How It Works

Overview

This chapter describes how to operate and control the computer.

The first section describes how to operate the main unit's screen and floppy disk drive.

The second section describes how to use the keyboard.

The third section provides an overview of how software is used with the system.

The fourth section describes how to properly handle floppy diskettes.

The fifth section describes how to properly handle the hard disk.

The six section shows the character set of this computer.

The Main Unit

The main unit is the heart of the system. In addition to processing, displaying and storing data, it also serves as the connector point for external devices such as a printer, telephone, and CRT. Let's take a closer look at the main unit.

First, if you have not already done so, set up the computer as described in Chapter 2. Next, sit down in front of the system while we take a quick tour.

The indicator panel, the screen contrast control and brightness control of the main unit are illustrated below.

| POWER | LOW BATTERY | DRIVE A | DRIVE B | PC-4602 |
| POWER | LOW BATTERY | FLOPPY DISK | HARD DISK | PC-4641 |
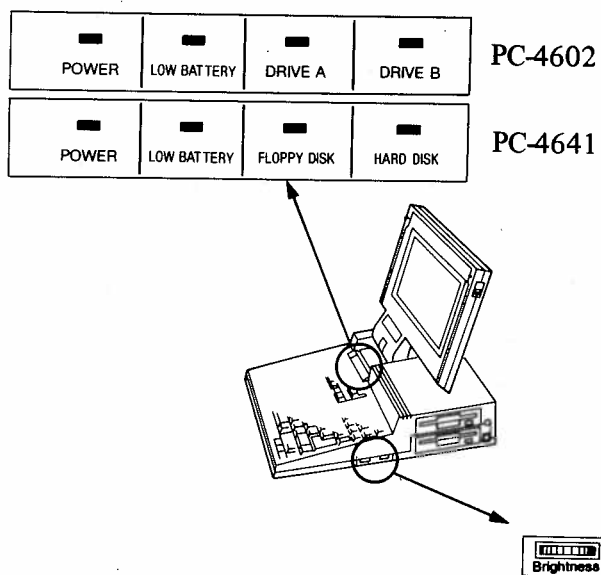
The Screen

The screen displays text and graphics on a flat panel supertwist illuminated crystal display. Normally, information displays as dark characters on a light background. You can also configure the screen to display light characters on a dark background.

These are three important features for controlling the screen:

▲ Brightness

▲ Contrast

▲ Tilt

Brightness. A backlight located directly behind the screen controls brightness of the display background.
The backlight's brightness can be adjusted by turning the brightness control located on the right side panel of the main unit. To brighten the display, turn the dial backward. To darken the display, turn the dial forward.

The backlight illuminates automatically when the computer is turned on and remains illuminated while you are operating the computer. If, however, no keys are pressed on the keyboard for a specified period of time, the system automatically turns off the backlight to conserve its life. When this occurs, the screen will appear dim. To turn the backlight on after inactivity, press any key on the keyboard. Since this key is not ignored, be careful when pressing the key.

Backlight Replacement. The backlight will grow dim after extended use. When it no longer provides the desired brightness, the backlight should be replaced.

Contact your Sharp authorized dealer or Sharp service center for replacement of the backlight panel.

Contrast. The contrast between the information that appears on the screen and the background can be adjusted by turning the contrast control located on the right side panel. To lighten the display, locate the contrast control and turn the dial forward. To darken the display, turn the dial backward.

Tilt. To easily view the screen in many sitting positions, the tilt of the screen can be adjusted in the range approximately 90 to 129 degrees from horizontal.
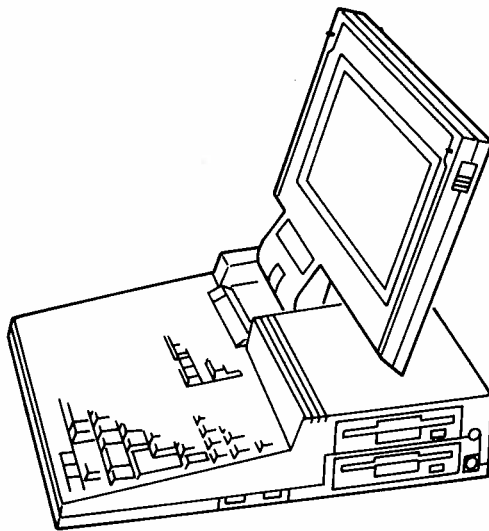
Indicator Panel

There are four indicators on the front panel.

Power. When power is turned on to the main unit, this indicator illuminates in green.

Low Battery Indicator. To the right of the power indicator is the low battery indicator. When battery voltage drops, the low battery indicator illuminates in red and a buzzer sounds for approximately 15 seconds, alerting you to charge with the AC adaptor. If you fail to recharge the battery when the low battery indicator lights, the computer is automatically turned off after approximately 30 (PC-4602) or 10 (PC-4641) minutes when the disk drive is used at the rate of 10 percent with the backlight brightness half to protect the hardware. If this occurs, recharge the battery immediately. Otherwise the clock and set up selections will be lost.

