ZENITH
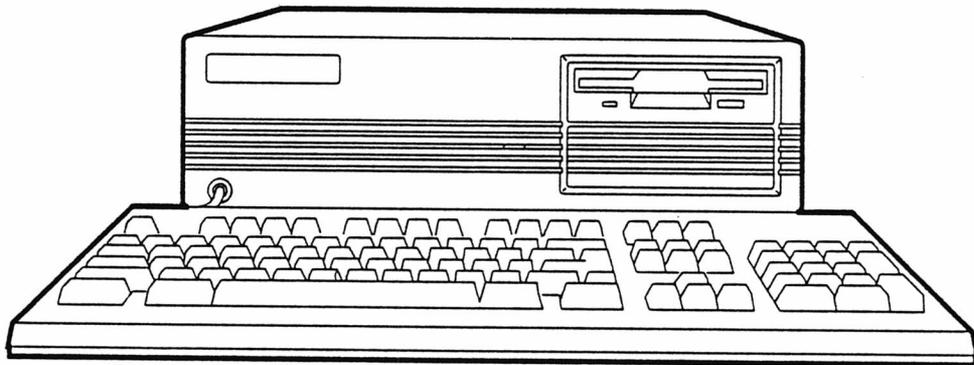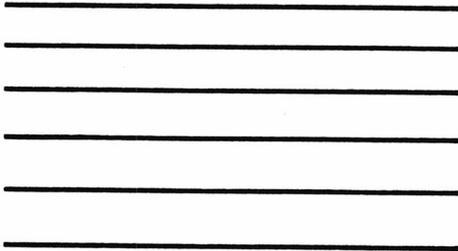data systems
Groupe Bull

Z - 286 LP Plus
and
Z - 316 SX/LP
Computers

Service Manual

860-237   585-336-01

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Contents

Product Description

This service manual covers two computer models:

- *Z - 286 LP Plus* — An 80286 - based computer which can be upgraded with an 80386 SX processor.
- *Z - 316SX/LP* — An 80386 SX - based computer.

Both computer models provide AT-compatible computing power in a low-profile footprint. Each computer is shipped with up to 2M (megabytes) of memory and supports up to 8M of memory.

Related Materials

- Owner's Manuals:
  Z-286 LP Plus — Part number 595-4351
  Z-316SX/LP — Part number 595-5031
- Disk-Based Diagnostics:
  Z-286 LP Plus — Part number CB-31-07
  Z-316SX/LP — Part number CB-31-09

Tools

Use the following tools to install, repair, and maintain this computer:

- Small flat-bladed screwdriver
- #1 phillips screwdriver
- Voltmeter
- 5 mm nutdriver.

Safety Precautions

To avoid potential shock or personal injury, use the following precautions when servicing this computer:

- Verify the correct line voltage selection.
- Use a grounded AC power source.
- Disconnect AC power before opening the cabinet.
- Avoid power-ground shorts.

Base Computer

As shipped from the factory, this computer consists of several major assemblies. These include the main board, a processor module, a floppy disk drive, a hard disk drive, and a power supply.

Main Board

The main board contains most of the computer's control circuitry, including the address, data and system busses, memory, DMA, and I/O circuits. This board also contains the parallel output port, both of the serial ports, and the module connector for the CPU and coprocessor module. Finally, this board also contains a VGA controller, floppy disk drive controller, and decoder circuitry for the hard disk drive.

System RAM — The base computer has at least 2M of RAM expandable to 8M.

Optional RAM — Eight sockets on the main board provide for up to 8M of expansion memory. Because the data bus is 16 bits wide, SIMMs must be added in pairs. Any optional memory can be configured as extended or EMS memory.

System ROM — ROM data is 16 bits wide. The BIOS code and MFM-200 Monitor program are integrated and stored on two ROM ICs. The ROM is used for bootup, configuration, password setup, and self-testing.

Serial Ports — Two RS-232C serial ports are supplied with DB-9 connectors. They are configured as COM1, COM2.

Parallel Port — One 25 pin Centronics-type parallel port is supplied. It can be configured as LPT1, LPT2, or LPT3.

Video — A video controller and pallet IC on the main board provide analog RGB signals to a DB-15 connector on the back panel. The supported output is 31 kHz VGA with resolutions up to 640 x 480. A features connector is provided on the main board to allow other video boards to share the pallet IC and video connector. There is 256K of video RAM.

Floppy Drive Controller — The drive controller supports up to two floppy disk drives, including one external floppy drive. The supported variations are as follows:

1. Internal floppy disk drive

    - 3.5-inch, 720K
    - 3.5-inch, 1.4M.

2. External floppy disk drive

    - 3.5-inch, 720K
    - 3.5-inch, 1.4M
    - 5.25-inch, 360K
    - 5.25-inch, 1.2M.

Hard Disk Drives — The main board supplies the address decoding and control signals for the IDE hard disk drive. The controller circuitry for the hard drive is part of the hard drive unit. No support is provided for an external hard disk drive.

The computer is factory-equipped with a 20M or 40M hard disk drive, depending on the computer model.

Processor Modules

Depending on the computer model, the standard processor module may contain an 80286 central processing unit and a socket for an optional 80287 coprocessor, or an 80386SX central processing unit and a socket for an optional 80387SX coprocessor.

Backplane

The backplane board provides three AT-compatible expansion slots. There are no active components on this board. The lower slot will only accept a half-length circuit card, while the upper two slots will accept full-length circuit cards.

Keyboard Interface Board

The keyboard interface board attaches to the front of the main board and supplies the connector for the keyboard cable.

Power Supply

⚠ **Caution:** The power supply contains no serviceable parts. To avoid component damage or possible personal injury, do not attempt to disassemble or repair the unit.

The power supply provides 80 watts of power in the following voltages:

- +5VDC @ 10A
- +12VDC @ 2.1A
- -12VDC @ 0.2A.

These outputs are electrically isolated from the main voltage and share the cabinet as the common ground. The input voltage automatically switches between 115 and 230 VAC.

Keyboard

The computer comes with a 101-key AT-compatible keyboard.

Optional Hardware

Options for the Z - 286 LP Plus include:

- 2M memory upgrade
- 80287 numeric coprocessor
- 80386SX processor module upgrade
- External floppy disk drive interface card
- External floppy disk drives.

Options for the Z -316 SX/LP include:

- 2M memory upgrade
- 80387SX numeric coprocessor
- External floppy disk drive interface card
- External floppy disk drives.

Operation

Notice: Do not apply power to the computer if the peripherals are connected and turned on. This may cause a "Keyboard not responding" error message. Turn off the peripherals, then power up the computer and monitor first.

Power Up

Turn on the computer using the power switch located on the right side.

When power is applied:

- The power LED glows green.

- The power supply and fan starts.

- The keyboard resets (status LEDs blink), NUMLOCK indicator remains lit.

- Disk drives initialize (floppy indicator blinks; power LED changes to yellow during hard disk drive activity).

- Internal power-up self-tests complete.

- A blinking cursor appears on the display.

- The operating system loads from the hard disk drive or the floppy disk drive (autoboot option configured).

If the operating system is not installed, or is not present on the disk, one of the following messages appears:

```
+++ DISK ERROR: Drive not ready! +++
+++ DISK ERROR: No bootable partitions! +++
No system
No bootable partitions
```

Refer to the operating system documentation for installation instructions.

If the computer detects faults during the power-up sequence, error messages appear on the display (if the computer can drive the display). Refer to "Power-Up and Error Messages" in Chapter 4.

Resetting the Computer

Two methods are used to reset the computer: a hard reset, or a soft reset. A hard reset occurs whenever the computer is turned on. To accomplish a hard reset:

Turn off the computer, wait 15 seconds, then turn it back on. All circuits are reset to the power-on state.

A soft reset is usually initiated from the keyboard and only resets a portion of the system. Use one of the following methods to accomplish a soft reset:

1. Press and hold the CTRL, ALT, and DEL keys, then release them. This resets the CPU, reinitializes the computer, and initiates the autoboot sequence.

2. Press and hold the CTRL, ALT, and INS keys, then release them. This resets the CPU, reinitializes the computer, and enters the Monitor program.

The Monitor Program

The MFM-200 Monitor program contains:

*   Power-up tests to detect problems that would prevent additional tests from running, or an operating system from loading.

*   The boot command to load the operating system.

*   User-selectable tests to check the disk drives, keyboard, and memory.

*   Video commands to display a color bar or set video and scroll modes.

*   Programming commands.

*   The Setup/Configuration program to store hardware configuration information.

Entering the Monitor Program

There are two ways to enter the program:

CTRL-ALT-INS — Press and hold the CTRL, ALT, and INS keys, then release them. A message similar to the following appears:

```
MFM-200 Monitor, Version x.x
Memory size: xxxK + xxxxK
Enter "?" for help
->_
```

The first line indicates the ROM version. The second line indicates how much memory is installed, including base and extended memory. The third line gives the syntax for the help command.

CTRL-ALT-ENTER — If the CTRL-ALT-INS key combination does not force the computer to enter the Monitor program, press and hold the CTRL, ALT, and ENTER keys, then release them. The CPU register contents are displayed on the screen, followed by the Monitor prompt. This key combination does not reset the CPU or memory. The program that was interrupted can be reentered by pressing G then ENTER.

Note: In some cases, the CPU locks up, preventing access by either method. If this happens, turn off the computer, wait 15 seconds, then turn it back on. This clears the CPU and allows you to use the CTRL-ALT-INS key combination.

Figure 2-1. Monitor Command Summary

```
- MFM-200 Command Summary -
```

CMD:	Explanation	Syntax
?:	Help	?
B:	Boot from disk	B [{F¦W}][{0¦1¦2¦3}][:<partition>]
C:	Color bar	C
D:	Display memory	D [<range>]
E:	Examine memory	E <addr>
F:	Fill memory	F <range>,{<byte>¦"<string>"}...
G:	Execute (Go)	G [=<addr>][,<breakpoint>]...
H:	Hex math	H <number1>,<number2>
I:	Input from port	I <port>
M:	Move memory block	M <range>,<dest>
O:	Output to port	O <port>,<value>
R:	Examine Registers	R [<register>]
S:	Search memory	S <range>,{<byte>¦"<string>"}...
T:	Trace program	T [<count>]
U:	Unassemble program	U [<range>]
V:	Set Video/Scroll	V [M<mode>][S<scroll>]
	Where <range> is:	<addr>{,<addr>¦L<length>}
TEST:	Extended diagnostics	TEST
SETUP:	Define hardware Setup	SETUP

```
->
```

Boot Command

The boot process loads the operating system from a disk into computer memory. The command syntax is:

B[{F|W}][{0|1}][:<partition>]

Enter BF (boot from floppy) or BW (boot from winchester) to boot a specific drive. If more than one floppy drive is installed, add the drive number (0 or 1) as required. This computer supports up to four partitions per hard disk drive. If more than one partition exists on the hard drive, specify partition number (1 to 4). Refer to the operating system documentation for additional information.

Error messages appear if you attempt to boot from a non-existent drive. To correct this, access the Monitor program and enter the correct boot command. For more information about error messages, refer to "Power-Up and Error Messages" in Chapter 4.

Video Commands

The video commands are used to display a color bar pattern or set the video and scroll modes.

Color Bar Command

This command displays a series of colors in the form of a bar graph. On a monochrome monitor, the bars appear as a gray scale. This command is useful for adjusting the brightness and contrast of the video monitor.

To view the color bars:

1. Type C.

2. Press ENTER.

Video Modes

The different video modes determine the number of pixels to produce on the screen. The pixel resolution determines the sharpness, character definition, number of lines, and number of colors in the display.

Application programs can change resolutions to provide different display characteristics. Table 2-1 lists the video modes.

Table 2-1. *Video Modes*

MODE NUMBER	DISPLAYABLE COLORS	RESOLUTION
0	16	40 x 25 text, 320 x 200 pixels
01	16	40 x 25 text, 320 x 350 pixels
02	16	40 x 25 text, 360 x 400 pixels
1	16	40 x 25 text, 320 x 200 pixels
11	16	40 x 25 text, 320 x 350 pixels
12	16	40 x 25 text, 360 x 400 pixels
2	16	80 x 25 text, 640 x 200 pixels
21	16	80 x 25 text, 640 x 350 pixels
22	16	80 x 25 text, 720 x 400 pixels
3	16	80 x 25 text, 640 x 200 pixels
31	16	80 x 25 text, 640 x 350 pixels
32	16	80 x 25 text, 720 x 400 pixels
4	4	40 x 25 text, 320 x 200 graphics
5	4	40 x 25 text, 320 x 200 graphics
6	2	80 x 25 text, 640 x 200 graphics
7	4 (monochrome)	80 x 25 text, 720 x 350 graphics
72	4 (monochrome)	80 x 25 text, 720 x 400 graphics
D	16	40 x 25 text, 320 x 200 graphics
E	16	80 x 25 text, 640 x 200 graphics
F	4 (monochrome)	80 x 25 text, 640 x 350 graphics
10	4 or 16	80 x 25 text, 640 x 350 graphics
11	2 (monochrome)	640 x 480 VGA
12	256	640 x 480 VGA
13	256	320 x 200 VGA

Scroll Modes

Scroll modes determine how information scrolls on the screen. Three modes are available:

- S0 (Software Scroll Mode) is used by PC-compatible software. This mode is available in all video modes. The display scrolls in single-line increments.

- S1 (Hardware Jump Scroll Mode) is not compatible with all applications software. Mode S1 is used with video modes 3 through 6 to provide a faster scroll rate than mode S0. The display scrolls in single-line increments.

- S2 (Smooth Scroll Mode) is only used with video mode 6. The display scrolls in smaller increments to provide a smoother appearance.

ROM-Based Tests

The Monitor program contains five tests. To access the test menu, type TEST at the Monitor prompt and press ENTER. The following menu appears:

```
CHOOSE ONE OF THE FOLLOWING:

1.      DISK READ TEST
2.      KEYBOARD TEST
3.      BASE MEMORY TEST
4.      EXTENDED MEMORY TEST
5.      POWER-UP TEST
6.      EXIT

ENTER YOUR CHOICE:
```

To run a test, type the number that corresponds to the test. With the exception of the keyboard test, each test continues to run until an error is detected or the test is halted.

To stop a test, press the ESC key once. Press the ESC key a second time to return to the test menu. There you can select another test or select EXIT to return to the Monitor prompt.

All tests, except for the keyboard test, display a test count similar to the following:

```
SAMPLE TEST
    TEST COUNT = x
TYPE <ESC> TO ABORT
```

If an error is detected during the test, information about the error appears on the display.

Disk Read Test — This test continuously reads the first sector of track 0 on the test drive. To change the test drive, manually boot from the drive you want to test. (It is not necessary for the boot operation to actually load the operating system.) To run the test, you must have a formatted disk in the drive.

Successful completion of this test indicates only that the drive can read from the disk. If the computer still fails to boot, problems could exist with memory or related control circuits.

Keyboard Test — This test checks the operation of most keys on the keyboard. Valid entries display an ASCII character or symbol and a key scan code each time a key is pressed. The following keys cannot be tested:

- PRINT SCREEN
- SCROLL LOCK
- PAUSE
- CAPS LOCK
- SHIFT
- CTRL
- ALT
- NUM LOCK
- ESC.

Base Memory Test — This test performs a fast march algorithm on all memory in the first megabyte of the system memory map, including video memory.

While the test is running, a clicking sound can be heard. When the test reaches the video memory area, the screen displays a series of moving patterns.

Extended Memory Test — This test performs the same fast march algorithm on all installed memory above the 1 megabyte base memory area. Since no video memory exists in this area, no patterns appear.

Power-Up Test — This test continuously repeats the power-up tests used during startup. This test checks the following:

- CPU — The CPU test fills all registers (except CS, IP, SS, and SP) with zeroes and ones, sets and clears the flag bits, tests conditional jump operations, and tests the ALU (arithmetic/logic unit).

- ROM — The ROM test generates a checksum for the ROM which is compared with the actual ROM checksum (last two bytes in the ROM).

- Timer 1 interrupt — The timer test initializes the real-time clock and verifies accuracy to within ± 10%.

Disassembly & Options

The first part of this chapter contains step-by-step instructions for computer disassembly. For reassembly, perform the steps in the reverse order unless instructed otherwise. Read each section completely before disassembling the computer.

The second part of this chapter describes installation of various computer upgrades.

Static Precautions

To prevent component damage from static discharges, use the following precautions during disassembly, hardware installation, and reassembly.

- Do not remove any static-sensitive device from its protective packaging until you are ready to install it.

- Equalize the static electricity between the work surface, the device, and you by touching the work surface with one hand and then picking up the device with the other hand.

- Once you remove the device from its protective packaging, do not set it down or let go of it until it is either installed in the computer or returned to its protective packaging.

Removing the Cover

1. Turn on the computer. Place a shipping insert (or a scratch disk) in the floppy drive(s).

⚠️ **Caution:** Avoid shock hazard. Unplug the computer and disconnect the line cord before beginning disassembly.

