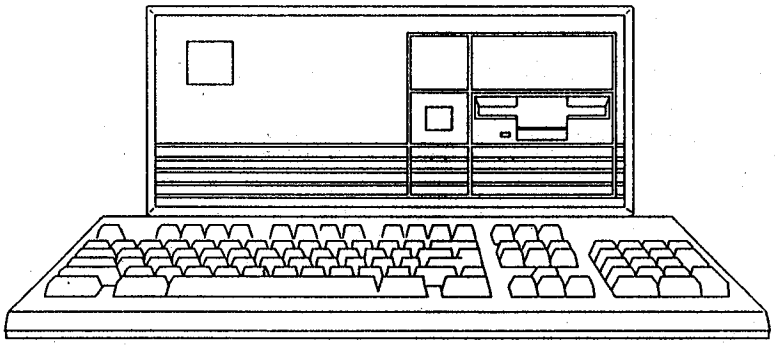
data systems

Z 3 8 6 S X
Owner's Manual

ZENITH

data systems



Z 3 8 6 S X

Owner's Manual

595-4453

REGULATORY INFORMATION

Warning – This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC Rules. Only peripherals (computer input/output devices, monitors, terminals, printers, ect.) certified to comply with the Class B limits may be attached to this computer. Operation with non-certified peripherals is likely to result in interference with radio and TV reception.

NOTE: To meet Class B emission limits, the user must observe the following requirements:

1. Use only shielded I/O cables to connect this computer with any peripheral (such as a printer, modem, monitor, etc.).
2. The manufacturer ships this computer with a shielded line (power) cord. If you replace the line cord, use only a shielded line cord.

If this equipment does cause interference with radio or television reception, which you can determine by turning the equipment off and on, try to correct the interference by using one or more of the following measures.

- Move the computing device away from the affected receiver.
- Reposition the computing device with respect to the affected receiver.
- Reorient the affected receiver's antenna.
- Plug the computer into a different AC outlet so the computer and the receiver are on different branch circuits.
- Disconnect and remove any I/O cables used. (Unterminated I/O cables are a potential source of high RF emission levels.)
- Only plug the computer into a grounded outlet receptacle. Do not use AC adapter plugs. (Removing or cutting the line cord ground may increase RF emission levels and may also present a lethal shock hazard to the user.)

If you need additional help, consult your dealer or the manufacturer. You can find customer service information at the end of this manual. You may also find this booklet helpful: *How to Identify and Resolve Radio-TV Interference Problems*. This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402 -- Stock number 004-000-000345-4.

Canadian Regulatory Information – This equipment complies with the Class B limits for radio noise emissions from digital apparatus as established by the Radio Interference Regulations of the Canadian Department of Communications.

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Zenith Data Systems Corporation
St. Joseph, Michigan 49085

Z 386 SX

Chapter 1

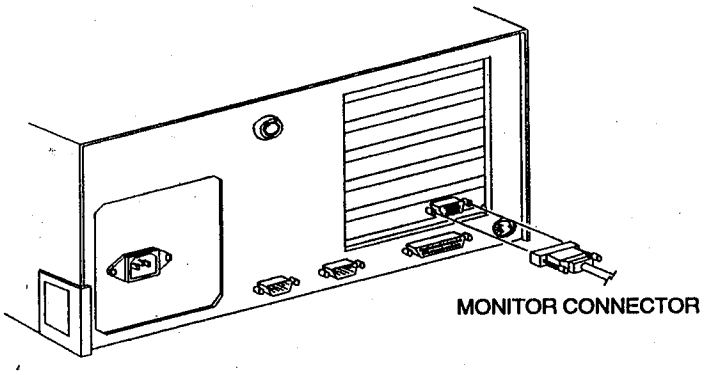
Getting Started

Contents

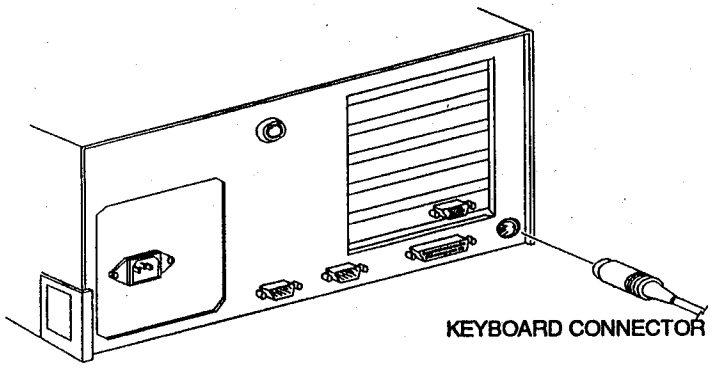
Setting Up the Equipment

Some computer models allow you to select and install your own video card. If your computer does not have a video connector, refer to the Hardware Upgrades section at the end of this manual for video card installation procedures.

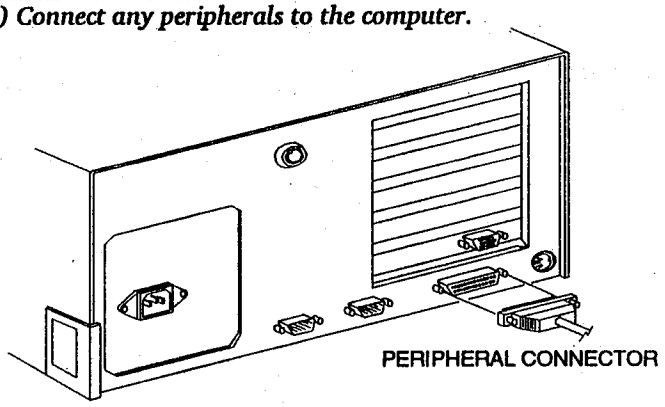
1.) Connect the monitor cable to the computer.



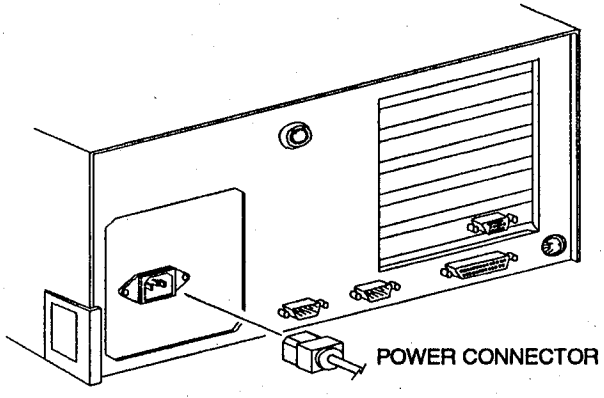
2.) Connect the keyboard to the computer.



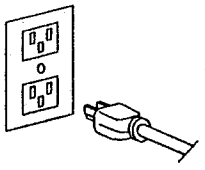
33.) Connect any peripherals to the computer.



4.) Attach the power cord to the computer.



5.) Connect the power cord to an AC outlet.



Powering Up

Connect the monitor and any peripheral power cords to an AC outlet. You may wish to use a switched multiple outlet power strip if you have a number of power cords in your computer system. The power strip must be a 3-wire (grounded) type and properly rated for your application.

115-volt systems — 10 amps minimum

230-volt systems — 5 amps minimum

Press in the power switch, located on the front of the computer.

Notice the LED (light-emitting diode) indicators located on the front panel of the computer.

The power LED flashes.

The hard disk LED flashes (on models with a hard disk drive).

The power LED lights and stays on.

The floppy disk drive LED lights.

The computer tries to boot (load) the operating system from the factory-set drive.

If your computer has only a floppy disk drive, the following message appears:

```
DISK ERROR: Drive not ready!
```

Press ESC to display the Monitor prompt.

If your computer has a hard disk drive, the Monitor prompt (->) appears.

If any other message appears on the screen, refer to the Tests and Error Messages section at the end of this manual.

Chapter 2

The Setup Program

Contents

Using the Setup Program

Press, then release, the CTRL-ALT-INS key combination. The computer enters a built-in program called the Multi-Function Monitor. The screen displays the Monitor message and prompt:

```
MFM-300 Monitor, Version x.xx

Memory Size: xxx + xxx + xxx

Enter "?" for help.

->_
```

The screen shows numbers in place of the xxxs. Type SETUP and press ENTER to run the Setup/Configuration program. A screen similar to the one shown in Figure 2-1 is displayed.

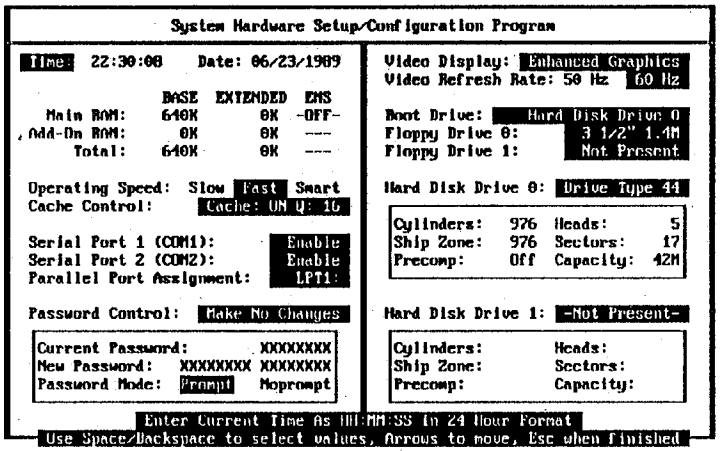


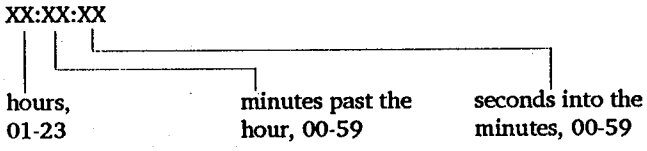
Figure 2-1. Setup Screen

The System Hardware Setup/Configuration Program stores hardware configuration information essential for the operation of the computer. The program also maintains the computer's built-in clock and calendar, which run continuously.

The screen display has highlighted fields that show the computer's current factory-set configuration. The screen cursor appears in the Time field at the upper left portion of the display.

TIME

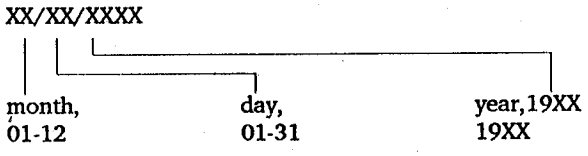
The computer's clock operates on a 24-hour basis, in hours (00-23), minutes (00-59) and seconds (00-59). For example, 2:00 PM is 14:00 and 11:00 PM is 23:00. Type in the time using two digits for each entry. The colons are entered automatically.



After entering the time, press ENTER/RETURN to move to the Date field.

DATE

The computer tracks the date using months (01-12), days (01-31), and years. Type in the date using that format. Use two digits for the first two entries and four digits for the year. The slashes are entered automatically.



After entering the date, press ENTER/RETURN to activate the clock and calendar.

Follow the directions on the bottom of the screen and set the time and date. If you make a mistake, use the BACKSPACE key to erase the entry.

Select a different field by moving the cursor, with the arrow keys, to the field. To change options in a field, press the space bar and BACKSPACE keys until the desired option appears.

The program settings are stored in a real-time clock/battery IC. When the battery runs down, you must replace the IC and re-enter the setup information.

Important Especially note the hard drive(s) number. You must restore the drive type setting when you replace the real-time clock/battery IC; if you don't, the computer will not recognize the hard drive(s). Be sure to record the Setup/Configuration program information on the Setup Record at the end of this manual.

Main RAM

The main board supports from one to eight megabytes of memory in one-megabyte increments. The Main RAM fields allow you to select how that memory is allocated.

BASE

Base memory is used by the operating system for most programs. Part of the first megabyte of memory in your computer is used for base memory. You can set the base memory option for 256K, 512K, or 640K. The remaining available memory in the first megabyte (640K, 384K, or 256K, respectively) is unused and can be added to the extended or EMS memory option.

EXTENDED

Extended memory is located between the 1M and 16M memory range. You can set the extended memory option from zero to seven megabytes (if the main board is fully populated). The option increases by one-megabyte increments if you have allocated the unused memory from the first megabyte as EMS. Otherwise, you can increase the option by one megabyte, then by the amount of unused (first megabyte) memory, then by another megabyte, and so on.

EMS	You can set the EMS memory option from zero to seven megabytes (if the main board is fully populated). The option increases by one-megabyte increments unless you allocate unused memory from the first megabyte (not allocated as base or extended memory), as EMS. Then you can increase the option by one megabyte, then by the amount of unused (first megabyte) memory, then by another megabyte, and so on.

If you want to use a memory expansion card that supports EMS memory, you must set the Main RAM EMS option to OFF. Refer to the manual supplied with the memory expansion card for proper operation.

NOTE Base, extended, and EMS memory allocations cannot exceed total memory installed on the main board. If memory is allocated to both the extended and EMS options, increasing the allocation in one field reduces the allocation in the other.

Add-On RAM

The expansion bus supports up to approximately fifteen megabytes of memory (15,232K). The Add-On RAM fields allow you to select how memory (on cards plugged into the expansion bus) is allocated.

BASE

This option allows you to allocate (or backfill) part of the expansion bus memory as base memory. Some expansion bus memory cards can allocate part of their memory as base memory so that you can increase base memory to 640K.

Refer to the manual supplied with the card to properly set up the allocation. Set the Add-On RAM base memory option to the amount of backfill provided by the card (the option can be set from zero to 384K in 64K increments).