Note: Occasionally, the low battery indicator blinks and an alarm beep sounds during disk drive access, etc. Since this indicates the computer is approaching the low battery condition, recharge the battery.

**Drive Indicators.** To the right of the low battery indicator are two disk drive indicators.

PC-4602: The left one is the floppy disk drive A indicator and illuminates when the system is accessing floppy disk drive A. The right one is the floppy disk drive B indicator and illuminates when the system is accessing floppy disk drive B. **PC-4641:** The left one is the floppy disk drive (drive A) indicator and illuminates when the system is accessing the floppy disk drive. The right one is the hard disk drive indicator and illuminates when the system is accessing the hard disk drive.

Let's move on to the right side panel.

Right Side Panel

The right side panel contains the backlight brightness control, the screen contrast control, disk drive(s), disk drive eject button(s), AC adaptor connection and ON/OFF button.
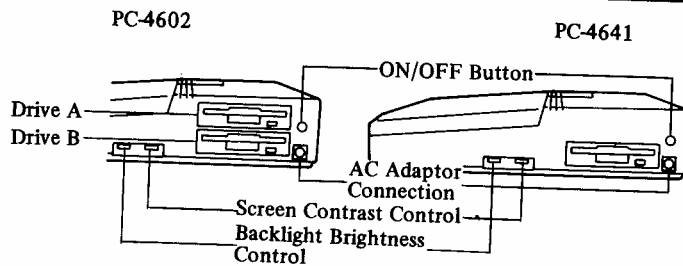
Backlight Brightness Control. There is a control to adjust backlight brightness. Its function is explained in section "Screen".

Screen Contrast Control. To the right of the backlight brightness control is a control to adjust the liquid crystal display contrast. Its function is explained in section "Screen".

Disk Drive(s). To the right of the screen contrast control are two (PC-4602) or one (PC-4641) floppy disk drives. For the PC-4602, the upper drive is drive A and the lower drive is drive B.

Eject Button(s). There is an eject button(s) for the disk drive(s). It is used to eject the diskette when finished.

CAUTION:
           Never push the eject button with no diskette in the disk drive.

The illustration below shows how to insert a floppy diskette into a drive.
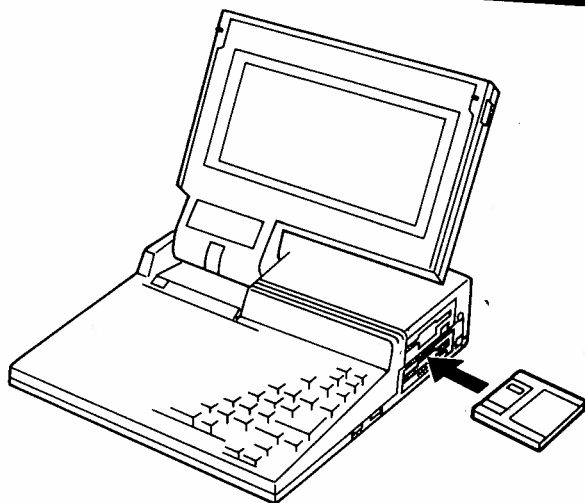
To insert a diskette, do the following:

1. Remove the diskette from its storage case.

2. Grasp the diskette by the top and insert into the drive slot so that the diskette label is facing upward.

3. Gently push the diskette into the slot until it comes to a stop.

Note: Be sure to read the section in this chapter about how to handle floppy diskettes.

To remove a diskette, do the following:

1. Press the eject button to partially eject the diskette from the drive.

2. Grasp the diskette and gently pull it out of the drive.

3. Place the diskette back into its storage case.

CAUTION: Never attempt to remove a
   diskette from a disk drive
                                  when the disk drive indicator
                                  light on the front panel is
                                  illuminated. This may cause
                                  damage to the contents of
                                  the diskette.

Power ON/OFF Button. To turn on the main unit, press the ON/OFF button. To turn off the main unit, press the ON/OFF button again.

Note: You can also turn off the system by pressing the **SetUp** key while holding down the **Ctrl** and **Alt** keys. This method turns the system off in any situation. In the unusual event the power ON/OFF button does not function, you can use this method to turn the system off. Note that the Auto Power ON function through Alarm indicator does not work when the system is turned off using **Ctrl/Alt/SetUp**.

AC Adaptor Connection. The computer can be powered from battery only, AC adaptor only, or can be used while being charged. When the low battery indicator lights while the computer is running, recharge the battery with the AC adaptor.

The illustration below shows how to connect the AC adaptor.