2. Turn off the computer and unplug it.

3. Disconnect the keyboard, video monitor, and all other peripherals from the computer.

4. Refer to Figure 3-1 and unlock the cover.

Figure 3-1. Unlocking the Cover

SECURITY BRACKET

UNLOCK
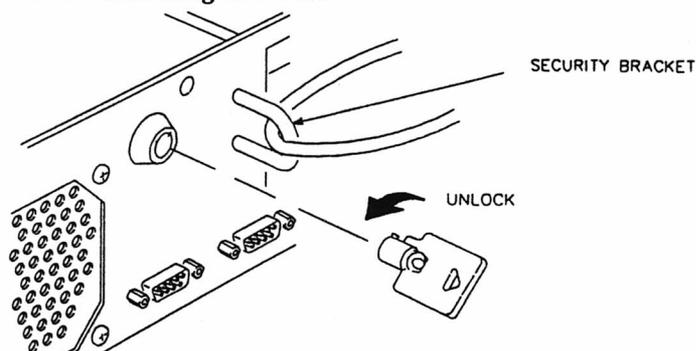
5. Refer to Figure 3-2 and remove the screws that secure the cover to the computer. Save the screws.

Figure 3-2. Removing the Cover

POWER SWITCH BRACKET

SCREWS

SCREWS

SCREWS

SUPPORT FLANGE
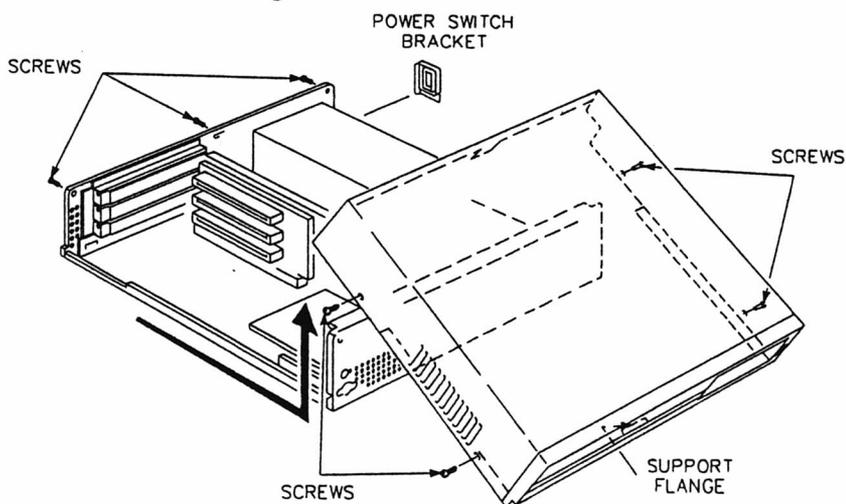
6. Remove the cover by sliding it toward the front of the computer. Support the cover as you slide it off to avoid contact with circuit cards or cables.

Removing the Battery

Notice: This procedure deletes all configuration information stored in the CMOS RAM. Note the current setup information before removing the battery so you can reenter the correct information after reassembly.

⚠ **Caution:** The battery may contain lithium. To prevent explosion hazards, avoid shorting the battery, and do not crush, incinerate, or attempt to recharge it. Use the disposal procedure described below.

The battery package is mounted on the speaker bracket attached to the center support of the chassis, as shown in Figure 3-3. The battery connects to the main board at P513.

Figure 3-3. *Removing the Battery*
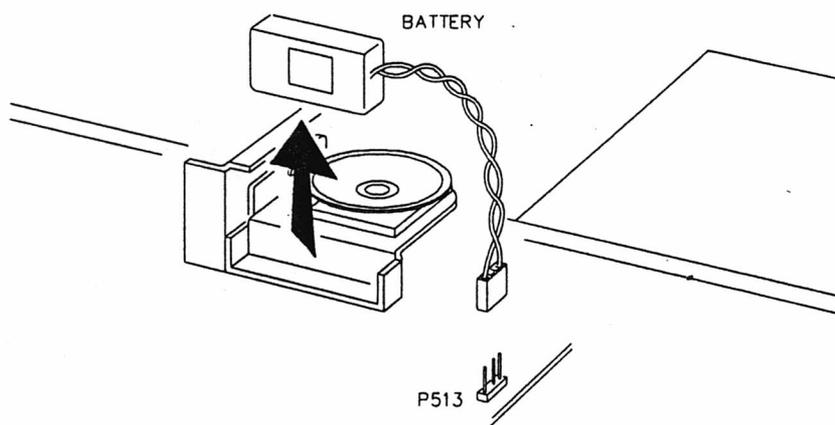
1. Remove the cover as described earlier.

2. Disconnect the battery leads at P513.

Disposing of the Battery

⚠ **Caution:** Your battery may contain lithium. To prevent explosion hazards, avoid shorting the battery, and do not crush, incinerate, or attempt to recharge it.

1. Clip all exposed battery leads. Do not short the battery!

2. Wrap the battery in insulating tape to prevent accidental shorting.

3. Pack the battery so it cannot be crushed.

4. Dispose of the battery according to prevailing regulations.

Removing a Circuit Card

Notice: Observe static precautions.

1. Remove the cover as described earlier.

2. Remove any cables attached to the card. Note their location and orientation.

3. Refer to Figure 3-4 and remove the screw that secures the circuit card to the computer chassis. Save the screw. Grasp the card and pull it out of the connector.

4. Place the card in protective packaging.

Figure 3-4. *Removing a Circuit Card*
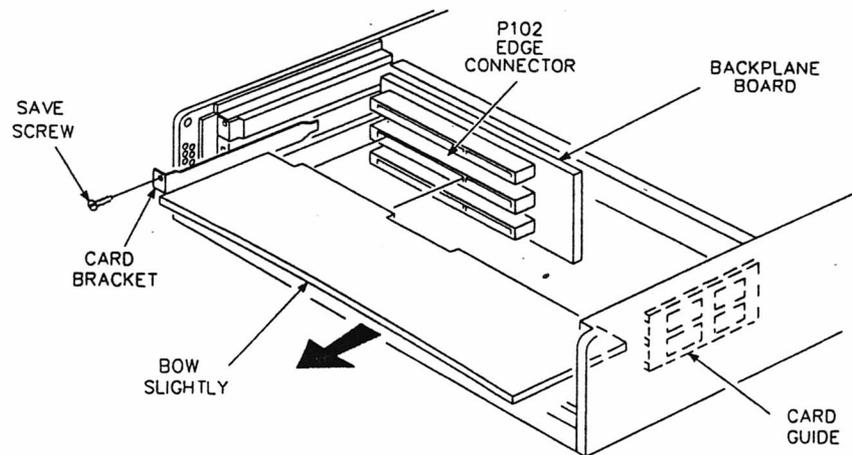
Removing the Keyboard Interface Board

1. Remove the cover as described earlier in this chapter.

2. Refer to Figure 3-5 and remove the screw that secures the keyboard interface board bracket to the front corner of the main circuit board.

Figure 3-5. *Removing the Keyboard Interface Board*
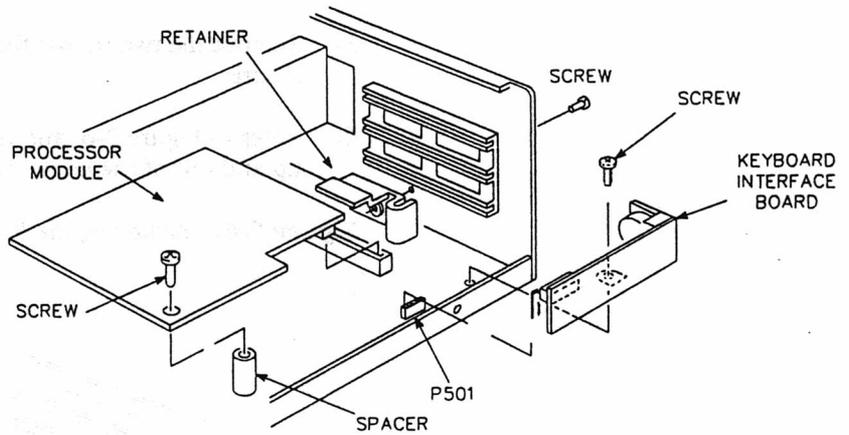
3. Disconnect the keyboard interface board from the main board at P501. Remove the keyboard interface board and set it aside.

Removing the Backplane Board

Notice: Observe static precautions.

1. Remove the cover as described earlier in this chapter.

2. Remove any circuit cards installed in the backplane board. Save these cards and reinstall them when you finish servicing the computer.

3. Remove the two screws that secure the backplane board to the chassis.

4. Refer to Figure 3-6, and remove the backplane board by pulling it up and out of the edge connectors on the main board.

Figure 3-6. *Removing the Backplane Board*
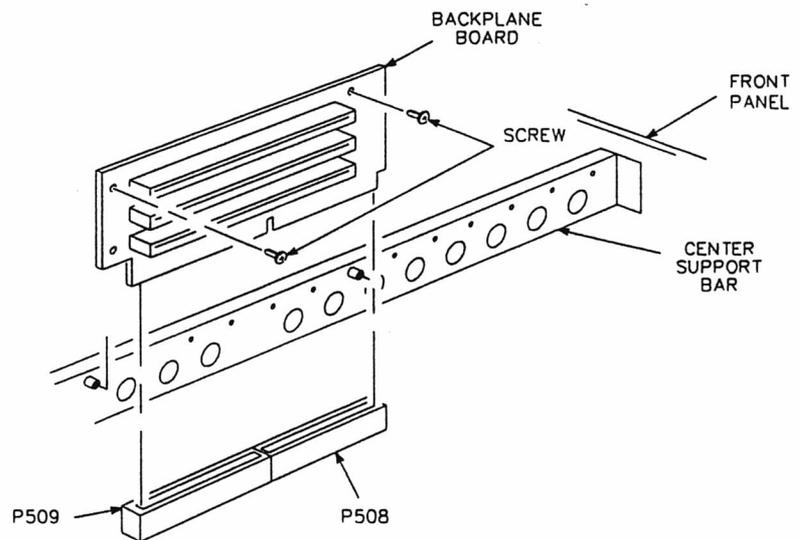
Removing the Processor Module

Notice: Observe static precautions.

1. Remove the cover as described earlier in this chapter.

2. Refer to Figure 3-7 and locate the processor module.

Figure 3-7. *Processor Module*
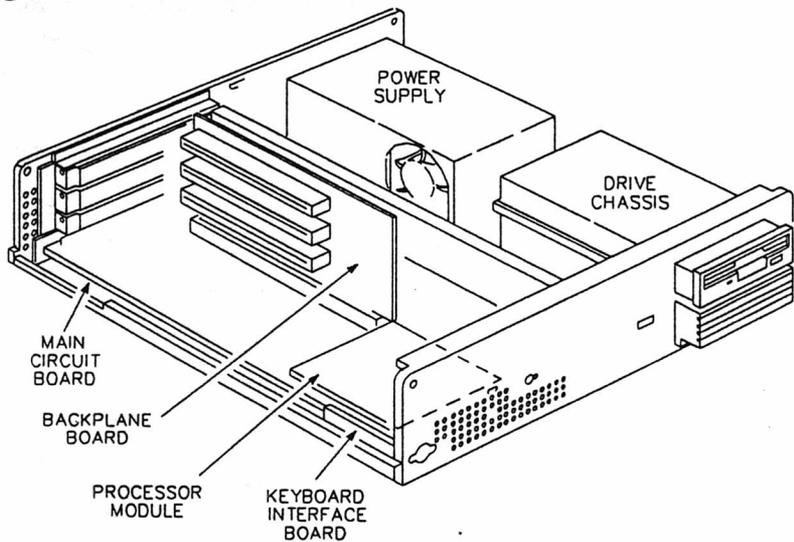
3. Remove any circuit cards that block the removal of the processor module.

4. Remove the screw from the spacer. Save the screw.

5. Remove the module retainer bracket. Save the screw.

6. Refer to Figure 3-8 and remove the processor module.

Figure 3-8. *Removing the Processor Module*

Removing the Password EEPROM

1. Remove the cover as described earlier.

2. Remove the processor module as described earlier.

3. Refer to Figure 3-9 and locate the password EEPROM.

4. Using a suitable IC retractor tool, remove the password EEPROM.

Figure 3-9. Password EEPROM Location
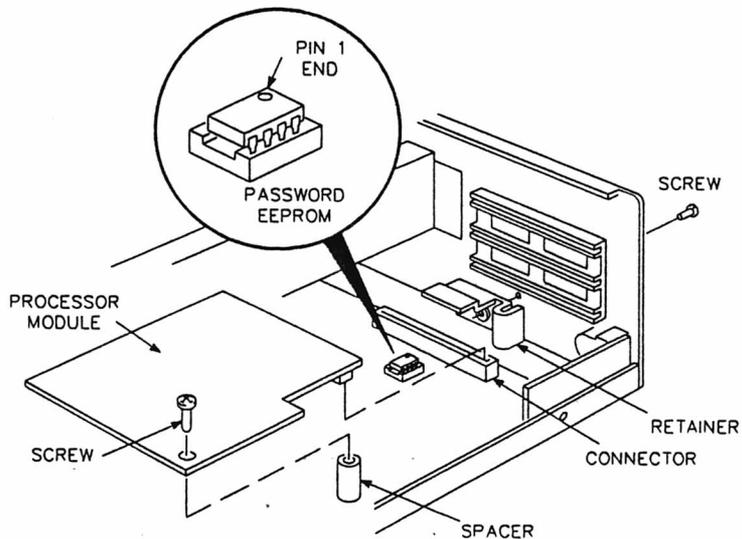
Removing the Main Board

Notice: Observe static precautions.

1. Remove the cover as described earlier in this chapter.

2. Observe static precautions and remove any circuit cards installed in the backplane board. Save these cards and reinstall them when you have finished servicing the computer.

3. Remove any cables attached to the two serial connectors, parallel connector, and video connector located on the back panel.

4. Disconnect cables attached to the following connectors:

    - P510
    - P511
    - P512
    - P513
    - P514
    - P515.

5. Remove the backplane board as described earlier in this chapter.

6. Refer to Figure 3-10 and remove the five screws.

7. Refer to Figure 3-10 and remove the hex standoffs on the serial, parallel, and video connectors.

Figure 3-10. Removing the Main Board Screws
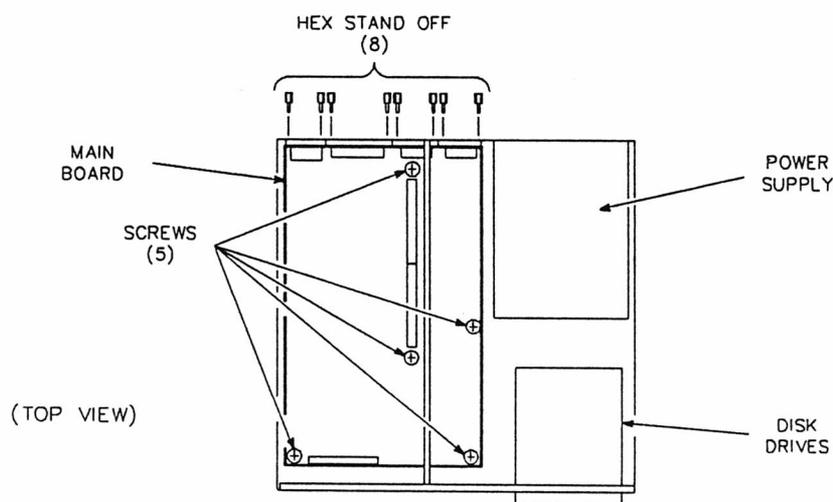
8. Slide the main board toward the front of the computer so the video, parallel, and serial connectors clear the rear of the cabinet. Refer to Figure 3-11.

Figure 3-11. *Removing the Main Board*
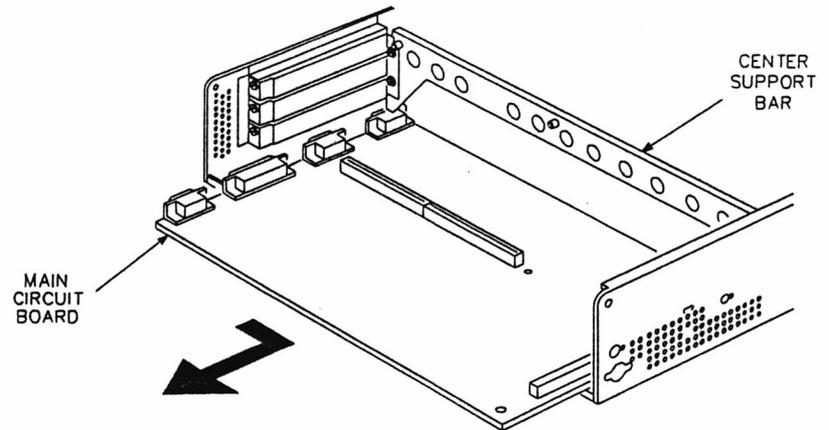
9. Carefully slide the main board out of the cabinet.

Removing a Memory Module

There are instructions for removing and inserting memory modules later in this chapter.