EXTENDED

Some programs use extended (protected-mode) memory. You can set the Add-On RAM extended memory option from zero to 15,232K if enough memory cards are plugged into the expansion bus.

NOTE The total allocation for Main RAM extended memory and Add-On RAM extended memory cannot exceed 15,232K. For example, if Main RAM extended memory is set for 8 megabytes, the maximum amount of Add-On-RAM extended memory you can allocate is 7 megabytes.

Total

The Total fields indicate all the memory in your computer that is specified as base memory and extended memory. A maximum of 16M (with memory modules and expansion cards) can be installed in the computer.

BASE -- The total base memory cannot exceed 640K.

EXTENDED -- Indicates the amount of extended memory installed in your computer. The maximum cannot exceed 15,232K.

Operating Speed

Slow	Reduces computer speed for software compatibility. Do not select Slow if you use an operating system other than MS-DOS.
Fast	Maximizes computer speed for time-sensitive applications. Select Fast if you use a protected-mode operating system such as XENIX® or OS/2.®
Smart	Reduces floppy disk drive speed to provide software compatibility. CPU (central processing unit) speed remains set to Fast.

Cache and Queue Control

Cache refers to cache memory, a feature that allows the CPU to access commonly-used instructions or data in extremely fast memory. This memory is not part of main or add-on RAM, but a separate part of the computer. A queue (Q) is a memory buffer that is either not used, or contains a 1- or 16-buffer queue. The buffers and cache isolate the very fast CPU from the slower bus and allow the CPU to run faster than normally possible.

The cache and Q fields control the on-board cache and write queue. Normally, the fields are set to Cache: ON Q: 16. However, some programs may require slower operation. If an application does not run, reduce Q and cache options until your application runs. The four options are listed below, from fastest to slowest computer operation:

Cache: ON/OFF	Turns the cache on and off.
Q: 16	The write queue uses 16 buffers.
Q: 1	The write queue uses one buffer.
Q: OFF	Disables the write queue.

Serial Port 1 (COM1)	Enable	Turns on serial port 1 (COM1).
	Disable	Turns off serial port 1.
Serial Port 2 (COM2)	Enable	Turns on serial port 2 (COM2).
	Disable	Turns off serial port 2.
Parallel Port Assignment	LPT1	Designates the parallel port as LPT1.
	LPT2	Designates the parallel port as LPT2.
	LPT3	Designates the parallel port as LPT3. You must have software support to use this selection.
	Disable	Disables the parallel port.

Password Control

Your computer is shipped without a password installed. This field allows you to establish a password to restrict the use of your computer by unauthorized persons. Refer to the Using the Password Control section at the end of this chapter for detailed instructions.

Make No Changes	Makes no changes to the password.
Modify Password	Allows you to enter or change a password.
Modify Mode	Allows you to select the password prompt mode.

Video Display

This field is factory set to match the video card installed in your computer. If you install your own video card, set this field to match that card.

Enhanced	Selects a high-resolution EGA or VGA display.
40 x 25 Color	Selects a CGA-compatible display, with text at 40 characters per line, 25 lines per screen.
80 x 25 Color	Selects a CGA-compatible display, with text at 80 characters per line, 25 lines per screen.
80 x 25 Mono	Selects a high-resolution monochrome display.

Video Refresh Rate

This field must match the power line frequency in your area. If you have the wrong setting, the screen display may flicker.

50 Hz	If you are in Europe, set the video refresh rate to 50 Hz.
60 Hz	If you are in the United States, set the video refresh rate to 60 Hz.

Boot Drive

Determines the loading procedure of the operating system. Boot options include:

- Boot from floppy disk drive A.
- Boot from hard disk drive 0 (drive C).
- Boot from floppy drive, then hard disk drive.
- Enter MFM-300. The computer does not automatically boot from any drive, but accesses the Monitor program instead.

Floppy Drive 0

Indicates the size of the first (or only) floppy disk drive installed. Your computer is shipped from the factory with a 1.4-megabyte, 3.5-inch floppy disk drive, so the factory-set entry in this field reads 3-1/2" 1.4M. If you install a different drive, press the space bar to select the drive type. Choices include:

- 5.25-inch 360K density
- 5.25-inch 1.2M density
- 3.50-inch 720K density
- 3.50-inch 1.4M density
- -Not Present-

Floppy Drive 1

Indicates the size of the second floppy disk drive (if two are installed) in the computer. Press the space bar to select the drive type. Choices include:

- 5.25-inch 360K density
- 5.25-inch 1.2M density
- 3.50-inch 720K density
- 3.50-inch 1.4M density
- -Not Present-

Hard Disk Drive 0

Drive Type	*If your computer contains a hard disk drive, this field lists its drive type. The computer automatically displays the information about that drive in the box below.
-Not Present-	If your computer does not have a hard disk drive, the entry in this field is -Not Present-.

Hard Disk Drive 1

Drive Type	*If your computer contains a second hard disk drive, this field lists its drive type. The computer automatically displays the information about that drive in the box below.
-Not Present-	If your computer does not have a second hard disk drive, the entry in this field is -Not Present-.

***IMPORTANT** Do not change this field unless the original drive is replaced with a different one. Note the drive type number and record it on the Setup record at the end of this manual. When you replace the real-time clock/battery IC, use the Setup record at the end of this manual to restore the drive type setting.

Using the Password Control

This feature protects your data by permitting operation of your computer only after entering a pre-set password.

IMPORTANT If you choose to use a password, be sure to record it and store it in a safe place. If you forget the password, you must take your computer to an approved service center for replacement of the password component.

For additional protection, use your computer's cover lock feature to prevent tampering with the component that stores the password. (The cover lock, located on the back panel, prevents the removal of the computer's cover.)

Use the Password Control field to establish the password. The computer is shipped from the factory with no password installed. Once a password is set, you must enter the password whenever you power up the computer, or boot the operating system.

IMPORTANT You can use any alphanumeric keys for your password. Alphanumeric characters include all punctuation, special characters, and the space bar. Do not use the SHIFT or CAPS LOCK keys when entering a password. If you inadvertently press one of the function keys (such as the CTRL or ALT), the computer beeps and the cursor does not move.

To stop a password entry, press the ESC key. To correct a mistake, use the BACKSPACE key (not the arrow keys) to delete incorrect characters.

Entering a Password for the First Time

1. Select Password Control.
2. Use the space bar to select *Modify Password.* Press ENTER.
3. When the highlight appears on the *Current Password: xxxxxxxx* line, press ENTER.
4. When the highlight appears on the *New Password* line, type a password of eight characters or less. For security reasons, the characters you type do not appear on the screen; the cursor moves and only x's are displayed. Press ENTER.
5 To verify the password, retype the password **exactly** as you entered it the first time, and press ENTER. The following line appears at the bottom of the display:

   Press ENTER to INSTALL new password, ESC to quit.

6. Press ENTER to install the password.

If you do not spell the password the same both times, the following message is displayed:

ERROR: Incorrect password entered, press ESC to continue.

Press ESC and carefully re-enter your password, then press ENTER.

After you have successfully entered your password, the highlight moves back to the *Password Control: Make No Changes* line.

7. Press the space bar to select ***Modify Mode*** and press ENTER. The highlight moves to ***Current Password: xxxxxxxx.***

8. Type your password and press ENTER. The cursor will not move during your entry. When you have entered the password correctly, the highlight moves to ***Password Mode: Prompt Noprompt.***

9. Select one of the two modes and press ENTER.

If you select ***Prompt*** mode, you will be prompted as follows whenever you power up or reset your computer:

```
Password:
```

You then have five chances to type the correct password and access the system. After five unsuccessful attempts, the computer halts and displays:

```
Password Security Violation: System Shutdown
```

Turn off the computer for at least 15 seconds, then back on; re-try password entry.

If you select ***Noprompt*** mode, the computer will boot up normally and display no password message. At the operating system prompt (such as C>), you must enter the password before you can proceed any further. The ***Noprompt*** mode can be used only if your computer is set to autoboot from a hard disk.

If your computer is set to boot a floppy disk, or enter the Monitor program, the computer prompts for the password.

In the ***Noprompt*** mode, you have an unlimited number of chances to enter the password. However, the correct password must be entered before further access to the system is possible.

Changing a Password

1. Select *Password Control.*
2. Use the space bar to select *Modify Password.* Press ENTER. The cursor moves to *Current Password: xxxxxxxx.*
3. Type your current password and press ENTER. The cursor moves to *New Password: xxxxxxxx xxxxxxxx.*

Proceed through the remainder of the steps as if you were entering a password for the first time. Your new password takes effect after you exit the Setup program.

Disabling the Password Feature

1. Select *Password Control.*
2. Use the space bar to select *Modify Password.* Press ENTER. The cursor moves to *Current Password: xxxxxxxx.*
3. Type your current password and press ENTER. The cursor moves to *New Password: xxxxxxxx xxxxxxxx.*
4. Press ENTER three times -- twice to disable the password, and once to "install" the command.

You will no longer be required to enter a password when you turn on the computer.

Chapter 3

Disk Drives

Contents

Disk Drives

Your computer may have only a floppy disk drive, or a floppy disk drive and a hard disk drive. Both types of drives are discussed in the following pages.

Floppy and hard drives are assigned drive names. Those names may vary from those described here. Your operating system documentation contains specific information on drive names. Most systems identify the disk drives in your computer as follows:

- The upper floppy disk drive (if installed) is drive A.
- The lower floppy disk drive is drive B (if an upper disk drive is installed).
- A hard disk drive containing a single partition (that is, the storage space is not divided into sections) is drive C.
- A hard disk drive divided in up to four partitions contains drives C, D, E, and F.

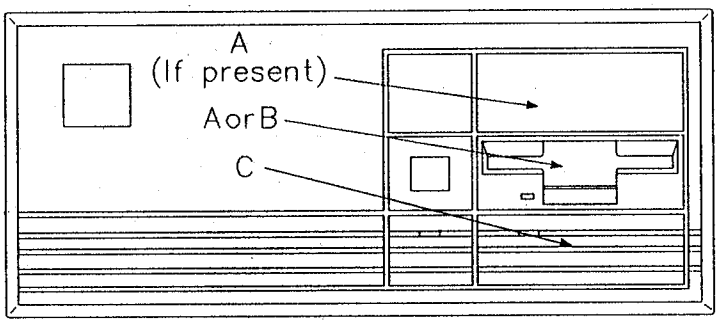


Figure 3-1. Identifying Disk Drives

Drive Size

Depending on the model of computer you have, you may have any of the following types of drives:

- 3.5-inch, 1.4M high-density floppy disk drive that can read and write up to 1.4 megabytes of data on 3.5-inch, double-sided, high-density, soft-sectored floppy disks.
- 5.25-inch, 360K double-sided, double-density floppy disk drive.
- 5.25-inch, 1.2M double-sided, high-density floppy disk drive.
- 3.5-inch hard disk drive, 40 or 80 megabytes capacity.

Using Floppy Disk Drives

Figure 3-2 shows the features of a typical 3.5-inch floppy disk drive. The following paragraphs describe these features.

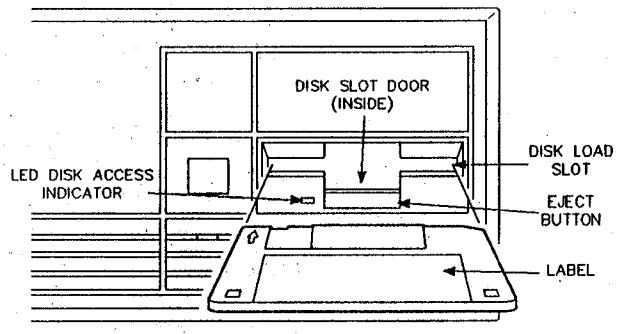


Figure 3-2. Floppy Drive Features

Disk Load Slot

This is where you insert a floppy disk, with the label and arrow side up and toward you. If you install the disk incorrectly, you could damage both the drive and the disk. The disk should slide smoothly into the drive until you hear a click and see the eject button pop out, indicating that the disk is completely installed. If you have problems inserting the disk into the drive, remove the disk to see if there is a disk already in the drive. Never try to force a disk into the drive.

Disk Slot Door

When you remove a floppy disk from the disk load slot, a small door inside the slot flips down to cover the opening. This door protects the drive when it is not in use, preventing dust, dirt, or any foreign objects from getting into the drive. When you insert a disk into the drive, the disk slot door moves back up to its open position inside the drive.

Eject Button

Press the eject button to remove a floppy disk from the drive. The disk pops out from the disk load slot and the button remains pressed in until you install another floppy disk in the drive.

LED Disk Access Indicator

This LED lights whenever the drive is attempting to read information from or write data to a floppy disk. Drive access can occur only if the disk is inserted correctly and completely into the drive.

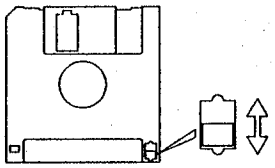
Floppy Disk Drive Care

Floppy disk drives are extremely reliable and require no special maintenance. However, there are some general guidelines to follow for trouble-free operation:

- Make sure the disk load slot is empty and the eject button is pressed in all the way before you install a floppy disk.
- Remove the floppy disk from the drive before turning off computer power.
- If your computer was packed with a shipping insert in the drive, install the insert before you move the computer. (Some drives have an auto-park feature that eliminates the need for a shipping insert.)
- Keep dust, dirt, and smoke away from the drive.
- Do not attempt to eject a disk while the LED access indicator is lit.
- Insert only a floppy disk or shipping insert into the drive.
- Insert only one floppy disk at a time into the drive.
- Do not attempt to disassemble, clean, or adjust a floppy drive.