To Wall Outlet
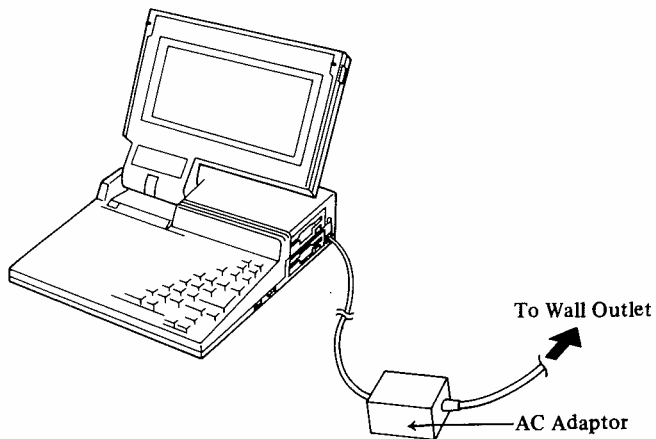
AC Adaptor

With the computer turned off, the battery is fully
recharged after approximately 8 hours.

AC Adaptor. The AC adaptor can serve either as the lead
battery recharger or as the computer power source.
This adaptor can be used without the lead battery or when
the battery has been discharged significantly. Note that
the content of clock/calendar and set up function will
be lost if the AC adaptor is removed when no battery
or a discharged battery is present.

CAUTION: Never use any AC adaptor
                                      other than the one provided.
                                      Do not use the AC adaptor
                                      for other equipment.
                                      Otherwise equipment may
                                      be damaged due to
                                      nonconformity of rated

voltage, current and polarity.
The AC adaptor input must
be of rated voltage and rated
frequency. When inserting or
disconnecting the plug, hold
the plug by hand. The plug
must be inserted firmly into
the socket. When not using
the AC adaptor, be sure to
disconnect the plug from
the plug socket.

Note: Before connecting the AC adaptor, be sure the
polarity of the AC adaptor is the same as that of the
computer.

Computer   AC adaptor

$\oplus$ —(•— $\ominus$ $\oplus$ —(•— $\ominus$
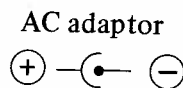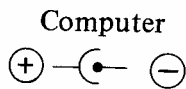
Let's move around to the left side panel.

Left Side Panel

As shown in the following illustration, there are several
connectors located on the left side panel. Let's look at each
one, starting at the left side of the panel.

Note: Dust caps are provided for the 5-1/4″ floppy disk
port, serial port and parallel port. Remove them before using
these connectors and save them for future use.

Color/Monochrome
CRT Connector

Serial Port (Option)

Parallel
Port

Serial
Port

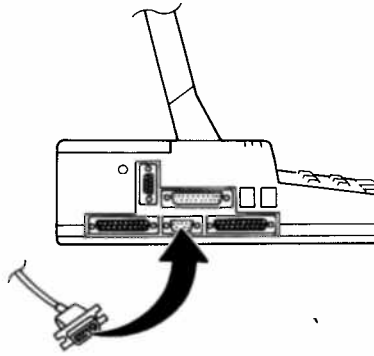5-1/4" Floppy
Disk Drive Unit
Connector
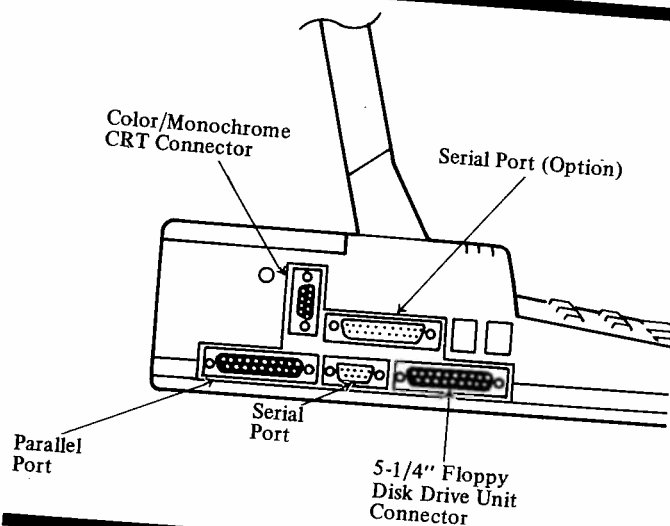
Parallel (Printer) Port. The first connector is the parallel port, used to connect parallel printers to the unit.
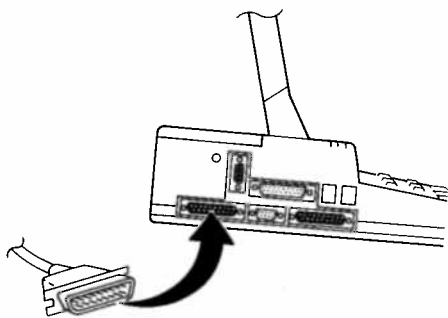
The end of the cable connected to this port must be a 25-pin male connector.
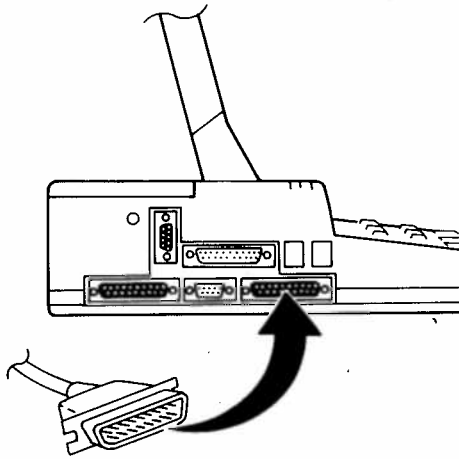
If you need detailed specifications for this port, turn to Appendices.