Removing the Floppy Disk Drive

1. Remove the cover as described earlier in this chapter.

2. Remove the controller cable from the drive as shown in Figure 3-12.

3. Remove the power cable from the drive.

4. Refer to Figure 3-12 and remove the two screws that secure the drive to the right side of the disk drive chassis.

Figure 3-12. *Removing the Floppy Disk Drive*
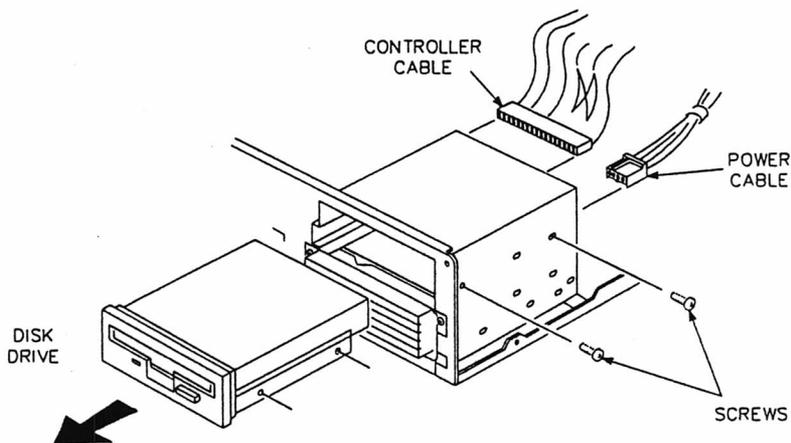
5. Slide the drive out of the front of the computer.

Removing the Hard Disk Drive

This computer supports one hard disk drive mounted internally.

1. Remove the cover as described earlier in this chapter.

2. Refer to Figure 3-13, and remove the controller cable from the drive.

3. Remove the power cable from the drive.

Figure 3-13. Removing the Hard Disk Drive Cables
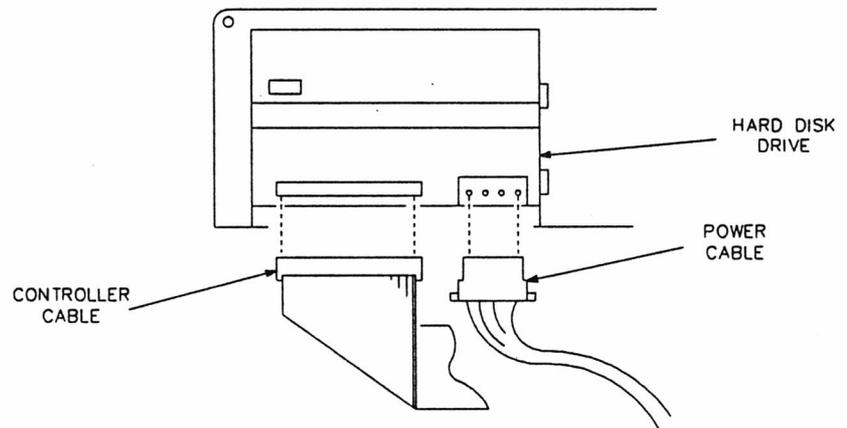
4. Remove the three screws that secure the cover plate of the hard disk drive as shown in Figure 3-14.

Figure 3-14 . Removing the Cover Plate.
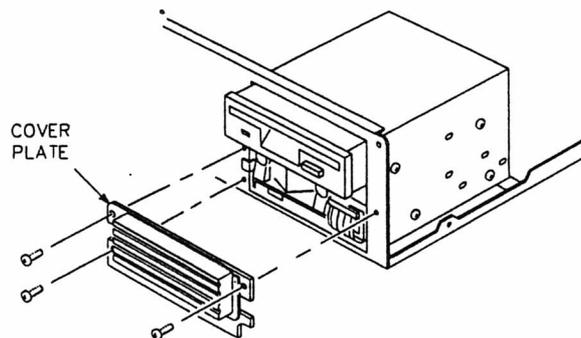
5. Carefully remove the three nylon screws that secure the hard disk drive to the right side of the disk drive chassis as shown in Figure 3-15.

Figure 3-15. *Removing the Hard Disk Drive*

DISK DRIVE

SCREWS
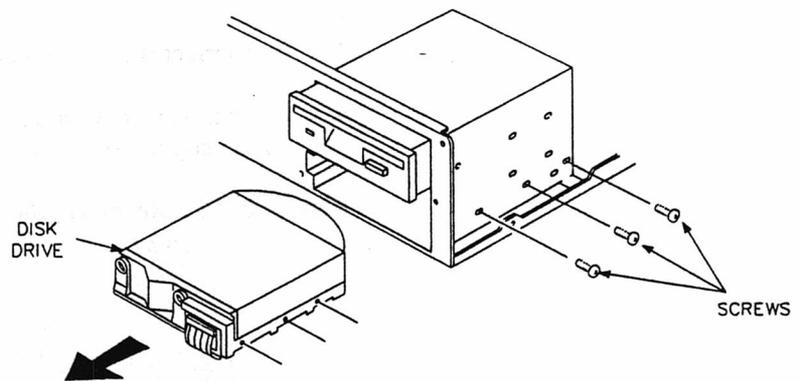
6. Slide the drive out of the front of the computer.

Removing the Power Supply

1. Remove the cover as described earlier in this chapter.

2. Disconnect the power cables from the disk drives.

3. Disconnect the power cable from the main board.

4. Refer to Figure 3-16 and remove the five screws that secure the power supply to the cabinet.

Figure 3-16 . *Removing the Power Supply*
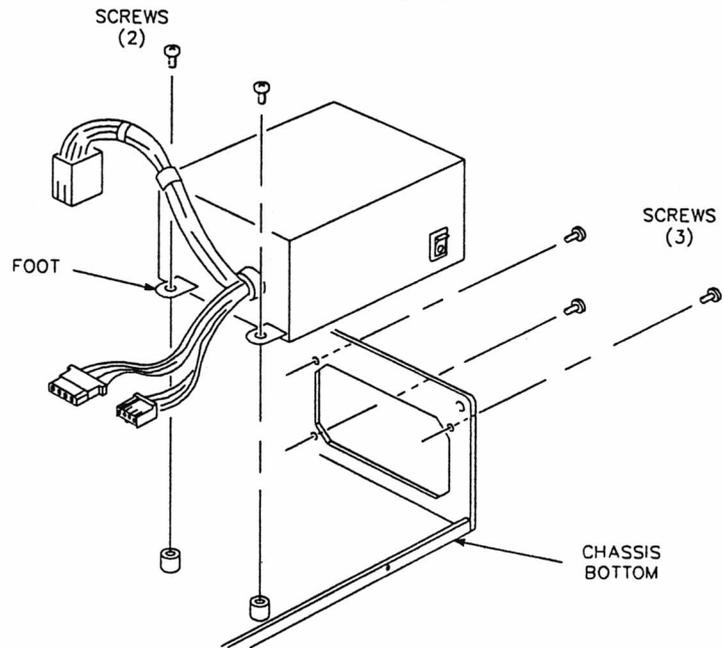
5. Lift the power supply up and out of the cabinet.

Removing the Keylock

1. Remove the cover as described earlier in this chapter.

2. Remove the lever retaining nut, lockwasher, and lock lever, as shown in Figure 3-17.

3. Remove the retainer clip.

4. Remove the keylock.

Figure 3-17. *Removing the Keylock*
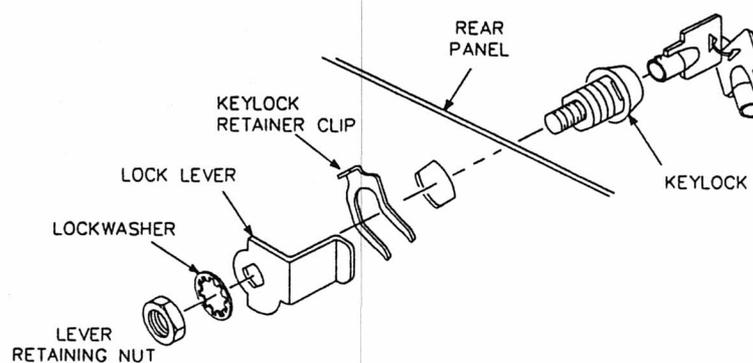
Removing the Card Guide

1. Remove the cover as described earlier in this chapter.

2. If any full-size circuit cards are installed in the backplane, remove them as described in "Removing a Circuit Card."

3. Refer to Figure 3-18, and remove the card guide.

Figure 3-18. *Removing the Card Guide*
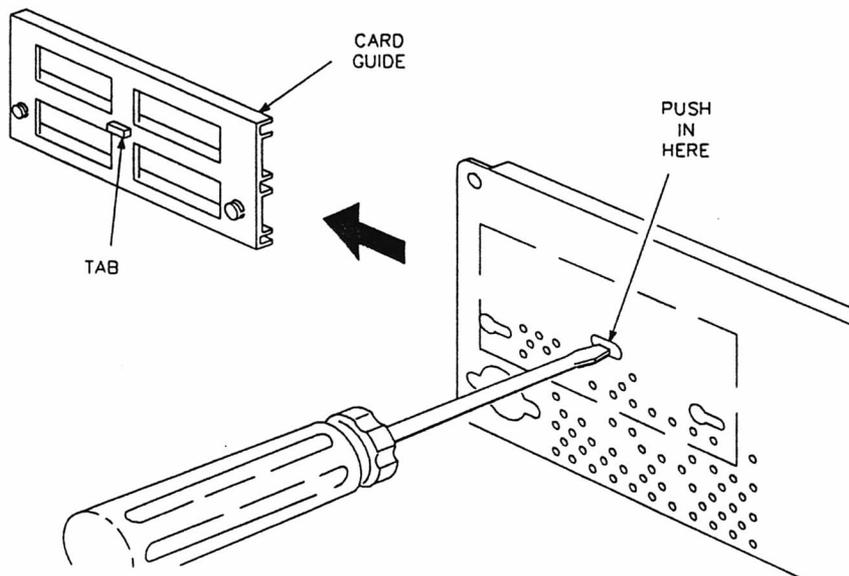
Removing the Speaker

1. Refer to Figure 3-19 and disconnect the speaker wires from the main board at P512.

2. Press the tabs on the LED indicator as shown in Figure 3-20 and remove the LED indicator from the front panel.

3. The speaker is secured to the speaker bracket with foam tape. Gently pull on the speaker to remove.

Figure 3-19. Removing the Speaker
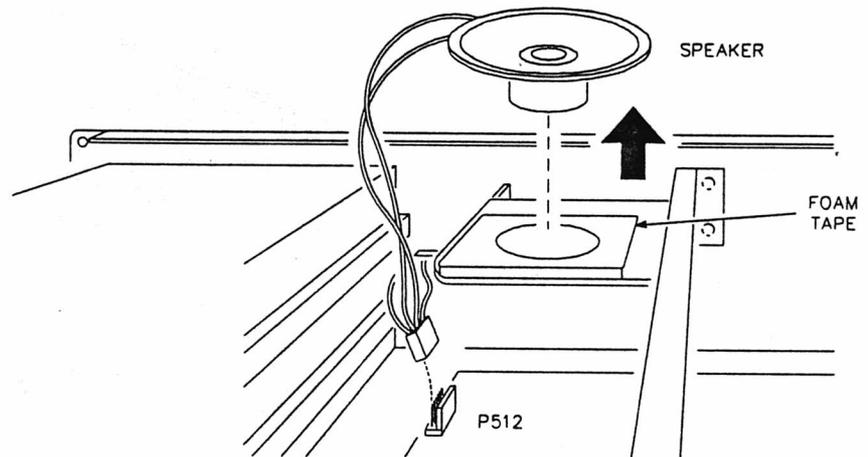
Figure 3-20. Removing the LED Indicator
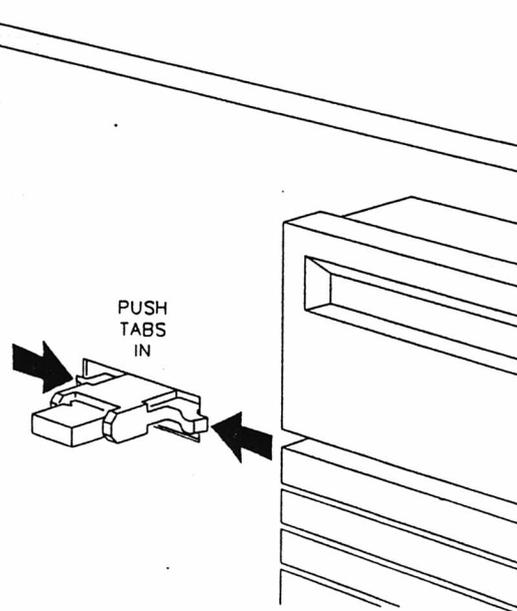
Option Installation

This section describes how to install hardware options.

Processor Module Installation

Notice: Observe static precautions.

Figure 3-21. *Processor Module Location*
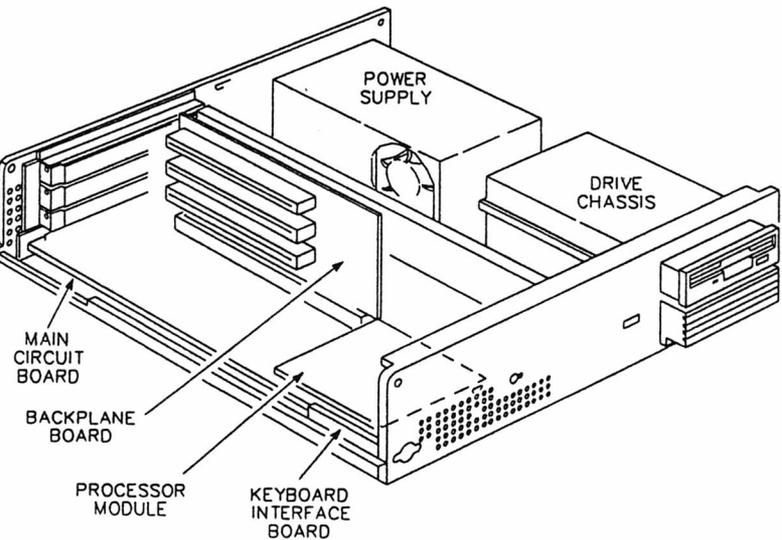
1. Remove the cover as described earlier in this chapter.

2. Refer to Figure 3-21 and locate the processor module.

3. Refer to Figure 3-22 and remove the screw from the spacer. Save the screw.

4. Remove the module retainer bracket. Save the screw.

5. Carefully lift the module up and out of its connector and place it in protective packaging.

6. Push the new module into the connector until it is fully seated, as shown in Figure 3-22.

7. Reinstall the screw removed in step 3.

8. Reinstall the module retainer bracket removed in step 4.

9. Replace the cover and power up the computer.

Figure 3-22. *Processor Module Connector*
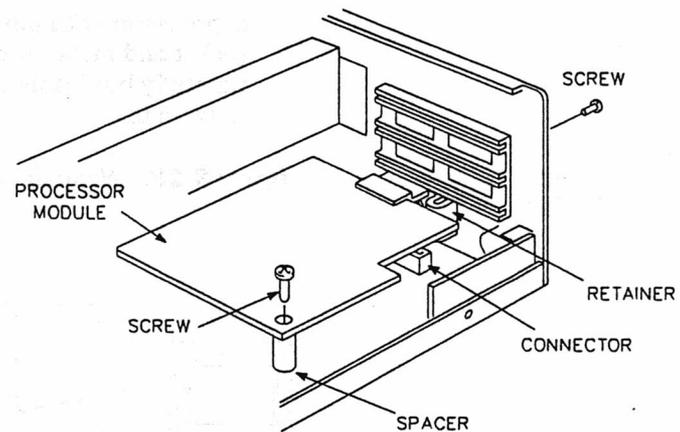
Numeric Coprocessor Installation

Notice: Use static precautions.

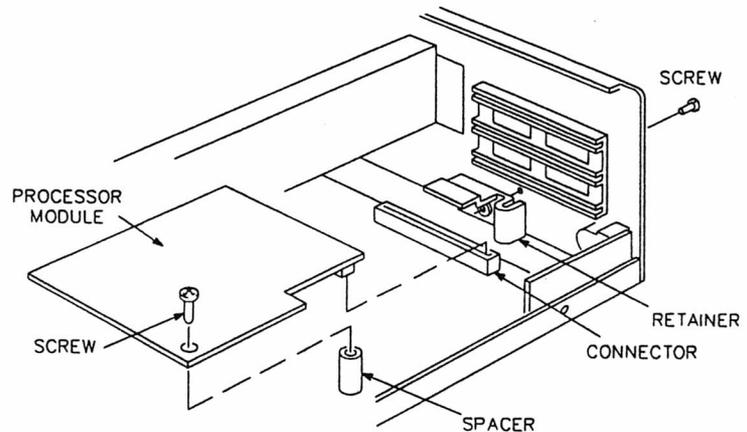
1. Remove the cover as described earlier in this chapter.

2. Refer to Figure 3-21 to locate the processor module.

3. Carefully lift the module up out of its connector and place it on a sturdy surface with the component side up.

4. Locate the part number on the processor module and refer to the appropriate figure (3-23, 3-24, or 3-25). Align pin 1 of the coprocessor with pin 1 of the socket. Place the coprocessor on the socket and make sure all of the pins are properly aligned. Carefully but firmly insert the coprocessor into the socket until fully seated.

