style="list-style-type: none"> <li>16700 indicates good alternate adapter</li> <li>Other codes indicate failure</li> </ul>

## 5170 AT® Parts

### System Unit

#### System Board – See Figure 9

128Kb RAM Module	8286139
256Kb RAM Module	6480008
Battery	8286121
Power Supply	8286122

### Keyboards

Keyboard Assembly USA (84 key)	8286165
Keypad Assembly USA (84 key)	8286140
Keyboard Assembly USA (101/102 key)	6447033
Keypad Assembly USA (101/102 key)	6447039

### Diskettes

High-Capacity Diskette Drive	8286130
Double-Sided Diskette Drive	8286131

### Fixed Disk

20Mb Fixed Disk Drive	6278099
30Mb Fixed Disk Drive	8286216

## Options and Adapters

128Kb Memory Expansion Adapter	8286116
64Kb Memory Module	59X7317
128Kb/640Kb Memory Expansion Adapter	6279116
64Kb Memory Module	59X7317
256Kb RAM Module	6480008
512Kb Memory Expansion Adapter	8286115
128Kb RAM Module	8286139
512Kb/2Mb Memory Expansion Adapter	59X7294
256Kb RAM Module	6480008
Fixed Disk Drive and Drive Adapter	8286125
Enhanced Graphics Adapter	8654215
Monochrome Display and Printer Adapter	8529148

## 5162 XT/286 Parts

### System Unit

System Board	62X1025
256Kb Memory Module Package	62X1035
64Kb x 4 Memory Modules	62X1026
Power Supply	62X1034
Battery	72X8498
Parity Module	6480008

### Keyboard

Keyboard USA (101/102 key)	6447033
Cable Assembly (External)	6447051
Keypad USA (101/102 key)	6447039

### Diskette Drive

1.2Mb Diskette Drive, Half-High	62X1028
360Kb Diskette Drive, Half-High	62X1036
720Kb Diskette Drive, 3.5-inch	6820821

### Fixed Disk Drive

20Mb Fixed disk drive	62X1031
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## Options and Adapters

128Kb Memory Expansion Adapter	8286116
64Kb Memory Module	59X7317
128Kb/640Kb Memory Expansion Adapter	6279116
64Kb Memory Module	59X7317
256Kb RAM Module	6480008
512Kb Memory Expansion Adapter	8286115
128Kb RAM Module	8286139
512Kb/2Mb Memory Expansion Adapter	59X7294
256Kb RAM Module	6480008
Fixed Disk and Drive Adapter	62X1032

## Printers

4201 Proprinter	6412641
5152 Matrix Printer	8529246
5182 Color Printer	6323469

## Displays

5151 Monochrome Display	8529171
5153 Color Display	8529227
5154 Enhanced Color Display	6321035
5175 Professional Graphics Display	6181764
5272 Color Display	6931932

The following is a cross-reference that will also assist in identifying the correct replacement system board for the base models of the Personal Computer AT® (5170). The base models are 068, 099, 239, 319, and 339.

Any numbers other than the ones listed above on BIOS modules in a Personal Computer AT are for the Model 239.

The BIOS module sockets are located in positions U17, U27, U37, and U47 on the system board. If the system board has four BIOS modules, all sockets will be filled, but if there are only two BIOS modules, they will be located in positions U27 and U47.

Serial No. Range	FRU No.	Model	BIOS Part No.
0000001-5999999	8286112	068/099	6181028, 6181029, 1503107, 1503108, 1503109, 1503110, 6180957, 6180958, 6180959, 6180960, 6181024, 6181025, 6181026, 6181027,
6000000-6999999	6480170 6480072	239 239	6480090, 6480091, 6448894, 6448895, 6480090, 6480091,
7000000-7999999	6489922	319/339	61X9265, 61X9266, 61X0820, 61X0821,

Figure 9. 5170 System Board Part Number Identification Chart