Write-Protecting Floppy Disks

Most floppy disks have a write-protect feature. When a disk is write-protected, you can only read information from the disk. You cannot change or erase any data on the disk. Always write-protect your operating system disks, application program disks, and any other disks that contain valuable data. (Some software disks have no write-protect feature; they are permanently write-protected.)



A 3.5 inch floppy disk has a write-protect tab in the corner. To write-protect the disk, slide the tab toward the corner. To unprotect the disk so you can write information to it, slide the tab away from the corner.

Formatting Disks

Before you can use a floppy or hard disk to store information, you must prepare, or "format", the surface of the disk so that it can accept information. Any disk that is not write protected can be formatted, including disks that have been used previously. Formatting a disk erases everything on it, so be sure the disk you format does not contain anything valuable. Your operating system documentation provides you with procedures for formatting disks.

Organizing Data on Disks

Disks can store three types of information:

- An operating system to "manage" the computer.
- Application programs, such as word processing, spreadsheets, and graphic programs.
- Data you create using an application program.

You need to load the operating system into your computer before you can load and use any other information. Some application programs allow enough space on the disk for you to add operating system commands to make the application program disk "bootable."

Using a Hard Disk Drive

Your computer may have a hard disk drive installed in it; if you do not have a hard disk drive, skip this section. If you add a hard disk drive to your computer in the future, use the information here to set it up. The hard disk drive operates much faster than a floppy disk drive and provides a much greater amount of permanent data storage. Some of the many advantages of a hard disk drive are:

- The increased information storage capability allows you to store the equivalent of several dozen floppy disks inside your computer.
- Fast access to the information stored on it. Because the hard disk drive is built into your computer, the information is always available, ready for use. Your computer can find information on a hard disk ten to twenty times faster than on floppy disks.
- The ability to customize space on a hard disk drive for your particular applications. You can make efficient use of the drive's large storage space by dividing it into sections, called partitions, and storing different information on each partition.
- To protect the data on hard disks, one or more tracks on the disk is reserved as a shipping zone. No information is stored in this "safe" area. The hard disk drive in your computer automatically moves the drive's read/write heads to this shipping zone each time you turn off the computer.

Your computer can contain any one of several types of hard disk drives. The type of hard disk drive installed in your computer is recorded in the computer's Setup/Configuration program, described in Chapter 2. You should have recorded your hard drive type on the Setup record at the end of this manual. If you have not recorded it, do so now.

The computer's Monitor program and the operating system handle the operations of hard disk drives. A disk access indicator on the front of the drive lights whenever information is being transferred to and from the hard disk.

Hard Disk Drive Care

The hard disk drive is carefully designed and built for reliable, trouble-free operation. To maintain its precise operation, it is sealed against contamination. Nevertheless, the drive is fragile and can be damaged, resulting in the loss of the information stored on it. Following are some guidelines for using and handling a hard disk drive:

- Prepare, partition (if desired), and format the hard disk drive before you use it. (See the operating system documentation for details.)
- Keep dust, dirt, and smoke away from hard disk drives. Use a protective cover for your computer when it is not in use.
- Regularly back up the contents on the hard disk to floppy disks.
- Handle a computer with a hard disk drive installed very carefully. Do not move or jar the computer when it is turned on.
- Do not attempt to disassemble, clean, or repair the hard disk drive.
- Do not reformat or repartition a hard disk until all information is backed up to floppy disks.

Using the Boot Command

The boot command instructs the computer to load the operating system into memory. You can boot from a disk in the floppy disk drive or from the hard disk.

To use this command, make sure the Monitor prompt (->) is showing on the screen. Use the CTRL-ALT-INS command, if necessary, to display the prompt.

Booting from a Floppy Disk Drive

Type B and press ENTER. The computer boots the "default" drive. The default drive is the drive your computer boots from when you first turn on the power. Usually it is drive A.

To boot from a second floppy, insert the disk into that drive, type BF1 (boot from floppy drive B), and press ENTER.

If you attempt to boot a floppy disk that does not contain an operating system (non-bootable disk), the computer sounds a beep and the following message appears on the screen:

```
Non-system disk
```

If this happens, remove the disk from the drive, insert a bootable floppy disk, and press the ESC key. At the Monitor prompt, re-enter the boot command. If the Monitor prompt does not appear, press the CTRL-ALT-INS keys.

If you attempt to boot from a floppy drive without a disk in it, the computer sounds a beep and this message appears:

```
DISK ERROR: Drive not ready!
```

If this happens, press the ESC key or CTRL-ALT-INS key combination, insert a bootable disk into the drive, and re-enter the boot command.

If you incorrectly enter a boot command (such as BF3), the computer sounds a beep and one of these messages appears:

```
DISK ERROR: Bad disk controller!
```

```
DISK ERROR: Drive not ready!
```

If this happens,access the Monitor program again and enter the correct boot command.

Booting from a Hard Disk Drive

Type BW (boot from Winchester, which is another name for a hard disk drive) and press ENTER. The computer loads the operating system from the hard disk into computer memory.

If you have not formatted the hard disk drive, this message appears:

```
No bootable partitions
```

If you have not placed the operating system on the hard disk drive, the Monitor prompt appears.

If you have partitioned the hard disk, you can specify the boot partition in the command. Use the boot command with the appropriate drive number (0, since your computer has only one hard disk drive), followed by a colon and the partition number (1 through 4) for your computer, for example: BW0:1. The computer loads the operating system from the specified partition.

If you enter a boot command for a non-existent drive or partition, the following message appears on the screen:

```
No bootable partitions
```

If this happens, access the Monitor program again, using either the ESC key or CTRL-ALT-INS. Enter the correct boot command.

If you attempt to boot using a drive number larger than 3 or a partition number larger than 4 or less than 1, you will see:

```
^Invalid Command!
```

Access the Monitor program again and enter the correct boot command.

Installing MS-DOS

Locate the MS-DOS operating system disks. Insert the disk labeled 1 into the floppy disk drive (drive A) with the label and arrow facing up. Slide the floppy disk into the drive until it clicks into place.

Be sure the Monitor prompt is displayed; use CTRL-ALT-INS if necessary.

Enter BF at the Monitor prompt to boot MS-DOS disk 1.

During the boot process, the floppy disk drive LED on the computer indicates the disk is being read. After a few seconds, the screen displays:

```
Current Date is xx-xx-xxxx

Enter new date (mm-dd-yy)
```

The Current Date field should reflect your Setup date entry. You can re-enter the date or press ENTER to continue. The screen displays:

```
Current Time is xx:xx:xx

Enter new time (hh-mm-ss)
```

The Current Time field should reflect your Setup time entry. You can re-enter the time or press ENTER to continue.

The operating system automatically enters an installation program.

If you have a hard disk, follow the screen prompts and prepare the hard drive for "autoboot" operation. Refer to the MS-DOS documentation if you need more information about MS-DOS operations.

If you have a floppy disk drive only, follow the screen prompts and prepare working copies of your operating system disks.

Organizing the Hard Disk

The hard disk installation program transfers the MS-DOS boot files from the floppy disk to the hard disk and provides:

- The root directory
- The BIN subdirectory that holds the MS-DOS operating system files.
- System configuration files

Each of these is described in the following pages. When you boot the hard disk, it reads the system configuration files and runs MS-DOS commands stored in the BIN subdirectory.

The Root Directory

The root directory is the highest (main) level in the directory structure and may include up to 256 file and subdirectory entries.

Instead of storing all your files in the root directory, use subdirectories to take full advantage of the hard disk storage capacity.

Subdirectories

The subdirectory system keeps the hard disk organized. The installation program automatically added a subdirectory called BIN to the root directory and then transferred the MS-DOS operating system files to it.

You can add many subdirectories to the root directory and store application programs in them. For example, you could keep a word processing program in a "word processing" subdirectory called WP, and a data-base program in a "data-base" subdirectory called DB. Actual subdirectory names are limited to eight characters.

You can store files in a subdirectory, or add other subdirectories beneath it. For example, you could add two "documents" subdirectories, called DOCA and DOCB, beneath the "word processing" subdirectory, and store different documents in each.

Path Names

A path name specifies the way or means by which the computer accesses a specific subdirectory. To specify a path name from the root directory, begin with a backslash and include each consecutive subdirectory name. If you are not in the root directory, begin with the current subdirectory name. Include backslashes between names. For example: PATH=C:\WP\DOCB

Commands

Three basic MS-DOS commands are used in a subdirectory system:

- MD (Make Directory)
- CD (Change Directory)
- RD (Remove Directory)

Enter the command followed by the appropriate subdirectory path name.

MD

Add a subdirectory to the root directory with the MD command. Enter MD and a short subdirectory name such as WP. To add subdirectories to WP, enter CD\WP to make WP the current subdirectory. Now enter MD and specify a short subdirectory name such as DOCA

CD

Select the current subdirectory with the CD command. Specify the complete path name of the subdirectory. Begin with a backslash and include backslashes between names, for example CD\WP\DOCA

The operating system always remembers its path to the root directory. To make the root directory the current directory, enter CD\

RD

Remove an empty subdirectory from the root directory with the RD command. Specify the complete path name of the subdirectory. Begin with a backslash and include backslashes between names. For example, to remove the DOCA subdirectory, enter RD\WP\DOCA

System Configuration Files

When the MS-DOS hard disk setup program built the root directory, it transferred two system configuration files to it:

- CONFIG.SYS — File system support
- AUTOEXEC.BAT — Boot support for customizing the operating system

You can modify each of these files to customize the performance of your computer. Refer to the MS-DOS documentation for complete command descriptions.

CONFIG.SYS

The CONFIG.SYS file designates 18 memory buffers to speed input and output operations to the disk drives. It also specifies that 18 files can be open at the same time.

The number of memory buffers and files can be changed. You can also use the CONFIG.SYS file to add device drivers. Device drivers are programs used to enhance computer performance. They cause the hardware to perform specific functions, depending on the application. Device drivers include:

- ANSI.SYS — ANSI escape sequence support
- DRIVER.SYS — External drive support
- VDISK.SYS — Virtual disk support
- ZCACHE.SYS — Disk cache memory support

The device drivers are described in detail in the MS-DOS documentation. Some application programs may require you to specify a device driver in the CONFIG.SYS file. Refer to the documentation supplied with those applications.

Enter COPY CON CONFIG.SYS to make a CONFIG.SYS file. The screen cursor drops one line and the computer is ready to accept commands. This command overwrites the current CONFIG.SYS file, so be sure to re-enter the buffer and file information. Press ENTER after each command line. When all of the command lines have been entered, press CTRL-Z and ENTER to save the file. Reboot the computer whenever you modify the CONFIG.SYS file.

The following example shows how to specify a device driver in the CONFIG.SYS file:

```
BUFFERS = 18  (Sets 18 memory buffers)

FILES = 18  (Allows 18 open files)

DEVICE = <drivers>  (Installs the specified driver)
```

AUTOEXEC.BAT

The AUTOEXEC.BAT file specifies the path to your operating system files. You can add commands to the AUTOEXEC.BAT file that automatically run during the boot procedure. Many different MS-DOS commands can be specified in an AUTOEXEC.BAT file. Refer to the MS-DOS documentation for complete command descriptions.

Enter COPY CON AUTOEXEC.BAT to make an AUTOEXEC.BAT file. The screen cursor drops one line and the computer is ready to accept commands. Press ENTER after each command line. Specify PATH=C:\BIN. When all of the command lines have been entered, press CTRL-Z and ENTER to save the file. Reboot the computer whenever you modify the AUTOEXEC.BAT file.

The following example describes how to automatically make your word processing subdirectory (WP) the current subdirectory. Enter COPY CON AUTOEXEC.BAT, then:

ECHO OFF — (Turns off screen comments)

CLS — (Clears screen contents)

DATE — (Prompts user to enter current date)

TIME — (Prompts user to enter current time)

CLS — (Clears screen contents)

PATH =C:\BIN — (Sets search path to C:\BIN)

PROMPT $P — (Prompt appears as current path name)

CD WP — (Makes WP the current subdirectory)

Applications

After you build a subdirectory system, you can install your application programs on the hard disk. Refer to your software documentation for "loading" requirements.

Copy each of your programs to the appropriate subdirectory. Do not place all your programs in the root directory. Refer to the software documentation for installation procedures.

Once you have set up the hard disk and installed the application programs on it, familiarize yourself with your keyboard.

Chapter 4

Keyboard

Contents

The keyboard controls the operation of the computer when you enter commands and data. An AT-compatible 101-key keyboard is supplied with your computer.

The keyboard is programmable, so some of the functions described in this chapter may change, depending on your application. Check your software documentation for specific key functions. Figure 4-1 shows the keyboard layout.