Serial (RS-232C) Port. The next connector is the serial port, used to connect devices such as an external modem or serial printer, or used for communications.

The end of the cable connected to this port must be a 9-pin female connector. If you need detailed specification for this port, turn to Appendices.

5-1/4″ Floppy Disk Drive Unit Port. The next connector is the external floppy disk drive unit port. It is used to connect a 5-1/4″ floppy disk drive unit to the computer.

The end of the cable connected to this port must be a 25-pin male connector.

See Chapter 7 for information about using the external floppy disk drive unit with the computer.

If you need detailed specifications for this port, see Appendices.

Color/Monochrome CRT Connector. The next connector is used to attach a color or monochrome CRT to your computer.
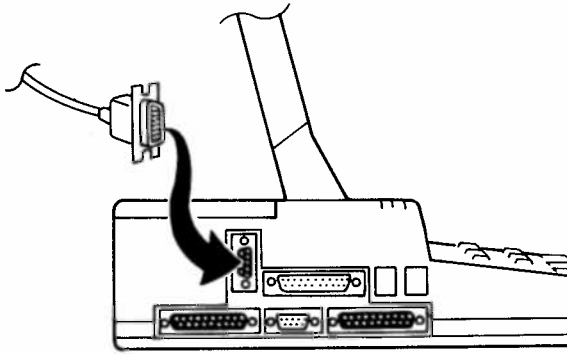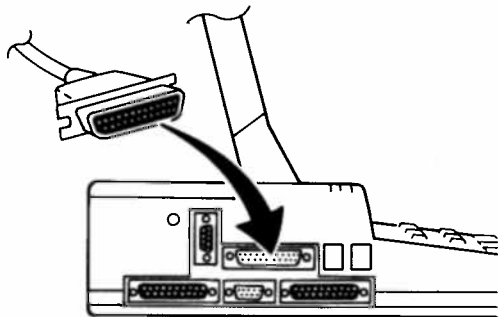

The end of the cable connected to this port must be a 9-pin male connector.

   See Chapter 6 for more information about using a CRT with your system, or turn to Appendices for detailed specifications for this connector.

Serial (RS-232C) Port (Option). The next connector is an optional serial RS-232C port. It is used to connect devices such as serial printers and external modems to the unit.

Note: A protective cap covers this port until the CE-451B serial I/O card is installed.

The end of the cable connected to this port must be a 25-pin female connector.

If you need detailed specifications for this port, see Appendices.

Let's look at the bottom panel.

Bottom Panel

On the bottom panel you will see a handle and some dip switches.

> **Note:** The system for Europe (except U.K.) has no dip switch on the bottom panel, due to the safety regulations.

The dip switches are used to control the following functions by setting them to ON or OFF as specified.

▲ System all reset

▲ Speaker volume

▲ Speaker control

▲ Alarm control

The following illustration shows the default setting of dip switches.
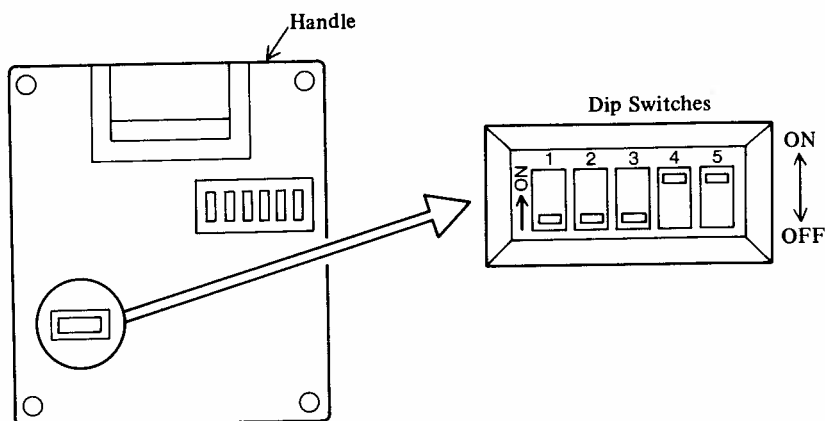
Each dip switch has two settings, ON and OFF. To set the dip switches, first put the computer face down.

Note: Remember to turn off power to the computer before setting dip switches. Dip switch settings do not take effect until the computer is turned back on.