Figure 3-23. Numeric Coprocessor Socket Location (PN 85-3597)
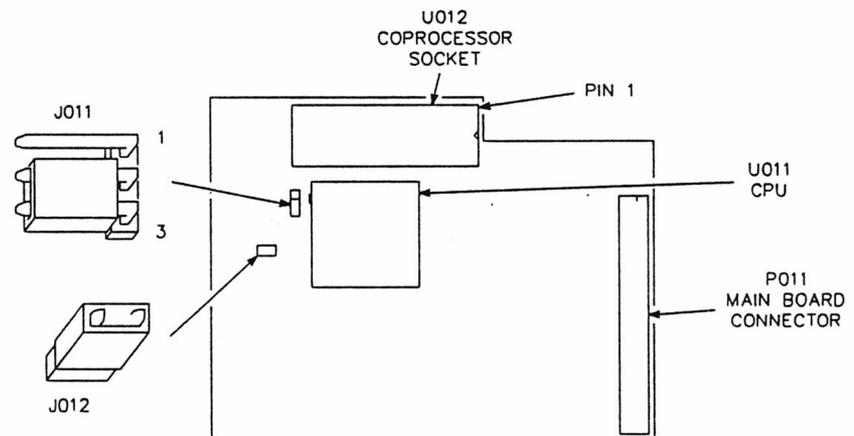
Figure 3-24 . *Numeric Coprocessor Socket Location (PN 85-3709)*
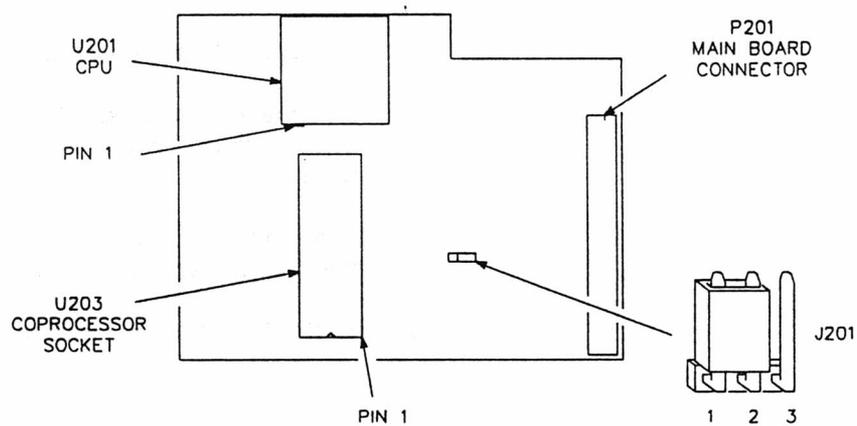
Figure 3-25. *Numeric Coprocessor Socket Location (PN 85-3594, PN 85-3666)*
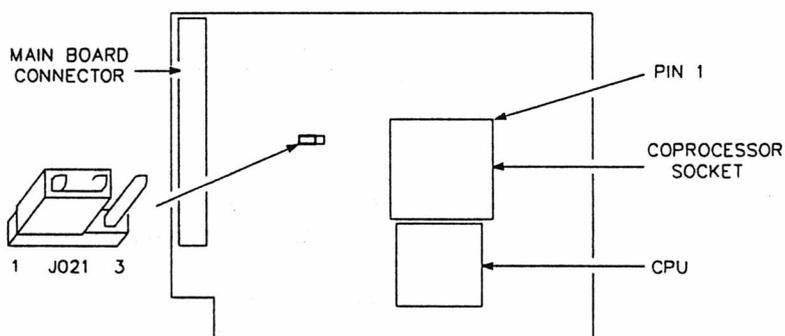
5. Reinstall the processor module and powerup the computer.

6. If error messages occur, refer Chapter 4.

Circuit Card Installation

1. Remove cover as described earlier in this chapter.

2. Select an expansion slot. The bottom slot accommodates a half-length card while the top two slots accommodate full-length cards.

3. Refer to Figure 3-26 and remove the screw and blank panel from the slot selected. Save the screw.

Figure 3-26. Removing the Blank Panel
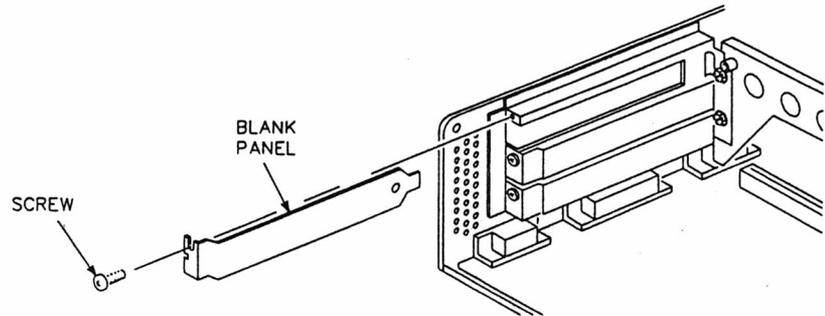
4. Refer to the card's documentation and Chapter 4 of this manual, and set any jumpers as necessary.

5. Refer to Figure 3-27 and position the card with the connector toward the expansion slot on the backplane board. Align the edge of a full-length card with the groove in the card guide. Carefully push the card into the socket until seated. Secure the card with the screw removed in step 3.

Figure 3-27. Installing a Circuit Card
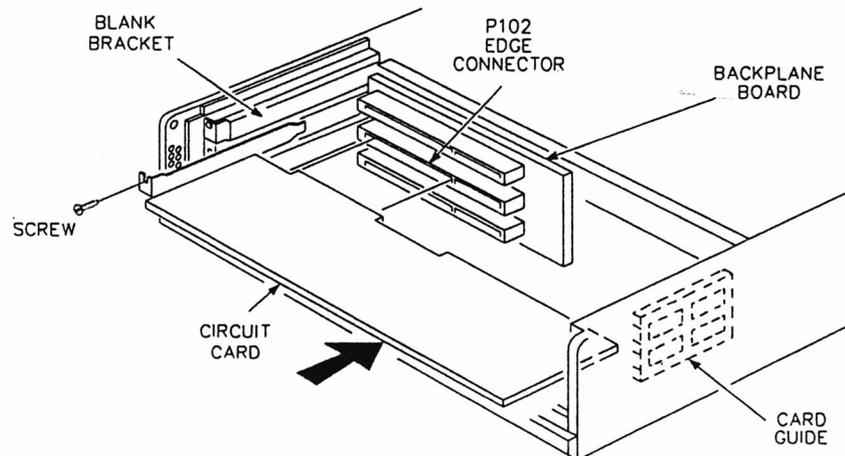
6. Replace the cover and power up the computer.

Memory Module Installation

Notice: Use static precautions.

1. Remove the cover as described earlier in this chapter.

2. Refer to Figure 3-28 and locate the memory module sockets on the main board.

Figure 3-28. *Memory Module Location*
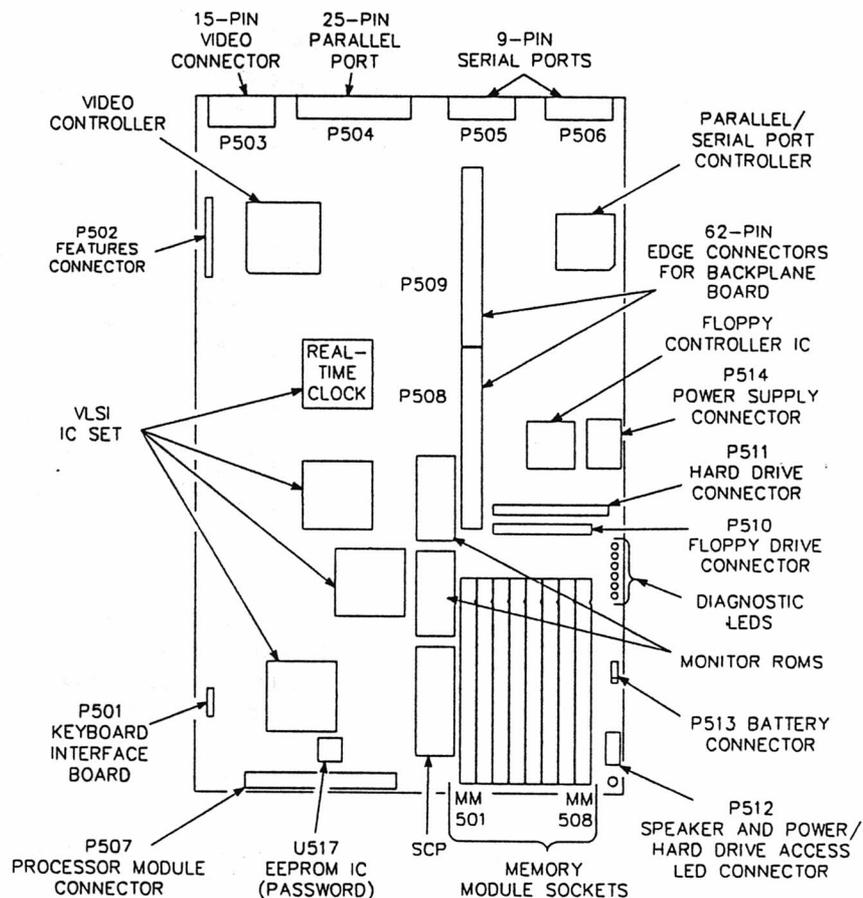
3. To install a memory module:

- Position the module with the component side facing away from the disk drives.

- Tip the module slightly towards the disk drives and guide it into the socket on the main board as shown in Figure 3-29.

Figure 3-29. Memory Module Installation
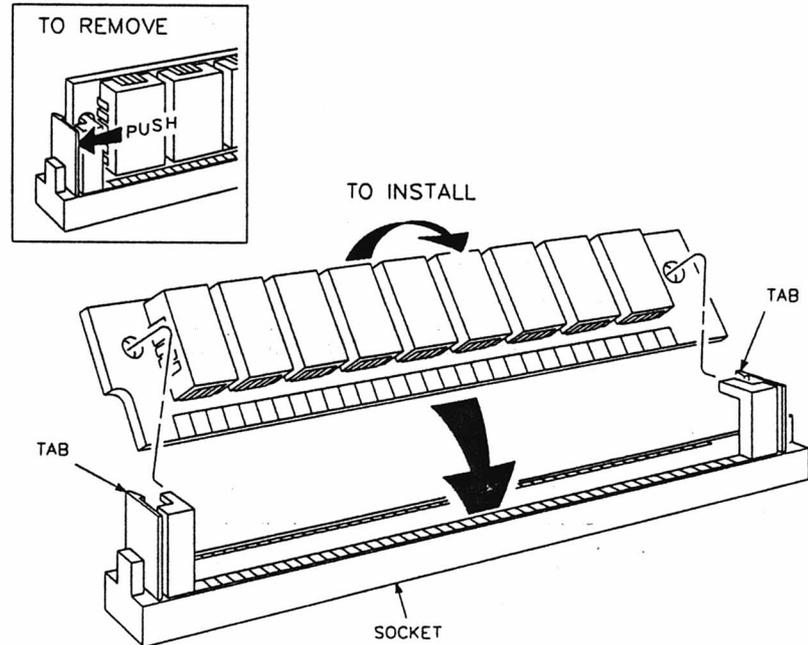
- Gently push the module to the upright position. A click can be heard when the tabs on either end of the socket snap over the ends of the module. Memory module sockets should be populated from the lowest number to the highest (MM501-MM508).

4. To remove a memory module:

- Use a small flat-blade screwdriver to release the tabs at each end of the module as shown in Figure 3-29.

- Gently tip the module toward the disk drives and lift it out.

5. Replace the cover.

6. Power up the computer and enter the Setup program. Update the memory information.

7. Perform the ROM-based memory tests (described in Chapter 2) to verify that all memory banks are functioning properly.

8. Run the Disk-Based Diagnostics to thoroughly test the new memory. Refer to the diagnostics manual for testing procedures.

Troubleshooting

This chapter provides computer troubleshooting procedures. The information included should assist in diagnosing problems to the major assembly level.

Preliminary Checks

Remove the cover and look for the following:

Damage — to the circuit cards or chassis parts including:

- Dented or bent metal parts
- Frayed, nicked, or cut cables
- Visible cracks on circuit cards
- Heat damage (discoloration or melting)
- Connector pins that are bent or touching
- Broken socket connectors.

Configuration — Make certain that jumpers on each card are properly configured (refer to Specifications).

Placement — Be sure the processor module is properly seated in the bus connector.

Connections — Check all cable connections. Make certain each cable is positioned and connected properly. Make sure power and external connections are secure.

Optional cards — Remove any optional card(s) that are not part of the base computer configuration.

Power Up

At power up, the computer begins an initialization process to check internal circuits and components. If the computer encounters a problem during this process, an error message appears on the monitor screen. (Refer to "Power-Up and Error Messages" later in this chapter.) Some initialization actions produce a visual or audible signal. The following events should occur when power is applied to the computer:

1. The power supply and fan starts.

2. The keyboard is reset, status LEDs blink, and the NUM LOCK LED remains lit.

3. Disk drives initialize (floppy drive indicator blinks; power LED changes to yellow during hard disk drive activity).

4. Prompt appears on the monitor display.

5. Internal power-up self-tests complete.

6. Computer attempts to autoboot if autoboot is configured in SETUP.

Diagnostic LEDs

The diagnostic LEDs are located on the main board near the power connector. All these LEDs light up when you power up the computer, then turn off in sequence as circuits pass their power-up tests. The RDY LED remains on until a system is booted. Figure 3-1 illustrates the diagnostic LEDs.

Figure 4-1. *Diagnostic LEDs*

D512   RDY

D511   DSK

D510   INT

D509   RAM

D508   ROM

D507   CPU

The LEDs provide an indication of the power-up initialization test status. Table 4-1 lists the circuits initialized and tested for each LED that turns off during the power-up test sequence.

Table 4-1. *Power-Up Test Status*

LED DISPLAY D507 – D512	TEST STATUS
011111	Video circuits initialized to a known state, BIOS is converted to slushware memory, CPU passed register test.
001111	ROM passed checksum test.
000111	SCP passed reset test, CMOS RAM passed test, and the first and last 64K of system RAM passed read/write test.
000011	Keyboard did not send an error, interrupt controller and the programmable interval timer passed test.
000001	Floppy disk controller passed test, floppy disk drive passed initialization, peripheral devices polled, RTC initialized. Computer is ready to boot a system.
000000	Computer has booted a system.

The diagnostic LEDs are used in the troubleshooting charts that follow to assist in repairing the computer.

Troubleshooting Charts

The following charts are organized to simplify your troubleshooting efforts. Start with the General System Troubleshooting Chart, Figure 4-2. This chart provides immediate repair recommendations or directs you to other, more detailed charts. These charts identify the faulty assembly or recommend further tests to isolate the problem. Follow the sequence through until you locate and repair the problem.

Each block in the chart represents a step in troubleshooting the computer. Some blocks contain a smaller numbered block. The smaller block is a reference to the notes that appear on the troubleshooting charts.

