ZENITH
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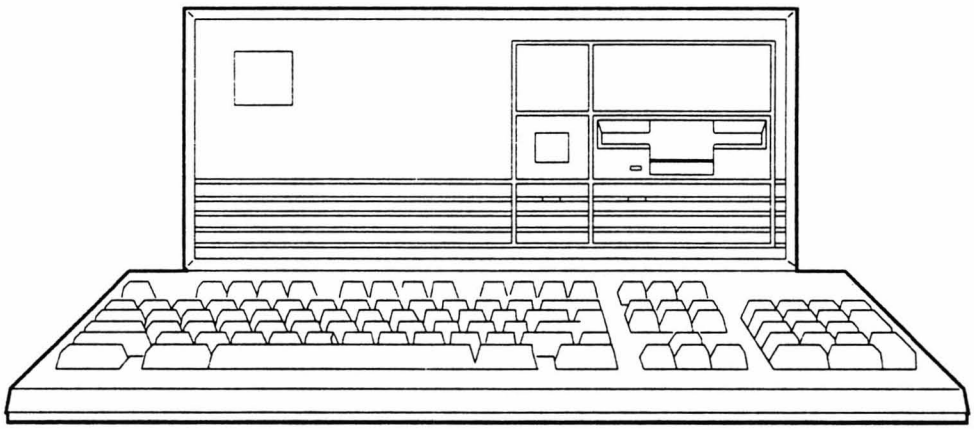

Z386 SX 16/20

Service Manual

860-227 585-327-01

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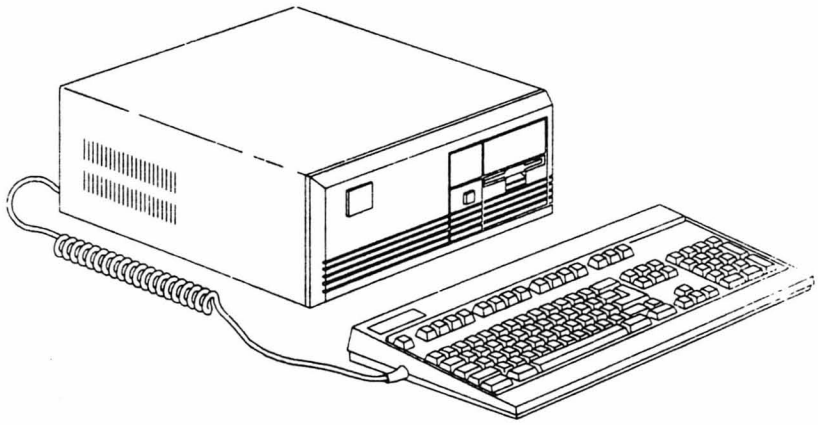
Zenith Data Systems Corporation
St. Joseph, Michigan 49085

Contents

Chapter 1
Introduction

The Z-386SX computer is a PC/AT-compatible personal desktop computer.

Figure 1-1. *Z-386SX Computer*



Related Materials

- Owner's Manual — Part number 595-4851-01
- Disk-Based Diagnostics — Part number CB-31-07.

Tools

Use the following tools to service this computer:

- Small flat-blade screwdriver
- #0 and #1 Phillips screwdrivers
- 1/4-inch hex nutdriver
- Small adjustable wrench.

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, the backplane board, a floppy disk drive, a hard disk drive, and a power supply.

Main Board

The main board contains the:

- CPU
- Coprocessor, if one is installed
- System RAM
- System ROM
- Serial and parallel ports
- Keyboard controller
- Real-time clock/battery IC
- Floppy disk drive controller, in some models
- Hard disk drive interface; on some models. (The hard drive controller is integrated into the drive.)

Backplane Board

The backplane board contains the:

- 5 expansion bus slots
- Floppy disk drive controller, in some models.
- Hard disk drive interface; on some models. (The hard drive controller is integrated into the drive.)

Optional Hardware

The following hardware options are available for this computer.

- 80387SX coprocessor
- 2M memory upgrade
- Internal 5.25-inch floppy disk drive (if not already present)
- Internal 3.5-inch floppy disk drives (maximum of two installable)
- Computer stand, for tower configuration
- SCSI controller card
- Internal SCSI tape backup unit
- External SCSI disk drives.

Chapter 2

Operation

This chapter covers power-up, resetting the computer, the Monitor program, and other operating information for the Z-386SX computer.

Power Up

Turn the computer on using the power switch mounted on the front panel.

When power is applied:

- The power supply fan starts
- The keyboard resets (status LEDs blink), NUM LOCK remains lit
- Disk drives initialize (access indicators light, heads seek)
- 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 (when autoboot option is configured).

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

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

Refer to the operating system documentation for installing operating system software.

If the computer detects faults during the power-up sequence, error messages may appear on the display (if the computer can drive the display). For further information on error messages consult the "Tests and Error Messages" appendix in the *Owner's Manual*.

Resetting the Computer

There are three different ways to reset the computer:

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, INS keys, then release them. This resets the CPU, reinitializes the computer and enters the Monitor program.

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

The Monitor Program

The MFM-300 Monitor program contains:

- Power-up tests to detect problems that would prevent additional tests 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.

Entering the Monitor Program

Use the following command to enter the Monitor program:

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

```
MFM-300 Monitor, Version x.xx
Memory size: xxxK + xxxxK + xxK Cache
Enter "?" for help.
->_
```

The first line indicates the ROM version. The second line indicates how much memory is installed, including base, extended, and cache memory. The third line gives the syntax for the help command. The fourth line shows the Monitor prompt indicating that the Monitor program is waiting for a command to be entered.

Once the computer has entered the Monitor program type a question mark (?) and press enter to display the Monitor program command summary menu.

All of the commands listed in the command summary may be used. Use the syntax (exact command entry) shown, type the command, then press ENTER. If the syntax is wrong, the computer reports that an invalid command was entered. The command syntax uses:

- Brackets [*option*] indicate optional entries.
- Braces { *choice* | *choice* } indicate a choice of entries.
- Angle braces <*variable*> indicate specified variables.

Boot Command

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

B[{F|W}][{0|1|2|3}][:<PARTITION>]

Extend the boot command to BF (boot from floppy) or BW (Boot from Winchester, a reference to the hard disk) to boot a specific drive. If more than one drive type is installed, add the drive numbers (0 or 1) and partition numbers as required.

Error messages appear if an attempt is made 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 the "Tests and Error Messages" appendix in the *Owner's Manual* and to Chapter 3 of this manual.

If the computer has been configured in such a way that it is not possible to boot, use the XR command. At the Monitor prompt, entering XR will destroy the previous configuration information and forces the computer to boot. It is useful only when the computer has been configured in such a way as to make it unbootable. After using the XR command, configuration errors may appear as a reminder to enter a new configuration.

User Tests

The Monitor program contains five user-selectable 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 there must be a formatted disk in the drive.

Successful completion of this test only indicates 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.

The *Technical Reference Manual* contains a detailed listing of scan codes for the computer.

Base Memory Test — All memory in the first megabyte of the system memory map, including video memory, is tested.

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

Extended Memory Test — All installed memory above the 1 megabyte base memory area is tested. 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:

- Crystal frequencies
- Interrupt controllers
- DMA controllers
- Disk drive controller
- Timer 1 interrupt
- CPU
- ROM
- RAM.

Chapter 3

Troubleshooting

This chapter provides troubleshooting procedures for the Z-386SX and Z-386SX 16/20 computers. Enough information is provided to diagnose most faults to the major assembly level.

Preliminary Checks

Before you begin troubleshooting, perform the following:

- Look for physical signs of damage to the circuit cards, chassis parts, and cables.
- Verify that each card or board is properly configured. (Refer to *Specifications*.)
- Verify that all cards are properly seated in their connectors.
- Check all cable connections.
- Check the AC line fuse.
- Remove any optional cards that are not part of the base computer configuration.

Status LEDs

There are two sets of status LEDs in the computer. Figure 3-1 illustrates the power/drive status LEDs. These LEDs are located on the front of the base unit, and indicate power status and floppy/hard disk drive activity.

Figure 3-1. *Power/Drive Status LEDs*

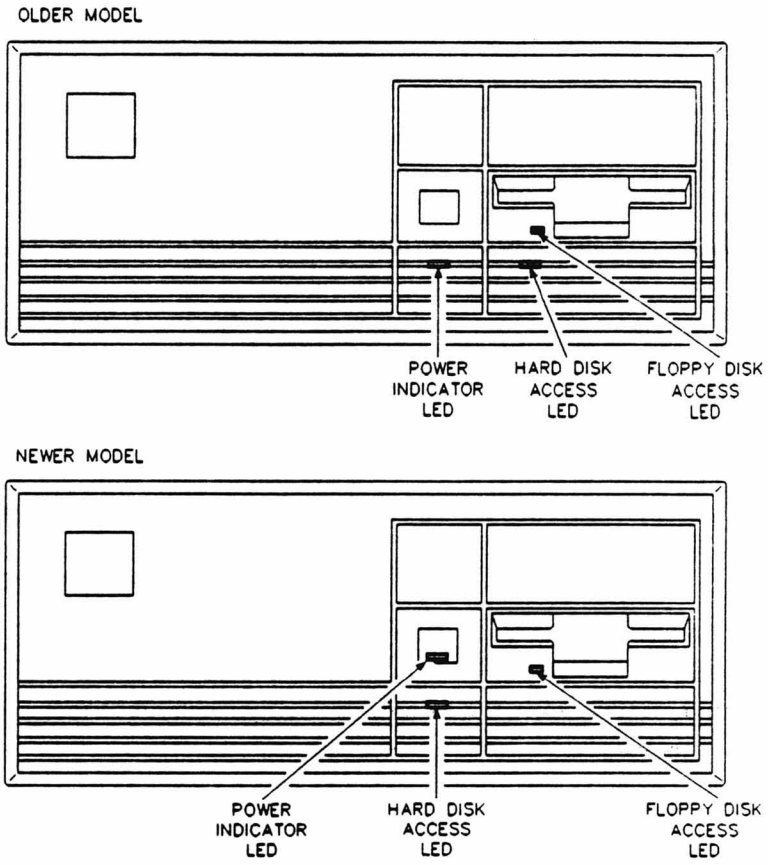
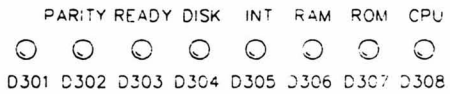


Figure 3-2 illustrates the second set of LEDs, located inside the computer at either the top of the backplane board or on the system board, depending on the computer model. These LEDs indicate the status of various parts of the computer during the internal diagnostic test.

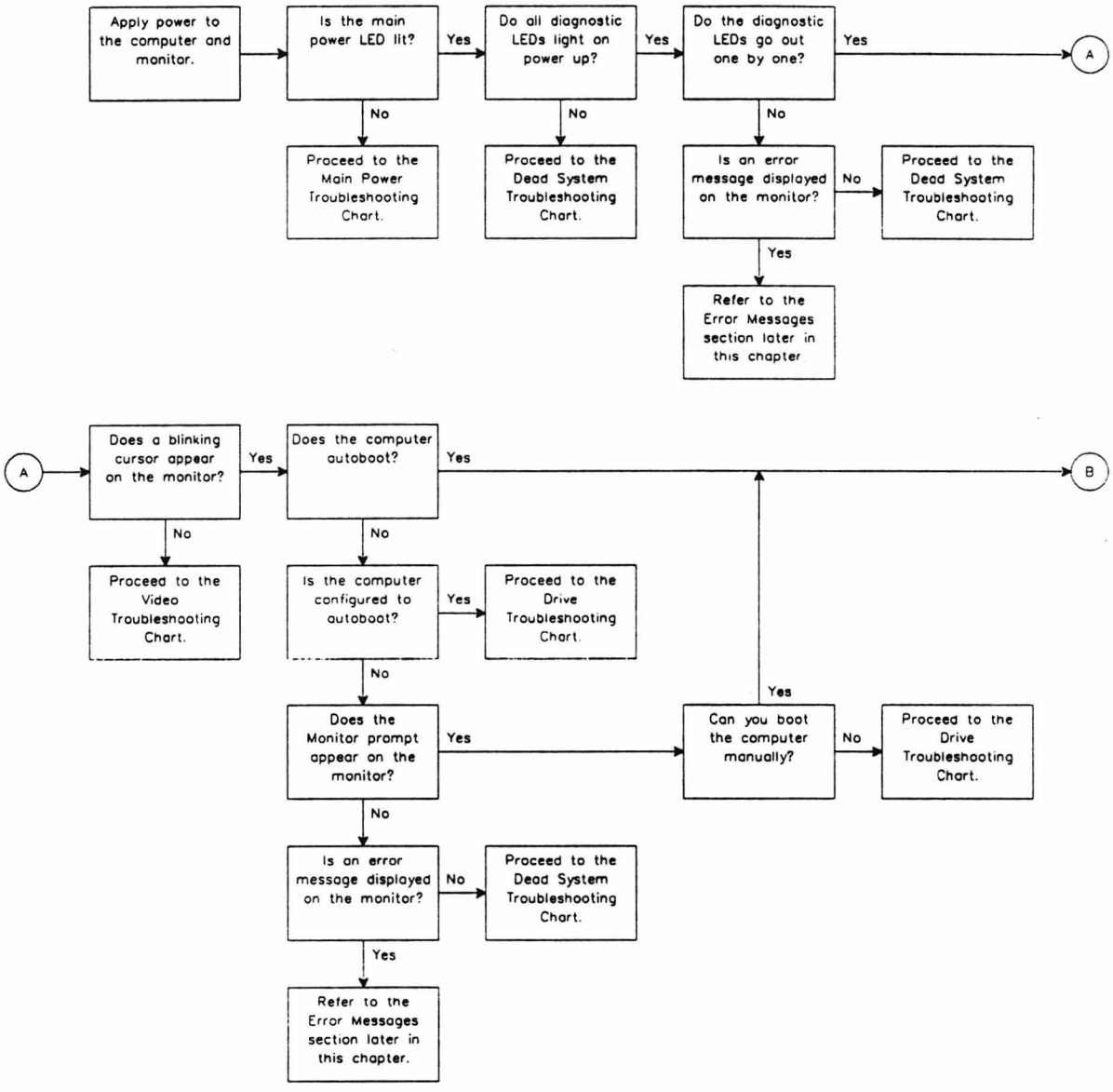
Figure 3-2. *Internal Diagnostic Status LEDs*



Troubleshooting Charts

The following pages contain a series of troubleshooting charts designed to assist in diagnosing failures to the major assembly level. Begin with the General System Troubleshooting Chart. This chart directs you to either replace a part or proceed to a more detailed chart (which identifies the faulty assembly or recommends further tests to isolate the problem). Follow the sequence through until you locate and repair the problem.