To set any dip switch, push it using a pointed object to the desired position:

The available dip switch settings are as follows:

Dip Switch Label	Feature	Setting
1	System All Reset	ON: All Reset OFF: Normal
2	Not Used	
3	Speaker Volume	ON: Speaker volume LOW. OFF: Speaker volume HIGH.
4	Speaker Control	ON: Speaker ON. OFF: Speaker OFF.
5	Alarm Control	ON: Low Battery/Shut off Alarm ON OFF: Low Battery/Shut off Alarm OFF

System All Reset. Dip switch 1 can be used if the system locks up and you are unable to reboot by turning power off and on again. When this switch is moved to the ON position and then back to the OFF position, the unit will proceed with the power-on routine by turning power on.

Note: This operation clears the set up memory. When you turn power on after this operation, the set up screen appears on the screen. For this screen, see Chapter 4.

Speaker Volume. Dip switch 3 enables you to control the speaker volume.

Speaker Control. Dip switch 4 enables you to turn the speaker off if desired.

Alarm Control. Dip switch 5 enables you to disable or enable the alarm beep when the battery is low or when the system is closed with the power on.

Let's move on to the keyboard.

The
Keyboard

The keyboard allows you to communicate with the main unit.

The description below provides an overview of keyboard usage. When using applications software, however, certain keys may take on different meanings.

For example, in a word processing application a certain key might be used to insert text in a line, while in a spreadsheet application, the same key might not have any use. Be sure to read your application documentation for specific use of keys.

The keyboard is divided into four basic groups — typewriter keys, special function keys, numeric keypad, and cursor control keys.

Numeric Keypad

Special Function Keys

Typewriter Keys

Cursor Control Keys
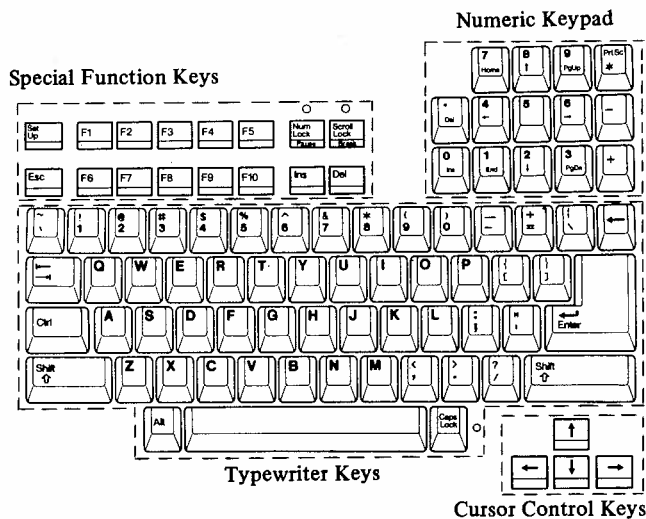
Typewriter Keys

The typewriter keys are similar in function and appearance to those found on a standard typewriter. There are some keys in this group, however, that you might not be familiar with.
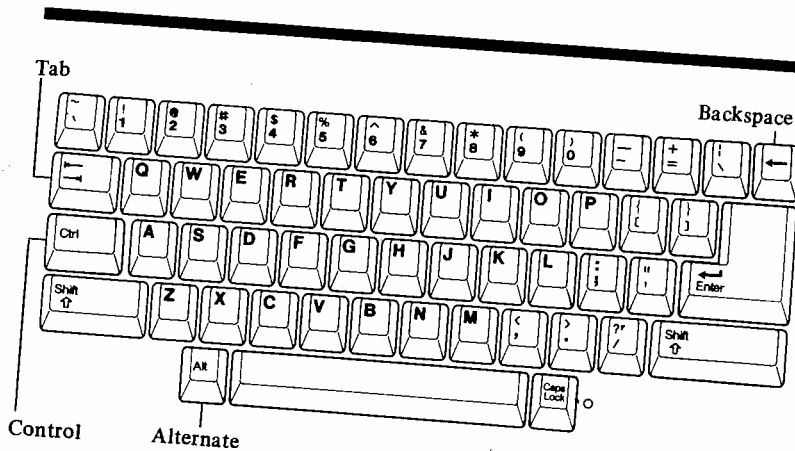
Enter. The **Enter** key is generally used to end a line or end an entry. In some application documentation, this key is referred to as **Return** or ↵ key.

Shift. There are two **Shift** keys located on the left and right sides of the typewriter keys. Pressing a key while holding down **Shift** gives you uppercase.

Caps Lock. The **Caps Lock** key allows you to type all the letters in uppercase. It is a toggle key which means pressing it once turns it on and pressing it again turns it off. When **Caps Lock** is on, the indicator light on the right of the key illuminates.

Caps Lock affects letter keys only. **Shift** is used when **Caps Lock** is on to type uppercase symbols and punctuation marks.

Shift also reverses the action of **Caps Lock** when typing letters. If you press **Shift** when the **Caps Lock** key is on and type a letter, you get a lowercase letter.

Tab. The **Tab** key works like the tab key on a regular typewriter. In certain applications, you can return to the last tab in a line by pressing **Tab** while holding down **Shift**.

Backspace. The **Backspace** key works like the backspace key on a typewriter, backing up one character position at a time. In some applications, **Backspace** erases characters as it backs up.