Figure 4-2. *General System Troubleshooting Chart*

Figure 4-3. *General System Troubleshooting Chart (continued)*

```
        ┌──────────────┐         ┌──────────────┐         ┌──────────────┐          ┌──────────────┐
        │  Does a DOS  │  Yes    │ Enter the date│        │ Do any error │   No     │Enter the time│
 (B)───▶│prompt appear │────────▶│ using the DOS │───────▶│   messages   │─────────▶│using the DOS │───▶ (C)
        │   on the     │         │ DATE command  │        │   appear?    │          │ TIME command │
        │   screen?    │         └──────────────┘        └──────────────┘          └──────────────┘
        └──────────────┘                                         │
               │ No                                              │ Yes
               ▼                                                 ▼
        ┌──────────────┐  Yes    ┌──────────────┐         ┌──────────────┐
        │  Does an error│───────▶│  Refer to the │        │   Refer to   │
        │message appear?│        │operating system│       │   Chapter 4  │
        └──────────────┘        │documentation for│       │   for error  │
               │                │ an explanation │        │   message    │
               │ No             └──────────────┘        │  explanation │
               ▼                        │                └──────────────┘
        ┌──────────────┐                ▼
        │  Refer to the │        ┌──────────────┐
        │  Dead System  │        │   Refer to   │
        │Troubleshooting│        │   Chapter 4  │
        │    Chart     │        │    for an    │
        └──────────────┘        │  explanation │
                                └──────────────┘


        ┌──────────────┐         ┌──────────────┐
        │  Do any error │        │  System OK.  │
 (C)───▶│   messages   │───────▶│   Refer to   │
        │   appear?    │        │ Disk-Based   │
        └──────────────┘        │Diagnostics for│
               │                │ further tests │
               │                └──────────────┘
               ▼
        ┌──────────────┐
        │   Refer to   │
        │   Chapter 4  │
        │   for error  │
        │   message    │
        │  explanation │
        └──────────────┘
```

Figure 4-4. *Dead System Troubleshooting Chart*

```
                                                    No
              ┌───────────────────────────────────────────────────┐
              │                                                    │
  ┌───────────────┐       ┌───────────────┐      ┌───────────────┐      ┌───────────────┐      ┌───────────────┐
  │ Do all the    │  Yes  │ Does the      │ Yes  │ Do all LEDs   │  No  │ Does a blinking│ Yes  │ Does the      │ Yes
  │ diagnostic    │──────▶│ power indicator│─────▶│ blink and     │─────▶│ cursor appear │─────▶│ CPU LED       │────▶( A )
  │ LEDs light?   │       │ LED light?    │      │ does the      │      │ on the        │      │ go out?       │
  └───────────────┘       └───────────────┘      │ speaker beep? │      │ monitor?      │      └───────────────┘
          │                       │              └───────────────┘      └───────────────┘              │
          │ No                    │ Yes                  │ Yes                  │ No                    │ No
          ▼                       ▼                      ▼                      ▼                      ▼
  ┌───────────────┐       ┌───────────────┐      ┌───────────────┐      ┌───────────────┐      ┌───────────────┐
  │ Are correct   │  Yes  │ Replace       │      │ Reseat the    │      │ Refer to      │      │ Replace the   │
  │ supply voltages│─────▶│ main          │      │ memory        │      │ the Video     │      │ main board    │
  │ present?      │       │ board         │      │ modules       │      │ Troubleshooting│      └───────────────┘
  │            [1]│       └───────────────┘      └───────────────┘      │ Chart         │
  └───────────────┘                                     │              └───────────────┘
          │ No                                          ▼
          ▼                                     ┌───────────────┐
  ┌───────────────┐                             │ Replace the   │
  │ Refer to      │                             │ memory modules│
  │ Main Power    │                             └───────────────┘
  │ Troubleshooting│                                   │
  │ Chart         │                                    ▼
  └───────────────┘                             ┌───────────────┐
                                                │ Replace the   │
      NOTE                                      │ main board    │
      ┌─┐                                       └───────────────┘
      │1│ Refer to Specifications
      └─┘ for connector pinouts
```

```
  ┌───────────────┐       ┌───────────────┐      ┌───────────────┐      ┌───────────────┐      ┌───────────────┐
( A )──▶│ Does the │  Yes  │ Does the      │  No  │ Does the      │ Yes  │ Does a        │  No  │ Does the      │ Yes
  │ ROM LED       │──────▶│ Bad SCP       │─────▶│ RAM LED       │─────▶│ keyboard      │─────▶│ INT LED       │────▶( B )
  │ go out?       │       │ error message │      │ go out?       │      │ error appear? │      │ go out?       │
  └───────────────┘       │ appear?       │      └───────────────┘      └───────────────┘      └───────────────┘
          │               └───────────────┘              │                      │                      │
          │ No                    │ Yes                  │ No                   │ Yes                   │ No
          ▼                       ▼                      ▼                      ▼                      ▼
  ┌───────────────┐       ┌───────────────┐      ┌───────────────┐      ┌───────────────┐      ┌───────────────┐
  │ Replace the   │       │ Replace the   │      │ Reseat the    │      │ Refer to      │      │ Replace the   │
  │ main board    │       │ main board    │      │ memory        │      │ the Keyboard  │      │ main board    │
  └───────────────┘       └───────────────┘      │ modules       │      │ Troubleshooting│      └───────────────┘
                                                 └───────────────┘      │ Chart         │
                                                        │              └───────────────┘
                                                        ▼
                                                ┌───────────────┐
                                                │ Replace the   │
                                                │ memory modules│
                                                └───────────────┘
                                                        │
                                                        ▼
                                                ┌───────────────┐
                                                │ Replace the   │
                                                │ main board    │
                                                └───────────────┘
```

Figure 4-5. *Dead System Troubleshooting Chart (continued)*
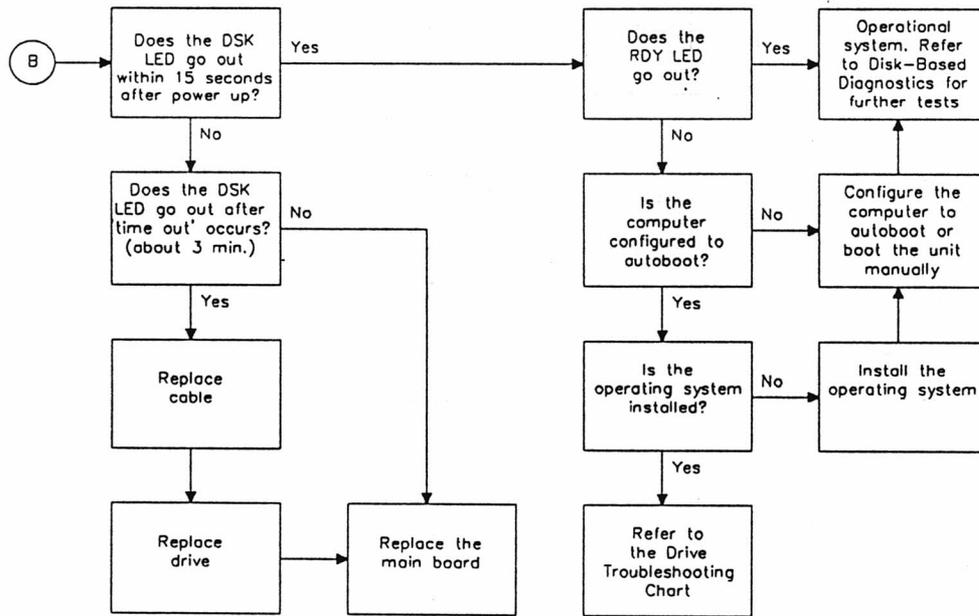
Figure 4-6. *Keyboard Troubleshooting Chart*

```
┌──────────────┐          ┌──────────────┐          ┌──────────────┐
│ Is the NUMLOCK│   Yes   │ Do any error │    No    │ Replace the  │
│  LED lit?    ├─────────▶│  messages    ├─────────▶│  keyboard    │
│              │          │  appear?     │          │              │
└──────┬───────┘          └──────┬───────┘          └──────┬───────┘
       │ No                      │ Yes                     │
       ▼                         ▼                         ▼
┌──────────────┐          ┌──────────────┐          ┌──────────────┐
│ Is the keyboard│  No    │ Refer to Chapter│       │ Replace the  │
│ connected to  ├─────┐   │   4 for a    │          │  keyboard    │
│ the computer? │     │   │  message     │          │ interface board│
└──────┬───────┘     │   │ explanation  │          └──────┬───────┘
       │ Yes    ┌────▼────────┐└─────────┘                 │
       ▼        │ Connect the │                            ▼
┌──────────────┐│ keyboard.   │                   ┌──────────────┐
│ Is the keyboard└─────────────┘                   │ Replace the  │
│ configured for│   No    ┌──────────────┐         │  main board  │
│ AT operation? ├────────▶│ Set the      │         │              │
│           [1] │         │ keyboard switch│       └──────────────┘
└──────┬───────┘         │ for AT operation│
       │ Yes             │          [1]   │
       ▼                 └──────────────┘
┌──────────────┐
│ Is +5VDC supply│  Yes   ┌──────────────┐
│ voltage available├─────▶│ Replace the  │
│ at the keyboard │       │  keyboard    │
│ connector?  [2] │       └──────────────┘
└──────┬───────┘
       │ No
       ▼
┌──────────────┐
│ Is +5VDC present│  Yes  ┌──────────────┐
│ at the main   ├───────▶│ Replace the  │
│ board connector│       │  keyboard    │
│ P501?     [2]  │       │ interface board│
└──────┬───────┘        └──────────────┘
       │ No
       ▼
┌──────────────┐
│ Is +5VDC      │  Yes   ┌──────────────┐
│ available at  ├───────▶│ Replace the  │
│ the main power│       │  main board  │
│ connector?    │       └──────────────┘
└──────┬───────┘
       │ No
       ▼
┌──────────────┐
│ Refer to the │
│ Main Power   │
│ Troubleshooting│
│ Chart        │
└──────────────┘
```

NOTES
1. Refer to Specifications for configuration information.
2. Refer to Specifications for pinout information.

Figure 4-7. *Parallel/Serial Port Troubleshooting Chart*

```
┌──────────────┐      ┌──────────────┐      ┌──────────────┐      ┌──────────────┐
│ Is the output│ Yes  │ Are the cables│ Yes │   Is the     │ Yes  │ Does the COM1│ Yes      ┌───┐
│device properly├─────▶│connected between├────▶│  computer    ├─────▶│serial channel├─────────▶│ A │
│ configured?  │      │the peripheral │      │ configured   │      │   operate?   │          └───┘
│              │      │and the computer?│    │  properly?   │      │              │
└──────┬───────┘      └──────┬───────┘      └──────┬───────┘      └──────┬───────┘
       │ No                  │ No                  │ No                  │ No
       ▼                     ▼                     ▼                     ▼
┌──────────────┐      ┌──────────────┐      ┌──────────────┐      ┌──────────────┐   No  ┌──────────┐
│ Reconfigure the│    │ Connect the  │      │ Reconfigure the│    │  Does COM1   ├──────▶│Replace the│
│ output device │     │  peripheral  │      │   computer   │      │  work at the ├──────▶│ main board│
│              │      │  interface   │      │          ┌─┐ │      │    serial    │       └──────────┘
└──────────────┘      │   cables     │      │          │1│ │      │  connector?  │
                      └──────────────┘      └──────────┴─┘─┘      └──────┬───────┘
                                                                         │ Yes
                                                                         ▼
                                                                  ┌──────────────┐
                                                                  │ Have customer│
                                                                  │  consult the │
                                                                  │manufacturer of│
                                                                  │ the peripheral│
                                                                  │     unit     │
                                                                  └──────────────┘
```

NOTE

[1] Refer to Specifications for configuration information.

```
        ┌──────────────┐      ┌──────────────┐         ┌──────────────┐
┌───┐   │ Does the COM2│ Yes  │  Does the LPT1│ Yes    │   Refer to   │
│ A ├──▶│serial channel├─────▶│parallel channel├───────▶│  Disk-Based  │
└───┘   │   operate?   │      │   operate?   │         │  Diagnostics │
        │              │      │              │         │for further tests│
        └──────┬───────┘      └──────┬───────┘         └──────────────┘
               │ No                  │ No
               ▼                     ▼
        ┌──────────────┐   No ┌──────────┐    ┌──────────────┐  No  ┌──────────┐
        │  Does COM2   ├─────▶│Replace the│   │  Does LPT1   ├─────▶│Replace the│
        │  work at the │      │ main board│   │  work at the │      │ main board│
        │    serial    │      └──────────┘    │   parallel   │      └──────────┘
        │  connector?  │                      │  connector?  │
        └──────┬───────┘                      └──────┬───────┘
               │ Yes                                 │ Yes
               ▼                                     ▼
        ┌──────────────┐                      ┌──────────────┐
        │ Have customer│                      │ Have customer│
        │  consult the │                      │  consult the │
        │manufacturer of│                     │manufacturer of│
        │ the peripheral│                     │ the peripheral│
        │     unit     │                      │     unit     │
        └──────────────┘                      └──────────────┘
```
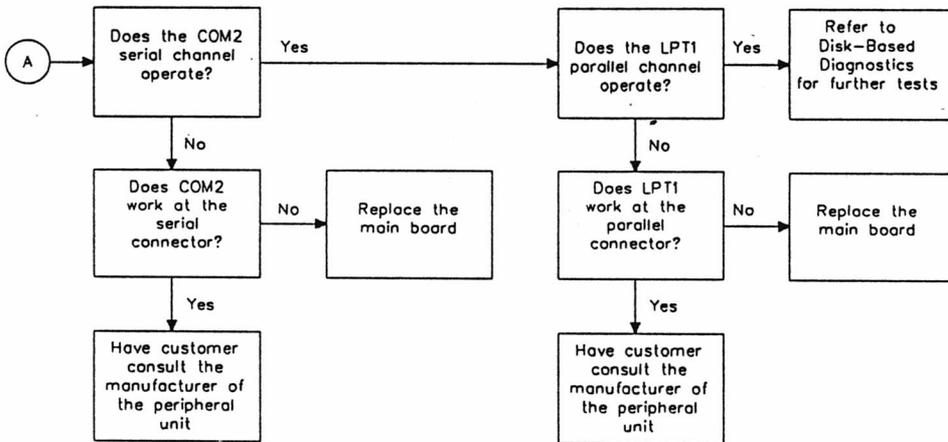
Troubleshooting

Figure 4-8. *Drive Troubleshooting Chart*

```
┌─────────────┐        ┌─────────────┐                ┌─────────────┐        ┌─────────────┐
│ Does an error│  No   │Perform ROM  │     Yes        │Are drive    │  Yes  │Are any drive│  No   ┌───┐
│message appear├──────▶│Disk Read Test├───────────────▶│cables       ├──────▶│cables       ├──────▶│ A │
│             │        │             │                │connected    │        │damaged?     │        └───┘
│             │        │   Pass?     │                │securely?    │        │             │
└──────┬──────┘        └──────┬──────┘                └──────┬──────┘        └──────┬──────┘
       │ Yes                  │ No                           │ No                   │ Yes
       ▼                      ▼                              ▼                      ▼
┌─────────────┐        ┌─────────────┐   Yes  ┌──────────┐  ┌─────────────┐        ┌─────────────┐
│ Refer to    │        │Perform ROM  ├───────▶│Replace the│ │Re-connect the│       │Replace any  │
│ Chapter 4   │        │Base Memory  │        │main board │ │drive cables │        │damaged cables│
│ for message │        │Test         │        └──────────┘  └─────────────┘        └─────────────┘
│ explanation │        │   Pass?     │
└─────────────┘        └──────┬──────┘
                              │ No
                              ▼
                       ┌─────────────┐
                       │Replace memory│
                       │module(s)    │
                       └─────────────┘
```
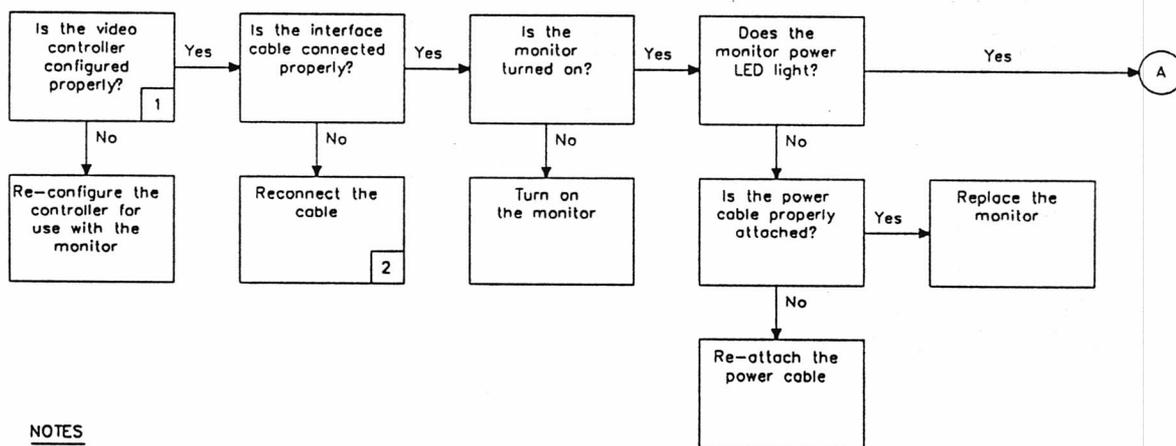
```
        ┌─────────────┐        ┌─────────────┐
┌───┐   │Is supply    │  Yes   │Replace the  │
│ A ├──▶│voltage      ├───────▶│drive        │
└───┘   │available at │        └──────┬──────┘
        │the drive    │               │
        │connector? │1││              ▼
        └──────┬──────┘        ┌─────────────┐
               │ No            │Replace the  │
               ▼               │main board   │
        ┌─────────────┐        └─────────────┘
        │Refer to     │
        │Main Power   │
        │Troubleshooting│
        │Chart        │
        └─────────────┘
```

NOTE

1 Refer to Specifications
   for connector pinouts.

Figure 4-9. *Video Troubleshooting Chart*

```
┌──────────────┐        ┌──────────────┐        ┌──────────────┐        ┌──────────────┐
│  Is the video│  Yes   │ Is the       │  Yes   │   Is the     │  Yes   │  Does the    │  Yes       ╱A╲
│  controller  │───────▶│ interface    │───────▶│   monitor    │───────▶│ monitor power│──────────▶│ A │
│  configured  │        │ cable connec-│        │   turned on? │        │  LED light?  │            ╲__╱
│  properly?  1│        │ ted properly?│        │              │        │              │
└──────┬───────┘        └──────┬───────┘        └──────┬───────┘        └──────┬───────┘
       │ No                    │ No                    │ No                    │ No
       ▼                       ▼                       ▼                       ▼
┌──────────────┐        ┌──────────────┐        ┌──────────────┐        ┌──────────────┐   Yes   ┌──────────────┐
│ Re-configure │        │  Reconnect   │        │   Turn on    │        │ Is the power │────────▶│ Replace the  │
│ the controller│       │  the cable   │        │  the monitor │        │ cable properly│        │   monitor    │
│ for use with │        │              │        │              │        │  attached?   │         │              │
│ the monitor  │        │             2│        │              │        │              │         │              │
└──────────────┘        └──────────────┘        └──────────────┘        └──────┬───────┘         └──────────────┘
                                                                               │ No
                                                                               ▼
                                                                        ┌──────────────┐
                                                                        │ Re-attach the│
                                                                        │  power cable │
                                                                        └──────────────┘
```

NOTES

[1] Refer to owner's manual for configuration information.