Figure 3-3. *General System Troubleshooting Chart*



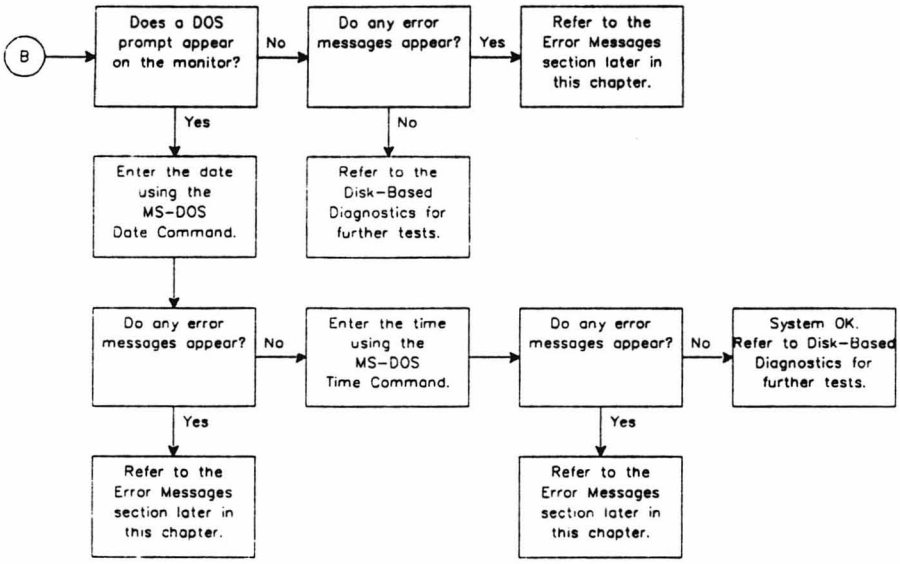
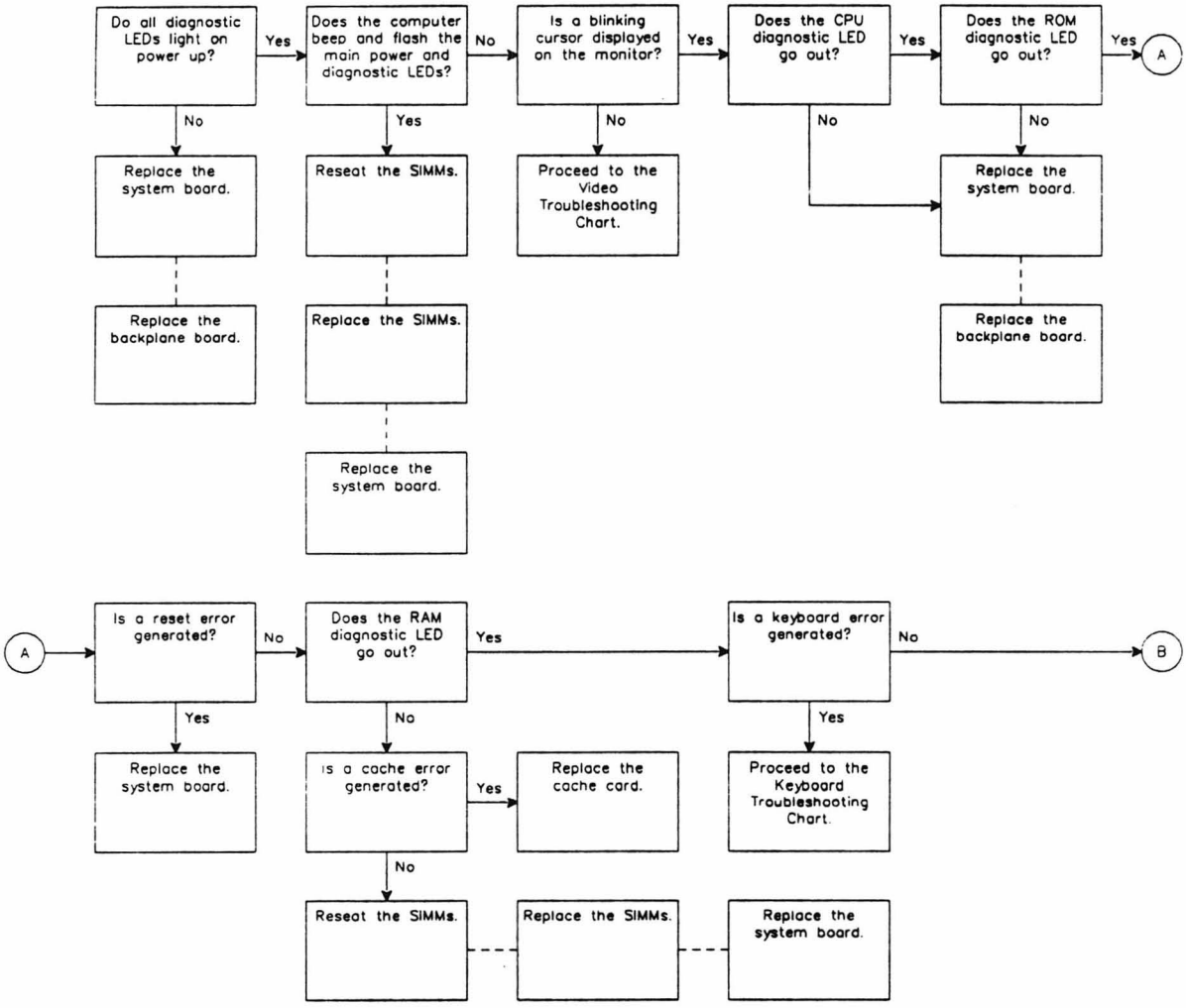
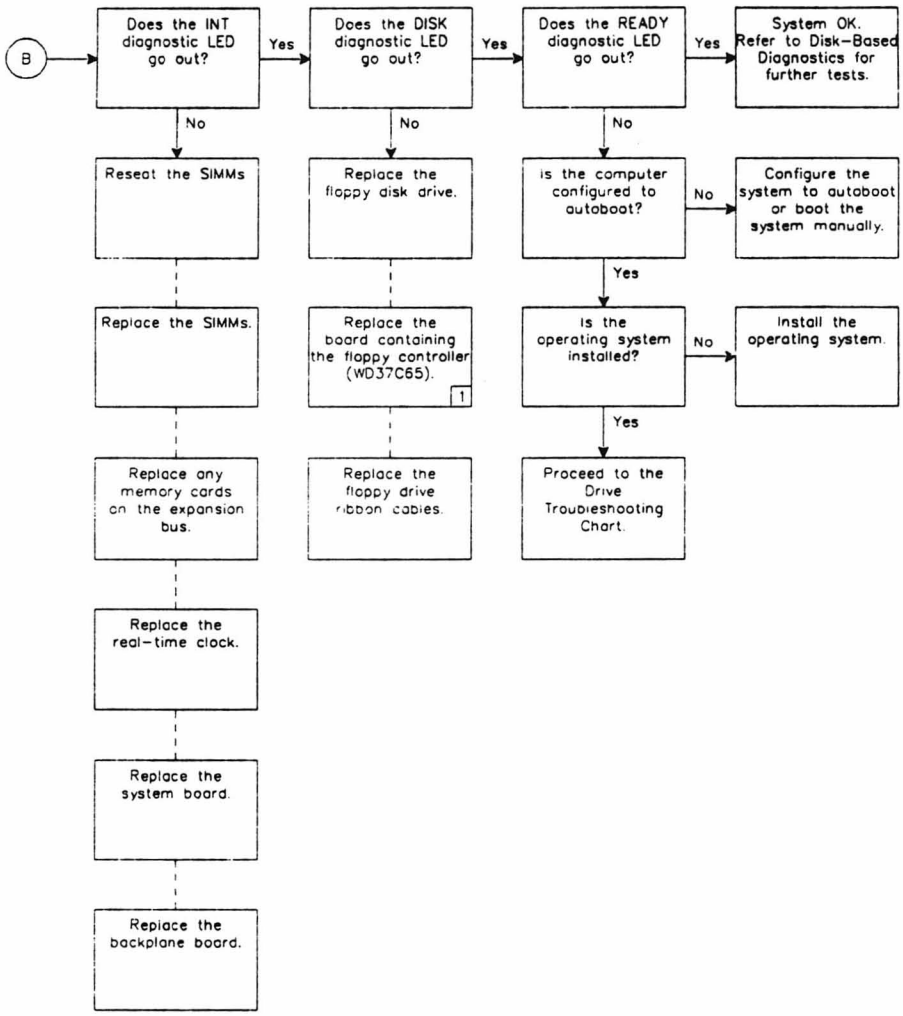

B
Does a DOS prompt appear on the monitor?
No
Do any error messages appear?
Yes
Refer to the Error Messages section later in this chapter.
Yes
No
Enter the date using the MS-DOS Date Command.
Refer to the Disk-Based Diagnostics for further tests.
Do any error messages appear?
No
Enter the time using the MS-DOS Time Command.
Do any error messages appear?
No
System OK. Refer to Disk-Based Diagnostics for further tests.
Yes
Yes
Refer to the Error Messages section later in this chapter.
Refer to the Error Messages section later in this chapter.

Figure 3-4. *Dead System Troubleshooting Chart*





NOTE
1. The floppy disk controller is located on either the backplane board or the system board, depending on the computer model.

Figure 3-5. *Keyboard Troubleshooting Chart*

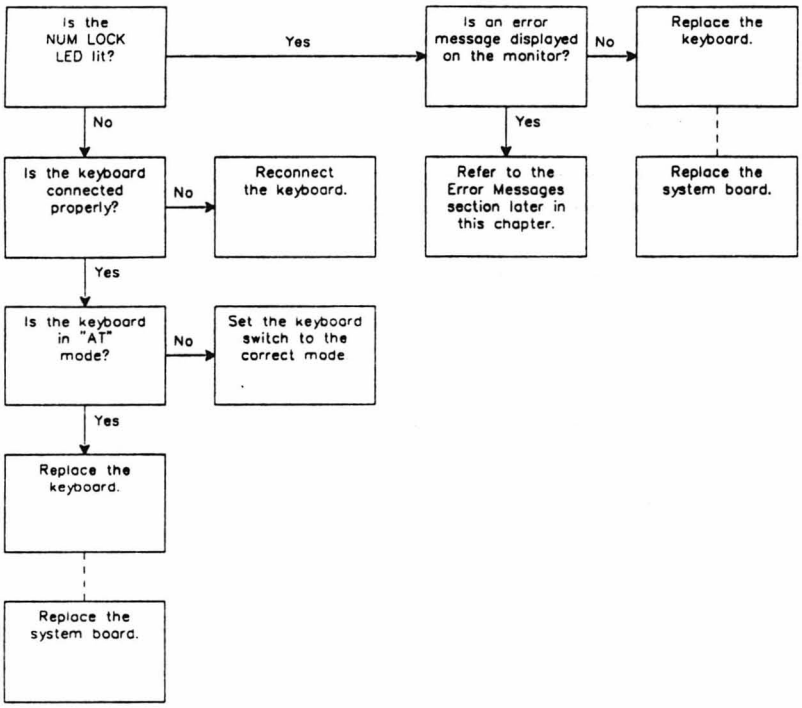
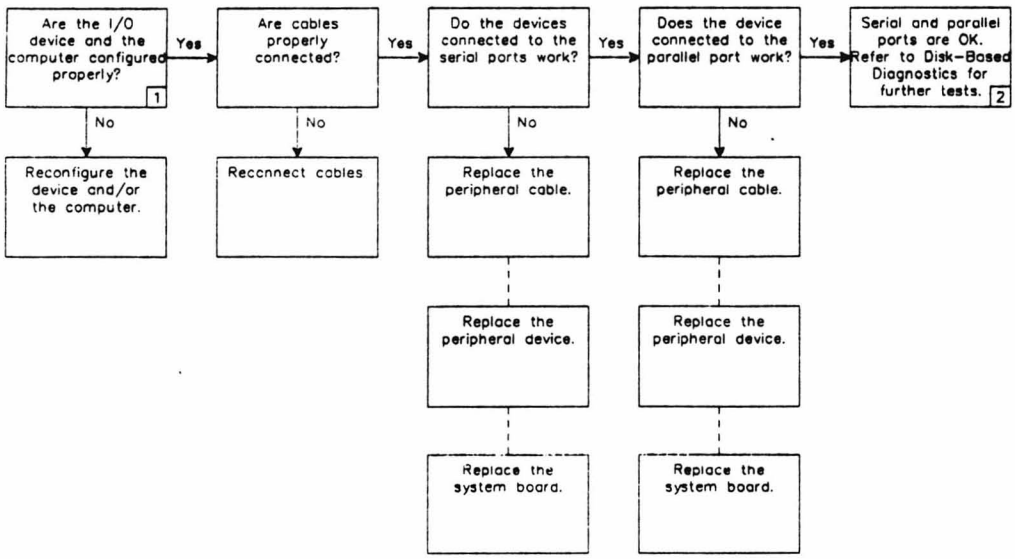