Control. The **Ctrl** key, when used with another key, sends a special instruction to the system. For example, in a word processing application, pressing **Ctrl** and **P** together might tell the system to stop printing a document.

Alternate. Like **Ctrl**, the **Alt** key provides an alternate function or accesses characters from the extended character set. (See "Character Set" in this chapter.)

Special Function Keys

At the top of the keyboard are 10 function keys labeled F1 through F10 and 6 other keys as shown in the illustration below.
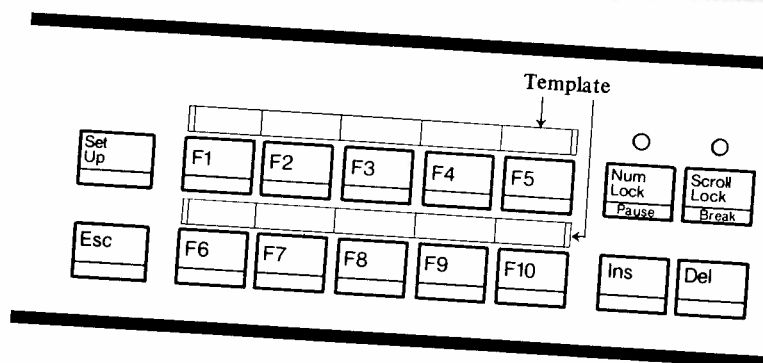
Function Keys. These keys perform editing functions in MS-DOS* and have application defined functions at other times. Refer to your application documentation for a description of these keys.

Note: Directly above the function keys are blank templates. You can write labels on the template to identify functions for each key.

Other Keys

Set Up. Pressing **Set Up** accesses the set up screen where you can define certain characteristics of the system. See Chapter 4 for more information about this screen.

Escape. The **Esc** key is frequently used in applications to cancel a command or exit the application.

Number Lock. The **NumLock** toggle key affects only the numeric keypad, allowing you to enter numbers using the numeric keypad.

When **NumLock** is on, pressing keys labelled 0 through 9 and decimal point results in a number. When **NumLock** is on, the **Shift** key can be used to activate the cursor control keys.

When pressed with **Ctrl**, **NumLock** suspends the system operation, pausing the display of text on the screen. To restart, press any key.

Scroll Lock. This key has no function when used alone. When pressed together with **Ctrl, Scroll Lock** provides a break function, stopping programs that are running.

Insert. The **Ins** key is used to insert text.

Delete. The **Del** key is used to delete text.

Numeric Keypad

To the right of the function keys is a numeric keypad.
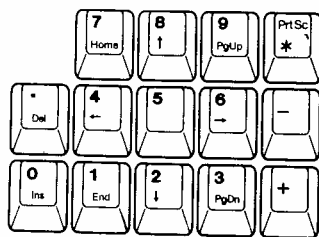
Cursor Control. The keys labelled 1 through 9 can be used as an alternative to the typewriter number keys or as a way to control the movement of the cursor — the underline or block character that you move around the screen.

When the system is first turned on, these keys control the movement of the cursor. The arrow keys move the cursor up or down one line at a time and to the right or left one character at a time.

The **Home, PgUp, PgDn,** and **End** keys also move the cursor around the screen. In general:
The **Home** key moves the cursor to the upper left corner of the screen.
The **PgUp** key moves the cursor back one full screen.

The **PgDn** key moves the cursor ahead one full screen. The **End** key moves the cursor to the last character in a file.

Insert. The **Ins** key is used to insert text. When used with **Shift**, the 0 can be accessed.

Delete. The **Del** key is used to delete text. When used with **Shift**, the decimal point can be accessed.

Print Screen. Pressing **PrtSc** while holding down **Shift** prints whatever is on the screen. Pressing **PrtSc** alone results in an asterisk.

Numeric +/− keys. Like those on the typewriter keys, they are used to type the + and − characters.

Cursor Control Keys

Beneath (to the right) of the typewriter keys are the cursor control keys.
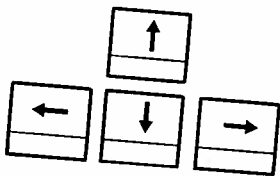
These keys control the movement of the cursor — the underline or block character that you move around the screen.

The arrow keys move the cursor up or down one line at a time and to the right or left one character at a time.

The
Software

As you learned in Chapter 1, a computer system needs software to be useful. Without software, your computer is just a collection of electrical components.

In order to understand how software functions on the computer, think of it in three levels.
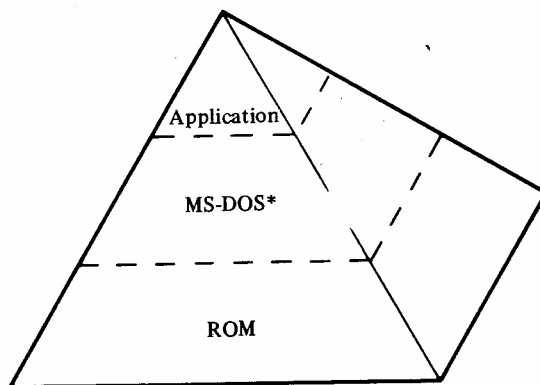
When power is turned on to the system, software and hardware begin to interact.