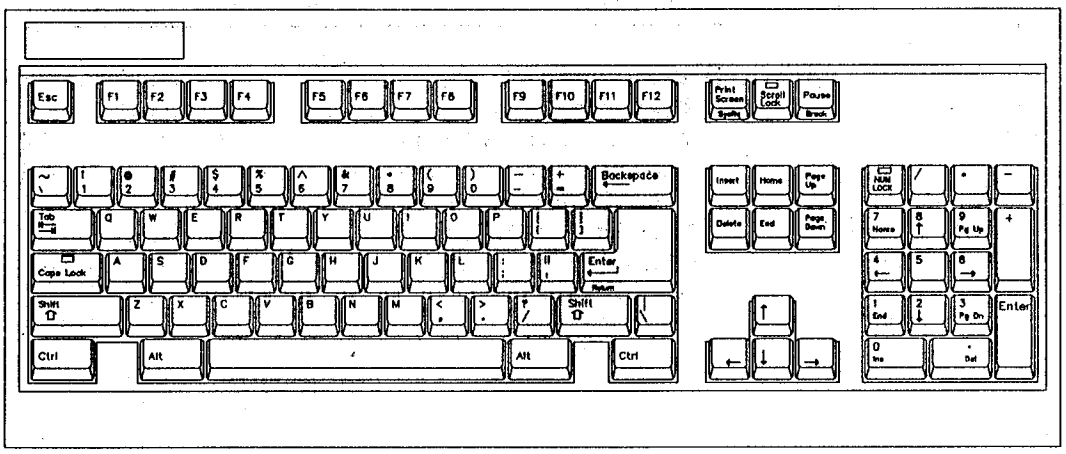


Figure 4-1. Keyboard

Features

The keyboard provides:

- Audible feedback
- Automatic key-repetition
- Tactile keys for touch typing
- Key-selectable modes
- Mode status LEDs
- PC-AT compatibility

Most keys make a clicking sound when pressed. You can turn the key click feature off and on by pressing the ALT-~ (tilde) key combination.

Some keys start to repeat when you press and hold them. The repetition rate speeds up until you release the key.

The F and J keys have a raised dot on them to help touch typists keep their fingers oriented.

Key Groups

The keyboard keys are arranged in convenient groups:

- Alphanumeric keys
- Screen and cursor control keys
- Numeric keys
- Function keys

Alphanumeric Key Group

The alphanumeric key group has character and control keys that resemble a typewriter keyboard.

Character keys include letter, number, punctuation, and space keys.

Control keys include CTRL (control), ALT (alternate), SHIFT, TAB, BACKSPACE, CAPS LOCK, and ENTER/RETURN. An LED in the CAPS LOCK key indicates when that function is active.

The letter and number keys on the computer keyboard are not interchangeable. Do not type lowercase L (l) when you mean a number one (1) or the capital letter O when you want the number zero (0).

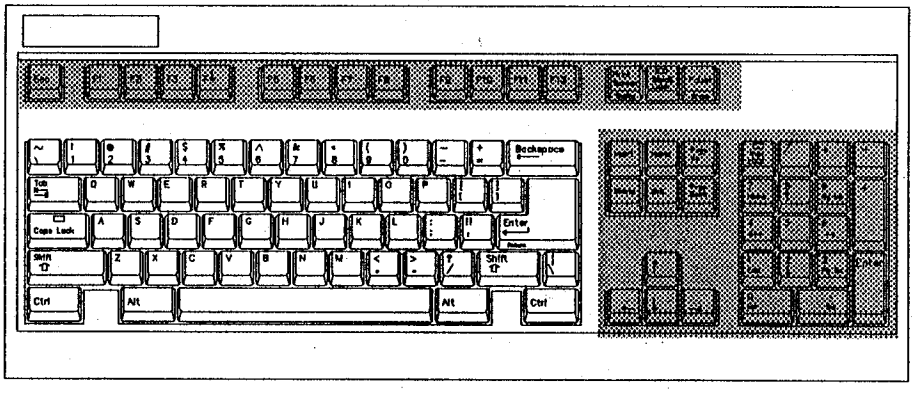


Figure 4-2. Alphanumeric Key Group

Screen and Cursor Control Key Groups

The keyboard has two sets of screen control and cursor control keys. One set is part of the numeric keypad group at the far right of the keyboard, and the other set is located between the alphanumeric key group and the numeric keypad group. Both sets are used to control screen presentation.

Screen control keys include INSERT, DELETE, HOME, END, PAGE UP, and PAGE DOWN, PRINT SCREEN/SYSRQ, SCROLL LOCK, and PAUSE BREAK. An LED in the SCROLL LOCK key indicates when that function is active.

Cursor control keys include the left, right, up, and down arrow keys.

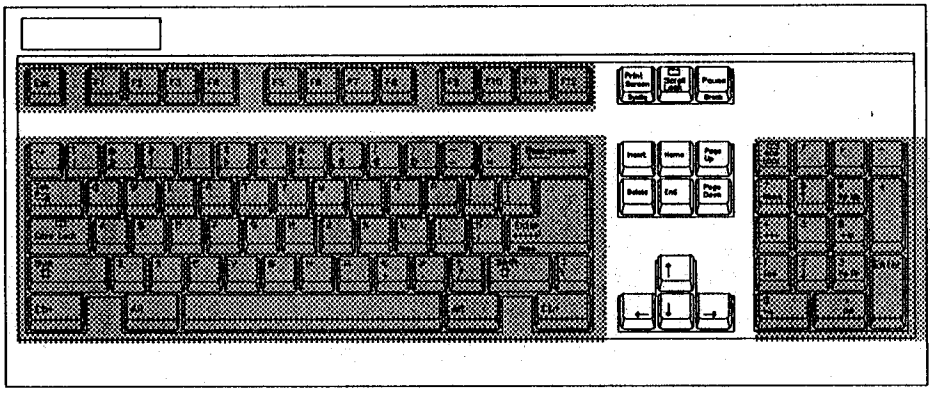


Figure 4-3. Screen Control and Cursor Control Key Groups

The operating system and some software packages program the functions of both sets of screen control and cursor control keys.

Other software packages only program the screen control and cursor control keys that are part of the numeric keypad.

Numeric Keypad Group

The numeric keypad has mathematical operator keys, numeric keys, and control keys.

Mathematical operators include division (/), multiplication (*), subtraction (-), and addition (+).

Numeric keys include the numbers 0 through 9, and a decimal point.

Control keys include NUM LOCK (number lock), ENTER, HOME, END, PG UP, PG DN, and arrow keys.

The keypad numeric keys are arranged like a calculator keypad for rapid data entry. To help touch typists keep their fingers on the proper keys, the number 5 key has a raised dot.

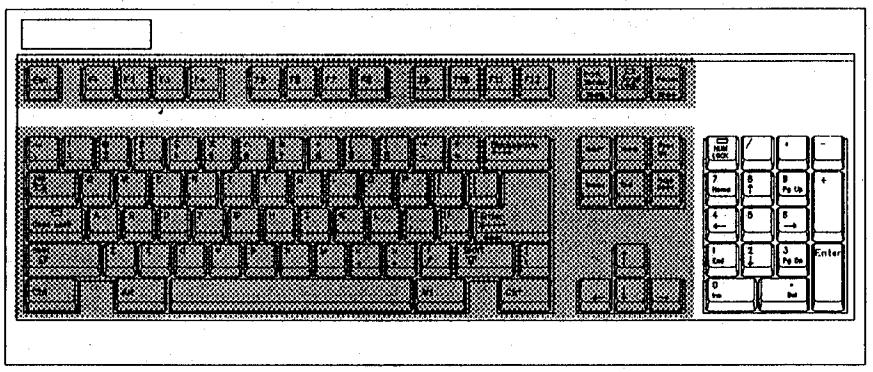


Figure 4-4. Numeric Keypad Key Group

Function Key Group

The function keys include twelve programmable keys, three dedicated function keys, and the ESC key.

Programmable keys include F1 through F12.

Dedicated function keys include PRINT SCREEN/SYS RQ, SCROLL LOCK, and PAUSE/BREAK.

ESC halts or exits a program.

The PRINT SCREEN function sends the screen display to the printer port. SYS RQ accommodates applications that program a system request.

Press the SCROLL LOCK key to stop information scrolling on the screen. Press it again to continue scrolling. An LED in the SCROLL LOCK key indicates when that function is active.

The PAUSE/BREAK key halts program execution.

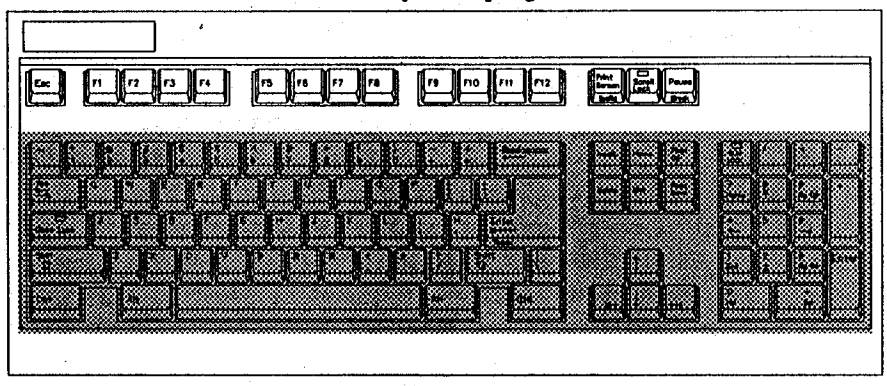
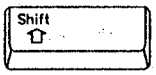


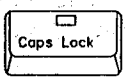
Figure 4-5. Function Key Group

Key Functions

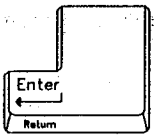
The following key functions are programmed when the computer is under Monitor ROM program control.



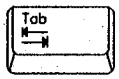
SHIFT affects alphanumeric letter, number, and punctuation keys. Either SHIFT key enables capital letters, symbols, and alternate punctuation marks. If CAPS LOCK is on (the CAPS LOCK LED is lit) and you press SHIFT, lowercase characters are produced.



CAPS LOCK is similar to a typewriter shift lock key, but it affects only the letter keys. Press it once to begin typing capital letters, press it again to stop typing capital letters. When CAPS LOCK is on (LED is lit), pressing either SHIFT key generates lowercase letters on the letter keys.

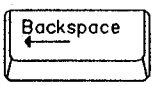


The ENTER/RETURN key completes keyboard entries; press ENTER when you finish entering data or instructions to tell the computer to process them.



The TAB key moves the cursor to the next tab setting. The next tab setting may be a specific number of spaces (usually 5) in the line you are typing, or it may be a new data field on the screen.

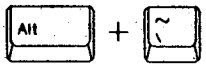
When typing commands and data, use the space bar to enter a blank space. The space bar also is used to select option fields in the Setup/Configuration program.



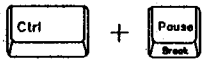
The BACKSPACE key moves the cursor to the left, erasing any characters in the cursor's path. It can also be programmed to change text on the screen or move the cursor without erasing any characters. For example, in the Setup/Configuration program, you press the BACKSPACE key to view configuration options.

Key Combinations

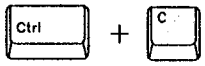
The CTRL and ALT keys, together with other keys, issue commands. Sometimes both keys are used in conjunction with a third key. To use a CTRL or ALT key, press and hold it, then press another key. Some common CTRL and ALT key commands are:



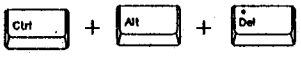
ALT-~ toggles key click off and on.



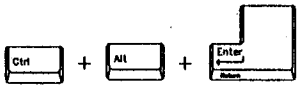
CTRL-BREAK halts the Monitor ROM program in progress. This command is not recognized by the Setup/Configuration program.



CTRL-C halts a Monitor ROM command in progress. This command is not recognized by the Setup/Configuration program, or by the user-selectable test programs.

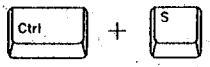


CTRL-ALT-DEL resets the computer, initiates the power-up self-tests, and then autoboots the computer.

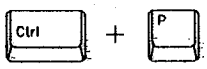


CTRL-ALT-ENTER displays the contents of the CPU's registers and flags, and then enters the Monitor program.

CTRL-ALT-INS resets the computer, initiates the power-up self-tests, and then enters the Monitor program. This command overrides autoboot.



CTRL-S stops output to the screen until you press another key. This command is generally used to stop scrolling.



CTRL-P toggles "printer echo" on and off. When printer echo is on, everything displayed on the screen is also printed by the printer.

Chapter 5

Hardware Upgrades

Contents

Adding Options

You can add various options to your computer to enhance its performance. This chapter describes the installation of several frequently-selected hardware upgrades:

- Additional circuit cards
- Floppy and hard disk drives
- Additional memory
- An 80387SX numeric coprocessor.

Most of these options are shipped with documentation which provides product specifications, configuration, and operation information. Use the instructions contained in this chapter to install the upgrades.

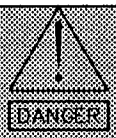
Optional drives are shipped with documentation which provides product specifications, configuration, operation, and installation information. If you are installing optional floppy or hard disk or tape drives, use the instructions contained in the installation guide for that drive.

Preparation

To install any upgrades in your computer, you must partially disassemble it. The extent to which you disassemble the computer depends on what you are installing. The only tools you will need during disassembly, installation, and reassembly are a phillips screwdriver and a flat-blade screwdriver.

Circuit cards and ICs (integrated circuits) can be easily damaged by static electricity. To prevent damage, keep them in protective packaging when they are not installed in your computer.

Removing the Cover



Hazardous voltages may be present inside the computer whenever the power cord is connected to an AC power source. Do not begin disassembly before unplugging the computer.

1. Turn off the computer, unplug the power cord from the AC source, and then disconnect the cord from the back of the computer.

2. Turn off the power to the video monitor and all peripherals, disconnect them from the AC power source and the computer, and then set them aside.

3. Disconnect the keyboard cable from the back of the computer and set the keyboard aside.

4. Unlock the cover, as shown in Figure 5-1.

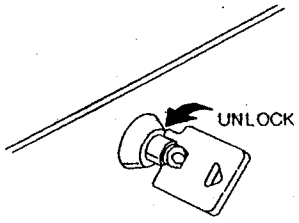


Figure 5-1. Unlocking the Cover

5. Remove and save the two thumb screws that secure the cover to the base of the computer cabinet. Their locations are shown in Figure 5-2.