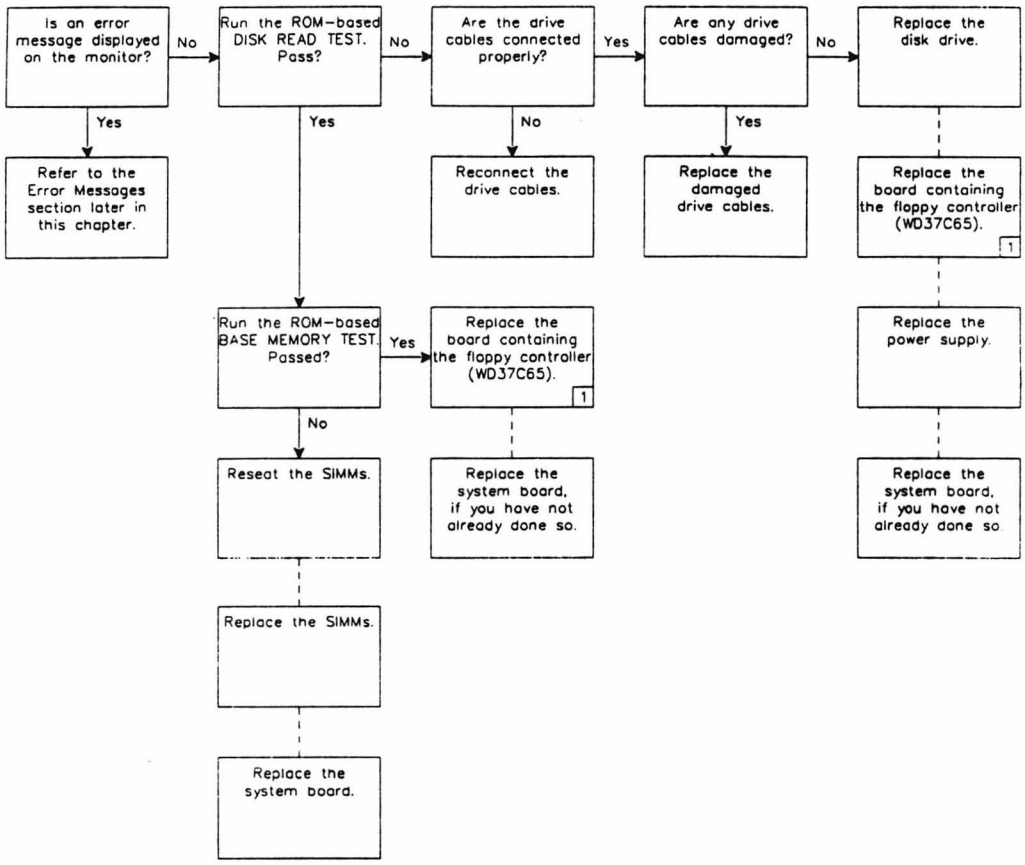
Figure 3-6. *Parallel/Serial Port Troubleshooting Chart*



NOTES

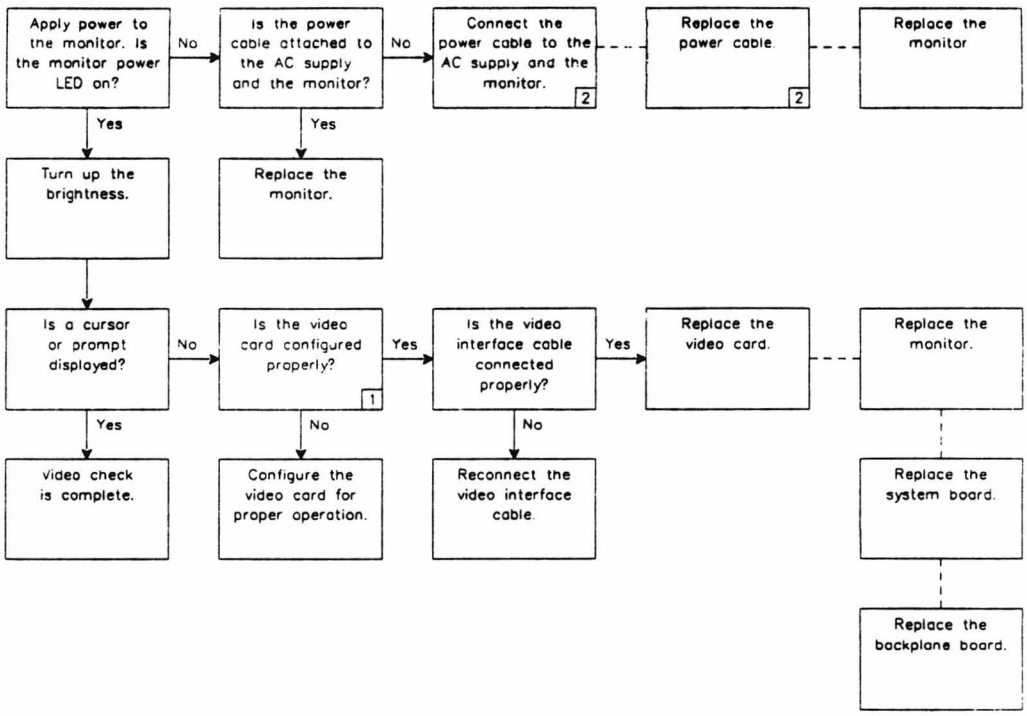
1. Run the Setup program to verify proper computer configuration, I/O device configuration, and to verify that the device(s) is (are) enabled. Check the peripheral device documentation to verify hardware configuration.
2. Disk-Based Diagnostics tests require the serial loopback connector (438-73) and parallel loopback connector (438-64).

Figure 3-7. *Drive Troubleshooting Chart*



NOTE
1. The floppy disk controller is located on either the backplane board or the system board, depending on the computer model.

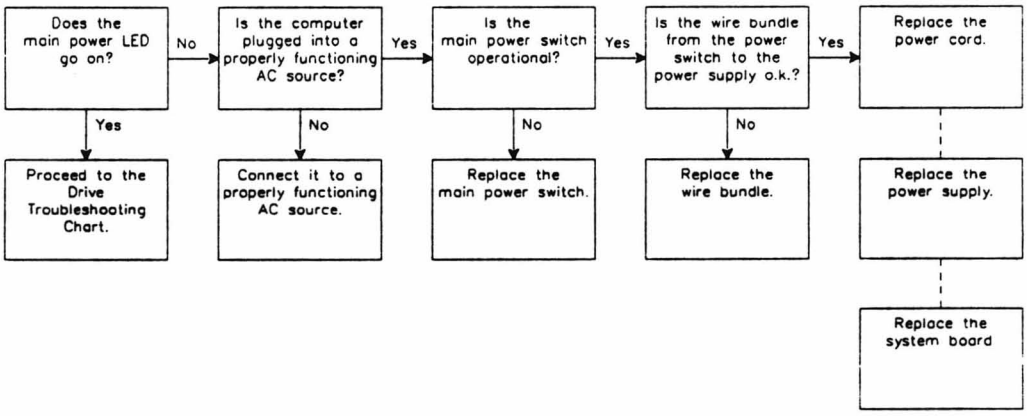
Figure 3-8. *Video Troubleshooting Chart*



NOTES

1. Refer to the Specifications appendix in the back of this manual or to the video card manufacturer's documentation for hardware configuration information. Also, check the Setup program to verify proper configuration.
2. On some monitors the power cable cannot be removed. Replace the monitor instead.

Figure 3-9. *Main Power Troubleshooting Chart*



Disk-Based Diagnostics

An optional disk-based diagnostics package (CB-31-06) is available for this computer. The disk-based diagnostics are configurable and provide an extensive and detailed series of tests for the computer.

Error Messages

This section lists the various error messages the computer may display. It also includes an explanation of each message and steps to correct the error condition.

DISK ERROR: Bad disk controller!

This message occurs when a disk drive cable is damaged or is not securely connected. The error message may also result from an incorrectly seated controller card, or when a hardware failure has occurred.

Corrective steps:

1. Inspect the disk drive power and data cables for nicks or other damage.
2. Verify that all cables are properly connected.
3. Reseat the drive controller card.
4. Use the DISK READ TEST to determine whether the drive or the controller card is at fault. (Refer to the computer *Owner's Manual* for instructions on running the DISK READ TEST.) Replace the failing unit.

DISK ERROR: CRC error!

This message indicates a faulty disk, a drive failure, or a loose or faulty drive cable. The drive controller card can also be the problem.

Corrective steps:

1. Try another disk; if the problem disappears, then the original disk is bad. Copy any readable files to a good disk and reformat the faulty disk. If bad sectors are reported, discard it.
2. If more than one disk drive is installed, try the other drive. If the second disk drive works, replace the first drive.
3. Inspect all power and signal cables for nicks or other damage.
4. Inspect all cables for proper installation.
5. Replace the main board.

DISK ERROR: DMA overrun!

The problem is caused by a DMA hardware failure.

Corrective step:

1. Replace the main board.

DISK ERROR: Disk not bootable!

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

Corrective steps:

1. Verify that the disk is bootable. If it isn't, reformat the disk and install the operating system.

2. For a hard disk drive, first try to re-install the operating system. If necessary, back up the drive and use PREP to reinitialize the disk. Reformat the drive and install the operating system. As a last resort, replace the drive.

DISK ERROR: Drive not ready!

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

Corrective steps:

1. Verify that the correct drive was specified.

2. Verify that the disk is properly and fully inserted in the drive and, for a 5.25-inch drive, the door is latched and closed.

3. Replace the drive.

DISK ERROR: Invalid address mark detected!

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

Corrective steps:

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

2. If the problem is a hard disk and reformatting does not work, replace the drive.

DISK ERROR: Invalid data read!

The floppy disk is damaged or was not properly formatted.

Corrective step:

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

DISK ERROR: Sector not found!
DISK ERROR: Seek failure!

These error messages are similar and mean that the computer attempted to access an unformatted or damaged floppy disk.

Corrective step:

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

ERROR: Bad configuration information found in CMOS!

This message is normal after back-up battery replacement, or it could indicate a back-up battery failure. When it appears, the message "Errors found! Please press <ESC> to continue" also appears at the bottom of the screen.

Corrective steps:

1. Use the Setup/Configuration program to re-enter the configuration information. (Refer to the computer *Owner's Manual* for instructions on running this program.)

2. Refer to the *Owner's Manual* and replace the back-up battery.

ERROR: Base memory size error! SETUP: XXXK ACTUAL: YYYK

The amount of base memory specified in the Setup/Configuration program does not agree with the amount of base memory identified during powerup. The error can also indicate a faulty or improperly installed memory module.

Corrective steps:

1. Use the Setup/Configuration program to verify the correct base memory size.
2. Inspect the memory modules for proper installation.
3. Use the 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 base memory module and try again. If the tests identify a memory module, replace it. If the tests identify any other problem, replace the main board.

ERROR: CPU failure!

Either the CPU or supporting circuitry suffered a hardware failure.

Corrective step:

1. Replace the main board.

ERROR: Extended memory size error! SETUP: XXXXXK ACTUAL: YYYYYK

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

Corrective steps:

1. Use the Setup/Configuration program to verify the memory size entry.
2. Inspect all memory modules for proper installation.
3. Use the EXTENDED MEMORY TEST to check extended memory.
4. Use the disk-based diagnostics to test extended memory. If you cannot boot the computer, replace the base memory module and try again. If the tests identify a memory module, replace it. If the problem is on a memory expansion card, replace the indicated memory module or the card. If the tests identify any other problem, replace the main board.

ERROR: Invalid/No keyboard code received!
ERROR: Keyboard not responding or not connected!

The keyboard is not properly connected or the cable is damaged.

Corrective steps:

1. Verify that the keyboard is properly connected.
2. Replace the keyboard.
3. Replace the main board.

ERROR: Overflow!
Divide by zero!

Either of these messages appears if a power-up self-test fails, or if the computer is turned off then on again too quickly. This problem can also be software related.

Corrective steps:

1. Try another copy of the program. If the error message reappears, have the customer contact the software manufacturer or dealer to report the problem.
2. Unless this message occurs during the power-up sequence, the problem is most likely to be software related. Otherwise, turn the computer off, wait for 15 seconds, then turn it back on. If the message reappears, replace the main board.

ERROR: Please replace the back-up battery!

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

Corrective steps:

1. If the battery was recently replaced, use the Setup/Configuration program to enter the proper hardware configuration settings for the computer.
2. Refer to the *Owner's Manual* and replace the back-up battery.

ERROR: RAM failure! Address: XXXX:YYYY Bit: N Chip: Uxxx

The power-up tests detected a memory failure.

Corrective steps:

1. Inspect the memory chip identified in the message for proper installation.

2. Swap the suspect memory chip with another memory chip. If the problem disappears, the suspect chip was not installed correctly. If the problem moves, the chip is defective.

ERROR: ROM checksum failure!

The Monitor ROM failed the power-up self-test. This message may also appear if the computer is turned off then on again too quickly.

Corrective steps:

1. Turn the computer off, wait for 15 seconds, then turn it back on.

2. If the message reappears, replace the main board.

ERROR: 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 then on again too quickly.