Software stored in ROM (read only memory) is installed into the computer at the factory. Sometimes referred to as firmware, it performs three basic functions when the system is first turned on:

▲ Checks performance of hardware components

▲ Determines what external devices (e.g., CRT, printer) are connected to the main unit

▲ Loads (reads) MS-DOS* from a diskette or the hard disk into main memory

Once MS-DOS* is loaded into main memory, you can enter various MS-DOS* commands.

You can also instruct MS-DOS* to load an application such as word processing into main memory. Chapter 4 describes in detail how to load and run an application.

The Diskettes

A diskette is a magnetic device that stores information created on a computer. Once information is stored on a diskette, it can be re-used whenever necessary or replaced when no longer needed.

The computer uses 3-1/2 inch, double-sided, double density diskettes that store up to 720K (approximately 720,000 characters) of information.

Diskette Format

In order for information to be stored on a diskette, the operating system must first prepare — format — the diskette. This process enables stored information to be easily located.

During formatting, the diskette is divided into 80 circular tracks, similar to those on a record.

Sector   Tracks
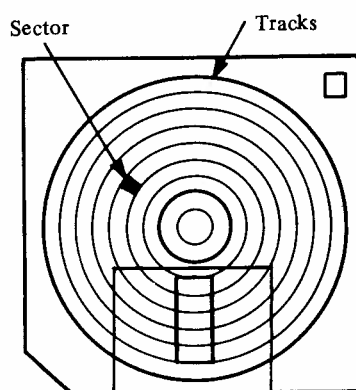
Each track is further divided into sectors that identify information stored within the track. The track number and sector number act like addresses to the computer, making access to information an automatic and rapid process.

During operation, the diskette rotates inside its protective jacket. As it rotates, the read/write head of the drive moves from one track to another, locating information or finding space available for new information. You need not be concerned where information is stored on a diskette. MS-DOS* will manage that function automatically.

Diskette Handling Procedures

To safeguard information stored on diskette, it is important that you handle diskettes with care.

The illustration below shows what a typical diskette looks like.

- Read/Write Window Shutter
- Diskette Case
- Label
- Write Protect Tab
- Storage Case
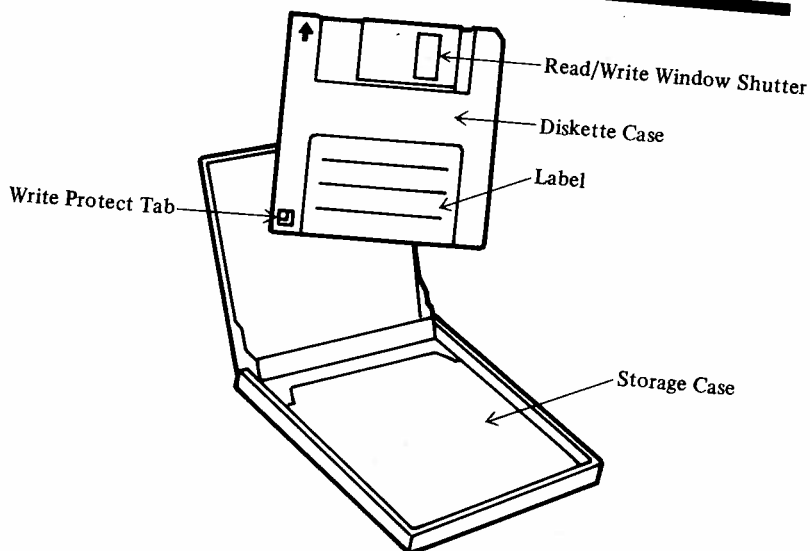
Storage Case. Some diskettes come with a storage case to protect the diskette. Return the diskette to its storage case after use.

Diskette Case. The diskette itself is permanently encased in a plastic jacket to protect its magnetic surface. This jacket can not be removed.

Label. The label identifies the content of the diskette. The label should be placed over the recessed area of the diskette.

Read/Write Window Shutter. The read/write window shutter allows the disk head to read from and write to the diskette.

Write Protect Tab. The write protect tab can be positioned to prevent changes to important files. To protect a diskette, slide the write protect tab to the open position; to allow the computer to write on the diskette, slide the tab to the closed position.

Follow these procedures when handling diskettes:

▲ Return the diskette to its storage case after use.

▲ Never bend or twist the diskette.

▲ Never expose the diskette to liquids. If you spill a liquid on the diskette, throw the diskette away.

▲ Never expose diskettes to excessive heat or direct sunlight.

▲ Always keep diskettes at least 3 meters (10 feet) away from magnetic fields such as those in electronic equipment and telephones.

▲ Always store diskettes in a cool, dry, dust free area, in an upright position.

▲ Never place heavy objects such as books on the diskettes.