[2] On some monitors, the cable cannot be removed. Replace the monitor instead.

```
 ╱A╲    ┌──────────────┐   Yes   ┌──────────────┐
│ A │──▶│ Are the      │────────▶│ Replace the  │
 ╲__╱   │ contrast and │         │   monitor    │
        │ brightness   │         │              │
        │ controls set │         │              │
        │ properly?    │         │              │
        └──────┬───────┘         └──────────────┘
               │ No
               ▼
        ┌──────────────┐   Yes   ┌──────────────┐
        │ Adjust the   │────────▶│ Video check  │
        │ controls to  │         │  complete    │
        │ their center │         │              │
        │ position.    │         │              │
        │ Does a display│        │              │
        │ appear?      │         │              │
        └──────┬───────┘         └──────────────┘
               │ No
               ▼
        ┌──────────────┐         ┌──────────────┐
        │ Replace the  │────────▶│ Replace the  │
        │   monitor    │         │  main board  │
        └──────────────┘         └──────────────┘
```

Figure 4-10. *Main Power Troubleshooting Chart*

NOTE

1. Refer to Specifications for connector pinouts.

Disk-Based Diagnostics

An optional disk-based diagnostics package is available for this computer. The disk-based diagnostics provide a more extensive and detailed series of tests for the computer. Refer to the beginning of this manual for the diagnostics product model number.

Power-Up and Error Messages

If the computer encounters any problems during self-tests or power up, it displays a message on the monitor. The error messages are listed here in alphabetical order, with descriptions of the probable cause(s), and corrective action.

Bad configuration information found in CMOS!

This message normally appears after backup battery replacement or disconnection. At other times it may indicate a backup battery failure. The message "Errors found! Please press <Esc> to continue" also appears at the bottom of the screen.

Corrective steps:

- Use the Setup program to reenter the configuration information.

- Refer to Chapter 3 and replace the backup battery.

Base memory size error! SETUP: XXXK ACTUAL: XXXK

The amount of base memory specified in the Setup program does not agree with the amount of base memory identified during power up. The message can also indicate a faulty or improperly installed memory module.

Corrective steps:

- Use the Setup program to verify correct base memory size.

- Inspect the memory modules for proper installation.

- Use the ROM-based Base Memory Test to check base memory. If the message is repeated, use the disk-based diagnostics for more extensive tests. If the computer does not boot, replace the first two memory modules and try again. If the tests identify a faulty memory module, replace it. If the tests identify a CMOS RAM failure or a problem with the Monitor ROM, replace the main board.

Extended memory size error! SETUP: XXXK ACTUAL: XXXXK

The amount of extended memory specified in the Setup program does not agree with the amount of extended memory identified during power up. A faulty or improperly installed memory module can create this problem.

Corrective steps:

• Use the Setup program to verify the memory size entry.

• Inspect all memory modules for proper installation.

• Use the ROM-based Extended Memory Test to check extended memory.

• Use the disk-based diagnostics to test extended memory. If you cannot boot the computer, replace the first memory module and try again. If the tests identify a faulty memory module, replace it.

• Replace the processor module.

• Replace the main board.

Cannot reset drive!

The disk is not properly installed in the drive, or a hardware failure has occurred.

Corrective steps:

• Check the floppy disk for proper installation.

• Replace the drive.

• Replace the main board.

CMOS memory failure!

The internal CMOS memory failed the power-up test.

Corrective steps:

• Use the Setup program and verify the configuration information.

• Replace the main board.

CPU failure!

Either the CPU or supporting circuitry suffered a hadware failure.

Corrective steps:

• Replace the processor module.

• Replace the main board.

CRC error!

This message indicates a faulty disk, a hardware failure, or a loose or faulty drive cable. The problem could also be with the main board.

Corrective steps:

• Try another disk. If the problem disappears, the disk is bad. Copy any readable files to a good disk and reformat the faulty disk. If bad sectors are reported, discard the disk.

• Inspect all disk drive power and controller cables for nicks or damage.

• Inspect all cables for proper installation.

• Replace the drive controller cable.

• Replace the drive.

• Replace the main board.

Data corrected!

The computer detected an error, but was able to correct the data.

Corrective steps:

• If this message occurs on a regular basis, refer to "CRC error."

• Use disk-based diagnostics to test the disk drive.

• Replace the drive.

Disk not bootable!

The computer attempted to boot an unformatted or non-system disk or the disk is not useable.

Corrective steps:

- Make certain that the disk is bootable. If not, reformat the disk and install the operating system.

- For a hard disk drive, first try to reinstall the operating system. If necessary, back up the drive and use PREP to reinitialize the disk. Reformat the drive and install the operating system.

- Replace the drive.

Divide by zero!

The power-up self-tests failed or a software failure occurred. This message can also appear if you quickly turn the computer off, then back on.

Corrective steps:

- Try another copy of the software, or have the customer contact the software manufacturer or dealer to report the problem. Unless this message occurs during the power-up sequence, the problem is likely to be in the software.

- Turn the computer off, wait 15 seconds, and turn it back on again. If the message reappears, replace the main board.

- Replace the processor module.

DMA overrun!

The problem is caused by a DMA hardware failure.

Corrective steps:

- Replace the main board.

- Replace the processor module.

- Replace the drive.

Not ready error reading drive X

There is no disk in the floppy drive, the disk is not fully inserted, or a drive hardware failure occurred. The message also appears if the computer attempts to access a non-existent disk drive.

Corrective steps:

- Verify that the correct drive was specified.

- Make certain the disk is fully inserted in the drive.

- Replace the drive controller cable.

- Replace the drive.

Fatal error; cannot continue.

This message only appears immediately following another error message. The first message indicates what error halted operation.

Corrective step:

- Refer to the first error message and follow the instructions to resolve the problem.

Invalid address mark!

This message appears if the floppy disk is damaged or has not been properly formatted.

Corrective steps:

- Copy any readable files to another disk and reformat the faulty disk. If bad sectors are reported, discard the disk.

- Replace the floppy disk drive causing the error.

- If the problem is a hard disk, three options are available:

  - Reformat the hard drive.

  - Run PREP, then reformat the hard drive.

  - Replace the hard disk drive.

- Replace the main board.

Invalid command!

Some internal process (usually math related) created an illegal processor state. Otherwise, a hardware failure occurred. This error also occurs when an illegal command is entered.

Corrective steps:

• Reenter the command.

• Try another copy of the software or have the customer contact the software manufacturer or dealer to report the problem.

• Replace the processor module.

• Replace the main board.

Data error reading drive X

The floppy disk is damaged or was not properly formatted.

Corrective steps:

• Copy any readable files to another disk and format the disk. If bad sectors are reported, discard the disk.

• Replace the drive.

• Replace the main board.

Invalid date

The date was entered incorrectly, or the real-time clock failed.

Corrective steps:

• Use the Setup program to reenter the date information.

• Replace the main board.

Invalid time

The time was entered incorrectly, or the real-time clock failed.

Corrective steps:

• Use the Setup program to reenter the time information.

• Replace the main board.

Keyboard not responding or not connected!

The keyboard is not properly connected, or the cable is damaged, or peripheral devices that have their own power supplies are interfering with the power-up sequence.

Corrective steps:

- Verify the keyboard is properly connected.

- Power down all peripherals. Wait one minute, power up the computer, and then power up the peripherals.

- Replace the keyboard.

- Replace the keyboard interface board.

- Replace the main board.

Memory parity failure!

The power-up tests detected a memory parity failure.

Corrective steps:

- Inspect all memory modules for proper installation.

- Use the ROM-based Base Memory Test to check memory.

- Use the ROM-based Extended Memory Test to check memory. If these tests reveal the same message, use the disk-based diagnostics to run more extensive tests. If the computer does not boot, replace the first memory module and try again. If the tests identify a faulty memory module, replace it.

- Replace the main board.

Must run SETUP to boot from Winchester!

The Setup program contains the wrong hard disk drive configuration information.

Corrective steps:

- Use the Setup program to specify the correct hard disk drive type for the boot drive.

- Replace the main board.

- Replace the hard disk drive.

No bootable partitions

The computer attempted to boot from an unformatted partition on the hard disk drive.

Corrective steps:

- Make certain a valid partition is selected to boot from.

- Format the partition and install the operating system. Refer to the operating system documentation for instructions.

- Replace the hard disk drive.

- Replace the main board.

Not a bootable partition

The computer attempted to boot an unformatted partition on the hard disk drive.

Corrective steps:

- Make certain a valid partition is selected for the boot operation.

- Format the partition and install the operating system. Refer to the operating system documentation for instructions.

- Replace the hard disk drive.

- Replace the main board.

Non-system disk

The computer attempted to boot from a formatted disk or partition without an operating system.

Corrective steps:

- Make certain a valid drive is selected for the boot operation.

- Install the operating system. Refer to the operating system documentation for instructions.

- Replace the drive.

- Replace the main board.

Non-maskable interrupt received!

This message warns of an impending power failure. Either the AC power supply has failed (blown fuse or circuit breaker), or the supply has dropped below acceptable operating levels (brownout). The message also appears if a software program issues an undefined interrupt. Certain machine language commands entered from the Monitor program can also cause this error.

Corrective steps:

- Turn off the computer. If the AC supply is at fault, do not restore power to the computer until the problem is resolved.

- If a software problem is suspected, either correct the problem or have the customer contact the manufacturer for assistance.

- Replace the power supply.

- Replace the main board.

Overflow!

This message appears if a power-up self-test failed or if the computer is turned off and back on very quickly. This problem can also be software related.

Corrective steps:

- Try another copy of the program or have the customer contact the software manufacturer or dealer to report the problem.

- Unless this message occurs during the power-up sequence, the problem is probably software related. Otherwise, turn off the computer, wait for 15 seconds, and turn it back on. If the message reappears, replace the main board.

- Replace the processor module.

- Replace the main board.

Parity hardware failure! Address: XXXXX:YYYY, Chip: UXXX

This message indicates that the power-up tests detected a parity failure.

Corrective steps:

- Check the memory modules for proper insertion.

- Reseat the memory modules.

- Use the ROM-based Base Memory Test to check memory. If the test reveals the same message, use the disk-based diagnostics to run more extensive tests. If the computer does not boot, replace the first memory module and try again. If the tests identify a faulty memory module, replace it.

- Replace the main board.

Please replace the back-up battery!

This message is normal after replacing the backup battery. It can also mean the backup battery has reached the end of its useful life.

Corrective steps:

- If the battery was recently replaced, use the Setup program to enter the proper hardware configuration settings for the computer.

- Replace the backup battery.

- Replace the main board.

RAM failure! SIMM module: XXXX

Note: SIMM is an acronym for Single In-line Memory Module.

The power-up tests detected a memory failure.

Corrective steps:

- Inspect all memory modules for proper installation.

- Swap the installed memory modules. If the problem disappears, the module was not installed correctly. If the problem moves, a module is defective.

- Use the ROM-based Base Memory Test to check memory. If the tests reveal the same message, replace the module indicated in the failure report. If you cannot enter the user tests, replace the memory modules.

- Replace the main board.

ROM checksum failure!

The Monitor ROM failed the power-up self-test. This message may also appear if the computer is turned off and back on very quickly.

Corrective steps:

- Turn off the computer, wait for 15 seconds, and turn it back on.

- Replace the processor module.

- Replace the main board.

Sector not found!

The computer attempted to access an unformatted or damaged floppy disk.

Corrective steps:

- Copy any readable files to another disk and format the faulty disk. If bad sectors are reported, discard the disk.

- Replace the drive.

- Replace the main board.

Seek failure!

The computer attempted to access an unformatted or damaged floppy disk.

Corrective steps:

- Copy any readable files to another disk and format the faulty disk. If bad sectors are reported, discard the disk.

- Replace the drive.

- Replace the main board.

System control processor failure!

The system control processor failed the power-up self-test. This message may also appear if you turn the computer off and back on very quickly.

Corrective steps:

- Turn off the computer, wait for 15 seconds, and turn it back on.

- Replace the main board.

- Replace the processor module.

Timer interrupt failure!

The interrupt controller or timing logic failed the power-up self-test. This message may also appear if you turn the computer off and back on very quickly.

Corrective step:

- Turn off the computer, wait for 15 seconds, and turn it back on again. If the message reappears, replace the main board.

Wild Hardware interrupt.

An unexpected error or memory failure occurred while running a program.

Corrective steps:

- Turn off the computer, wait 15 seconds, and turn it back on. Rerun the program.

- If the message reoccurs at the same place during the operation of a program, it may be software related. Have the customer contact the software manufacturer or dealer and report the problem.

- If the message reoccurs randomly, use the disk-based diagnostics to test the computer. Replace any faulty assemblies.

- Use the Dead System Troubleshooting Chart to correct the problem.

Wild interrupt!

An unexpected error or memory failure occurred while running a program.

Corrective steps:

- Turn off the computer, wait 15 seconds, and turn it back on. Rerun the program.

- If the message reoccurs at the same place during the operation of a program, it may be software related. Have the customer contact the software manufacturer or dealer and report the problem.

- If the message reoccurs randomly, use the disk-based diagnostics to test the computer. Replace any faulty assemblies.

- Use the Dead System Troubleshooting Chart to correct the problem.