Corrective step:

1. Turn the computer off, wait for 15 seconds, then turn it back on.

2. If the message reappears, replace the main board.

ERROR: Wild hardware interrupt!

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

Corrective steps:

1. Turn the computer off, wait 15 seconds, then turn it back on.

2. If the message reappears 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.

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

ERROR: Wild interrupt!

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

Corrective steps:

1. Turn the computer off, wait 15 seconds, then turn it back on. Rerun the program.

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

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

Error writing drive

The computer was unable to write data to a drive.

Corrective steps:

1. Verify that all drive cables are properly connected.

2. Copy any readable files to another disk and format the original disk or hard drive. If bad sectors are reported on the disk, discard it.

3. Replace the drive.

FATAL: Internal stack failure, system halted

This message appears immediately after another error message. The first message indicates the error that halted operation.

Corrective step:

1. Refer to the first error message and follow the instructions to solve the problem.

Invalid drive specifications

An invalid drive name was specified.

Corrective step:

1. Re-enter the command using the correct drive name.

Memory allocation error

The computer is unable to load MS-DOS.

Corrective steps:

1. Reboot MS-DOS.

2. If this error persists, make a new copy of the MS-DOS disk from your back-up copy of the system disk and reboot MS-DOS from that.

Memory parity failure!

This error results from a non-maskable interrupt.

Corrective step:

1. Replace the main board.

No system

The computer attempted to boot from a formatted disk or partition with no operating system present.

Corrective steps:

1. Check the boot command and verify that a valid drive was selected.

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

Non-maskable interrupt!

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 (brown-out). 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:

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

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

Not a bootable partition

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

Corrective steps:

1. Check the boot command and verify that a valid partition was selected.

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

Parity hardware failure! Address: XXXX:YYYY
Bit: N Chip: Uxxx

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

Corrective step:

1. Use the 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 memory module, replace it. If not, replace the main board.

Unformatted partition

The computer attempted to boot an unformatted partition on the hard disk drive. This message is normal the first time a hard disk system is powered up.

Corrective steps:

1. Check the boot command and verify that a valid partition is selected.

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

Chapter 4

Disassembly and Installation Procedures

This chapter provides computer disassembly procedures and optional hardware installation instructions for the Z-386SX.

Static Precautions

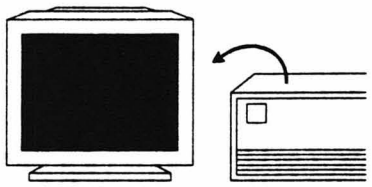
To protect ICs and circuit boards:

- 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 yourself by touching the work surface with one hand, then picking up the device with the other hand.
- Once you have removed the device from its protective packaging, do not set it down until it is installed in the computer or returned to its protective packaging.

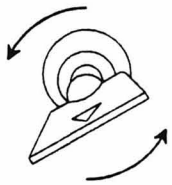
Cover Removal/Installation

Caution: To prevent shock, disconnect the computer from the AC power source before removing the cover.

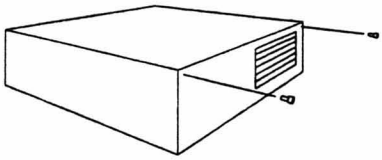
To remove the computer cover:



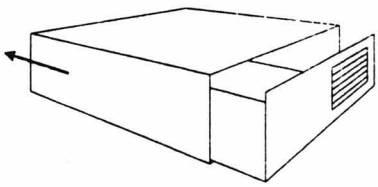
A. Disconnect and set the video monitor aside.



B. Unlock the computer cover.



C. Remove the cover screws from the back.



D. Lift the cover up and slide it off the chassis. Make sure the computer cover does not bind on internal cables or connectors.

To re-install the cover, reverse the process in the above steps.

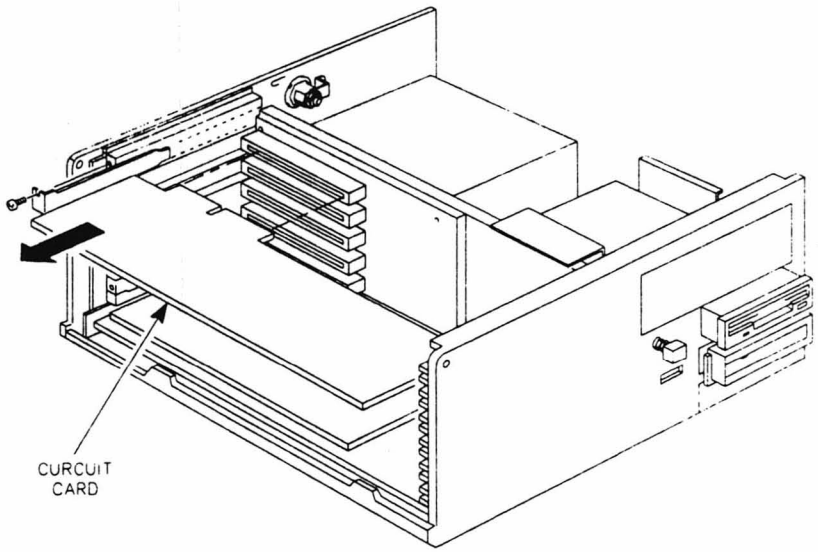
Circuit Card Removal/Installation

Notice: Use static precautions.

To remove a circuit card:

1. Remove the cover as described earlier.
2. Remove any cables attached to the card. Note their location and orientation so they can be properly reattached later.
3. Remove the screw that secures the circuit card to the computer chassis. Save the screw.
4. Grasp the card and lift it until it is free of the connector.

Figure 4-5. *Removing a Circuit Card*

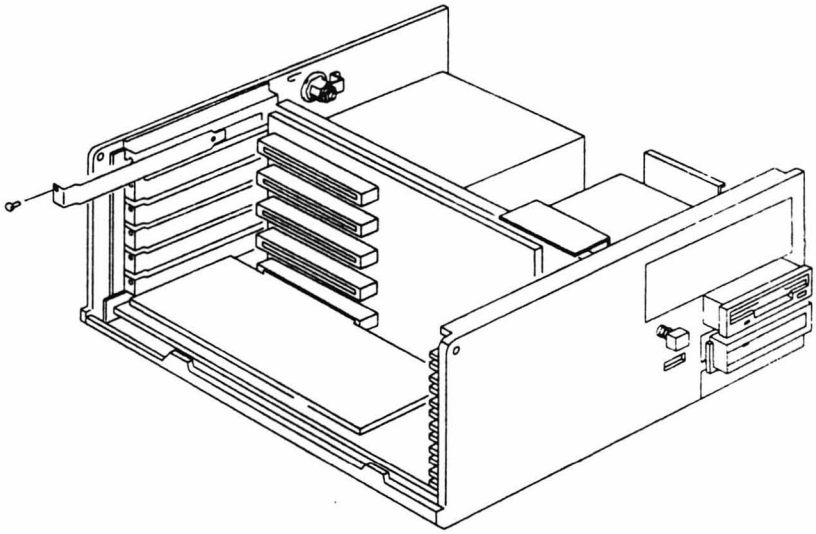


5. Place the card in protective packaging.

To install a circuit card in the computer:

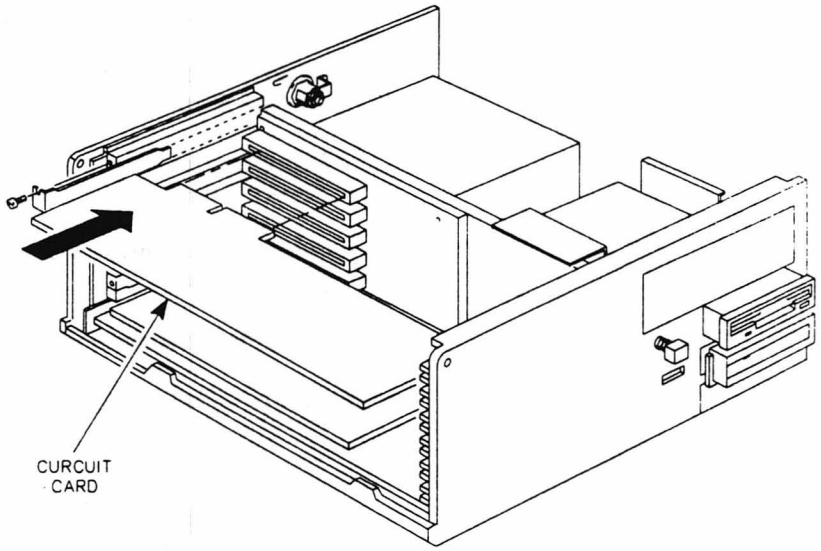
1. Remove the cover as described earlier.
2. Select the expansion slot for the new card.
3. Before installing the new card, set any jumpers or switches as indicated by the circuit card documentation.
4. Remove and save the screw and blank cover plate from the computer chassis at the slot location to be used.

Figure 4-6. *Removing a Blank Cover Plate*



5. Position the new card next to the slot. Seat the card by pushing it carefully until it slides into place. Secure the card with the screw removed in step 4.

Figure 4-7. *Installing a Circuit Card*



6. Refer to circuit card documentation and attach any peripheral cables needed.

7. Replace the cover.

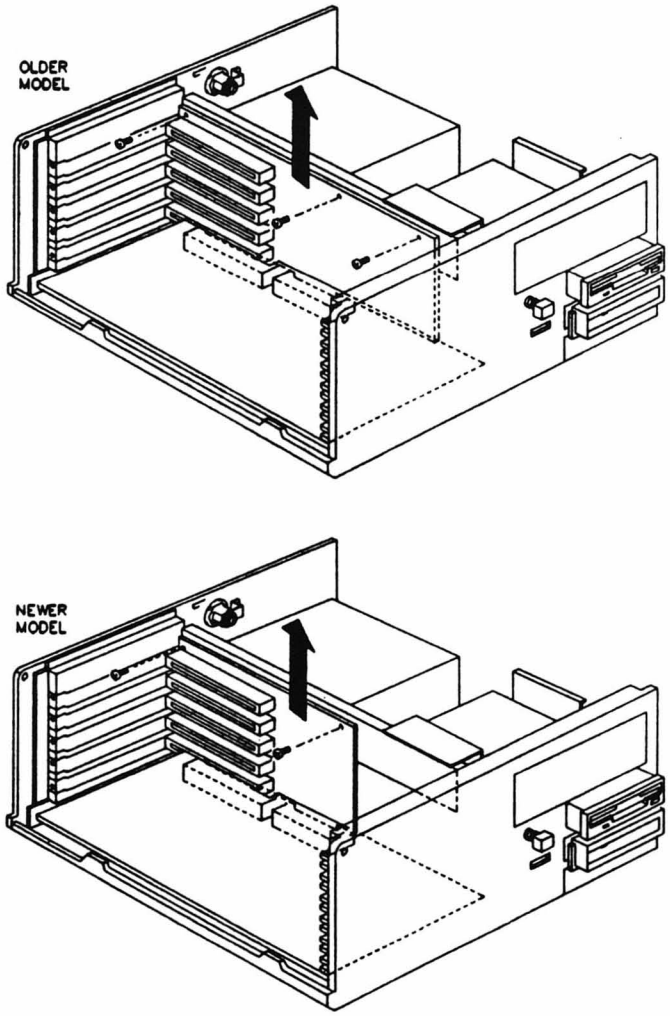
Backplane Board Removal/Installation

Notice: Use static precautions.

To remove the backplane board:

1. Remove the cover as described earlier.
2. Remove all expansion cards from the backplane board. See previous section for details on removing expansion circuit cards.
3. Depending on the computer model, there may be cables connected to the backplane board. Disconnect these cables.
4. Remove the screws that secure the backplane board to the computer chassis.
5. Grasp the backplane board and lift it until it is free of the connector.

Figure 4-8. *Removing the Backplane Board*



To re-install the backplane board, reverse the process in the above steps.

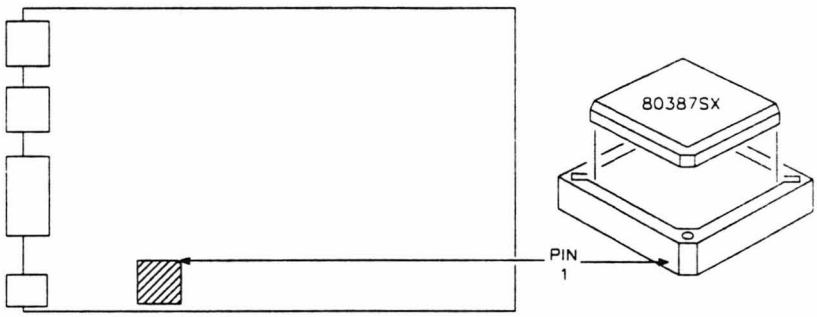
80387SX Coprocessor Installation

Notice: Use static precautions.

To install an optional 80387SX coprocessor:

1. Remove the cover as described earlier.
2. Remove any expansion cards installed in the backplane board that may make installation of the numeric coprocessor difficult. See previous section for details on removing expansion circuit cards.
3. Insert the coprocessor into its socket. Align the notched corner of the coprocessor with the pin 1 corner of the socket.

Figure 4-9. *Installing the Coprocessor*



4. Replace any expansion cards previously removed and reattach cables.
5. Replace the cover.

The coprocessor is automatically made available to the system when the computer is turned on and booted, so no configuration is necessary.