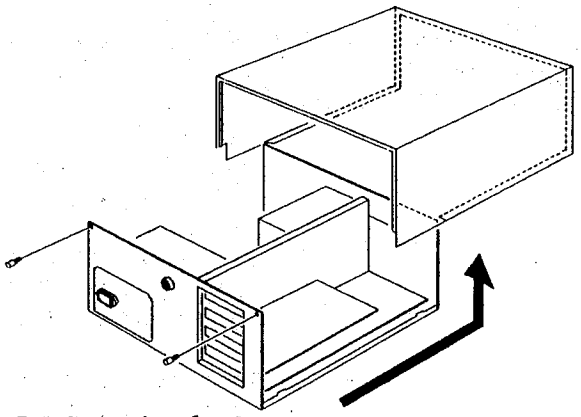


Figure 5-2. Removing the Cover

6. Slide the cover forward slowly, taking care not to catch any cables, wires, or components. Make sure the support flange on the bottom of the cover does not catch on the cabinet. Lift the cover up and off the computer and set it aside. The inside of your computer should look similar to Figure 5-3.

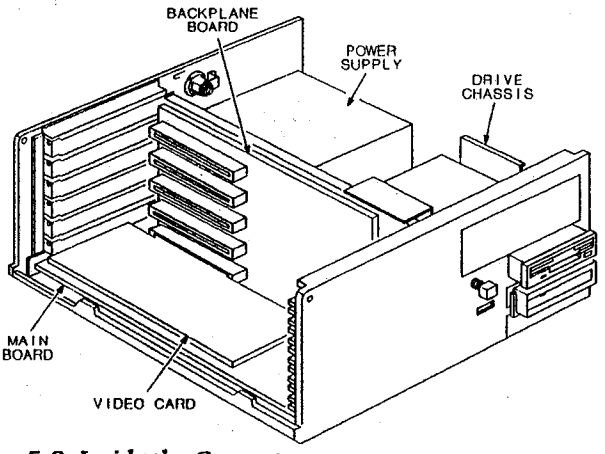


Figure 5-3. Inside the Computer

Installing a Circuit Card

There are five card slots on the backplane board, as shown in Figure 5-4. The bottom slot (P305) is reserved for the video card.

You can install any PC- or AT-compatible, full- or half-length circuit cards in the open slots.

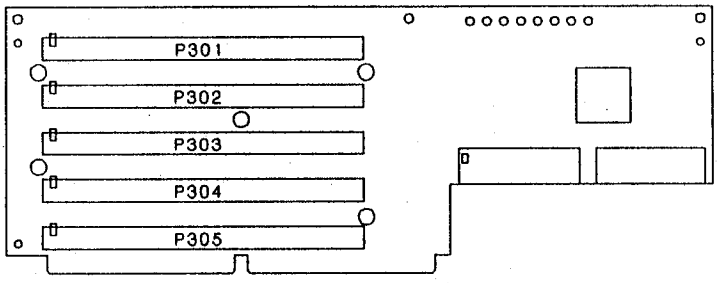


Figure 5-4. Backplane Board

1. Remove the cabinet cover as described previously.

2. Select an open card slot on the expansion bus. Remove the screw and the blank bracket from the slot selected, as shown in Figure 5-5. Save the screw.

3. Set any jumpers or switches on the card you are installing according to the documentation that came with the card.

If you are replacing the video card, be sure to check the setting of J102 on the main circuit board. The jumper must be installed if you are using a color video or EGA/VGA card; remove the jumper if you are installing a monochrome video card.

4. Position the circuit card with its connector toward the backplane board, as shown in Figure 5-5. If you are installing a full-length card, align the edge of the card with the groove in the card guide mounted inside the front of the computer.

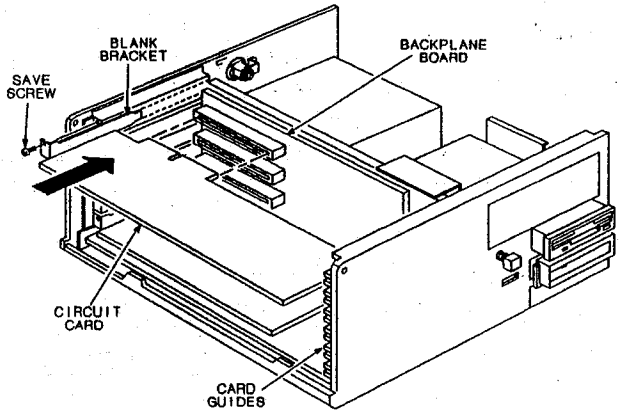


Figure 5-5. Installing a Circuit Card

5. Slide the card into the card guide. Be sure the card clears the cache memory module installed in P110. Gently, but firmly, press the card into the backplane board edge connector. Make sure the card is completely seated in its slot.

6. Secure the card to the computer cabinet with the screw you saved in step 2. Connect cables as necessary.

7. Replace the cover and reconnect the keyboard, video monitor, peripherals, and power cord as described at the end of this chapter.

8. If you changed the type of video card, or added a memory expansion card, update the Setup/Configuration program, as described in Chapter 2.

Removing a Circuit Card

To remove or replace the video card or any other circuit cards installed in your computer, use the following procedure.

You must remove the circuit cards when you install components such as a numeric coprocessor on the main board. You do not need to remove the backplane board for the upgrades described in this chapter. Figure 5-6 illustrates the card removal process.

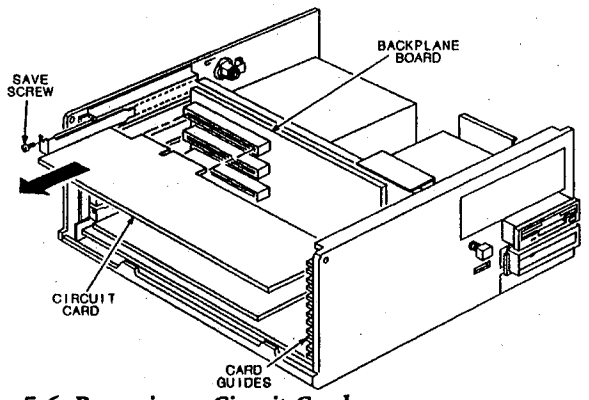


Figure 5-6. Removing a Circuit Card

1. Remove the cabinet cover as described previously.
2. If there are any cables attached to the card you are removing, disconnect them.
3. Remove and save the screw that secures the card to the computer cabinet.
4. Firmly grasp the card and pull it out slightly from the backplane board edge connector, until you feel it release. Slide the card out of the card guide.
5. Place the card in protective packaging.
6. Proceed to the appropriate sections of this chapter for installation and reassembly procedures.

Drive Options

The drive chassis in your computer can accommodate up to three disk drives:

- Two 3.5-inch drive slots.
- One 5.25-inch drive slot.

The bottom slot normally contains a 3.5-inch hard disk drive; the middle slot generally contains a 3.5-inch floppy disk drive; the top slot can contain a 5.25-inch floppy disk drive. Figure 5-7 shows the drive chassis.

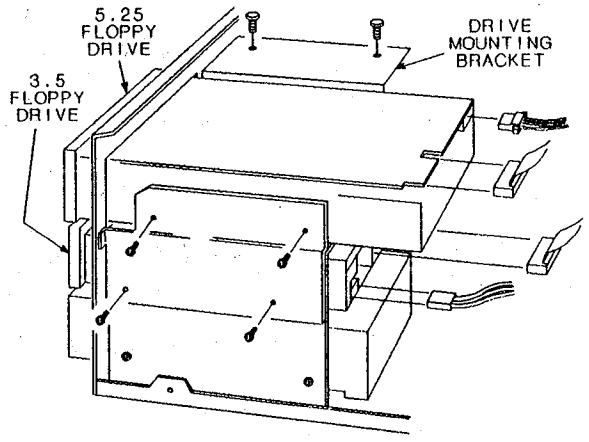


Figure 5-7. Drive Chassis Hardware

If you install a hard disk drive, you may also need to install a compatible drive controller circuit card. Remove jumper J304 from the backplane board if you install a drive controller card.

Factory-installed hard disk drives do not require a separate drive controller circuit card; the hard drive interface connector is on the backplane board. Most of the control circuitry is contained within the drive itself. If you are installing only a floppy disk drive, **do not** remove jumper J304 on the backplane board.

Installing and Removing Memory Modules

Your computer was shipped from the factory with at least 1 megabyte of memory installed on the main circuit board, as shown in Figure 5-8.

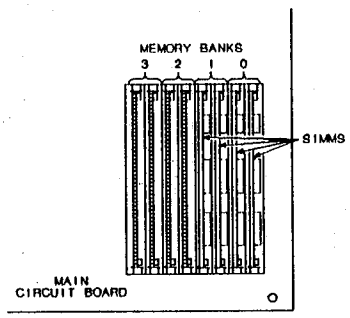


Figure 5-8. Location of Memory Modules and Banks

1. Remove the cabinet cover as described previously.
2. If you have a 5.25-inch floppy disk drive installed in the top (wide) slot of the drive chassis, remove it. If you do not have a drive installed in the top slot, proceed to step 7.
3. Remove cables.
4. Remove and save the two screws that secure the drive to the outer side of the drive chassis.
5. Remove and save the two screws that secure the drive mounting bracket to the inside of the drive chassis.
6. Slide the floppy disk drive with the mounting bracket attached toward the back of the computer until the drive clears the front of the computer. Then lift the drive and mounting bracket up and out of the drive chassis.
7. Before installing new memory modules, note the positioning and locations of the factory-installed memory modules, as shown in Figure 5-8. Refer to Figure 5-9 and the following procedure to install and remove memory modules.

Possible Main Board Memory Configurations				
Total Main Board RAM	Bank 0*	Bank 1*	Bank 2*	Bank 3*
1M	256K	256K		
2M	256K	256K	256K	256K
3M	256K	256K	1M	
5M	256K	256K	1M	1M
2M	1M			
4M	1M	1M		
6M	1M	1M	1M	
8M	1M	1M	1M	1M
*=Two SIMMs per bank.				

NOTICE Memory modules are sensitive to static electricity. Keep the memory module in its protective packaging until you are ready to install it. Before picking up the memory module, equalize the static electricity between the work surface and the module by touching the work surface with one hand and picking up the memory module with the other. After you remove the memory module from its 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.

To install a memory module, position it so that the edge connector is over the socket and the side with the memory devices faces the drive chassis. Tip the memory module at a slight angle away from the drive chassis and guide it into its socket. The gently push it to its upright position. You should hear a distinct click as the tabs at the end of the socket snap into the holes at the ends of the memory module. Never force a memory module into its socket.

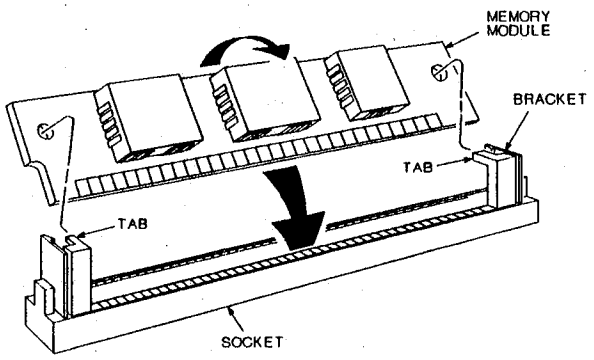


Figure 5-9. Installing Memory Modules

To remove a memory module, use a small flat-blade screwdriver to pry the brackets at the ends of the module socket so that the holes in the memory module can clear the bracket tabs. Gently tip the memory module away from the drive chassis and lift it from the computer.

8. If you removed a drive earlier, re-install it, and secure it with the screws you removed. Reconnect any cables you removed.

9. Replace the cover as described at the end of this chapter.

10. Update the Setup/Configuration program, so the computer can recognize and use the added memory.

11. Perform the base memory and extended memory tests, described in the Tests and Error Messages section at the end of this manual, to verify that the existing and added memory banks are functioning properly.

1. Remove the cabinet cover as described previously.

2. Remove any circuit cards installed in the computer using the procedures in the Removing a Circuit Card section of this chapter. This provides access to the main board.

3. Note the location for the numeric coprocessor IC at U135, as shown in Figure 5-10.

4. Align the pin 1 end of the IC with the pin 1 mark on the circuit board location for the IC. Carefully press the IC pins completely into the socket.

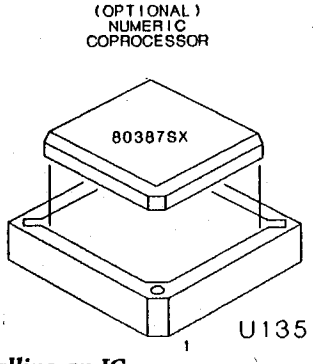


Figure 5-11. Installing an IC

5. Re-install any circuit cards you removed from the computer according to the procedures in the Installing a Circuit Card section of this chapter.

6. Replace the cover as described in the next section.

Replacing the Cover

1. Make sure all circuit cards and components are secured, and all cables are properly routed and connected.

2. Hold the cover so that the front is toward you and the rear is positioned over the front of the computer cabinet, as shown in Figure 5-12. Place the cover over the cabinet grooves, then slide it back onto the cabinet.

   You may have to hold down various cables as you slide the cover over them. Make sure the support flange on the bottom of the cover fits over the bottom of the cabinet. Also, make sure the power-on LED shows through the cover, and the push button power switch fits through its opening in the cover.