Parts List

Table 5-1 lists field-replaceable parts. All part numbers are cross referenced to the exploded views in Figures 5-1, 5-2, and 5-3.
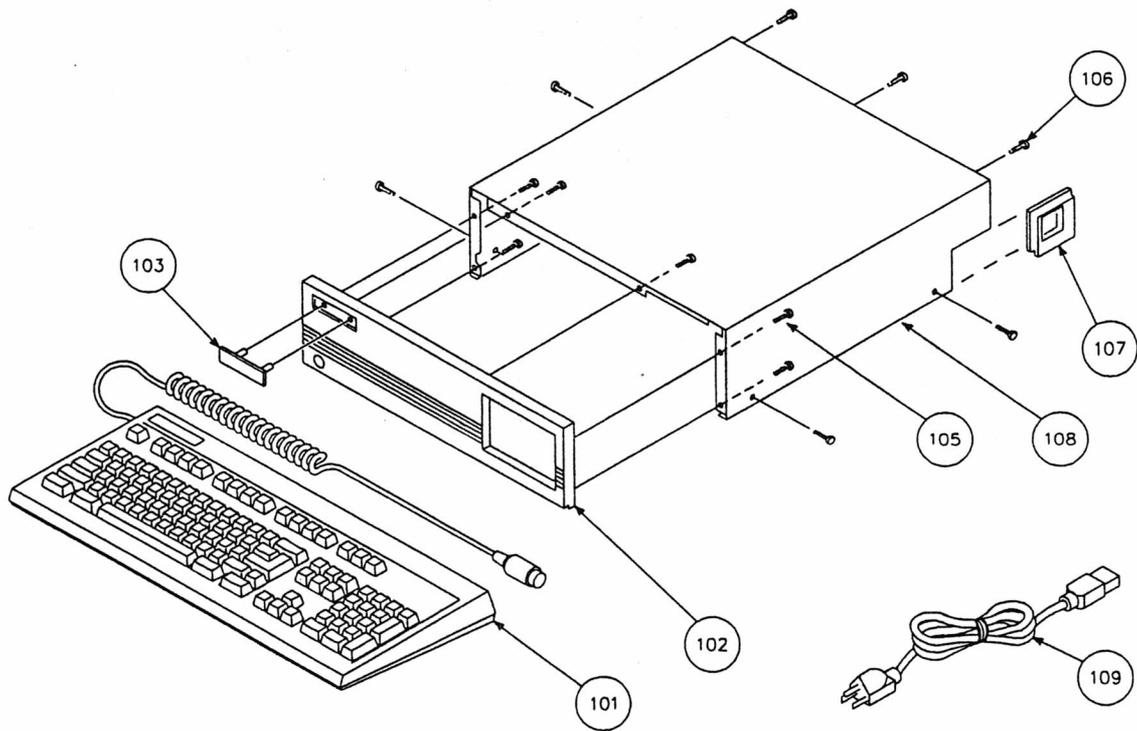
Figure 5-1. *Exploded View*
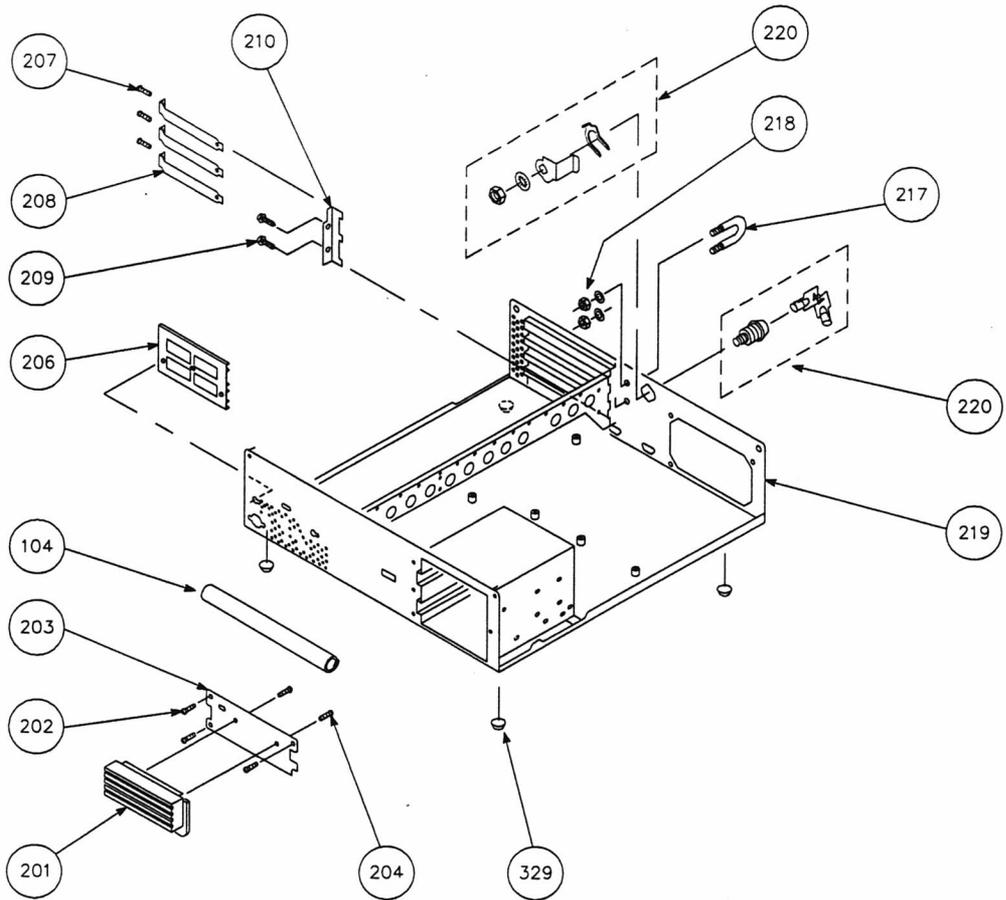
Figure 5-2. *Exploded View (continued)*
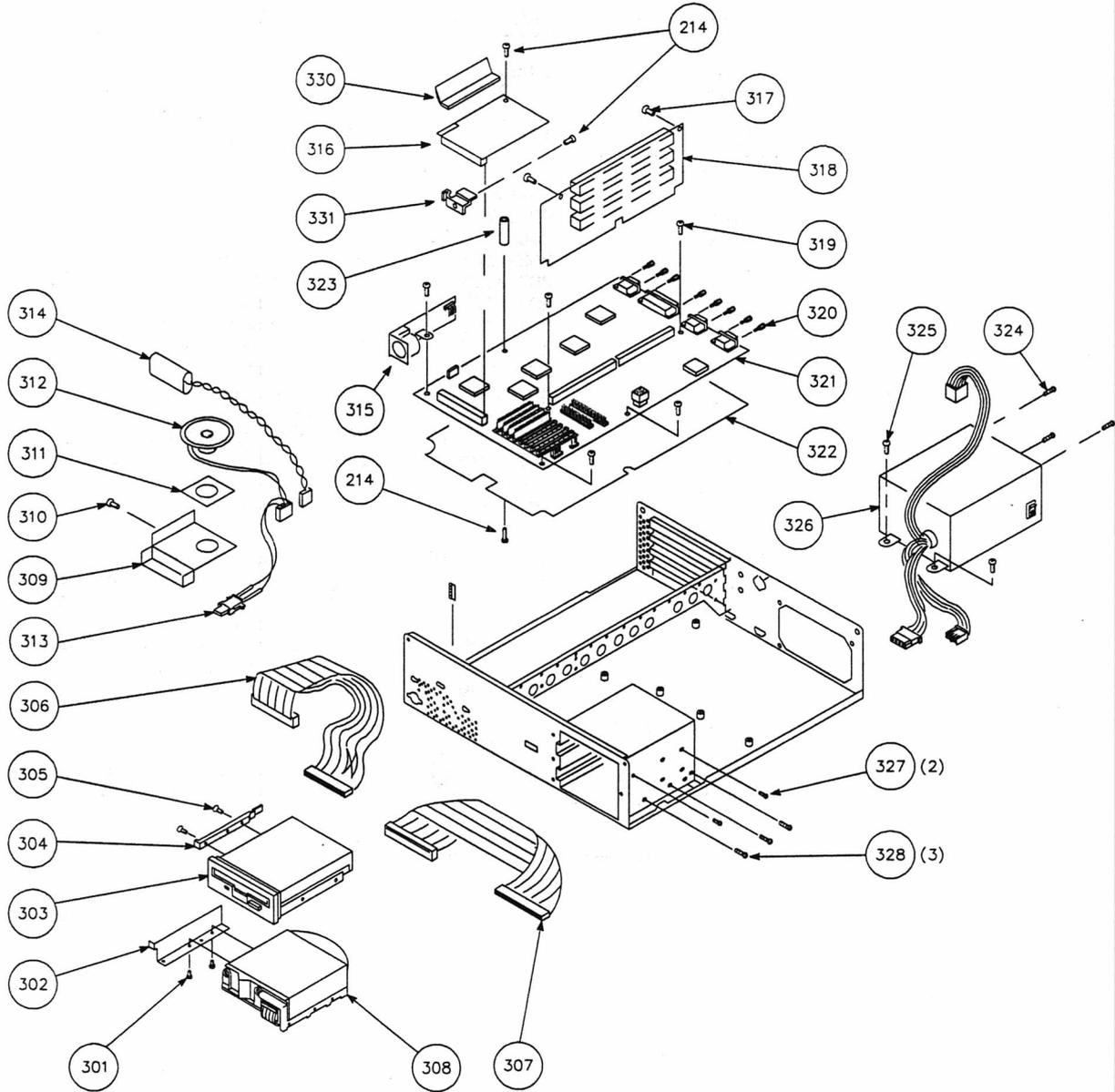
Figure 5-3. *Exploded View (continued)*

Table 5-1. *Field-Replaceable Parts*

REF. NUMBER	PART NUMBER	DESCRIPTION
Cables		
109	89-65	Line cord
306	134-2173	Floppy drive interface cable
307	134-2174	Hard drive interface cable
313	134-2176	LED/speaker cable
Chassis Parts		
322	75-908	Insulator, 7.75 x 12.75
108	90-1427-1	Cabinet
219	200-1660-01	Chassis assembly
201	203-2383	Front panel plug, w/o LED
102	203-2423	Front panel, molded
208	204-2721	Blank panel bracket
309	204-3370	Speaker mounting bracket
203	205-2112	Hard drive cover plate
104	206-1543	RFI gap shield
217	207-666	Security clamp
107	210-140	Power switch bezel
302	266-1295-1	Hard drive mount, plastic
304	266-1296	Molded drive guide, plastic
206	266-1299	Card guide, 3 section
331	266-1431	Module retainer
Circuit Boards		
321	240-7993-1F	Main circuit board w/1M memory LP
321	240-7993-10	Main circuit board w/2M memory SX/LP
321	240-8001-10	Main circuit board w/3M memory SX/LP
316	181-7880-20	80286 processor module
316	240-7879-20	80386SX processor module ZCA-2500-SX
315	181-7881-10	Keyboard interface board
318	181-7699-1B	Backplane board
Disk Drives		
303	151-1047-D1	3.5-inch, 1.4M floppy disk drive
308	151-1109-F1	20 MB hard disk drive, IDE
308	151-1108-F4	40 MB hard disk drive, IDE
Keyboard		
101	163-73-1	101-key keyboard

REF. NUMBER	PART NUMBER	DESCRIPTION
Miscellaneous Parts		
314	418-72	Lithium battery, 6V
	or	
	418-74	Alkaline battery, 4.5V
312	401-176	Speaker
311	73-267	Foam gasket
103	391-764-1	Front panel nameplate
326	234-1062	Power supply
323	255-914	Spacer
220	266-1425	Lock assembly
330	266-1432	Air baffle
Optional		
Not shown	134-2104	ZCA-2300-EF, ext. floppy drive cable
Not shown	181-7603-1C	ZCA-2300-EF, ext. floppy drive filter board
Not shown	443-1483	80287 coprocessor upgrade
Not shown	443-1603	80387SX coprocessor upgrade
Not shown	443-1536	1M 85ns memory SIMM w/parity
Not shown	150-483	256K memory SIMM w/parity
Hardware		
329	261-76	Foot
209	250-365	6-AB x .250 screw, slotted
106, 301, 310, 317, 319, 325	250-1538	6-32 x .250 screw, phillips pan
105, 204	250-1556	6-BT x .375 screw, phillips pan
202, 207, 324	250-1594	6-32 x .375 screw, phillips pan
218	252-799	6-32 x .250 nut, hex
214	250-1538	6-32 x .250 screw, phillips pan
Not shown	252-798	4-40 x .250 nut, hex lock
320	255-757	4-40 x .190 spacer, hex threaded
210	258-792	.010 spring, stamped
305	810-15	M3 x 5mm screw, phillips flat
327	810-16	M3 x 5mm screw, phillips pan
328	250-1679	6-32 x 3/16" machine, nylon

Specifications

CPU

Processor

Z-286LP Plus	Intel 80286 16-bit microprocessor, 12 MHz.
Z-316SX/LP	Intel 80386SX 32-bit microprocessor, 16 MHz.

Coprocessor

Z-286LP Plus	Intel 80287.
Z-316SX/LP	Intel 80387SX.

Memory

Main	256K, 512K, or 640K base memory. EMS memory up to 288K.
Expansion	Up to 7M extended memory on main board.
	Up to 7840K EMS memory on main board.
Maximum	16 megabytes.

Power Supply

Power Output	80 watts total power.
AC Input	100 to 130 VAC or 210 to 240 VAC, 50/60 Hz; auto-switching.
DC Output	+5 VDC, +12 VDC, -12 VDC.
Battery Backup	6-volt lithium or 4.5-volt alkaline battery for real-time clock and configuration information.

Input/Output

Parallel Port

One 25-pin Centronics-type parallel port (DB-25 connector). Configurable as LPT1, LPT2, LPT3, or disabled.

Serial Port

Two RS-232-C asynchronous serial ports (DB-9 connectors).

One start bit; 7- or 8-bit word length; one or two stop bits.

Selectable Baud Rates   110, 150, 300, 600, 1200, 2400, 4800, or 9600 baud (MS-DOS® options).

RI, CTS, DSR, DCD signals recognized. RTS and DTR control signals generated.

Half or full-duplex operation.

Disk Drives

Floppy

One 3.5-inch 1.4M floppy disk drive standard, write-protection recognized.

Optional external:

3.5-inch 720K

3.5-inch 1.4M

5.25-inch 360K

5.25-inch 1.2M

Hard

ZCV-2525-EC: One 20M, IDE

ZCV-2526-EC: One 40M, IDE

ZCV-3726-GM: One 40M, IDE

ZCV-3726-IM: One 40M, IDE

ZCV-3727-GM; One 80M, IDE.

Sound

Single channel, 8-Ω, 2-inch speaker.

Specifications

Video

VGA video built into the main circuit board.

Automatically detects and emulates various display modes: MDA, HGC, CGA, EGA, and VGA.

Memory

Display	256K of video RAM.
Video Interface	16-bit (8-bit I/O).

Output

Video Output Signals	Software configurable for most types of VGA monitors.
Signal Type	Analog RGB; 0 to 0.714 V; 75-ohm impedence; zero (0) volts represents black.

Sync

Horizontal	31.49 kHz.
Vertical	40 to 70 Hz.

Resolution

Standard VGA Modes	640 x 400 in 16 colors; 640 x 480 in 16 colors; 320 x 200 in 256 colors; 360 x 400 in 16 colors; 720 x 400 in 16 colors.
Modes with Appropriate Software and Monitor	800 x 600 in 16 colors; 960 x 720 in 4 colors; 1280 x 960 in monochrome.
Colors/Shades Displayed	Depends on video display and emulation mode: Monochrome — 2 to 16 levels on gray scale. Color — Up to 256 of 262,144 colors or shades.

Environment
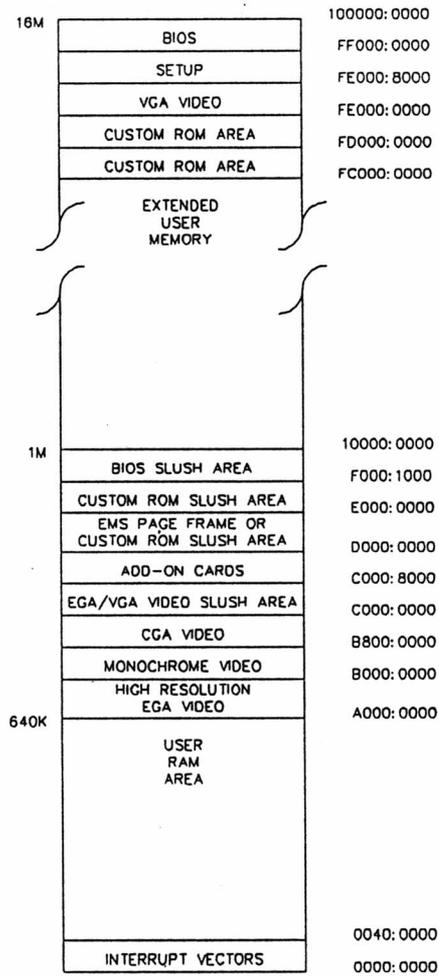
Operating

Temperature	60° to 95°F (15° to 35°C).
Humidity	10% to 80%.
Altitude	0 to 7000 feet (0 to 2133 m).

Memory Map

Figure S-1. *Memory Map*

16M	BIOS	100000: 0000
		FF000: 0000
	SETUP	FE000: 8000
	VGA VIDEO	FE000: 0000
	CUSTOM ROM AREA	FD000: 0000
	CUSTOM ROM AREA	FC000: 0000
	EXTENDED USER MEMORY	
1M	BIOS SLUSH AREA	10000: 0000
		F000: 1000
	CUSTOM ROM SLUSH AREA	E000: 0000
	EMS PAGE FRAME OR CUSTOM ROM SLUSH AREA	D000: 0000
	ADD-ON CARDS	C000: 8000
	EGA/VGA VIDEO SLUSH AREA	C000: 0000
	CGA VIDEO	B800: 0000
	MONOCHROME VIDEO	B000: 0000
	HIGH RESOLUTION EGA VIDEO	A000: 0000
640K	USER RAM AREA	
		0040: 0000
	INTERRUPT VECTORS	0000: 0000

Pinout Tables

The following tables list the signals available at the various connectors in the computer.

Table S-1. *Processor Module Connector (P507)*

PIN	SIGNAL	PIN	SIGNAL
1	INTR	51	NPER
2	D07	52	NPBUSY
3	A10	53	GND
4	D06	54	HLDA
5	MIO	55	Vcc
6	D05	56	A15
7	CPUA20	57	A21
8	D11	58	NPRST
9	D10	59	READY
10	AF16	60	A23
11	D03	61	TYPE0
12	D09	62	NPCS
13	D01	63	TYPE2
14	D08	64	A22
15	RESET3	65	A19
16	D00	66	S1
17	NPINT	67	GND
18	REF	68	A17
19	CLKEN	69	A18
20	NMI	70	CLK2
21	GND	71	A16
22	Vcc	72	A14
23	GND	73	A00
24	Vcc	74	D13
25	GND	75	D15
26	Vcc	76	A01
27	GND	77	S0
28	Vcc	78	A02
29	GND	79	D02
30	Vcc	80	PROCCLK
31	GND	81	BHE
32	D04	82	A03
33	GND	83	PROCHOLD
34	D12	84	A04
35	GND	85	BUSY
36	NC	86	A05
37	GND	87	IOCHRDY
38	Vcc	88	A06
39	GND	89	D14
40	Vcc	90	A07
41	GND	91	DCOK
42	Vcc	92	A08
43	GND	93	XIOR
44	Vcc	94	A09
45	GND	95	TYPE1
46	Vcc	96	A11
47	NC	97	XIOW
48	XA04	98	A12
49	NC	99	XA02
50	XA01	100	A13
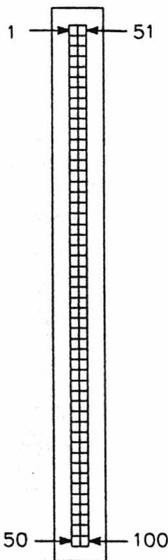
Table S-2. *Floppy Disk Drive Connector (P510)*
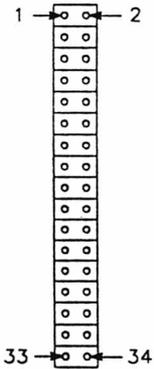
PIN	SIGNAL	PIN	SIGNAL
1	GND	18	DIR
2	SL0	19	GND
3	GND	20	STP
4	NC	21	GND
5	GND	22	WRD
6	NC	23	GND
7	GND	24	WRG
8	IND	25	GND
9	GND	26	TR0
10	MTR1	27	GND
11	GND	28	WPSA
12	DS2	29	GND
13	GND	30	RD
14	DS1	31	GND
15	GND	32	SD1
16	MTR2	33	GND
17	GND	34	DC