OEM ROM Installation

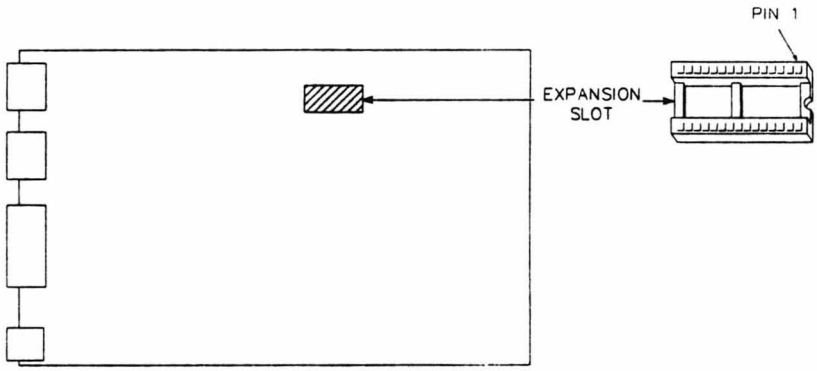
Notice: Use static precautions.

An OEM ROM can be installed only on the older Z-386SX models.

To install an OEM ROM:

1. Remove the computer cover as described earlier.
2. Disconnect any cables connected to the backplane board.
3. Insert the ROM into its socket. Align pin 1 of the ROM with pin 1 of the socket.

Figure 4-10. *Installing the OEM ROM*



4. Reattach any cables removed previously.
5. Replace the cover.

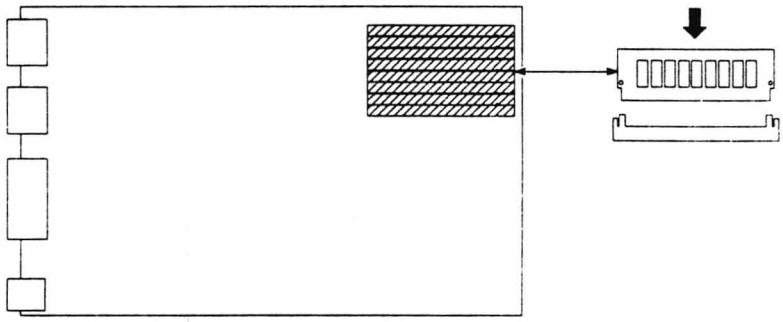
SIMM Installation/Removal

Notice: Use static precautions.

To install SIMMs (single in-line memory modules):

1. Remove the cover as described earlier.
2. If a disk drive is installed in the top drive bay location, remove the drive and drive bracket as described later in this chapter.
3. Position the SIMM with the component side facing the drive bay. Tip the SIMM slightly away from the drive bay and guide it into the socket, then push the SIMM upright until it clicks into place.

Figure 4-11. *Installing a SIMM*

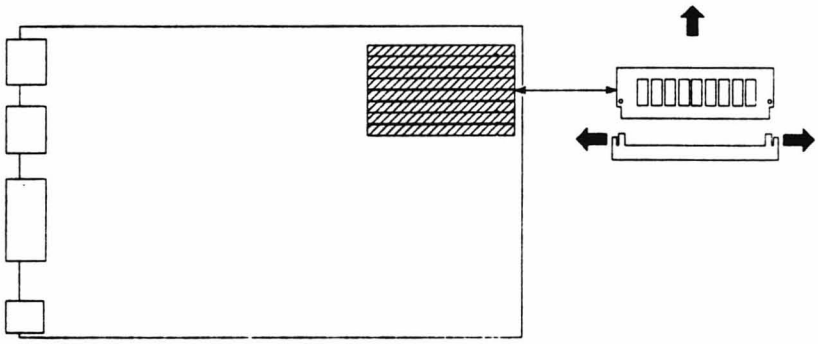


4. Replace the disk drive, if you removed one, and the drive bracket.
5. Replace the cover.
6. Update the memory setting in the Setup program, as described in Chapter 2.
7. Run the disk-based memory diagnostic tests to thoroughly check the new memory. Refer to the *Diagnostics Manual* for testing instructions.

To remove a SIMM:

1. Remove the cover as described earlier.
2. If a disk drive is installed in the top drive bay location, remove the drive and drive bracket as described later in this chapter.
3. Use a small flat-bladed screwdriver to release the latches at each end of the SIMM. Gently tip the SIMM away from the drive bay and lift it out.

Figure 4-12. *Removing a SIMM*



4. Replace the disk drive, if you removed one, and the drive bracket.
5. Replace the cover.
6. Update the memory setting in the Setup program, as described in Chapter 2.
7. Run the disk-based memory diagnostic tests to thoroughly check the memory. Refer to the *Diagnostics Manual* for testing instructions.

Disk Drive Installation/Removal

Notice: Use static precautions.

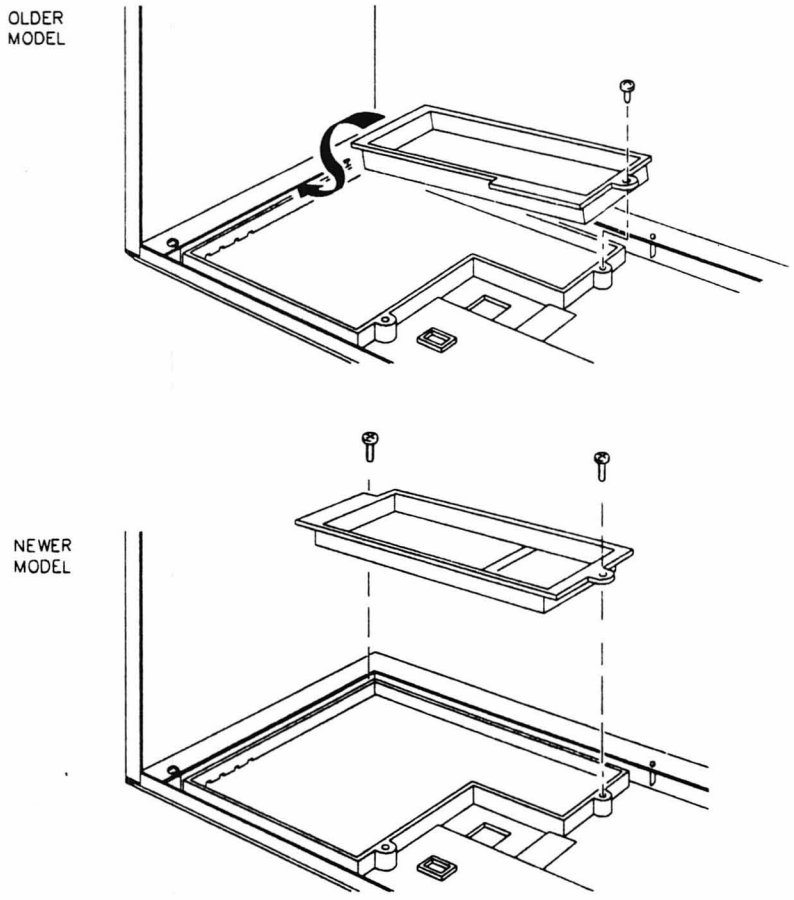
Top Drive Bay Position

The top drive bay position can hold a 5.25-inch floppy disk drive, 3.5-inch floppy disk drive, or SCSI tape backup unit. For a SCSI tape backup unit to work, a SCSI controller card must be installed in an expansion slot. To install or replace one of these items:

1. Remove the cover as described earlier. If you are replacing a drive, skip to step 5.

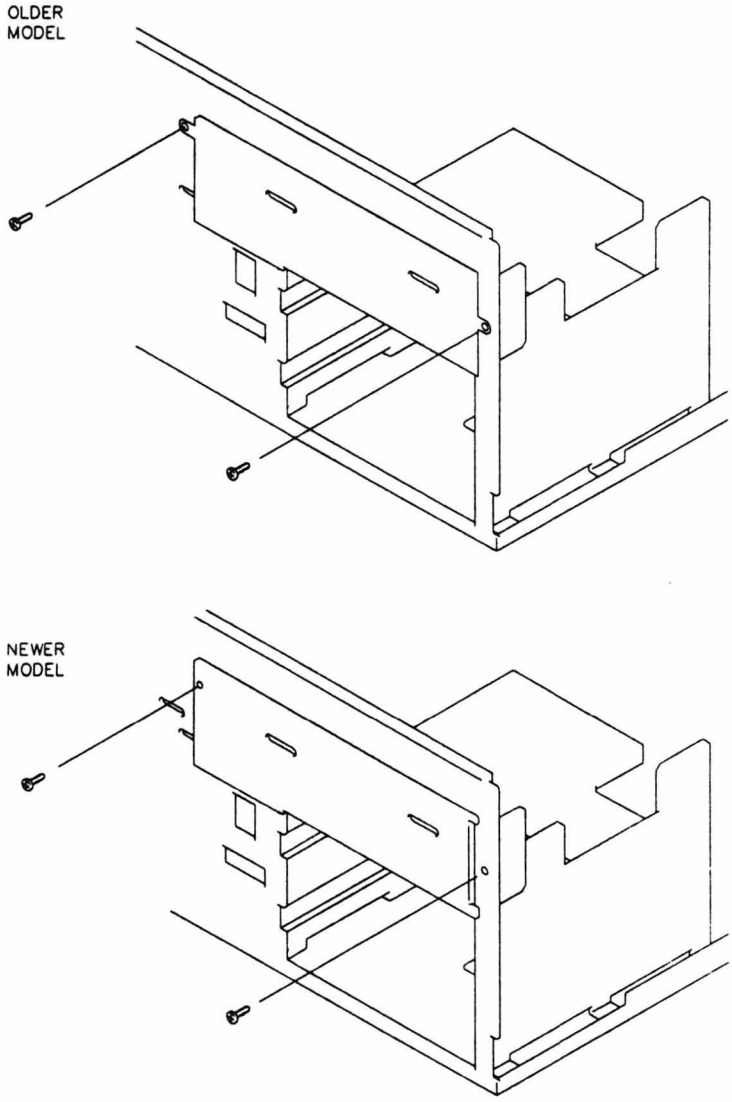
2. Remove the plastic drive slot cover. For the newer models, replace the screws that held the cover.

Figure 4-13. *Removing the Drive Slot Cover*



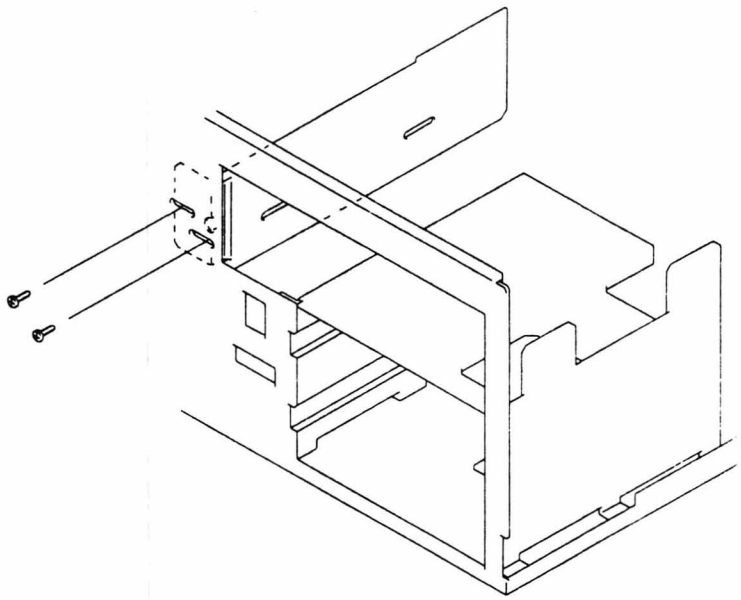
3. Remove the screws and RFI bracket covering the drive slot opening.

Figure 4-14. *Removing the RFI Bracket*



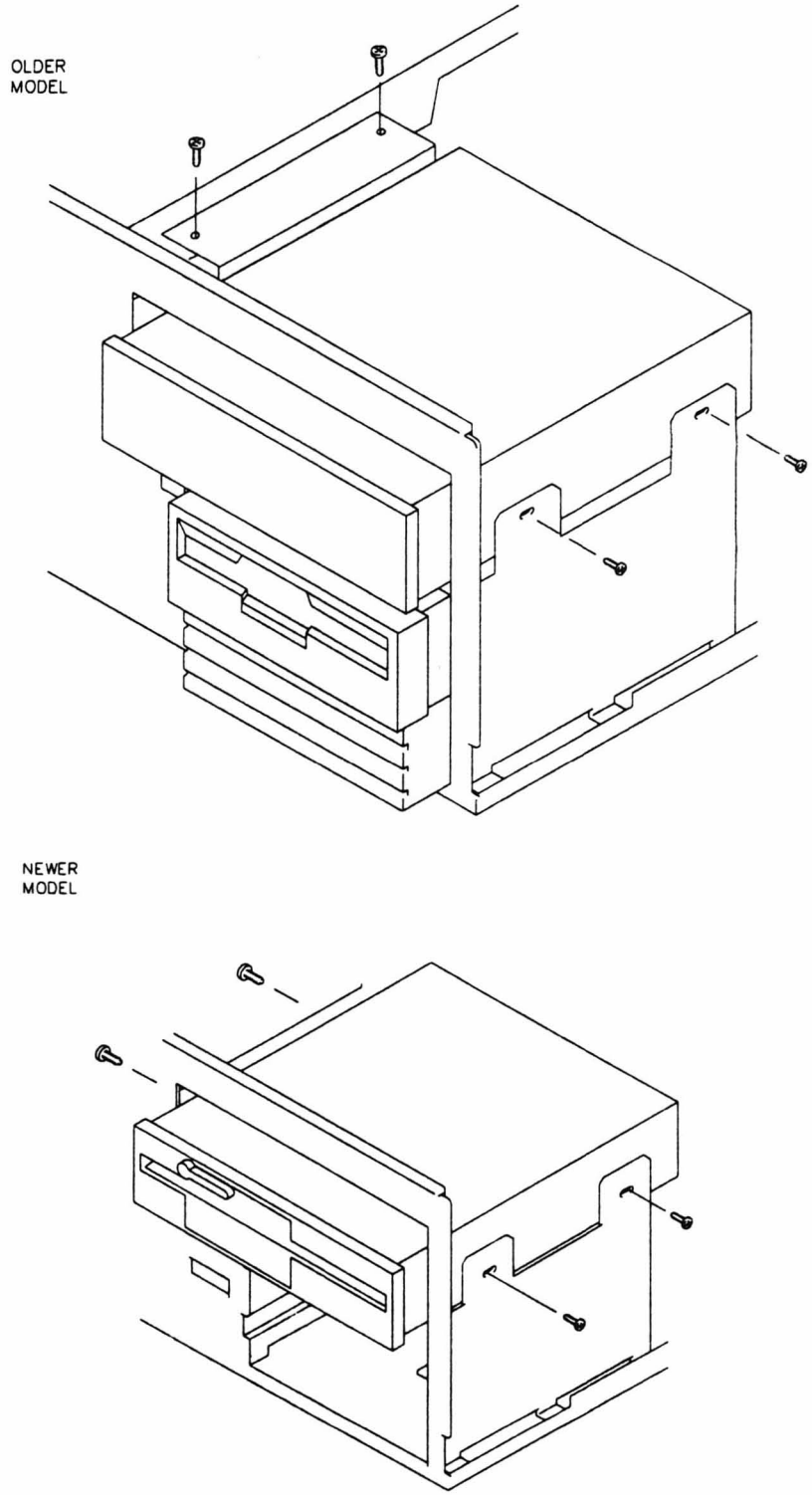
4. For the newer models, reinstall the RFI bracket inside the computer. **Do not** tighten it down until after the drive is installed.