3. Secure the cover to the computer with two thumb screws removed during disassembly, as shown in Figure 5-12.

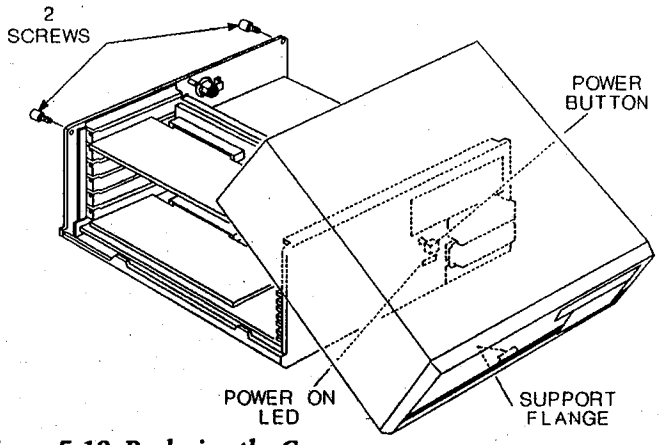


Figure 5-12. Replacing the Cover

4. Lock the cover, if necessary, by turning the key in the cover lock in the direction shown in Figure 5-13.

5. Reconnect the keyboard, video monitor, peripherals, and the power cord to the computer. Reconnect the computer, monitor, and peripherals to an AC power source.

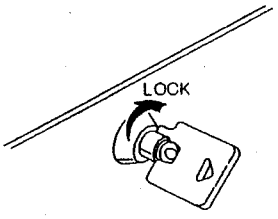


Figure 5-13. Locking the Cover

Video Card

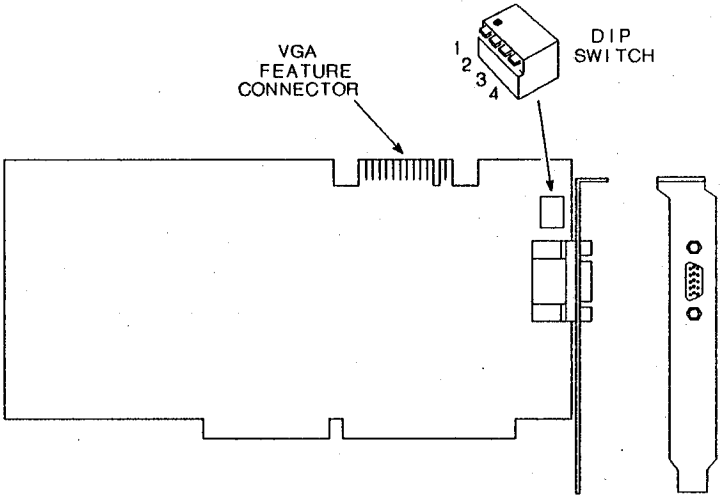
Introduction

This computer contains a 31 kHz Video Graphics Array (VGA) video card (Z-549-A). The card has been configured at the factory to provide full VGA color video output. If you are planing to use a VGA color monitor, you will not need to make any changes or adjustments to your video card.

VGA Video Card

The Z-549-A card produces an analog RGB video signal which can support display modes VGA, EGA, CGA, MDA and HGC. It can produce displays having a resolution of 640 pixels by 480 lines with up to 16 colors. It can display 256 colors simultaneously with a resolution of 320 x 200. The video card is shown in Figure V-1.

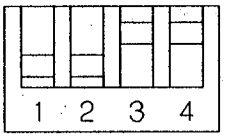
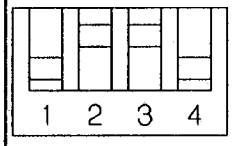
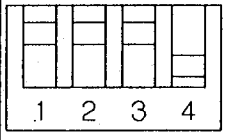
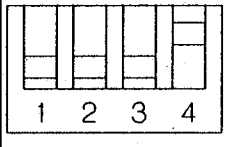
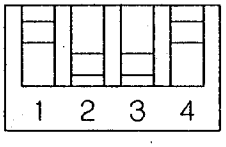
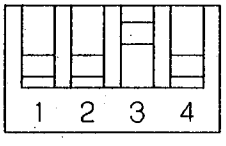
Figure V-1. VGA Video Card



Switch Settings

The 4-position DIP (dual in-line package) switch on the card is used to select the default video mode (the display mode used at power up). The default factory setting is VGA. Use the information in Table V-1 when you want to change the DIP switch to select a different default video display type.

Table V-1. Default Video Display Type Settings

	DISPLAY TYPE	DIP SWITCH SETTING			
		1	2	3	4
	VGA (Factory set)	ON	ON	OFF	OFF
	CGA (40 column)	ON	OFF	OFF	ON
	CGA (80 column)	OFF	OFF	OFF	ON
	EGA (200 line)	ON	ON	ON	OFF
	EGA (350 line)	OFF	ON	ON	OFF
	MDA/HGC	ON	ON	OFF	ON

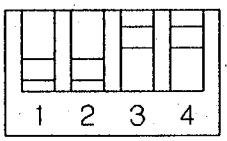
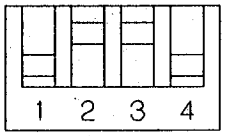
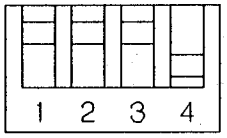
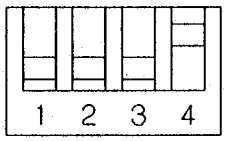
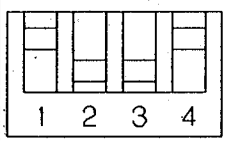
Using a Second Video Card

You may install one video card in addition to you VGA card. This flexibility allows you to switch easily from one video display type and monitor to another. For instance, you can have a VGA monitor connected to your VGA card, and a CGA monitor connected to a CGA video card. The DIP switch settings for the various possible video card combinations are described in Tables V-2 through V-4.

Primary video card refers to the card that will initially supply video information to its monitor when the computer is powered up (default display type). The secondary video card refers to the other installed video card that can be activated from the Monitor program using the Video Mode (VM) command. Only one video card and monitor can be active at one time, but both cards can remain in the computer.

- If the VGA card will be the only video card installed in your computer, use the configuration information in Table V-1.
- If the VGA card will be the primary video card and an MDA (monochrome) card will be the secondary video card installed in your computer, refer to Table V-2.
- If an MDA (monochrome) card will be the primary video card and the VGA card will be the secondary video card installed in your computer, refer to Table V-3.
- If a CGA (color) card will be the primary video card and the VGA card will be the secondary video card installed in your computer, refer to Table V-4

Table V-2. VGA Card (Primary) and MDA Card (Secondary) Video Display Type Settings

	DISPLAY TYPE	DIP SWITCH SETTING			
		1	2	3	4
	VGA*	ON	ON	OFF	OFF
	CGA (40 column)	ON	OFF	OFF	ON
	CGA (80 column)	OFF	OFF	OFF	ON
	EGA (200 line)	ON	ON	ON	OFF
	EGA (350 line)	OFF	ON	ON	OFF

*Factory setting.

Table V-3. MDA Card (Primary) and VGA Card (Secondary) Video Display Type Settings

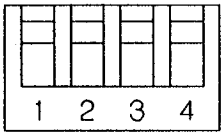
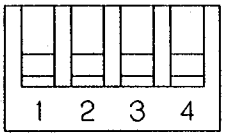
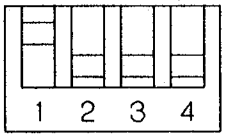
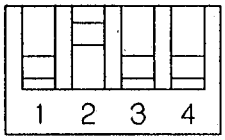
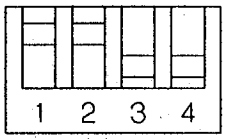
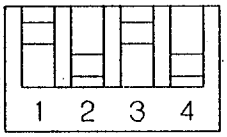
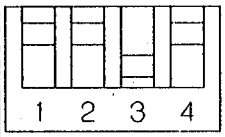
	DISPLAY TYPE	DIP SWITCH SETTING			
		1	2	3	4
	VGA	OFF	OFF	OFF	OFF
	CGA (40 column)	ON	ON	ON	ON
	CGA (80 column)	OFF	ON	ON	ON
	EGA (200 line)	ON	OFF	ON	ON
	EGA (350 line)	OFF	OFF	ON	ON

Table V-4. CGA Card (Primary) and VGA Card (Secondary) Video Display Type Settings

	DISPLAY TYPE	DIP SWITCH SETTING			
		1	2	3	4
	MDA 720 x 350	OFF	ON	OFF	ON
	VGA (monochrome) 720 x 400	OFF	OFF	ON	OFF

Once you set the DIP switch for its default display type, no further configuration changes or adjustments are required. For example, when the card is set for a default display type of VGA, most software that produces CGA or EGA will be displayed properly. However, when the card is set for a default display type of CGA, any software that is set to produce an EGA or VGA display cannot be produced.

You can use the computer's Monitor program Video Mode command to temporarily change the display type without changing the DIP switch settings. You may also use the MS-DOS MACHINE VIDEO command to override the DIP switch setting (refer to your MS-DOS manuals for further information).

To temporarily change the video display type:

1. Enter the Monitor program by pressing the CTRL-ALT-INS key combination.

2. When the Monitor prompt appears, use the information in Table V-5 to change the default display type.

Table V-5. Temporarily Setting the Video Display Type

DEFAULT DISPLAY	ENTER THIS AT THE MONITOR PROMPT
MDA and HGC	VMF0
CGA	VMF1
EGA 350 line	VMF2
VGA	VMF3
EGA 200 line	VMF4

Tables V-6 and V-7 give additional specifications for each of these video modes. Refer to Section P of this manual for information on the Monitor Program Video Mode (VM) command.

The Z-549-A video card supports three additional modes beyond VGA:

1. 132 x 25 text-VGA output
2. 132 x 43 text-VGA output
3. 800 x 600 non-VGA output; requires a multi-frequency monitor.

Technical Information

This section contains additional information about the Z-549-A VGA video card, including features, modes of operation, and other specifications.

General

The Z-549-A video card provides hardware register level compatibility with the existing CGA, EGA, MDA, and HGC video standards. These standards are emulated as analog RGB video signals at a constant 31.49 kHz horizontal scan frequency. In addition, this card provides hardware register level compatibility with both MCGA and VGA video standards.

The 16-bit interface is used for video memory and I/O only. The card can also be installed in a standard 8-bit PC bus and adjusts accordingly for this bus. The video card also supports Zenith Data System's use of "slushware" to provide faster screen updates.

The video card automatically senses the type of monitor (color or monochrome) connected, based on the status of pins 11 and 12 of the 15-pin, D-type video connector. When pin 11 is grounded, the video card is signaled that a color monitor is connected to the card; when pin 12 is grounded, the video card is signaled that a monochrome monitor is connected to the card.

Video Modes

Table V-6 lists the alphanumeric video modes supported by the Z-549-A video card, and Table V-7 lists the graphics video modes it supports.

To produce the display types listed in these tables, the video card must be set for the proper emulation mode (see Table V-5).

Table V-6. Alphanumeric Video Modes

Mode	Rows/ Columns	Resolution	Dis- play	Emulation mode	Character Box	Colors
0,1	25/40	320 x 200	CGA	F1	8 x 8	16
		320 x 350	EGA	F2	8 x 14	16 of 64
		320 x 400	MCGA	F3	8 x 16	16 of 256K
		360 x 400	VGA	F3	9 x 16	16 of 256K
23	25/80	640 x 200	CGA	F1	8 x 8	16
		320 x 350	EGA	F2	8 x 14	16 of 64
		320 x 400	MCGA	F3	8 x 16	16 of 256K
		360 x 400	VGA	F3	9 x 16	16 of 256K
7	25/80	720 x 350	MDA	F0	9 x 14	monochrome
		720 x 400	VGA	F3	9 x 16	monochrome
		640 x 350	EGA	F2	9 x 14	monochrome
IC	25/132	1188 x 400	*VGA	F3	9 x 16	**16 of 64
ID	43/132	1188 x 704	*VGA	F3	9 x 8	**16 of 64

*non-VGA display **requires special monitor

Table V-7. Graphics Video Modes

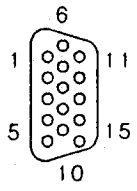
Mode	Resolution	Display	Mode	Colors
4 & 5	320 x 200	CGA	F1	4
		EGA	F2	4 of 64
		MCGA	F3	4 of 256K
		VGA	F3	4 of 256K
6	640 x 200	CGA	F1	2
		EGA	F1	2 of 64
		MCGA	F3	2 of 256K
		VGA	F3	2 of 256K
D	320 x 200	EGA	F2	16 of 64
		VGA	F3	16 of 256K
E	640 x 200	EGA	F2	16 of 64
		VGA	F3	16 of 256K
F	640 x 350	EGA	F2	monochrome
		VGA	F3	monochrome
10	640 x 350	EGA	F2	16 of 64
		VGA	F3	16 of 256K
11	640 x 480	MCGA	F3	2 of 256K
		VGA	F3	2 of 256K
12	640 x 480	VGA	F3	16 of 256K
13	320 x 200	MCGA	F3	256 of 256K
		VGA	F3	256 of 256K
F0	720 x 348	MDA	F0	monochrome
6A	800 x 600	non-VGA		*16 of 64

*requires special monitor

Connector Pin Assignments

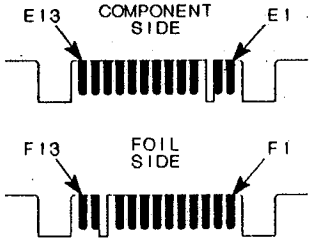
Table V-8 lists the 15-pin, D-type video connector pin assignments. A standard VGA feature connector is located along the top of the video card. Table V-9 lists the pin assignments for this connector.