Table S-3. *Hard Disk Drive Connector (P511)*
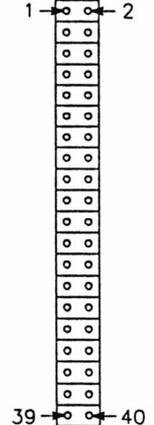
PIN	SIGNAL	PIN	SIGNAL
1	RESETDRV	21	NC
2	GND	22	GND
3	SD07	23	IOW
4	SD08	24	GND
5	SD06	25	IOR
6	SD09	26	GND
7	SD05	27	NC
8	SD10	28	BALE
9	SD04	29	NC
10	SD11	30	GND
11	SD03	31	DIRQ14
12	SD12	32	IOCS16
13	SD02	33	SA01
14	SD13	34	GND
15	SD01	35	WA0
16	SD14	36	SA02
17	SD00	37	HDCS0
18	SD15	38	HDCS1
19	GND	39	Vcc
20	GND	40	GND

Table S-4. *AT Bus Connector (P508)*

PIN	SIGNAL	PIN	SIGNAL
1	S8HE	32	MEMCS16
2	LA23	33	IOCS16
3	LA22	34	IRQ10
4	LA21	35	IRQ11
5	LA20	36	IRQ12
6	LA19	37	IRQ15
7	LA18	38	IRQ14
8	LA17	39	DACK0
9	MEMR	40	DREQ0
10	MEMW	41	DACK5
11	SD08	42	DREQ5
12	SD09	43	DACK6
13	SD10	44	DREQ6
14	SD11	45	DACK7
15	SD12	46	DREQ7
16	SD13	47	Vcc
17	SD14	48	MASTER
18	SD15	49	GND
19	Vcc	50	Vcc
20	Vcc	51	Vcc
21	Vcc	52	Vcc
22	GND	53	GND
23	GND	54	GND
24	GND	55	GND
25	GND	56	GND
26	GND	57	GND
27	GND	58	GND
28	GND	59	GND
29	GND	60	GND
30	Vcc	61	Vcc
31	Vcc	62	Vcc

32 → 1

62 → 31

Table S-5. *PC Bus Connector (P509)*
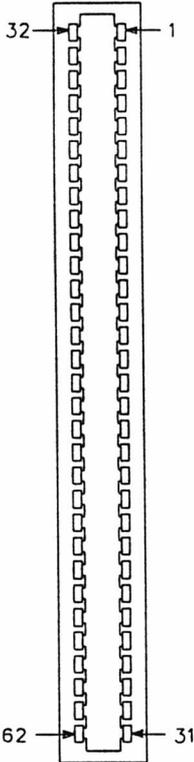
PIN	SIGNAL	PIN	SIGNAL
1	IOCHCK	32	GND
2	SD7	33	RESETDRV
3	SD6	34	+5V
4	SD5	35	IRQ9
5	SD4	36	-5V
6	SD3	37	DRQ2
7	SD2	38	-12V
8	SD1	39	0WS
9	SD0	40	+12V
10	BIOCHRDY	41	GND
11	AEN	42	SMEMW
12	SA19	43	SMEMR
13	SA18	44	IOW
14	SA17	45	IOR
15	SA16	46	DACK3
16	SA15	47	DRQ3
17	SA14	48	DACK1
18	SA13	49	DRQ1
19	SA12	50	REFRESH
20	SA11	51	CLOCK
21	SA10	52	IRQ7
22	SA9	53	IRQ6
23	SA8	54	IRQ5
24	SA7	55	IRQ4
25	SA6	56	IRQ3
26	SA5	57	DACK2
27	SA4	58	T/C
28	SA3	59	ALE
29	SA2	60	+5V
30	SA1	61	OSC
31	SA0	62	GND

Table S-6. *Video Port Connector (P503)*
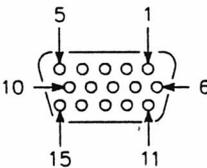
PIN	SIGNAL	PIN	SIGNAL
1	Red video	9	NC
2	Green video	10	GND
3	Blue video	11	NC
4	NC	12	NC
5	GND	13	HSYNC
6	GND	14	VSYNC
7	GND	15	NC
8	GND		

Table S-7. *Features Connector (P502)*
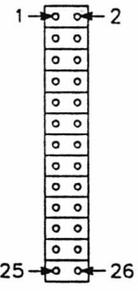
	PIN	SIGNAL	PIN	SIGNAL
	1	GND	14	Video data 6
	2	Video data 0	15	GND
	3	GND	16	Video data 7
	4	Video data 1	17	GND
	5	GND	18	PCLOCK
	6	Video data 2	19	GND
	7	ENDATA	20	BLANK
	8	Video data 3	21	GND
	9	ENSYNC	22	Horizontal sync
	10	Video data 4	23	NC
	11	ENPCLK	24	Vertical sync
	12	Video data 5	25	GND
	13	NC	26	NC

Table S-8. *Parallel Port Connector (P504)*
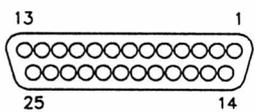
	PIN	SIGNAL	PIN	SIGNAL
	1	PSTROBE	14	PAUTOFD
	2	Data bit 0	15	PERROR
	3	Data bit 1	16	PINIT
	4	Data bit 2	17	PSLCTIN
	5	Data bit 3	18	GND
	6	Data bit 4	19	GND
	7	Data bit 5	20	GND
	8	Data bit 6	21	GND
	9	Data bit 7	22	GND
	10	PACK	23	GND
	11	PBUSY	24	GND
	12	PPE (paper end)	25	GND
	13	PSLCT (select)		

Table S-9. *Serial Port Connector (P505, P506)*

	PIN	SIGNAL	DESCRIPTION
	1	DCD	Carrier detect
	2	RXD	Receive data
	3	TXD	Transmit data
	4	DTR	Data terminal ready
	5	GND	Signal ground
	6	DSR	Data set ready
	7	RTS	Request to send
	8	CTS	Clear to send
	9	RI	Ring indicator
	Case		Chassis ground
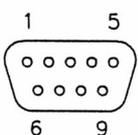
Table S-10. *Keyboard Connector (P501)*
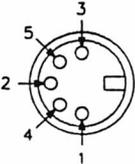
PIN	SIGNAL
1	Keyboard clock
2	Keyboard data
3	Keyboard reset
4	GND
5	+5V

Table S-11. *Main Power Connector (P514)*
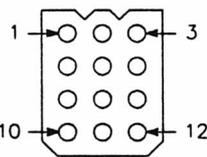
PIN	SIGNAL	WIRE COLOR
1	GND	Black
2	GND	Black
3	GND	Black
4	+5 VDC	Red
5	+5 VDC	Red
6	+5 VDC	Red
7	+12 VDC	White
8	GND	Black
9	-12 VDC	Orange
10	NC	
11	NC	
12	DCOK	Yellow

Table S-12. *Speaker/LED Connector (P512)*

PIN	SIGNAL
1	LED +
2	Speaker -
3	Speaker +
4	NC
5	LED -
6	NC

Specifications

Configuration

This section describes hardware jumper settings for the computer. For information about connector pinouts, refer to the tables earlier in this chapter.

Main Board

The main board contains several jumper blocks. Figure S-2 illustrates their locations and default settings. Table S-13 describes the settings.

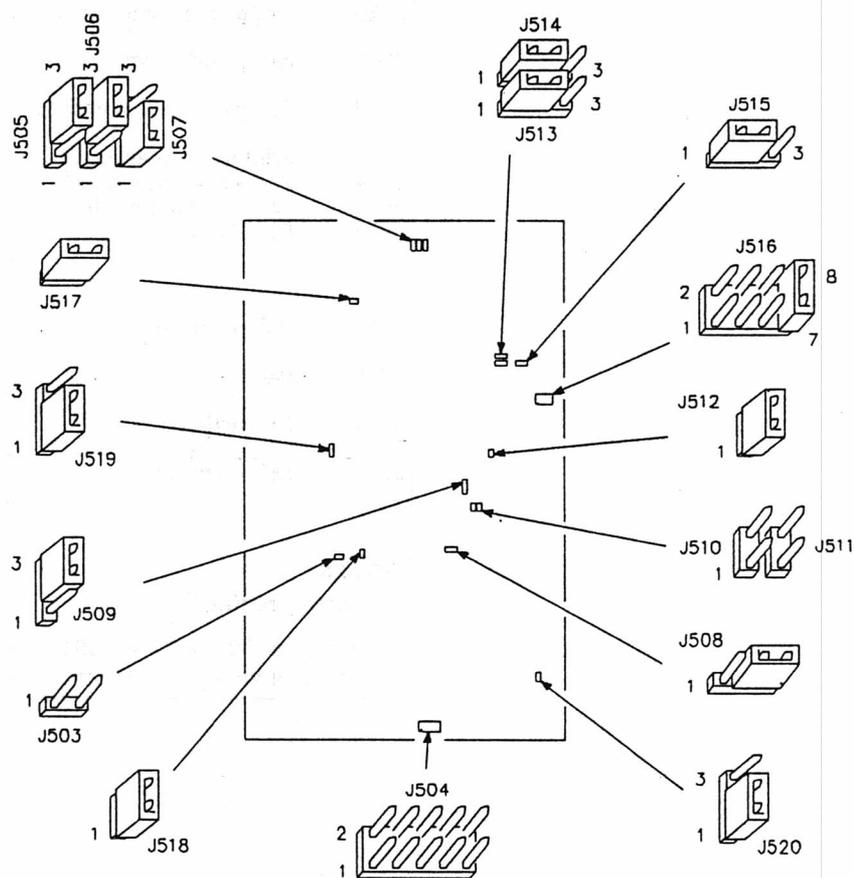*Figure S-2.* Location of Jumpers on the Main Board

Table S-13. *Main Board Jumper Settings*

JUMPER	DESCRIPTION	SETTING	CONDITION
J503	Keyboard reset	On	Enabled
		Off[1]	Disabled
J504	SCP inputs	1-2	OFF=normal; ON=page mode
		3-4	OFF=0 WS; ON=1 WS
		5-6	Not defined
		7-8	Not defined
		9-10	OFF=parity; ON=no parity
		None[1]	
J505[2]	Printer/scanner select	2-3[1]/1-2	
J506[2]	Printer/scanner select	2-3[1]/1-2	
J507[2]	Printer/scanner select	1-2[1]/2-3	
J508	EPROM size	1-2	32K x 8
		2-3[1]	64K x 8 or 128K x 8
J509	Hard drive type	1-2	Older Conner drives
		2-3[1]	All other drives
J510	Floppy pre-compensation	On	187 nanoseconds
		Off[1]	125 nanoseconds
J511	Floppy drive type	On	1.2M, 5.25-inch
		Off[1]	No 1.2M, 5.25-inch
J512	Floppy controller enable	On[1]	Enabled
		Off	Disabled
J513[2]	Printer/scanner select	1-2[1]/2-3	
J514[2]	Printer/scanner select	1-2[1]/2-3	
J515[2]	Printer/scanner select	1-2[1]/2-3	
J516	82C605 ID	1-2	
		3-4	
		5-6	
		7-8[1]	
J517	Video interrupt	On[1]	Enabled
		Off	Disabled
J518	Parity	On[1]	Enabled
		Off	Disabled
J519	LED activity	1-2[1]	Hard drive only
		2-3	Hard drive and floppy drive
J520	LED quantity	1-2[1]	Single two-color LED
		2-3	Separate hard drive and floppy drive LEDs

NOTES

1. Factory setting.

2. Jumpers J505–J507 and J513–J515 must all be properly configured in order for your parallel port to operate properly.

80286 Processor Module

The 80286 processor module (PCB# 85-3597) contains two hardware jumpers, illustrated in Figure S-3. The 80286 processor module (PCB# 85-3509) contains one hardware jumper, illustrated in Figure S-3. The jumpers are used for setting the clock speed of a numeric coprocessor. Table S-14 describes the settings.

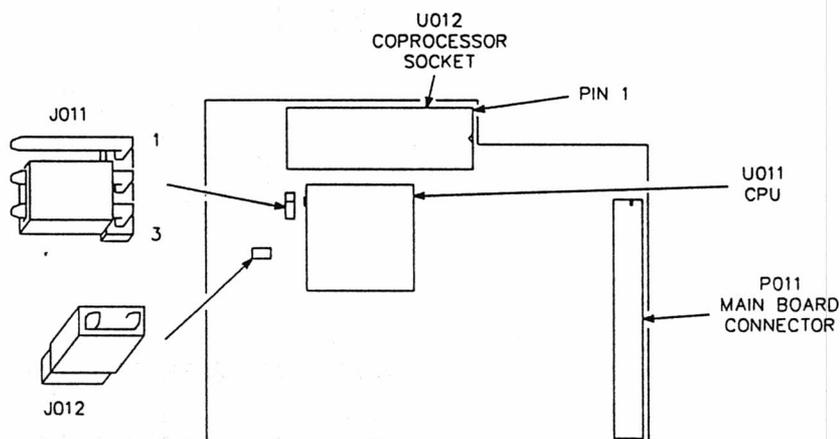**Figure S-3.** *80286 Processor Module Jumper Locations (85-3597)*
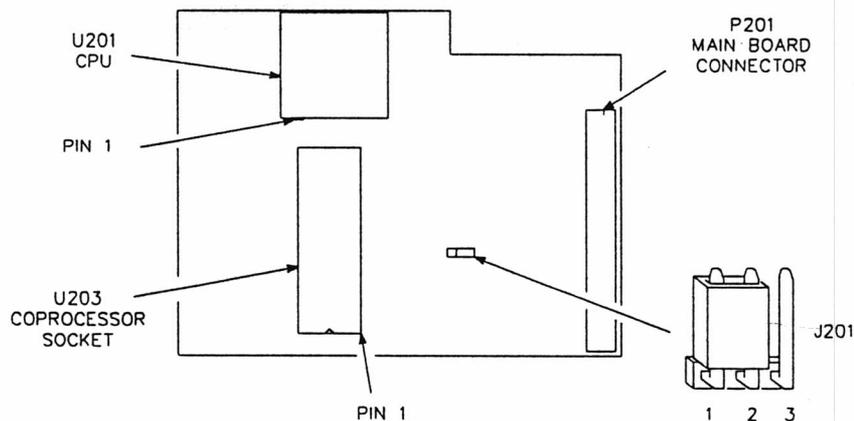

Figure S-4. *80286 Processor Module Jumper Locations (85-3509)*

Table S-14. *80286 Processor Module Jumper Settings*

JUMPER	DESCRIPTION	SETTING	CONDITION
J011	Coprocessor clock speed (85-3597)	1-2 [1] 2-3 [1]	12 MHz 32 MHz
J012	Divide coprocessor clock speed (85-3597)	On [1] Off	Divide clock by 3 Do not divide
J201	Coprocessor clock speed (85-3509)	1-2 [1] 2-3	32 MHz/3 42 MHz/3

NOTE

1. Factory setting.

80386SX Processor Module

The 80386SX processor module (PCB# 85-3594-01 and PCB# 85-3666-01) contains one hardware jumper, illustrated in Figure S-5. The jumper is used for determining the reset type of a numeric coprocessor. Table S-15 describes the settings.

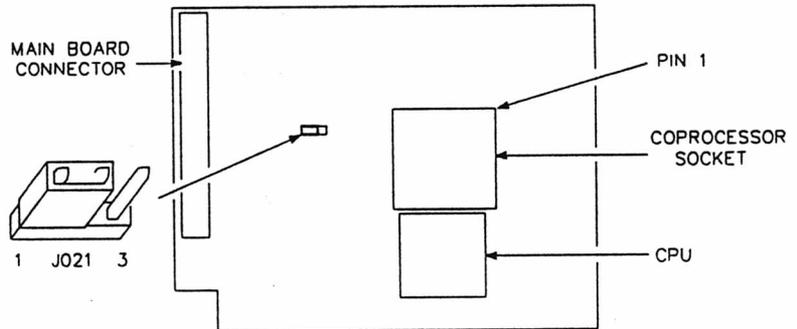*Figure S-5.* 80386SX Processor Module Jumper Location



Table S-15. 80386SX Processor Module Jumper Settings

JUMPER	DESCRIPTION	SETTING
J021	CPU can reset coprocessor	1-2[1]
	CPU cannot reset coprocessor	2-3

NOTE
1. Factory setting.

Keyboard

Some 101-key keyboard models can be set for either XT or AT operation via a switch located beneath the logo nameplate (Figure S-6), or on the underside of the keyboard (Figure S-7). To access the switch on the top of the keyboard, use a small screwdriver to gently pry up the nameplate. The switch positions are labeled AT and XT. Position the switch in the AT position for use with this computer.

Figure S-6. *AT/XT Compatibility Switch*
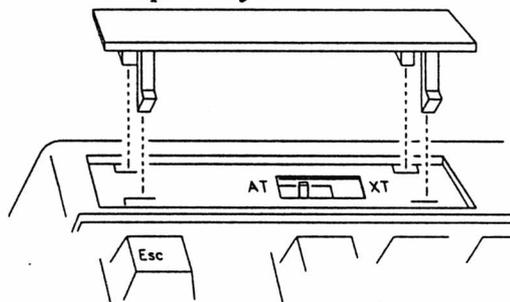
To set the switch on the underside of the keyboard, turn the keyboard over and set the 3-position switch to either of the two AT settings:

- AT/R — red LEDs in the keys
- AT/G — green LEDs in the keys.

Figure S-7. *AT/XT Compatibility Switch*