The Hard Disk

The hard disk is a magnetic device fixed to the axis, and each side of the disk has a magnetic head to read/write information. The hard disk drive uses a fully integrated, floating head system externally isolated for operation, providing high speed, large capacity, and high reliability.

The PC-4641 contains a 3-1/2 inch hard disk that stores up to 40 megabytes of information.

Hard Disk Format

Like diskettes, the hard disk must first be formatted by the operating system in order to store information.

During formatting, the hard disk is divided into 614 cylinders. A cylinder is a collection of tracks in the same position on different sides of the hard disk(s).

Each cylinder is further divided into 17 sectors per side. Each sector holds 512 bytes of data. Read/write can be performed in sector units.

Sector

Cylinder
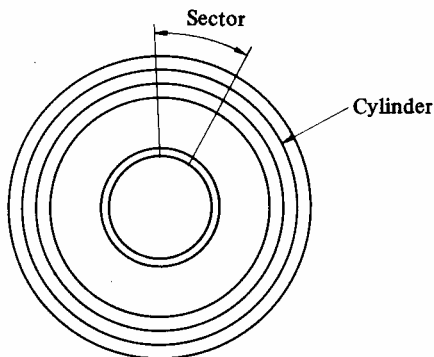
Hard Disk Drive Handling Procedures

The hard disk drive is a precision device that requires particular care in handling.

Follow these procedures when handling the PC-4641.

▲ When you finish working with the hard disk, be sure to execute the HDTRNS command by typing HDTRNS at the MS-DOS prompt and pressing the **Enter** key. This command positions the hard disk heads where they will be least affected by vibration and shocks.

▲ Do not subject the unit to vibration and shocks, especially during transportation.

▲ Backup copies of all programs and data should be retained on floppy diskettes to prevent loss or damage in the event of disk or hardware failure. The data once lost can never be restored unless you have backup copies.

▲ To move the unit to a temperature more than 10 degrees C (18 degrees F) different from its present location, first move it to a temperature difference of less than 10 degrees C (18 degrees F) for one hour, then gradually increase or decrease the temperature.

Character Set

The following table shows the character set along with decimal and hex codes.

DECIMAL VALUE →	↓	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
↓	HEXA DECIMAL VALUE	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	BLANK (SPACE)	►	BLANK (SPACE)	0	@	P	`	p	Ç	É	á	▦	└	╨	α	≡
1	1	☺	◄	!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	β	±
2	2	☻	↕	"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3	3	♥	‼	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4	4	♦	¶	$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5	5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6	6	♠	▬	&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷
7	7	•	↨	'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8	8	◘	↑	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9	9	○	↓	)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	•
10	A	◙	→	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
11	B	♂	←	+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
12	C	♀	∟	,	<	L	\	l	|	î	£	¼	╝	╠	▄	∞	ⁿ
13	D	♪	↔	—	=	M	]	m	}	ì	¥	¡	╜	═	▌	φ	²
14	E	♫	▲	.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	∈	■
15	F	☼	▼	/	?	O	_	o	△	Å	ƒ	»	┐	╧	▀	∩	BLANK FF

Note: Some of the characters in the character set (32 to 126 and 128 to 255) can be entered in the MS-DOS command line. To enter the character, type its decimal code while holding down the **Alt** key.
When you release the **Alt** key, the character will be displayed on the screen.

Character Set (for Denmark/Norway)

DECIMAL VALUE →	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
HEX ↓ / 0	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0 / 0	blank	►	blank (space)	θ	@	P	`	p	Ç	É	á					
1 / 1	☺	◄	!	1	A	Q	a	q	ü	æ	í				α	≡
2 / 2	●	↕	"	2	B	R	b	r	é	Æ	í				β	±
3 / 3	♥	‼	#	3	C	S	c	s	â	ô	ú				Γ	≥
4 / 4	♦	¶	$	4	D	T	d	t	ä	ö	ñ				π	≤
5 / 5	♣	§	%	5	E	U	e	u	à	ò	Ñ				Σ	∫
6 / 6	♠	▬	&	6	F	V	f	v	å	û	õ				σ	
7 / 7	•	↨	'	7	G	W	g	w	ç	ù	Õ				μ	÷
8 / 8	◘	↑	(	8	H	X	h	x	ê	ÿ	¿				τ	≈
9 / 9	○	↓	)	9	I	Y	i	y	ë	Ö	ã				Θ	°
10 / A	◙	→	*	:	J	Z	j	z	è	Ü	Ã				Ω	·
11 / B	♂	←	+	;	K	[	k	{	ï	Ü	ℓ				δ	√
12 / C	♀	∟	,	<	L	\	l	|	î	£	'n				∞	ⁿ
13 / D	♪	↔	–	=	M	]	m	}	î	£	'n				δ	√
14 / E	♫	▲	·	>	N	^	n	~	ì	Ø	¡				∞	²
15 / F	☼	▼	/	?	O	_	o	△	Ä	L	⌂				∈	■
									Å	I·					∩	blank