Figure 4-15. *Installing the RFI Bracket as Drive Guide*



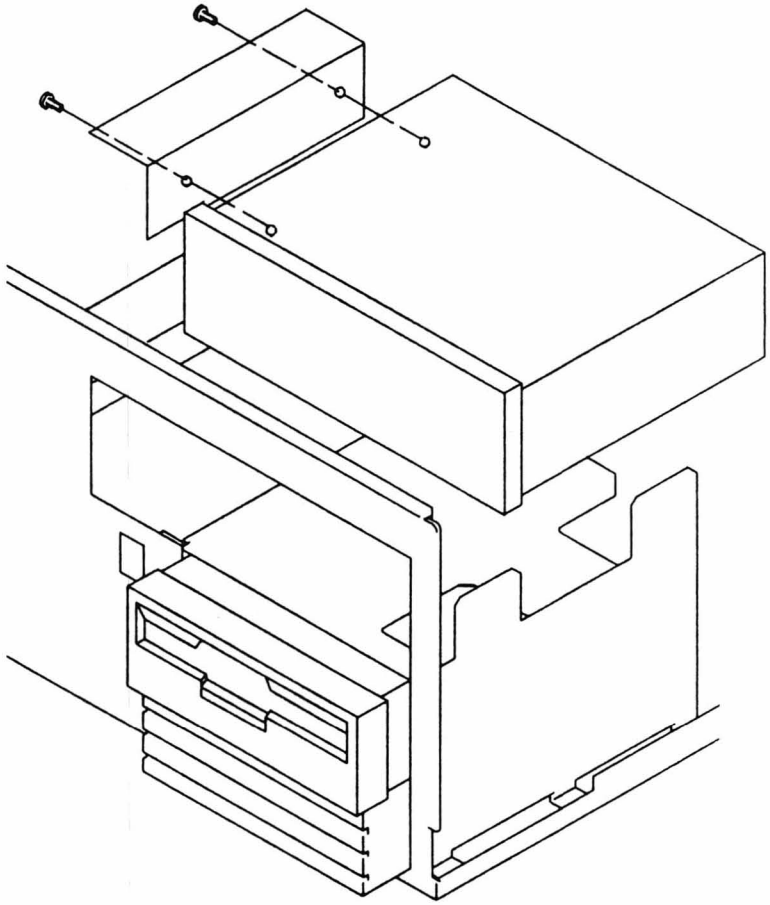
5. If you are replacing a drive, remove the mounting screws.

Figure 4-16. *Removing the Mounting Screws*



6. On older models, remove the disk drive bracket from the disk drive.

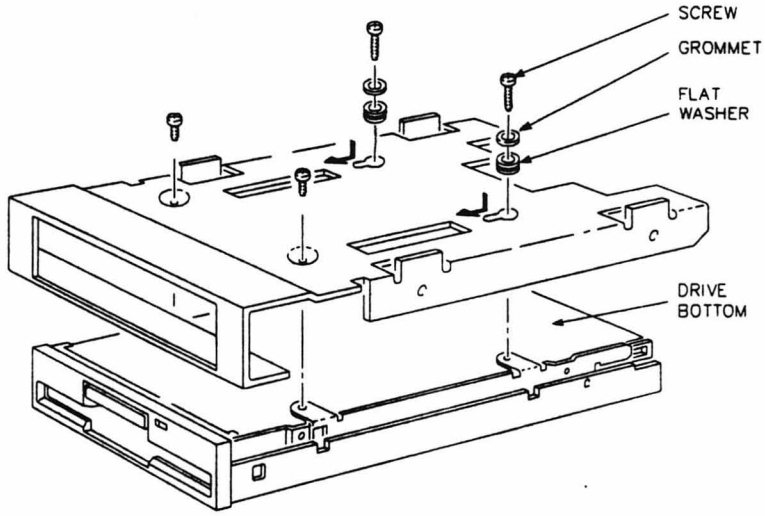
Figure 4-17. *Removing the Disk Drive Bracket*



7. Remove the disk drive or tape backup unit, if one is present.

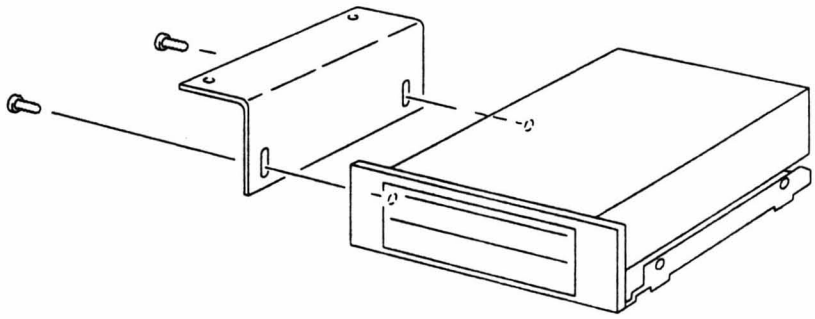
8. If you are installing a 3.5-inch disk drive, attach the drive adapter mounting plate to the new drive.

Figure 4-18. *Attaching the Drive Adapter Mounting Plate*



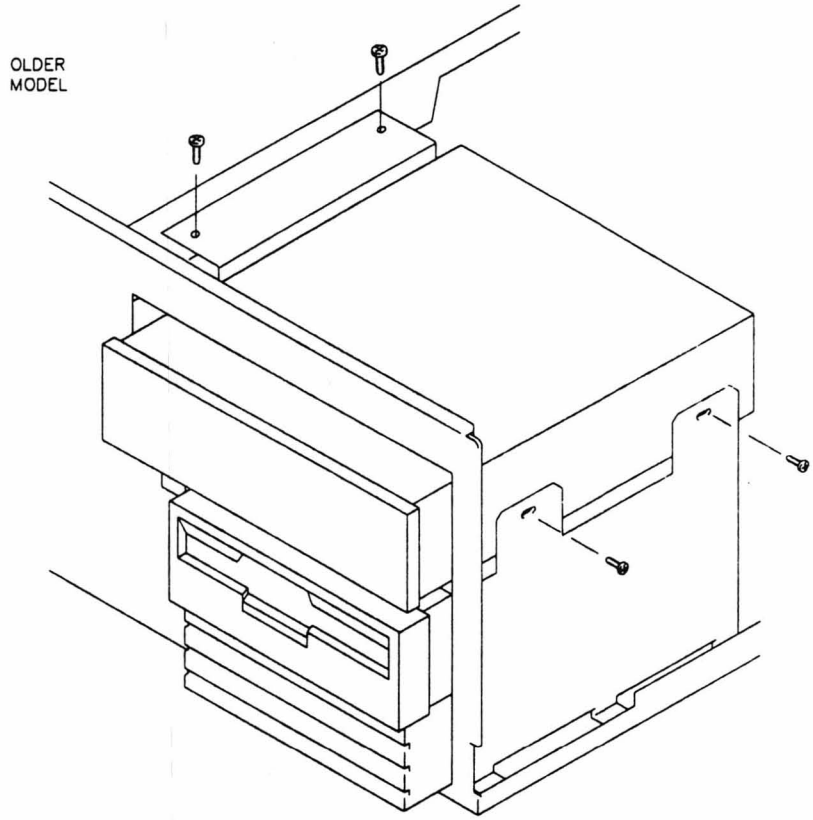
9. For the older models, attach the disk drive bracket to the left side of the 5.25-inch drive, the SCSI tape backup unit, or the 3.5-inch drive's drive adapter mounting plate, whichever you are installing.

Figure 4-19. *Connecting the Disk Drive Bracket*



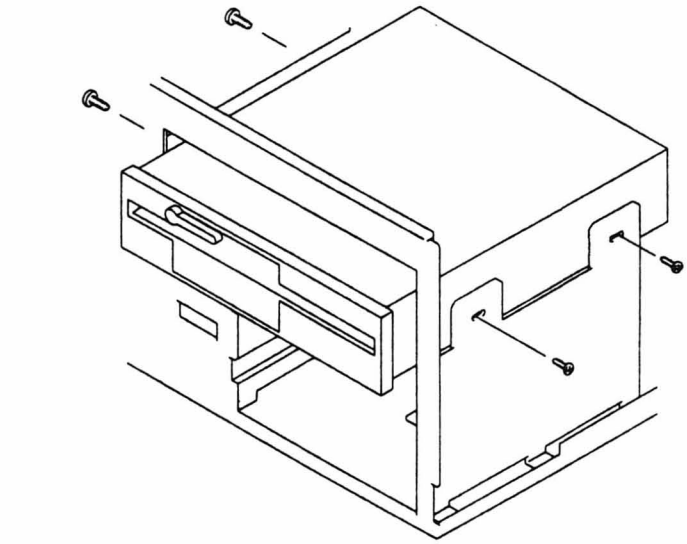
10. For the older models, install the drive in the computer and secure the drive bracket to the chassis.

Figure 4-20. *Installing the Drive in Older Models*



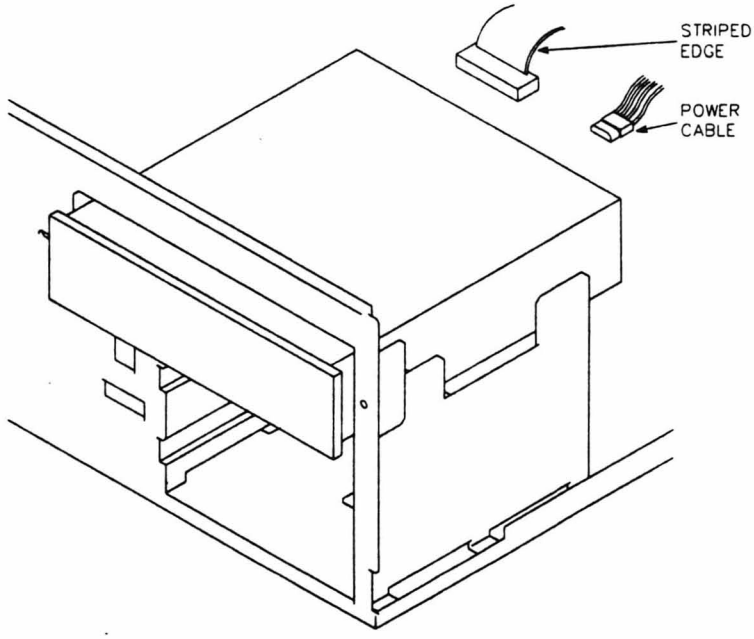
11. For the newer models, install the drive and make sure it lines up with the drive opening in the computer cover. Tighten the screws holding the RFI bracket to the chassis.

Figure 4-21. *Installing the Drive in Newer Models*



12. Attach the drive and power cables to the drive and remove the shipping insert from inside the drive.

Figure 4-22. *Attaching the Floppy Drive or Tape Backup Unit Cables*



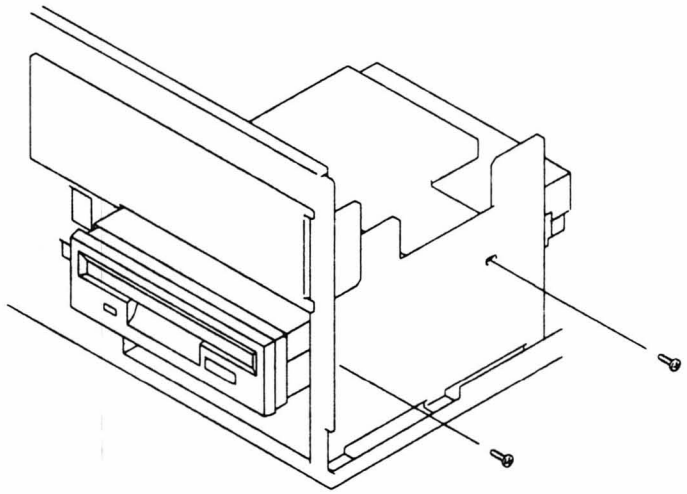
13. Replace the cover.