Table V-8. Video Connector Pin Assignments



Pin	Description
1	Red video
2	Green video
3	Blue video
4	Monitor type sense
5	Ground
6	Red ground
7	Green ground
8	Blue ground
9	No connection
10	Sync ground
11	Monitor type sense
12	Monitor type sense
13	Horizontal sync
14	Vertical sync
15	No connection

Table V-9. Feature Connector Pin Assignments



Pin	Function	Pin	Function
E1	C0	F1	GND
E2	C1	F2	GND
E3	C2	F3	GND
E4	C3	F4	#FC Data EN#
E5	C4	F5	#FC sync EN#
E6	C5	F6	#FC clock EN#
E7	C6	F7	NC
E8	C7	F8	GND
E9	FC clock	F9	GND
E10	FC blank	F10	GND
E11	FC H sync	F11	GND
E12	FC V sync	F12	NC
E13	NC	F13	NC

In Case of Difficulty

Possible solutions to commonly-experienced video problems are listed here. If these solutions do not solve the problem, contact your approved service center for further advice.

Video display is absent when the computer is turned on:

- Verify that the video card is properly configured as outlined earlier. If you are using a primary and secondary video card arrangement, make sure the card you wish to use is activated.
- Verify that the monitor's video input cable is securely connected to the correct video card.

Computer responds slowly or incorrectly:

- Make sure that no more than one video card installed in the computer is configured for color operation. If the Z-549-A card and a CGA card are both configured for color operation, the computer may not operate properly. In addition, an EGA card cannot be installed with the Z-549-A card.

Tests and Error Messages

Access the Monitor program with the CTRL-ALT-INS key combination. The Monitor prompt (->_) indicates the computer is under Monitor program control, and that it is ready to accept a command. If you enter a question mark (?), the Monitor program displays the command summary.

Using the TEST Command

The TEST command displays a menu that contains user-selectable tests you can run to detect problems with computer hardware.

```
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:
```

The selected test runs until an error is detected or you press ESC. If the computer appears to have an intermittent, time-dependent, or heat-related problem, let each test run continuously.

When an error is detected, the test stops and displays a message on the screen. Record the message on a sheet of paper. If the computer needs to be serviced, the error message could help the service technician pinpoint the trouble quickly.

Refer to the Error Messages at the end of this section for additional information.

1. Disk Read Test

If you see repeated disk error messages on your screen, run the DISK READ TEST. It checks the boot track of the last drive you booted from. To test a different drive, try to boot the drive, then run the test.

A test failure can occur if:

- The boot track on the disk is corrupted.
- The disk drive is defective.

If you are testing the floppy disk drive, place a formatted, blank disk in the drive and run the test. Do not use a valuable disk to test the drive; it could be destroyed.

If you are testing the hard disk drive, you may need to reformat the drive. Refer to the MS-DOS documentation for hard disk preparation information.

If the test is successful, the drive access LED lights and the computer increments the test count on the screen.

2. Keyboard Test

The KEYBOARD TEST checks the keyboard controller. When you press a key, the keyboard controller generates a keycode. The test fills the screen with the key character and displays the keycode in the upper right part of the screen. Non-printing characters generate only a key code.

If no screen presentation occurs when you press a key, the keyboard needs to be serviced.

3. Base Memory Test

Use the BASE MEMORY TEST to verify that the first 1M of your computer's RAM is functioning properly. As the test runs, the computer beeps and the screen displays:

SYSTEM AND VIDEO MEMORY TEST

The memory bank being tested is displayed in the upper right corner of the screen. After about 5 minutes, you see patterns appear on the screen as the computer tests the video memory.

4. Extended Memory Test

If your computer contains extended memory, use the EXTENDED MEMORY TEST to verify that the RAM above 1M is functioning. The memory tests are extensive and take 5 to 10 minutes to run.

5. Power-Up Test

When you select this test, the computer runs the power-up self-tests continuously. These tests are also run each time you turn on the computer or reset it.

Error Messages

The MFM-300 Monitor program reports error messages on the display. An error message can occur whenever the computer fails to function properly.

Table M-1 lists the error messages in alphabetical order and notes which ones are user-serviceable. If an error message is not user-serviceable, turn off the computer, wait a short time, and turn on the computer. If the message appears again, contact your service representative for assistance.

Except as described in the table notes, do not attempt to service the computer yourself.

Table M-1. Error Messages	
MESSAGE	USER-SERVICEABLE PROBLEM
DISK ERROR: Bad disk controller!	Note 11
DISK ERROR: CRC error!	Note 1
DISK ERROR: Disk not bootable!	Note 2
DISK ERROR: DMA overrun!	No
DISK ERROR: Drive not ready!	Note 3
DISK ERROR: Invalid address mark detected!	Note 1
DISK ERROR: Invalid data read!	Note 1
DISK ERROR: Sector not found!	Note 1
DISK ERROR: Seek failure!	Note 1
Divide by zero!	Note 4
ERROR: Bad configuration information found in [auxiliary] CMOS!	Note 5
ERROR: Base memory size error! SETUP: XXXK ACTUAL: YYYK	Note 6
ERROR: CPU failure!	No
ERROR: Expansion memory size error! SETUP: XXXXXK ACTUAL: YYYYYK	Note 6
ERROR: Invalid/No keyboard code received!	No
ERROR: Keyboard not responding or not connected!	Note 12
ERROR: Overflow!	No
ERROR: Please replace the back-up battery!	Note 7
ERROR: RAM failure! Address: XXXX:YYYY, Bit: N, Chip: UXXX	No
ERROR: ROM checksum failure!	No
ERROR: Timer interrupt failure!	No
ERROR: Wild Interrupt!	No
ERROR: Wild Hardware Interrupt!	No
Error writing drive	No
FATAL: Internal Stack Failure, System Halted	No
Invalid drive specifications	Note 8
Memory allocation error	No
Memory Parity Failure!	No
No system	Note 9

Table M-1. (Continued) Error Messages	
MESSAGE	USER-SERVICEABLE PROBLEM
Non-maskable interrupt!	No
Not a bootable partition	Note 9
Parity failure!	No
Parity hardware failure! Address: XXXX:YYYY, Bit: N, Chip: UXXX	No
Unformatted partition	Note 10

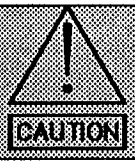
NOTES:

1. Usually, this message indicates that the data on the disk has been corrupted. Try using another copy of the application or data disk. If this does not correct the problem, contact your service representative.
2. **Hard disk:** Make sure you specified a bootable partition. Specify the correct partition and reboot. If this does not correct the problem, contact your service representative.
   Floppy disk: Make sure the disk is properly engaged in the drive. Try using another copy of the application or data disk. If this does not correct the problem, contact your service representative.
3. **Hard disk:** Try to reboot the computer. If this does not correct the problem, contact your service representative. **Floppy disk**: Place a different bootable disk in the floppy disk drive and retry the boot command. If this does not correct the problem, contact your service representative.
4. Some applications may attempt an invalid operation and cause this error. Reboot the computer and run the application again. If the problem persists, try another copy of the application disk. If this does not correct the problem, contact your service representative.
5. Press ESC and re-enter the Setup/Configuration program information from the Setup record at the end of the manual. If the message is repeated, replace the back-up battery. If this message still appears, contact your service representative.
6. Press ESC to continue the boot process. Check the Setup/Configuration program and update the memory size entries. The computer will not display the message when the Setup information matches the actual amount of memory.
7. This message appears when the computer detects that the back-up battery is weak. Replace it, as described in the Replacing the Battery section following this table, and check the Setup/Configuration program entries. If this does not correct the problem, contact your service representative.
8. This message appears if you specify an invalid drive name. Enter the command using the correct drive name.
9. This message indicates that you tried to boot from a disk drive (or partition of a hard disk) that does not have an operating system on it (non-bootable). Transfer the operating system to the disk (or partition), or try another disk, and reboot.
10. Format the partition using the correct drive name.
11. Check for the correct command entry — e.g., BF# where # > 2 will cause this.
12. Verify the keyboard connection.

Replacing the Battery

Your computer has a clock and calendar that keep time even when the computer power is turned off. When the power is off, the clock and calendar run on battery power. The Setup/Confuguration program also uses the same battery when power is turned off to store data in the computer's memory.

The battery is contained in the real-time clock IC. You occasionally must replace this IC. A message is usually displayed on the video screen when you need to replace the IC. Replace the IC according to the following procedures. Contact your service center for a replacement real-time clock IC.



Hazardous voltages are present inside the computer whenever the power cord is connected to an AC power source. Do not begin disassembly before unplugging the computer.

1. Remove the computer cover as described in Chapter 5.
2. Locate the real-time clock IC on the main circuit board, shown in Figure M-1.
3. Remove the real-time clock IC by pulling straight up on the IC.

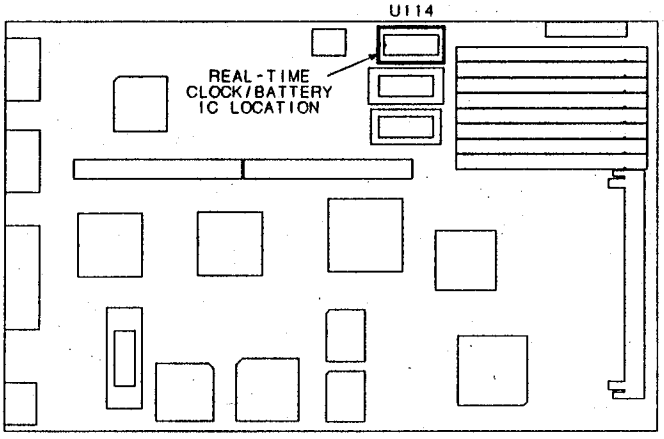
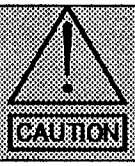


Figure M-1. Real-Time Clock/Battery IC Location

Disposing of the Battery



To prevent explosion hazards, avoid shorting the battery. Do not attempt to recharge it, and do not incinerate it.

1. Bend over all exposed IC leads. Do not short the battery!
2. Wrap the IC with insulating tape to prevent accidental shorting.
3. Pack the IC so it cannot be crushed.
4. Dispose of the IC in the trash.

NOTICE ICs can be damaged by static electricity if they are handled improperly. Keep the IC in its protective packaging until you are ready to install it. To equalize the static electricity between the work surface, the IC, and you, touch the work surface with one hand and pick up the IC with the other hand. After you remove the IC 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 packaging.

Installing a New Battery

1. Make sure the IC pins are straight . Align the pin 1 end of the IC, indicated by an index mark or a notch, with the pin 1 mark on the circuit board location for the IC. Firmly and carefully press the IC pins completely into the socket, as shown in Figure M-2.

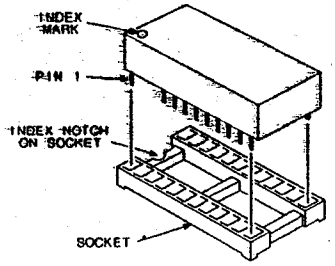


Figure M-2. Installing an IC

NOTE Incorrect installation may result in intermittent contact and damage to the IC or the socket. Pins may be bent underneath an IC. If tests indicate a malfunctioning IC, examine the IC by carefully lifting it from its socket far enough to make sure that all pins are correctly inserted. If a pin is bent, remove the IC and carefully bend the pin to the correct angle. Carefully reinstall the IC.

2. Replace the cover as described in Chapter 5.

Programming Commands

The Multi-Function Monitor (MFM-300) program built into your computer contains programming commands you can use to:

- Modify programs that you write.
- Customize video presentation.

Access the Monitor program with the CTRL-ALT-INS key combination. The Monitor prompt (->_) indicates the computer is under Monitor program control, and that it is ready to accept a command. If you enter a question mark (?), the Monitor program displays the command summary.

You can enter any of the commands listed in the command summary. Use the syntax shown in Figure P-1, then press ENTER, to begin the Monitor program command. Syntax is the way you enter a command so the computer recognizes it. If the syntax is wrong, the computer reports that you entered an invalid command. The command syntax uses:

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

-MFM-300 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>,<number 2>
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
->_		

Figure P-1. Monitor Command Summary

Using the Video Commands

You can use the video commands to program one of several different video modes, emulation modes, and scroll modes. Each mode offers a different display resolution and color scheme. You can also display a fixed color bar on the screen.

Video Modes

The different video modes determine the number of dots to produce on the screen. The dot 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 P-1 lists the video modes. Table P-2 lists the video emulation modes.