Middle Drive Bay Position

The middle drive bay position is designed to accommodate a 3.5-inch floppy disk drive. To replace this item:

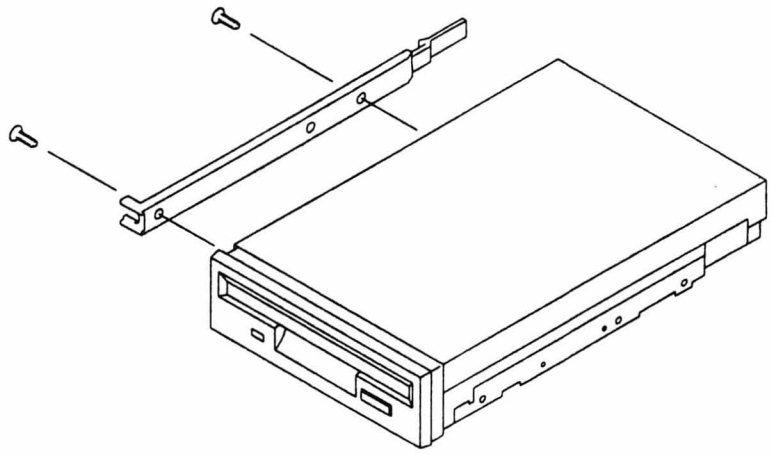
1. Place a shipping insert or an old disk in the drive to protect the read/write heads during disassembly.
2. Remove the cover as described earlier.
3. Note the orientation of the cables connected to the drive, then disconnect the cables.
4. Remove the mounting screws that secure the drive in the drive bay and carefully slide it out of the bay.

Figure 4-23. *Removing the 3.5-Inch Floppy Disk Drive*



5. For the newer models, there is a plastic drive guide attached to the side of the drive. Remove this guide and save it for the new drive.

Figure 4-24. *Removing the Drive Guide*



6. Unpack your new disk drive and set the configuration jumpers, switches, or termination resistors using the documentation supplied with the drive. To install the drive in the drive bay:

7. For the newer models, attach the plastic drive guide to the new drive.

8. Carefully place the drive assembly in the drive bay and install the mounting screws.

9. Reattach the cables to the drive.

10. Replace the cover.

Bottom Drive Bay Position

The bottom drive bay position is designed to accommodate a 3.5-inch hard disk drive. Depending on the model, the computer may or may not have a hard disk drive installed here. To install or replace a hard drive:

1. Remove the cover as described previously.
2. Depending on the model, remove either the combined front bezel/RFI bracket or the RFI bracket from the bottom drive bay position. If you are installing a drive for the first time in this drive bay position, skip to step 6.
3. Note the orientation of the cables connected to the drive, then disconnect the cables.
4. Remove the mounting screws that secure the drive in the drive bay and carefully slide the drive out of the bay.

Figure 4-25. *Removing the Front Bezel/RFI Bracket*

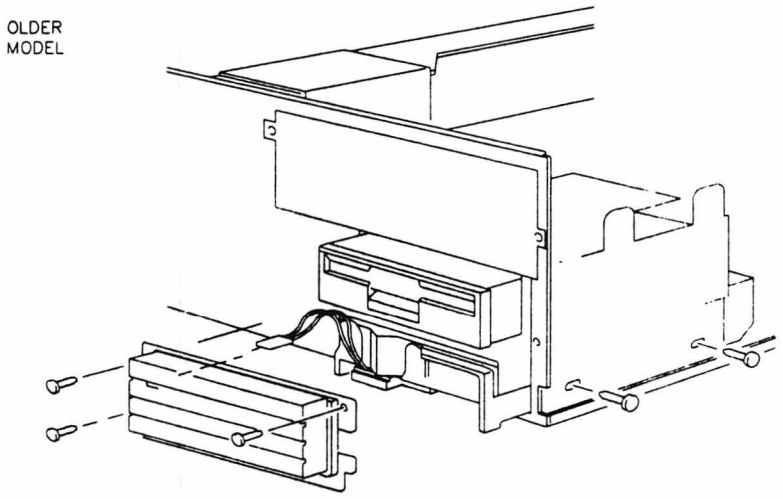
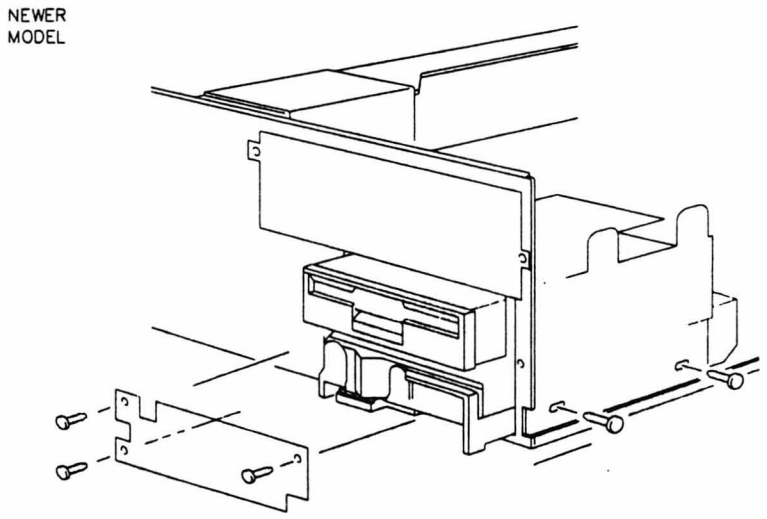
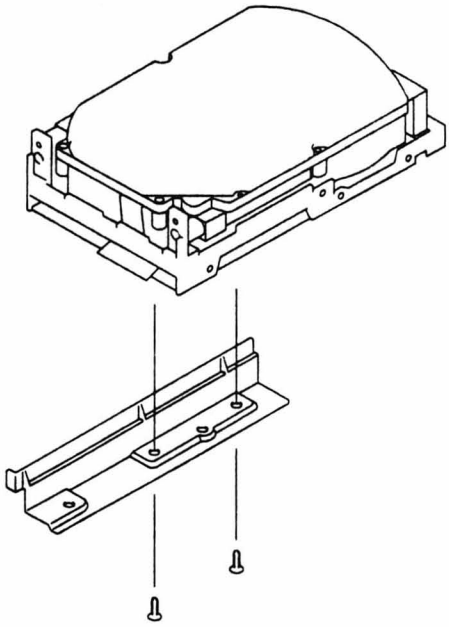


Figure 4-26. *Removing the RFI Bracket*



5. For the newer models, there is a plastic drive guide attached to the bottom of the drive. Remove this guide and save it for the new drive.

Figure 4-28. *Removing the Drive Guide*



6. Unpack your new disk drive and set the configuration jumpers, switches, or termination resistors using the documentation supplied with the drive. To install the drive in the drive bay:

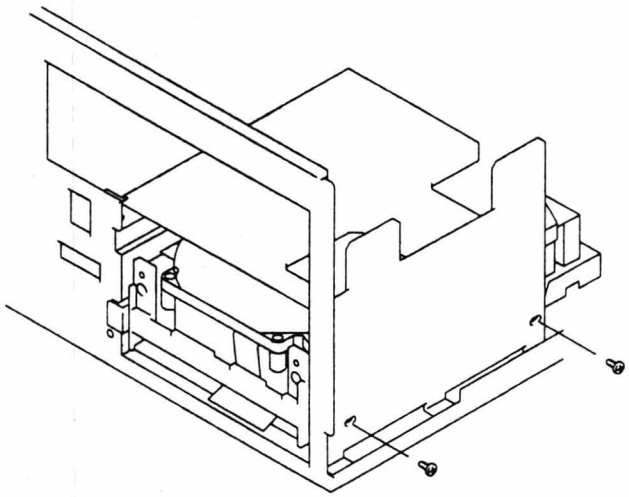
7. For the newer models, attach the plastic drive guide to the new drive.

8. Carefully place the drive assembly in the drive bay and install the mounting screws.

9. For the newer models, reinstall the RFI bracket.

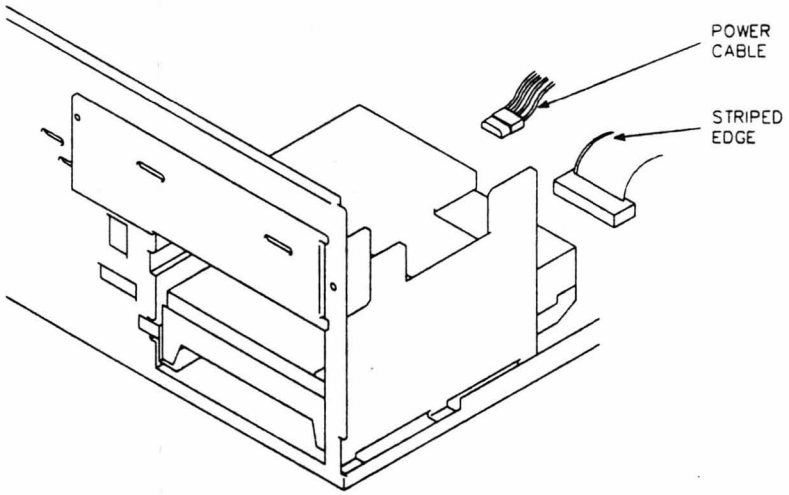
10. For the older models, install the LED and front bezel/RFI bracket.

Figure 4-29. *Installing the Hard Disk Drive*



11. Attach the cables to the drive.

Figure 4-30. *Attaching the Hard Drive Cables*



12. Replace the cover.

Real-Time Clock IC Removal/Installation

Notice: This procedure deletes all configuration information stored in the CMOS RAM. Note the current setup data before removing the Real-Time Clock IC (RTC) so you can re-enter the correct information after installing the new RTC.

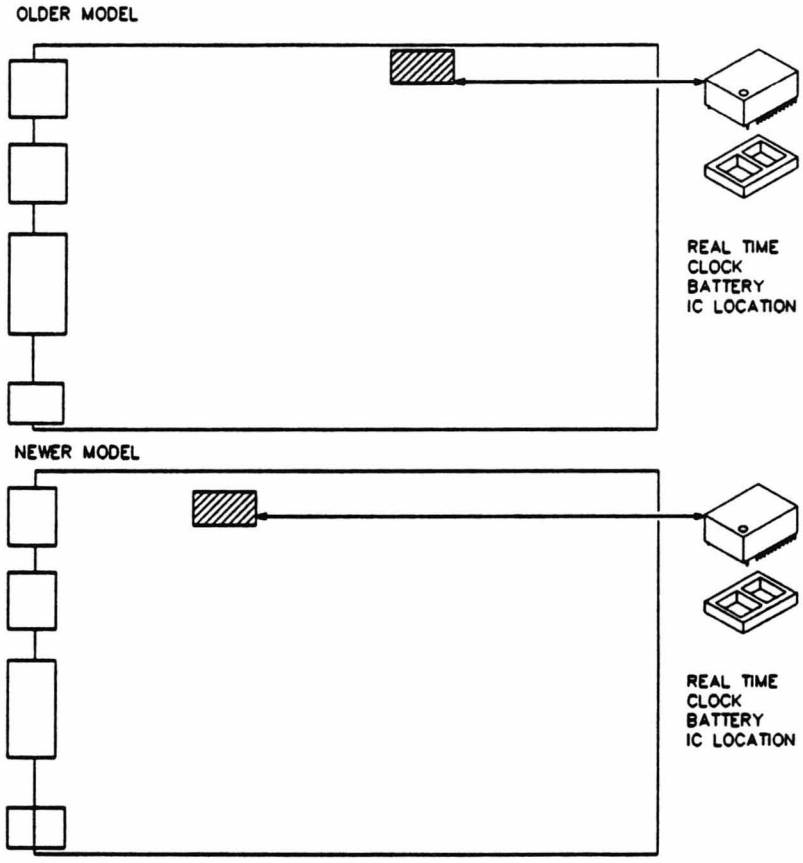
Caution: The Real-Time Clock IC contains a lithium battery. It is safety sealed and should not be opened. To prevent explosion hazards, avoid shorting the battery. Do not attempt to recharge it. Use the disposal procedure described later in this section.

Notice: Use static precautions.

To replace the RTC:

1. Remove the cover as described earlier.
2. Note the orientation of any cables connected to the backplane board and disconnect them.
3. Remove the RTC carefully by using a small bladed screwdriver to pry it out of its socket.

Figure 4-32. *Removing the Real-Time Clock IC*

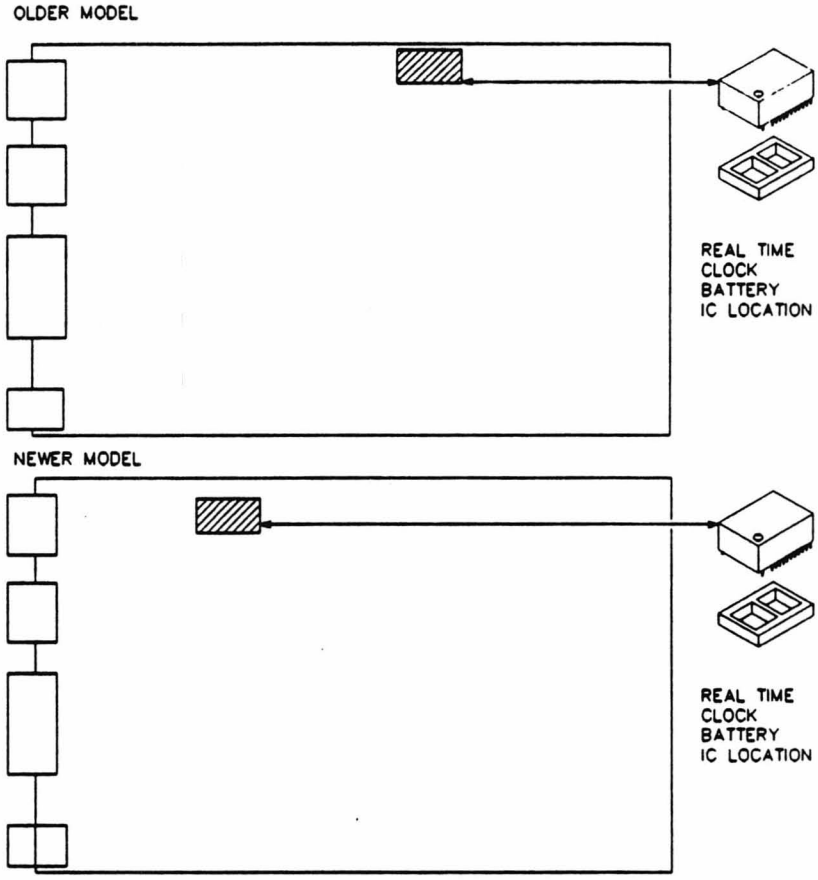


4. To comply with UL regulations, dispose of the old RTC as follows.

   - Clip all exposed leads from the RTC.
   - Cover the pins with insulating tape to prevent accidental shorting.
   - Pack the battery so it cannot be crushed.
   - Dispose of the battery in the trash.

5. Insert the new RTC. Be careful to align the dot on its package properly.

Figure 4-33. *Installing the Real-Time Clock IC*



6. Replace the cover.

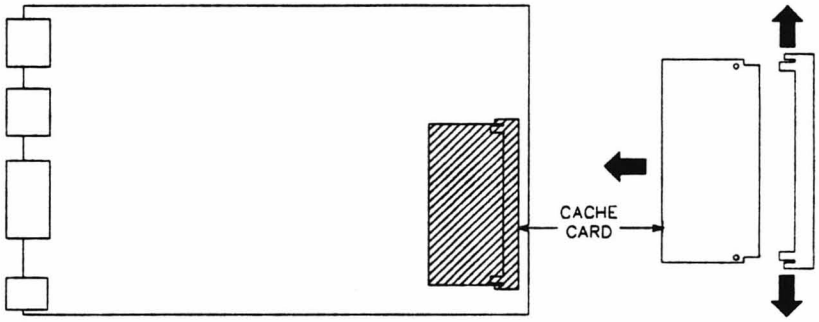
7. Enter the Setup program and update the time and date fields and hardware configuration information as described in Chapter 2. Refer to the back of the computer *Owner's Manual* for hardware setup settings.

Cache Card Removal/Installation

Notice: Use static precautions.

1. Remove the cover as described earlier.
2. Using a small screwdriver, push back the card latch and pull the circuit card up and out.

Figure 4-34. *Cache Card Removal*

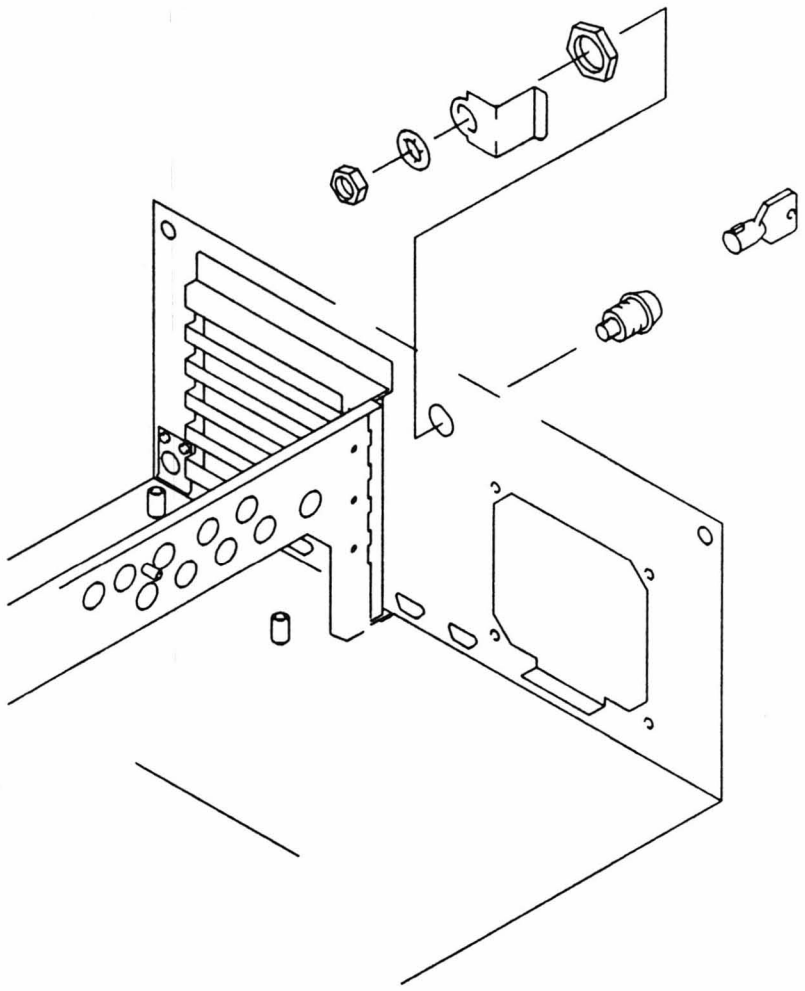


3. Place the card in protective packaging.
4. To install a new cache card, reverse the process in the above steps.
5. Replace the cover.

Keylock Removal/Installation

1. Remove the cover as described earlier.
2. Use an adjustable wrench to remove the hex nut on the lock.
3. Remove the internal lockwasher, the latch bracket, and the .750-inch nex nut.

Figure 4-35. *Removing the Keylock Assembly*

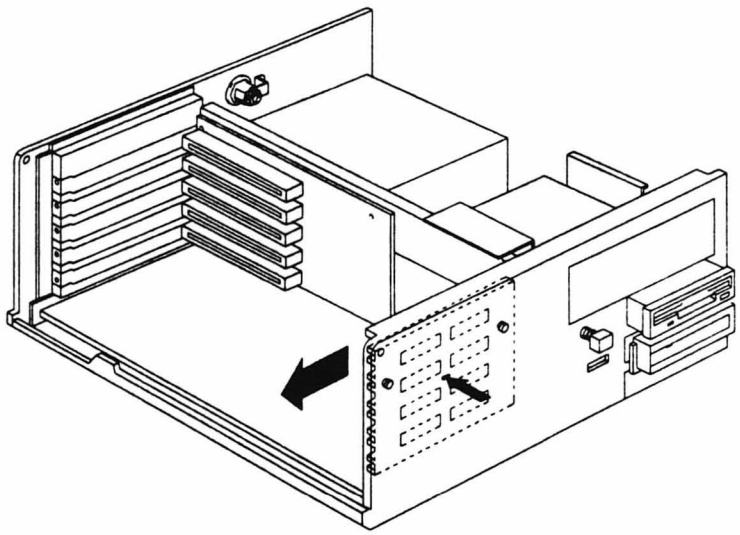


4. To install a new lock assembly, reverse the process in the above steps.
5. Replace the cover.

Card Guide Removal/Installation

1. Remove the cover as described earlier.
2. Remove any full-size circuit cards installed in the backplane as described earlier.
3. Use a flat-bladed screwdriver and push the center tab in while sliding the card guide toward the left side of the computer. Remove the card guide.

Figure 4-36. *Removing the Card Guide*

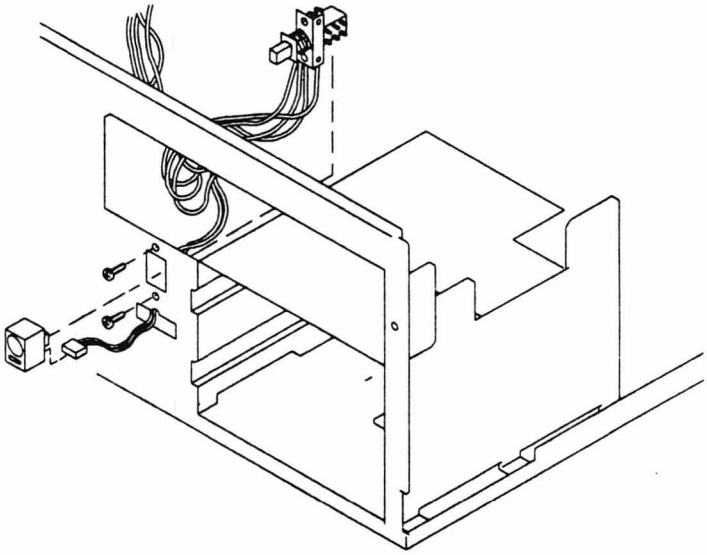


4. To install a new card guide, reverse the process in the above steps.

Power Switch Removal/Installation

1. Remove the cover as described earlier.
2. Remove any disk drive along with the attached drive bracket (in older models) from the top drive bay position, as described earlier.
3. Remove the screws holding the power switch in place.
4. Desolder and remove the power switch.

Figure 4-37. *Removing the Power Switch*

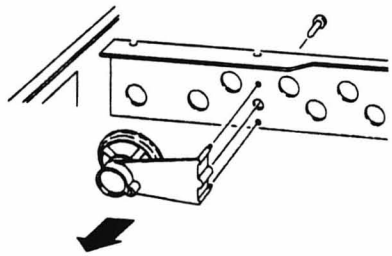


5. To install a new power switch, reverse the process in the above steps.

Speaker Removal/Installation

1. Remove the cover as described earlier.
2. Remove the backplane board as described earlier.
3. Remove any disk drive along with the attached drive bracket (in older models) from the top drive bay position, as described earlier.
4. Remove the speaker retaining screw, slide the speaker bracket back and lift it out.
5. Desolder the speaker wires and remove the speaker.

Figure 4-38. *Removing the Speaker*



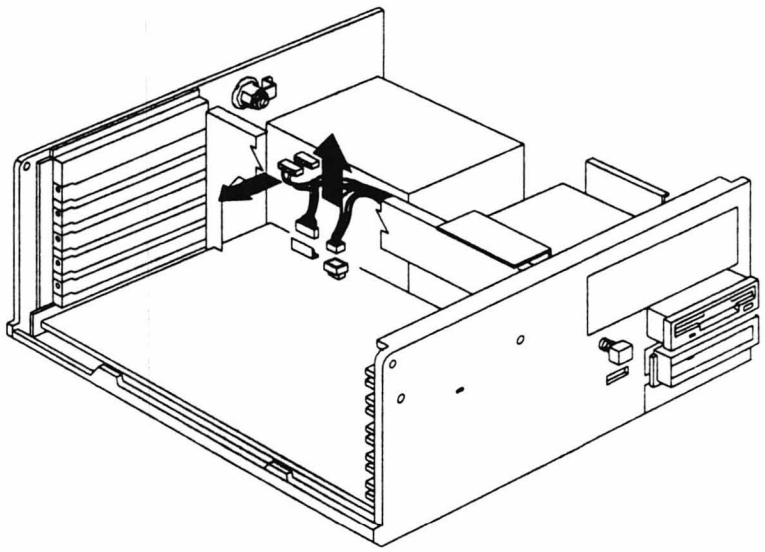
6. To install a new speaker, reverse the process in the above steps.

Power LED and LED/Speaker/Power Switch Cable Removal/Installation

1. Remove the cover as described earlier.

2. Disconnect the LED/speaker/power switch cable from the system board and the power supply.

Figure 4-39. *Disconnecting the LED/Speaker/Power Switch Cable*



3. Remove any disk drive along with the attached drive bracket (in older models) from the top drive bay position, as described earlier.

4. Remove the power switch as described earlier.

5. Remove the speaker as described earlier.

6. Remove the power LED and LED/speaker/power switch cable.

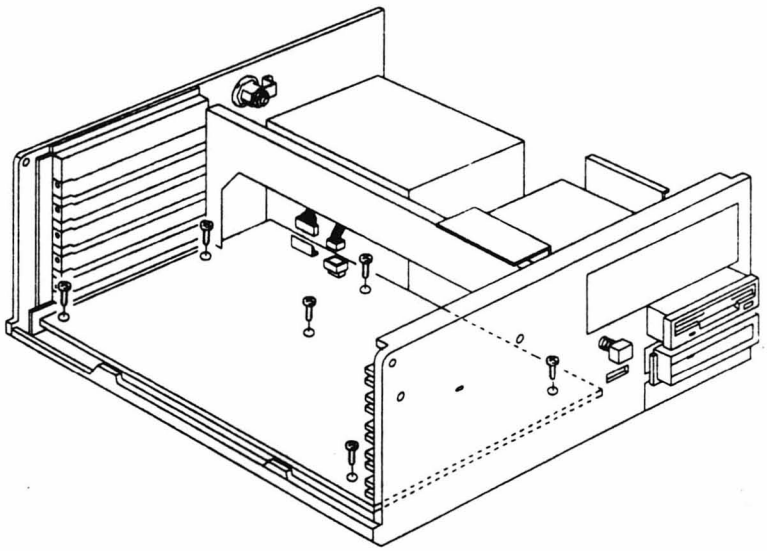
7. To install a new power LED and LED/speaker/power switch cable, reverse the process in the above steps.

System Board Removal/Installation

Notice: Use static precautions.

1. Remove the cover as described earlier.
2. Remove all circuit cards as described earlier.
3. Remove the backplane board as described earlier.
4. Disconnect the power supply connector from the system board.
5. Remove the screws that secure the system board to the chassis.

Figure 4-40. *Removing the System Board*



6. Lift the system board out of the computer.
7. To install a new system board, reverse the process in the above steps.