Table P-1. Video Modes

MODE NUMBER	COLORS	RESOLUTION
0 (color)	16	40 x 25 text
1 (color)	16	40 x 25 text
2 (color)	16	80 x 25 text
3 (color)	16	80 x 25 text
4 (color)	4	40 x 25 text /320 x 200 graphics
5 (color)	4	40 x 25 text /320 x 200 graphics
6 (color)	2	80 x 25 text /640 x 200 graphics
7 (monochrome)	4	80 x 25 text /720 x 350 graphics
D (color)	16	40 x 25 text /320 x 200 graphics
E (color)	16	80 x 25 text /640 x 200 graphics
F (monochrome)	4	80 x 25 text /640 x 350 graphics
10 (color)	4 or 16	80 x 25 text /640 x 350 graphics
11 (monochrome)	2	640 x 480 VGA
12 (color)	16	640 x 480 VGA
13 (color)	256	320 x 200 VGA
IC (color)	16	132 x 25 text VGA-super
ID (color)	16	132 x 43 text VGA-super
6A (color)	16	800 x 600 non-VGA multifrequency monitor only

Table P-2. Video Emulation Modes

MODE SELECT	DISPLAY
F0	Monochrome/Hercules graphics
F1	CGA
F2	EGA 350 line
F3	VGA
F4	EGA 200 line

Scroll Modes

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

- S0 (Software Scroll Mode)
- S1 (Hardware Jump Scroll Mode)
- S2 (Smooth Scroll Mode)

Software scrolling is used by PC-compatible software. Mode S0 can be programmed with all video modes to scroll the display in single-line increments.

Hardware jump scrolling is not compatible with all applications software. You can program mode S1 with video modes 3 through 6. The display is scrolled in single-line increments at a faster rate than S0.

Smooth scrolling can be programmed only with video mode 6. The display is scrolled in smaller increments to provide a smoother appearance.

Using the Color Bar Command

The color bar command displays a 16-shade bar scale on the display. Display the color bar when you adjust the contrast and brightness on your video monitor.

Using the Programming Commands

The MFM-300 command summary contains a complete set of assembly language programming commands. The commands can be used to verify routines, examine memory, examine registers, and debug assembler programs. Table P-3 lists the commands and their syntax.

NOTICE Do not use the programming commands if you do not understand assembly level programming techniques.

Table P-3. Programming Commands

COMMAND	SYNTAX	DESCRIPTION
Display memory	D<address>	Displays contents of 128 bytes of memory beginning at specified address.
	D<address>, L<bytes>	Displays contents of specified number of bytes of memory beginning at specified address.
	D<range	Displays contents of specified block of memory.
Examine memory	E<address>	Displays and allows user to alter contents of specified memory location.
Fill memory	F<range>,<data byte>	Enters specified data byte into each memory location in specified memory block.
	F<range>,"<ASCII string>"	Enters specified ASCII string into specified memory block.
Execute(Go)	G=<address>	Begins execution of program at specified address.
	G=<address>, <breakpoint>	Begins execution of program at specified address and halts at breakpoint.
Hex math	H<number1>, <number2>	Displays the sum and the difference of the specified hexadecimal numbers.
	H<register1>, <register2>	Displays the sum and the difference of the specified registers.

Table P-3 (continued). Programming Commands

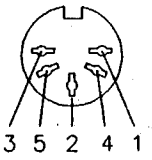
COMMAND	SYNTAX	DESCRIPTION
Input from port	I<port address>	Displays contents of specified port.
Move memory block	M<range>, <destination>	Copies contents of specified memory block to another specified memory block.
Output to port	O<port address>, <data>	Writes specified data to specified port address.
Examine Registers	R<register name>	Displays contents of specified CPU registers and allows modification of contents.
Search memory	S<address>, L<bytes>,<data>	Searches specified memory block for specified data byte and displays address data found.
	S<range>, L<bytes>,"<ASCII>"	Searches specified memory block for specified ASCII character or string and displays address character found.
Trace program	T<count>	Executes specified number of lines of an assembled program in single-step mode.
Unassemble program	U<range>	Displays assembler mnemonics and hex coding for specified memory block.

Specifications

KEYBOARD

101 keys with extended function capabilities.

Connects to the computer through a 5-pin DIN connector on the rear panel of the computer.



PIN	SIGNAL
1	Clock
2	Data
3	Reset
4	Ground
5	+5 volts

CABINET

Chassis Dimensions	15 inches deep, 14 inches wide, 6 inches high.
Weight	18 pounds with a floppy drive and a hard drive.

MAIN CIRCUIT BOARD

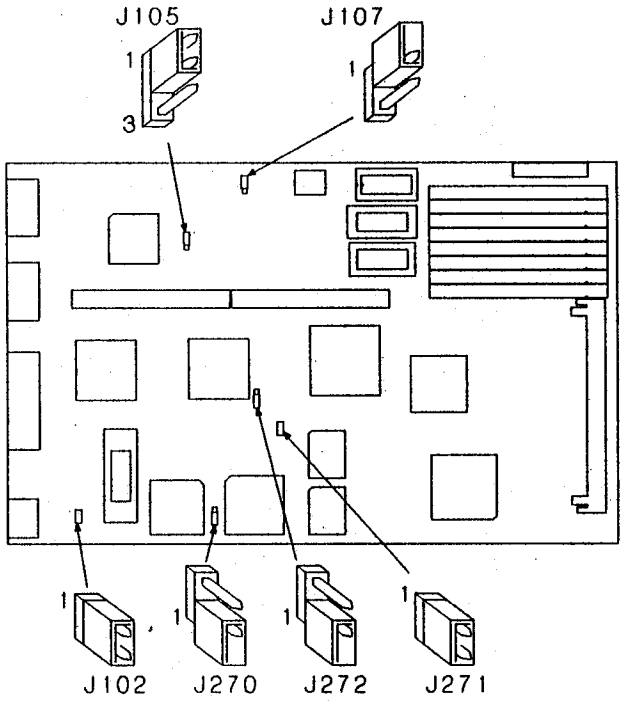
The main circuit board contains:

- The 80386SX CPU and I/O circuitry.
- A socket for the numeric coprocessor.
- Multi-function Monitor ROM IC.
- Real-time clock IC with a built-in battery.
- RAM

Configuration Jumpers

JUMPER	FUNCTION	SETTING
J102	Video card type	
	Color video card	ON*
	Monochrome video	OFF
J105	Auxiliary Interrupt	
	No interrupt	1-2*
	IRQ 12	2-3
J107	Keyboard Lock Enable	
	Disabled	ON
	Enabled	OFF*
J270	Numeric Coprocessor Mode	
	Asynchronous	ON
	Synchronous	OFF*
J271	Clock Speed	
	32 MHz clock A	ON*
	See J272	OFF
J272	Clock Speed	
	16 MHz clock B	ON
	See J271	OFF*

* = Factory setting.



Main Board Configuration Jumpers

PROCESSORS

CPU	80386SX 16-bit external, 32-bit internal microprocessor, socketed. 16 MHz system clock running with 0 wait states.
Numeric Coprocessor	Socket for optional 80387SX numeric coprocessor. 16 MHz clock speed.

MEMORY

RAM	1 megabyte standard. Four banks of 256K x 8 memory modules on the main circuit board and four empty banks. Installed memory can be split among base RAM, extended RAM, and EMS RAM, as described in Chapter 2. Memory expandable to 8 megabytes by filling empty banks with 1M x 16 memory modules.
Monitor ROM	Socketed ROM contains firmware code (boot, diagnostics, and Setup/Configuration program) which moves into a special area of memory (slushware RAM) at power up.
EEPROM	Stores password.
CMOS RAM	Real-time clock contains 50-bytes of battery backed-up CMOS RAM. Stores hardware configuration information. Contains a built-in battery.

BACKPLANE BOARD

5-slot PC/AT-compatible expansion bus.

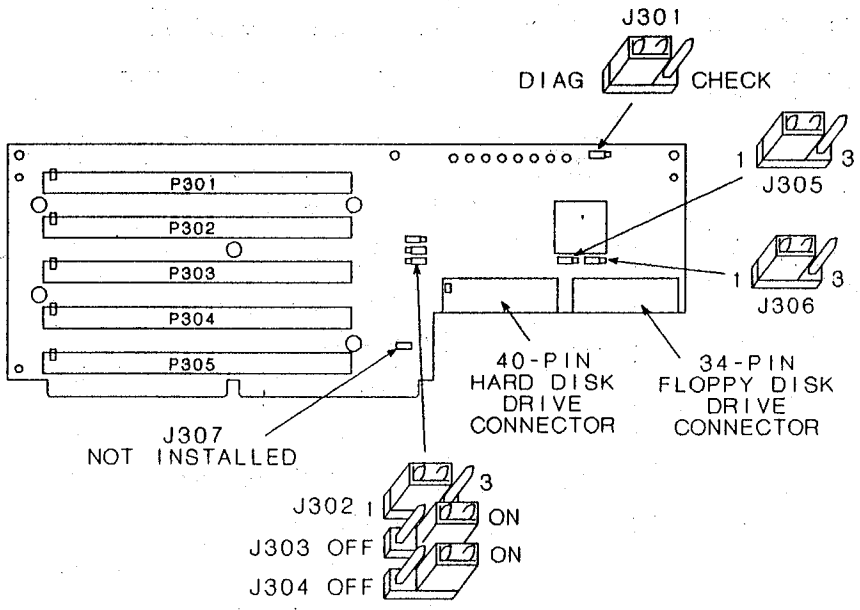
Configuration Jumpers

JUMPER	FUNCTION	SETTING
J301	LED Port select	
	ROM Check	2-3
	Boot Diag	1-2*
J302	RPM Select	
	Invert	2-3
	Not Used	1-2*
J303	Hard Disk Drive (Conner)	
	On/Enable	2-3*
	Off/Disable	1-2
J304	Floppy Disk Drive	
	On/Enable	2-3*
	Off/Disable	1-2
J305	Floppy Disk Drive Precompensation	
	125 nanoseconds	2-3
	187 nanoseconds	1-2*
J306	Drive Type	
	250 kb/s, 300, 500	1-2*
	250, 500 kb/s	2-3
J307	16 MHz Oscillator Select	Not Installed*
*Factory setting		

Drive Interface: 34-Pin floppy disk drive connector.

40-pin hard disk drive connector.

LEDs (green): CPU ROM RAM INT DISK READY PARITY POWER

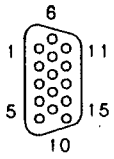


Backplane Board Configuration Jumpers

VIDEO	Compatible-VGA video card installed. This card can automatically detect and emulate various video display modes: MDA, HGC, CGA, EGA, VGA.
Display Memory	256 kilobytes of video RAM.
Video Output Signals	Software configured for most types of VGA monitors.
Video Monitor Compatibility	Analog RGB monochrome monitors that operate at 31.49 kHz (MDA, HGC, 480-line). 100% compatible with standard PC display modes (MDA, HGC, CGA, EGA, VGA).
Colors/Shades Displayed	Depends on video display and emulation mode: Monochrome: 3 to 16 levels on gray scale. Color: Up to 256 of 256,000 colors or shades.

Monitor Interface

Video signals are 31 kHz analog RGB, 75ohm.



PIN	SIGNAL
1	Red video
2	Green video
3	Blue video
4	Monitor type sense
5	Ground
6	Red ground
7	Green ground
8	Blue ground
9	No connection
10	Sync ground
11	Monitor type sense
12	Monitor type sense
13	Horizontal sync
14	Vertical sync
15	No connection

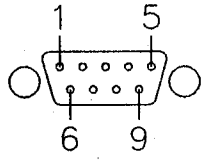
AUDIO

One 8-ohm, 1-inch speaker.

DRIVES	Supports a maximum of three built-in disk drives. The drive chassis has two 3.5-inch drive slots and one 5.25-inch drive slot.
Floppy Disk Drives	Supports the following built-in floppy disk drives: 3.5-inch 720K. 3.5-inch 1.4M. 5.25-inch 360K. 5.25-inch 1.2M.
Hard Disk Drives	Supports the following built-in hard disk drives: 3.5-inch 40M. 3.5-inch 80M.

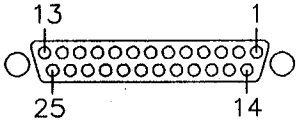
INPUT/OUTPUT PORTS

Serial Ports



PIN	SIGNAL
1	Carrier Detect (CD)
2	Receive Data (RD)
3	Transmit Data (TD)
4	Data Terminal Ready (DTR)
5	Ground
6	Data Set Ready (DSR)
7	Request To Send (RTS)
8	Clear To Send (CTS)
9	Ring Indicate (RI)

Parallel Port



PIN	SIGNAL
1	Strobe
2-9	Data bits 0 - 7
10	Acknowledge
11	Busy
12	Page end
13	Select
14	Auto feed
15	Error
16	Initialize printer
17	Select input
18-25	Ground

POWER SUPPLY

Power Output	125 watts total power.
AC Input	100-125 VAC or 200-250 VAC, 50/60 Hz.
DC Output	+5 VDC, +12 VDC, -12VDC.

ENVIRONMENTAL CONSIDERATIONS

Temperature	Operating — +15 to +35 degrees C. Storage — 0 to +60 degrees C.
Humidity	Operating — 10% to 95% non-condensing. Storage — 10% to 95% non-condensing.

SETUP RECORD

Fields	Record Settings Here-
Main RAM:	
Add-On RAM:	
Total:	
Operating Speed:	
Cache Control:	
Serial Port 1 (COM1):	
Serial Port 2 (COM2):	
Parallel Port 2 (COM2):	
Video Display:	
Video Refresh Rate:	
Boot Drive:	
Floppy Drive 0:	
Floppy Drive 1:	
Hard Disk Drive 0:	
Hard Disk Drive 1:	

REGISTRATION

To receive the full benefits of your Warranty, complete and mail the accompanying Registration Card. Also record the series and serial numbers of your equipment below. Refer to these numbers in any correspondence you have with Zenith Data Systems Corporation about this equipment.

Model	Serial #
Series	Date Purchased

If you alter or change the design, or use this computer in a manner other than described in this manual, you will void the Warranty and release the manufacturer from any responsibility for the computer's operation.